

**FASHION INSTITUTE OF TECHNOLOGY
ADMISSIONS OFFICE
RENOVATIONS
INVITATION FOR BID NUMBER C1536**

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SECTION I:
NOTICE TO BIDDERS

SECTION I: NOTICE TO BIDDERS

FASHION INSTITUTE OF TECHNOLOGY ADMISSIONS OFFICE RENOVATIONS INVITATION FOR BID NUMBER C1536

For the purposes of this project (the “Project”) the Fashion Institute of Technology and its auxiliary dormitory organization, the F.I.T. Student Housing Corporation, shall hereinafter be collectively referred to as “FIT” unless otherwise distinguished herein. Neither the Fashion Institute of Technology nor F.I.T. Student Housing Corporation will be responsible for receipt of any Bid which does not comply with the instructions as set forth further in this document.

FIT is **ONLY** accepting electronic scanned bids for the subject project. You must email your bid to purchasingbids@fitnyc.edu in PDF format and it should include all the requested documents (See Attachment A – Bid Checklist) including a scanned image of your bid security (Certified Check of 2 percent or Bid Bond of 10 percent of your total bid price), we’ll also need you to mail us the original copy of the bid security to have on file. The bid security must either be mailed to 227 W 27th Street, New York, NY 10001 or dropped off at 333 7th Avenue (16th Floor), New York, NY 10001. Bids must be received by **October 11, 2022, on or before 12:00 P.M.** All bidders will be notified of the bid results within the hour. Bid results are not official until each package has been fully reviewed.

ATTACHMENT A - BID CHECKLIST

FASHION INSTITUTE OF TECHNOLOGY & ADMISSIONS OFFICE RENOVATIONS INVITATION FOR BID NUMBER C1536

Bidder shall meet the following requirements and submit necessary information with the Bid. Failure to comply with these requirements shall be grounds for rejection of your Bid.

- Did you attend the **mandatory** site inspection?
- Did you include all required documentation? (As per Bidder Requirements – i.e. proof of being in business, permits, licenses, certifications, etc.)
- Did you include the Form of Bid? (See Section VIII.)
- Did you include the Non-Collusive Bidding Certification? (See Section IX.)
- Did you complete in full the Bid Analysis Form, (See Attachment C)
- Did you sign for each Addendum to this project, if any were published? (It is the contractor's responsibility to check FIT's "Current Bid Opportunities" webpage for addendums prior to submitting their bid.)
<http://www.fitnyc.edu/about/administration/finance/purchasing/current-bids.php>
- Did you complete the Contractor Reference Sheet? **Do not list FIT as your projects of similar size and scope.** (See Attachment B)
- Can you provide the required levels of insurance coverage? See: General Conditions – Article 15
- Did you include the Bid Security?
- Can the bidder provide references to at least three (3) different prior contracts that have been completed within the past five (5) years that are similar in size and scope to the project indicated for this Contract?
- Did you provide proof of years in business/date of incorporation?
- Sub-contracting percentage shall **not exceed 70%** of the project cost.
- Did you include an audited or reviewed financial report for the last two (2) years with your bid?
- You have read and agree to comply and sign Exhibits E, F, G, and H upon award of contract. In addition to the foregoing requirements you are responsible for compliance with any additional safety directives that may be forthcoming by Executive Order or other authorized Federal, State, or local authority, between the date of issuance of this addendum the date of award.

ATTACHMENT B - CONTRACTOR REFERENCE SHEET
FASHION INSTITUTE OF TECHNOLOGY
ADMISSIONS OFFICE
RENOVATIONS
INVITATION FOR BID NUMBER C1536

FIT requests a minimum of three references for **completed** projects of similar size and scope. Please complete the following information for each reference: **(Do not list FIT as your projects of similar size and scope.)**

Contact Name/Title: _____
 Company Name/Address: _____
 Phone Number: _____
 Project Name: _____
 Project Cost: _____
 Project Start/End Date: _____
For FIT Use Only – Reference Responses
 Quality of Work: _____ Site Maintenance: _____
 Scheduling: _____ Cooperation: _____ Safety Standards: _____
 Permits: _____ Report Submittals: _____ Payments: _____
 Other Relevant Factors: _____
 Overall Performance Rating: Excellent ___ Satisfactory ___ Marginal ___ Unsatisfactory ___

Contact Name/Title: _____
 Company Name/Address: _____
 Phone Number: _____
 Project Name: _____
 Project Cost: _____
 Project Start/End Date: _____
For FIT Use Only – Reference Responses
 Quality of Work: _____ Site Maintenance: _____
 Scheduling: _____ Cooperation: _____ Safety Standards: _____
 Permits: _____ Report Submittals: _____ Payments: _____
 Other Relevant Factors: _____
 Overall Performance Rating: Excellent ___ Satisfactory ___ Marginal ___ Unsatisfactory ___

Contact Name/Title: _____
 Company Name/Address: _____
 Phone Number: _____
 Project Name: _____
 Project Cost: _____
 Project Start/End Date: _____
For FIT Use Only – Reference Responses
 Quality of Work: _____ Site Maintenance: _____
 Scheduling: _____ Cooperation: _____ Safety Standards: _____
 Permits: _____ Report Submittals: _____ Payments: _____
 Other Relevant Factors: _____
 Overall Performance Rating: Excellent ___ Satisfactory ___ Marginal ___ Unsatisfactory ___

FIT

Interviewer: _____ Signature: _____ Date: _____

SECTION II:
BID TERMS AND CONDITIONS

SECTION II. BID TERMS AND CONDITIONS

SPECIFICATIONS FOR FASHION INSTITUTE OF TECHNOLOGY ADMISSIONS OFFICE RENOVATIONS INVITATION FOR BID NUMBER C1536

I. INTRODUCTION

The Fashion Institute of Technology, a community college of art and design, business and technology of the State University of New York, currently has an enrollment of approximately 10,000 full and part-time students. Located in the Chelsea area of Manhattan, FIT's facilities are composed of a twelve building complex containing administrative/academic offices, classrooms, computer labs, and studios. There are three (3) residence halls located on West 27th Street that currently house approximately 1,250 students and one (1) residence hall located at 406 West 31st Street that houses approximately 1,100 students. F.I.T. Student Housing Corporation is a separate, not-for-profit corporation that was established pursuant to the laws of the State of New York to own and operate these residence halls for the benefit of the College and its students. For purposes of this project all references to FIT shall be recognized to refer to the Fashion Institute of Technology (hereafter, "FIT" or the "College") and the F.I.T. Student Housing Corporation together, unless specifically designated otherwise. The successful responsive and responsible bidder (hereinafter "Contractor") shall be required to enter into a contract with FIT based on the Contract Documents, (including Notice to Bidders, Bid Terms and Conditions, Contract Terms and Conditions, General Requirements, General Conditions, Labor & Material Payment Bond, Performance Bond, Form of Bid, Non-Collusive Bidding Certification, Substitution Form Request, Contract, Affirmative Action Form, Change Order, Form, Contractor's Trade Payment Breakdown, Safety EHS Plan, Prevailing Wage Schedule, Specifications, and Drawings), attached hereto and incorporated herein.

II. SUMMARY OF SCOPE OF WORK

The Work of the Project is defined by the immediately following Project Description herein below and by the Contract Documents.

Project Description: Provide labor, materials, tests, tools and equipment to complete the Admissions Office Renovations Project. Contractor may begin survey and procurement of materials immediately following award. A detailed scope of work is outlined in specification Section 01100 "Summary of Work." The Contractor is to coordinate with FIT's On-Call Security Devices and Wiring Contractor.

The installation of all equipment in accordance with the Manufacturer's Installation/Operation & Maintenance Manuals & Instructions shall be followed.

III. **BIDDER REQUIREMENTS**

Bidder shall meet the following requirements and submit necessary information with the Bid. Failure to comply with these requirements shall be grounds for rejection of your Bid. FIT reserves the right to reject bids with incomplete information or bid security, or contain conditions not specified in the Bid Terms and Condition herein, or which are presented on a different form other than that provided to bidders. FIT reserves the right to determine whether a Bidder has substantially met all the Bid requirements and to ask for additional information prior to making such a determination.

- A. **Bidder shall have been primarily a General Contractor in the renovation business for a minimum of five (5) years as of the Bid Opening Date. Proof shall be submitted with the Bid.**
- B. Bidder shall have satisfactorily performed work of the size, scope and nature to be performed under this Contract, as evidenced by **references from at least three (3) different successfully completed contracts in an installation similar to those indicated for this Contract in the past five (5) years.** Bidder shall include for each reference: project location, dollar value of contract; initiation and completion date, name, title, address and telephone number of contact person. References cannot be members of FIT staff or FIT consultants.
- C. **Bidder shall attend the mandatory pre-bid meeting and site inspection. Failure to comply with this requirement shall be grounds for rejection of the Bid.**
- D. Bidder is responsible for all necessary field measurements, all necessary data on the existing conditions and verification of all quantities and dimensions listed in the Project Specifications and Drawings, if applicable.
- E. By submitting a Bid, Bidder agrees that s/he has examined the Contract Documents, visited the site, noted all conditions and limitations affecting the Work, and fully understands the nature of the Work. Bidder is required to inform FIT in writing immediately of any instance where changed conditions are encountered.
- F. Bidder shall submit documentation of financial viability, including balance sheets and profit and loss statement for the prior two (2) years, with the Bid.
- G. Bidder, upon request, shall submit copies of current licenses and certifications applicable to the work, including, but not limited to, licenses issued by the Commissioner of Buildings of the City of New York. Proof of the following certificates will also be required: 10 Hour OSHA Outreach Training Program; Asbestos Awareness Training, FDNY Certificate of Fitness, with the Bid.

IV. **APPROVAL OF SUBCONTRACTORS**

Subcontracting shall be permitted **not to exceed 70%** of the work of the Project as determined by FIT. The ratio of the contractors and subcontractors work must be included with your bid submission. All subcontractors are required to gain prior written approval by FIT's Facilities Director. The General Contractor will be the Prime Contractor (hereinafter "Contractor) and shall be permitted to Subcontract the following types of Services:

- Services to develop, amend and/or upgrade EHS Plan
- Demolition
- Masonry
- Metal Fabrication

The Contractor will require that the terms of this Contract apply to the sub-contractors and shall cause all sub-contractors to comply with the terms of this contract.

V. **BID SECURITY**

Failure to provide Bid Security in the prescribed manner shall result in the rejection of the Bid.

Bidder shall provide Bid Security in the form of either a bid deposit or a bid bond, at Bidders option. The bid deposit shall be in the form of a certified check made payable to "Fashion Institute of Technology" in an amount no less than two percent (2%) of the total bid price. The bid bond shall be in an amount no less than ten percent (10%) of the total bid price.

VI. **PRE-BID SITE INSPECTION AND QUESTIONS**

A **mandatory** Pre-Bid Site Inspection for prospective Bidders will be held on **September 23rd, 2022 at 10:00 A.M.** at the Fashion Institute of Technology, Feldman Building "C Building" Lobby, located at 27th Street (between 7th and 8th Avenues). **Failure to attend shall be grounds for rejection of your Bid. All attendees must wear a mask while at the site inspection. Please also bring a business card.**

Bidder shall examine the Bid documents carefully. Before bidding, Bidder shall make any requests for interpretation of Bid documents or clarification of any ambiguity therein that should have been detected by a reasonably prudent Bidder. Questions shall be submitted in writing to the attention of Purchasing Department via email: purchasingbids@fitnyc.edu, no later than **September 30th, 2022 on or before 3:00 P.M.** Answers shall be provided in the form of an Addendum and be posted on the FIT purchasing department website. Reference Bid number **C1536**.

VII. BID DESIGNATION

- A. FIT is **ONLY** accepting electronic scanned bids for the subject project. You must email your bid to purchasingbids@fitnyc.edu in PDF format and it should include all the requested documents (See Attachment A – Bid Checklist) including a scanned image of your bid security (Certified Check of 2 percent or Bid Bond of 10 percent of your total bid price), we'll also need you to mail us the original copy of the bid security to have on file. The bid security must either be mailed to 227 W 27th Street, New York, NY 10001 or dropped off at 333 7th Avenue (16th Floor), New York, NY 10001. Bids must be received by **October 11th, 2022, on or before 12:00 P.M.** All bidders will be notified of the bid results within the hour. Bid results are not official until each package has been fully reviewed.
- B. Bids received late will not be considered.

VIII. PREPARATION OF THE BIDS

- A. Bids must be submitted on the forms supplied by FIT in the Bidder's full legal name or the Bidder's full legal name plus a registered assumed name. All blank spaces for bid prices must be filled in, using both words and figures, words to take precedence over figures. **Conditional bids shall not be accepted.** Bids shall not contain any recapitulation of the Work to be done. Bidder exclusions shall be grounds for bid rejection. Do not modify the bid forms supplied by FIT
- B. Bids that are illegible or that contain omission, alterations, additions or items not called for in the bidding documents may be rejected as not responsive. Any bid which modifies, limits, or restricts all or any part of such bid, other than as expressly provided for in the Notice to Bidders, Bid Terms and Conditions, and Contract Terms and Conditions, may be rejected as not responsive.
- C. FIT may reject any bid not prepared and submitted in accordance with the provisions of the Notice to Bidders, Bid Terms and Conditions, and Contract Terms and Conditions. Neither FIT nor the FIT Student Housing Corporation will be responsible for receipt of any Bid which does not comply with these instructions. Only those Bids emailed to the FIT Purchasing Dept. inbox (purchasingbids@fitnyc.edu) on or before **October 11th, 2022, on or before 12:00 PM** will be considered.
- D. Any bid may be withdrawn prior to the scheduled time for the opening of bids or authorized postponement thereof and any bid received after such time and date shall not be considered.
- E. No Bidder may withdraw a bid within ninety (90) days after the actual date of the opening thereof.

IX. AWARD OF CONTRACT

- A. The award of the Contract shall be made to the Bidder submitting the lowest responsible bid if, in the opinion of FIT, the bid is responsive to the bid solicitation, and such Bidder is responsible and qualified to perform the work involved in the sole discretion of FIT. The lowest bidder will be considered the contractor with the lowest bid for the base bid. In case FIT will decide to include the 'alternate' in the scope of work, the lowest bidder will be considered the contractor with the lowest total of the base bid plus the alternate bid.
- B. FIT reserves the right to reject any bid or all bids, to waive any informalities or irregularities or omissions in any bid received.
- C. During the term of the Contract, the Contractor shall promptly notify FIT of any change in the ownership of the Contractor. Failure to notify FIT may result in termination of the Contract.
- D. FIT reserves the right, exercisable in its sole discretion, to cancel and withdraw from the Project at any time in advance of the award.
- E. Prior to the opening of the bids, Bidder shall promptly notify FIT of Change in ownership of the Bidder. Failure to notify with this bid shall be grounds for rejection of the Bid.

X. DAMAGES FOR FAILURE TO ENTER INTO CONTRACT

The successful Bidder, upon failure or refusal to execute and deliver the Contract and bond required within ten (10) days after such Bidder has received notice of the acceptance of such bid, shall forfeit to FIT as damages for such failure or refusal, the security deposited with the Bid or the sum of the difference between the total bid of the successful Bidder and the total bid of the Bidder submitting the next lowest bid, whichever sum shall be higher.

XI. PREVAILING WAGE

This contract is subject to New York State Labor Law 220, Article 8 Prevailing Wage Schedules. The Contractor shall submit with, each invoice, certified payrolls for all labor. Submission of a Certified Payroll with invoice in full compliance with labor laws is a condition of payment.

Contractor and its subcontractors shall pay at least the prevailing wage rate and pay or provided the prevailing supplements in accordance with the Labor Law.

A copy of the prevailing wage schedule, for New York County, can be found at the New York State Department of Labor website. (PRC# 2022010602)

www.labor.ny.gov

Bidder must also comply with all applicable federal, state, and local laws rules, regulations, requirements, and codes, including but not limited to, the statues regulations, laws, rules and requirements specifically referenced in the documents annexed hereto.

XII. M/WBE AND SDVOB

FIT encourages minority and women business enterprise participation in this project by contractors, subcontractors and suppliers, and all bidders are expected to cooperate with that commitment. Also, bidders are encouraged to use Service-Disabled Veteran-Owned Businesses (SDVOB). A directory of New York State Certified Minority and Women's Business Enterprises is available from: Empire State Development Corporation, Minority and Women's Business Development Division at: <http://www.esd.ny.gov/mwbe.html> to assist potential bidders in locating sources of M/WBE subcontractors and reaching these goals. SDVOBs can be readily identified on the directory of certified businesses at: <https://online.ogs.ny.gov/SDVOB/search>."

XIII. MISCELLANEOUS

- A. FIT reserves the right to request clarifications from bidders for purposes of assuring a full understanding of responsiveness and further reserves the right to permit revisions from all bidders who might be, in FIT's sole discretion determined to be viable bidders for contract award, prior to the award.
- B. FIT reserves the right to reject separable portions of any offer, to negotiate terms and conditions consistent with the bid, and to make an award for any or all remaining portions.
- C. FIT reserves the right to eliminate mandatory requirements unmet by all bidders.
- D. Any additional vendor terms which are attached or referenced with a submission shall not be considered part of the bid or proposal, but shall be deemed included for informational purposes only.
- E. Unless otherwise specifically stated in the Bid Terms and Conditions, all specifications and requirements constitute minimum requirements. All bids must meet or exceed stated specifications and requirements.
- F. FIT reserves the right to make an award to the responsive and responsible bidder whose product or service meets the terms, conditions, and specifications of the Bid and whose bid is considered to best serve FIT's interest. In determining the responsiveness and responsibility of the bidder, FIT may consider the following factors, including but not limited to: the ability, capacity, and skill of the bidder to perform as required; whether the bidder can perform promptly, or within the time specified without delay or interference; the character, integrity, reputation, judgment, experience and efficiency of the bidder; the quality of past performance by the bidder; the previous and existing compliance by the bidder with relevant laws and regulations; the sufficiency of the bidder's financial resources; the availability, quality, and adaptability of the bidder's equipment, supplies and/or services to the required use; and the ability of the bidder to provide future maintenance, service, and parts.

XIV. EXECUTIVE ORDERS/COVID-19

Contractors and Subcontractor shall comply with Governor Cuomo's Executive Order 202 & 202.16 (Exhibit E) and the COVID-19 Contractor Guidance for Construction Jobsites (Exhibit F). In addition to the foregoing requirements you are responsible for compliance with any additional safety directives that may be forthcoming by Executive Order between the date of issuance of this addendum the date of award.

In the event the Contractor's performance under this agreement is delayed or interfered with arising out of or connected to the COVID19 pandemic, including but not limited to worker availability, government-mandated suspension of work or any other emergency action associated with protecting the health and safety of the workforce, which leads to a site closure, delay or suspension of the work, Contractor or any subcontractors hereby acknowledge their only remedy under this agreement is to request an extension of time for the performance of the unfinished work as herein provided; under no circumstances will Contractor or any subcontractors or vendors be entitled to any increase in the subcontract price or additional compensation for any alleged costs, expenses or damages as a consequence of such delays or interference, including but not limited to: i) General Condition Costs (e.g.: site clean-up, home and field office expenses, telecommunications equipment or use, and/or supervisory costs including but not limited to Project Manager, Project Engineer, Superintendent and Foremen, etc.), ii) escalation (increases in material costs, transportation charges or any alleged wage or salary increases) or iii) any alleged inefficiencies or loss of productivity. NOTE: The above examples are not intended to be an exhaustive list of all the alleged costs, expenses or damages excluded by this clause. It is offered only as an example of some costs within each category.

Owner shall review the Contractors request for delay and, if acceptable, shall extend the time of performance by Change Order for such reasonable time as the Owner, in its sole discretion, may determine.

SECTION III:
CONTRACT TERMS AND CONDITIONS

SECTION III. CONTRACT TERMS AND CONDITIONS

I. COMPLIANCE REQUIREMENTS

All work hereunder, including but not limited to material and installations, shall be in compliance with the Contract Documents including both specifications and drawings, as well as all applicable state and local building codes (such as the New York City Building Code) and the rules, regulations of governmental agencies and utility companies having jurisdiction over the work.

The following additional notes shall be considered as part of the officially filed drawings:

NONE

THE WORK:

Unless modified by the Contract Documents, the work of each section of the specifications shall include all labor, materials, testing, tools and equipment necessary and reasonably incidental to **the work on the Admissions Office.**

WORKMANSHIP:

All work shall be performed by persons skilled in the work. Work shall be installed true to dimension, plumb and level with neat, accurate cutting and fitting of all materials in accordance with recognized standards of workmanship.

ON-SITE VERIFICATION:

The Contractor shall verify all dimensions and site conditions prior to commencing the work. Dimensions may not be scaled from drawings. Should there be a discrepancy, Contractor is to notify FIT Facilities Director and Architect immediately for clarification.

COORDINATION OF THE WORK:

The Contractor shall be responsible for the coordination of the work and the means and methods of construction and provide FIT with the resume of Contractor's project manager ("Project Manager"). FIT's Facilities Director shall approve the Project Manager and reserves the right to request a replacement Project Manager upon reasonable notice.

WORK HOURS:

Regular work hours are from **7:00 am to 9:00 pm** unless otherwise specified in the Contract Documents. Contractor will have reasonable access to the site in order to complete the work in the given time frame. Contractor shall comply with FIT's additional work rules related to such extended access. All labor costs required to meet this deadline are the sole responsibility of the Contractor and shall be included in the contract price. FIT reserves the right to put the work on hold on three (3) occasions during the course of construction for any length of time and for any reason.

PERFORMANCE AND PAYMENT BONDS

In addition to the insurance and bond requirements specified in the General Conditions, Performance and Payment Bonds shall be required for the Work of this Contract.

- A. Simultaneously with the delivery of the executed Contract, Contractor shall furnish to FIT and maintain, at its own cost and expense a Performance Bond in an amount at least equal to one hundred percent (100%) of the contract price as security for faithful performance of the Contract and also a Labor and Material Payment Bond in an amount at least equal to one hundred percent (100%) of the Contract price for the payment of all persons performing labor on the project under the contract or furnishing materials in connection with the Contract. The surety on such bonds shall be a surety company rated B+ or better by A.M. Best Company, shall be licensed to do business in the State of New York, and shall hold a certificate of authority as an acceptable surety on federal bonds or otherwise satisfactory to FIT.
- B. Attorneys-in-fact who sign said bonds on behalf of a surety must affix to each bond a certified and effectively dated copy of their power of appointment.

CONFLICTS, ERRORS AND OMISSIONS:

1. The Contract Documents and typical details apply throughout the work unless noted otherwise.
2. In the event that certain features of the work are not fully shown on the drawings, Contractor must obtain clarification from the FIT Facilities Director and Architect through the use of an AIA Standard RFI form (copies can be obtained from the Architect) before proceeding with the work.
3. In the event of conflicts with the drawings and/or specifications, the Contractor must promptly notify the FIT Facilities Director and Architect. The Architect will determine which shall govern.

MANUFACTURER'S PRODUCTS AND FABRICATIONS:

1. All manufacturers and fabricators printed warnings for handling of their products must be strictly observed.
2. All products and materials must be provided and installed in strict accordance with the recommendations of the manufacturer. In the event of conflict between the drawings or the specifications and the manufacturer's recommendations, Contractor must notify FIT Facilities Director and Architect to obtain clarification before proceeding with the work.
3. Contractor must verify all materials and manufactured items to be in conformance with applicable codes and regulations.

DELIVERY AND STORAGE OF MATERIALS:

1. All materials shall be new and delivered to the site in original, unbroken containers.
2. All materials shall be inspected by the Contractor at time of delivery and Contractor shall reject material evidencing damage or other defects.
3. Contractor shall provide secure and environmentally compatible storage facilities for all materials in accordance with the recommendations of the manufacturer.

PROJECT SCHEDULE:

1. Contractor shall attend a Project Initiation Conference, prior to the commencement of work at the site. Attending this Conference on behalf of the Contractor shall be a representative of FIT and the Project Manager assigned to the project. Contractor shall submit at this Conference a detailed timeline indicating the important milestones of the project and establishing an estimated date of substantial completion in accordance with Contract Documents. He/she shall also present all submittals required by the Contract Documents, such as Insurance Certificates, product tear sheets (not at the initial conference), copy of the General Liability insurance policy (amended to reflect required additional insureds), etc. Project access, storage locations, required crew size and other relevant issues shall also be addressed at this Conference.
2. Time is of the essence. Contractor shall be required to commence work of the **Admissions Office** within five (5) working days of receipt of a Notice to Proceed from FIT. The shop drawings process and ordering need to proceed first. Work shall commence on or about **November 21, 2022. The project shall be Substantially Completed no later than July 28, 2023.** Contractor must be de-mobilized and leave the job site on the ending date of work period. Only close-out, administrative tasks may continue beyond the closing date. Unless otherwise specified, the work is to be performed solely between the hours of **7:00 A.M. to 9:00 P.M.**, Monday through Friday, legal and union holidays excluded. All labor costs encountered to meet this deadline are the sole responsibility of the Contractor and shall be included in the Bid Price. FIT reserves the right, at no financial liability associated with the same, to put the Project work on hold on as many as three (3) separate occasions during the course of the Project for any length of time and for any reason.
3. On Monday of each week during the construction period, the Contractor shall email to FIT's Facility Director (or such other individual as FIT may designate at its sole discretion) a written report outlining the work completed during the preceding week and the work planned for the upcoming week. Included will be any unforeseen or anticipated problems regarding implementation of the work, in addition to Change Order requests, submission data, etc. Daily reports **MUST** be submitted to the CM and or the Facilities Department Designee.
4. Job meetings will be held at the site on dates to be determined by Architect and FIT. These meetings shall be attended by an officer of the Contractor, the Project Manager, FIT's representative, and the Architect. The purpose of these meetings will be to review

the status of the project, discuss any potential changes to the project scope, and resolve any problems relating to successful completion of the work.

5. Owner's meetings will be held weekly via zoom and in person when needed. The dates to be determined by the Architect and FIT. These meetings shall be attended by the Contractors Project Manager, FIT, and the Architect. The purpose of these meetings is to keep the Owners informed of the process and to discuss any issues relating to the successful completion of the work.

PAYMENT:

In accordance with, and in addition to, the payment requirements of the Contract Documents, the Contractor shall provide sufficient and appropriate documentation for all invoices to FIT including submittal of invoices for actual cost of materials, labor rates, and certified payrolls. Filing of such payrolls shall comply with the New York State Labor Law and is a condition precedent to payment. FIT reserves the right to request additional information and/or documentation at any time.

Contractor is required to submit Monthly Contractor's Compliance Form (as attached in Section XII. Affirmative Action Form) with each Payment Requisition.

Contractor is required to submit a Certificate of Monthly Payment/Lien Waiver signed by each Sub-contractor with each Payment Requisition.

Contractor is required to submit Waste Management Form with each Payment Requisition.

LABOR HARMONY:

- A. Contractor is advised that he/she must maintain labor harmony throughout the duration of the Contract. All labor disputes, slowdowns, strikes and/or sympathy actions will be the sole responsibility of the Contractor to resolve in order to maintain harmony.
- B. All costs, delays and scheduling impacts associated with any labor dispute that arises from such action or inaction will be borne by the Contractor.
- C. Contractor will also be responsible for all costs, damages and scheduling impacts which affect and disrupt any other workers on site as well as FIT employees.
- D. It will be the Contractor's responsibility to resolve all labor disputes immediately.

Contractor is further advised that FIT has a large union presence on the campus. All work performed by the Contractor must provide the required labor harmony to perform work without labor incident or dispute which can delay, obstruct or effect the work and project schedule, or interfere with FIT's ability to operate.

II. GENERAL NOTES

In accordance with, and in addition to, the requirements of the Contract Documents:

1. All work listed on the construction notes and shown or implied on all drawings shall be supplied and installed by the Contractor unless otherwise noted on drawings and/or in specifications.
2. Contractor to determine coordination of trades.
3. Contractor shall verify all dimensions and conditions shown on drawings and shall notify FIT Facilities Director and Architect of any discrepancies, omissions, and/or conflicts before proceeding with the work.
4. Contractor must comply with the rules and regulations of agencies having jurisdiction and shall conform to all construction and safety codes, statutes and ordinances. All fees, taxes, permits and applications to be obtained through governmental agencies shall be the responsibility of the Contractor.
5. Contractor shall comply with the rules and regulations of the building as to hours of availability of loading docks and elevators for the purposes of delivery, waste removal and other needs related to the work. Coordination with FIT Facilities Department is required for the handling materials, movement in and out of building, equipment and debris to avoid conflict and interference with normal building operations.
6. All drawings and construction notes are complementary and what is called for by any will be binding as if called for by all.
7. Contractor shall maintain a current and complete set of construction documents on the construction site during all phases of construction.
8. Do not scale drawings; dimensions shown govern. Larger scale drawings shall govern over smaller scale.
9. Contractor shall maintain a current and complete set of shop drawings on the construction site
10. Contractor shall maintain a current and complete RFI (Request for Information) log on the construction site.
11. Contractor shall submit for approval, prior to commencing work, a list of all sub-contractors to FIT's Facilities Director, with the name, address and phone number of the principal contact of each sub-contractor. In addition, he will file with the owner the emergency numbers available for 24-hour contact.

12. All work shall be performed by skilled and qualified workmen in accordance with the best practices of the trades involved and in compliance with building regulations and/or governmental laws, statutes or ordinances.
13. All materials shall be new, unused and of professional quality, unless otherwise noted, installed as per manufacturer's recommendations and instructions.
14. For purposes of the Specifications and Drawings sections in the Contract, the use of the words "Supplied By" or "Provided" in connection with any item specified is intended to mean that such item shall be furnished, installed and connected where so required.
15. All approvals of submittals shall be for design intent only. Contractor shall be responsible for quantities, dimensions and compliance with Contract Documents and for information pertaining to fabrication processes or techniques of first class construction and for coordination with other trades.
16. All work shall be erected and installed plumb, level, square, true and in proper alignment.
17. Contractor shall be responsible for cutting, patching and restoration required for this work.
18. If, during the course of construction, Contractor believes materials that might contain asbestos may be disturbed during performance of the work, Contractor shall immediately notify FIT of the area(s) of concern, and stop work if that area would be disturbed by the continuing work.
19. All correspondence to FIT shall be directed to the attention of the FIT Facilities Director with a copy of the same forwarded to the Architect.
20. Contractor shall at all times keep the premises free of accumulation of waste materials and rubbish; premises to be broom swept clean daily. At the completion of the work, Contractor shall leave the job site free of construction debris and materials, and "broom clean" including thorough cleaning of toilets, bathrooms, electrical closets, stairwells, and all areas of work or staging, etc.
21. Contractor shall provide all necessary protection against dirt and damage within the premises, as well as public areas, and shall be responsible for keeping these areas clean and free of materials at all times.
22. Contractor shall verify location of existing utilities and coordinate with location shown on drawings.
23. During construction, security and fire exit doors must remain unobstructed at all times.
24. Contractor shall take every precaution to properly protect all existing construction to remain. Contractor shall be responsible for all damaged areas to be returned to original condition.

25. Contractor shall schedule construction, in such a manner so as not to disturb areas outside of the area under construction during normal operating hours. The Contractor shall coordinate with FIT Facilities Director minimum of 24 hours prior to any disruption of services to those areas not under construction even if such a disruption occurs during or after normal operating hours.
26. Contractor shall staff the project with a Project Manager with at least 5 years' experience in this type of project scope, with similar complexity and schedule requirements.
27. The acceptance of shop drawings containing deviations not specifically brought to the attention of FIT, or containing errors or omissions of any sort, shall not relieve Contractor of the responsibility for executing the Work in accordance with the Contract Documents and Contract Terms and Condition.

III. DEMOLITION NOTES

In accordance with, and in addition to, the requirements of the Contract Documents. It shall be Contractor's responsibility to perform the following:

1. Prior to commencement of selective removals and demolition work, inspect the areas in which the work will be performed.
2. Any asbestos contaminated material will be removed by FIT's certified asbestos abatement contractor prior to the work of this contract.
3. Provide temporary barricades and other forms of protection required to protect all FIT personnel, inclusive of its faculty, staff and students as well as the general public from injury due to selective removals and demolition work.
4. Remove and dispose of exposed bolts, supports, brackets, cleats, grounds, and other items, that are no longer required for the purpose for which they were originally installed.
5. Where existing work is required to be removed and replaced but found to be defective in any way, it shall be reported to the FIT Facilities Director and Architect before it is disturbed.
6. All existing work damaged or lost as a result of performing the required new work, shall be patched, repaired or replaced with new, and finished to match the existing work, or as the individual case requires at the Contractor's expense.
7. Perform cutting, drilling and removals in a manner which will prevent damage to construction which is to remain.
8. Promptly repair any and all damages to all property and finishes caused by the removals and demolition work; to FIT's satisfaction and at no extra cost to FIT.

9. Cut, patch, paint and finish existing walls, ceiling and/or floor disturbed to match existing.
10. Perform patching around items penetrating existing construction in a manner that will maintain the water and fire resistive capability of existing construction. Should either of these be compromised, it is the responsibility of the Contractor to repair prior to completion.
11. Remove debris, rubbish and other materials resulting from the removals and demolitions from the building immediately; transport and legally dispose of materials off-site. Disposal method shall be in accordance with city, state and federal statues regulations, and ordinances.
12. Work of this section shall conform to all requirements of the New York City Building Code and all applicable regulations and guidelines of all governmental authorities having jurisdiction, including, but not limited to, Safety, Health and Anti-Pollution regulations.
13. Work is to conform to OSHA requirements.

IV. ADDITIONAL CONTRACTOR'S RESPONSIBILITIES

In accordance with, and in addition to, the requirements of the Contract Documents:

1. Contractor shall coordinate all work with FIT Facilities Department and Director.
2. Contractor to provide daily crew manpower log/count to FIT.
3. Contractor shall perform work in a neat workmanlike manner in accordance with accepted industry standards.
4. FIT Facilities Department shall notify Contractor before commencing work which floors are accessible by Contractor.
5. Contractor shall mask all signs, window frames, door frames, etc. when painting around them.
6. Contractor shall use Benjamin Moore, Regal Paint, or approved equal.
7. Employee Identification and Building Access: All Managers and their crew must wear at all times company identification. All Managers and their crew must sign in and out, upon entering and leaving the facility, at the FIT front security desk.
8. After Bid opening, FIT will evaluate and review submissions and notify the lowest Bidder, who is deemed most responsive and responsible. Within five (5) business days of such written notification, such Bidder shall submit the following information. Failure to comply with these requirements in whole or part shall constitute grounds for rejection of the Bid. FIT reserves the right to

determine whether a Bidder has substantially met these requirements and to ask for additional information. Documentation of the following:

- a. Health and safety training program and procedures for employees and on-site EHS Coordinator.
 - b. Copies of current licenses and certifications applicable to the Work, including but not limited to licenses issued by the Fire Department of New York, Department of Buildings of the City of New York, must be provided to FIT Facilities.
9. Contractor shall complete the attached Outline for Preparing Work-Specific Environment, Health and Safety Plan (“EHS Plan”) which will be reviewed and approved by FIT’s EHS Compliance Director prior to commencement of work. Contractor shall include the costs of completing the EHS Plan in the Bid price. Proof of the 10 Hour OSHA Outreach Training Program for Construction certificate will be required.
 10. Contractor shall provide as described in the FIT Safety EHS Plan, legible copies of SDS sheets and estimates of anticipated amounts of chemicals Contractor intends to store on site to the FIT’s Director of EHS Compliance for review and approval at least ten (10) days before Contractor allows on-site storage.
 11. Contractor shall ensure that legible copies of all SDS are available at the location of chemical storage and available for review at all times. Contractor shall take all necessary precautions necessary to prevent vapors, fumes, or dust from leaving the work area. This includes but is not limited to the construction of negatively ventilated containments as controls.
 12. Contractor shall provide as described in the FIT Safety EHS Plan a written statement of the types of project waste disposed, including the amounts and the name of the waste disposal facility for each type of waste disposed. Contractor shall provide the statement with each Payment Application. Contractor shall provide a separate copy of the statement to FIT’s Director of EHS Compliance.
 13. Contractor may not store Hazardous Waste on site at any time. Contractor may not generate or accumulate Hazardous Waste on site without the written approval of FIT’s Director of EHS Compliance. Contractor shall obtain FIT’s Director of EHS Compliance approval at least ten (10) days before the Contractor generates or accumulates Hazardous Waste on site beginning with demolition work.
 14. Off-site shipments of Universal or Hazardous Waste. The Contractor may not allow the off-site removal of Universal or Hazardous Waste without the written approval of the FIT Director of EHS Compliance. Contractor will ensure that the FIT Director of EHS Compliance alone signs any shipping

papers for the off-site removal of Universal or Hazardous Waste.

15. Contractor's personnel must report daily to the FIT Security area in the Lobby of Building "C" before entering FIT's site. All Contractor's personnel must obtain temporary FIT identification that shall be displayed at all times while on the FIT site. While on FIT property, all Contractor's personnel shall be subject to all FIT campus policies and procedures, including, but not limited to, prohibitions related to tobacco, drug, and alcohol use, and policies and procedures regarding appropriate and civil conduct. Contractor's personnel shall not fraternize with FIT students and employees beyond what is necessary to complete their work or any assigned Projects. FIT policies may be found at <https://www.fitnyc.edu/policies/>. FIT reserves the right, in its sole determination, to eject from the campus, any Contractor personnel violating such policies, in addition to any other rights and remedies.

V. **PERMITS**

Contractor shall be responsible for obtaining all required Permits and paying all costs and fees associated therewith. New York City Department of Buildings (DOB) Work Permit will be required for this project. Contractor will also be required to perform the following functions as it relates to this project:

- A. Contractor shall submit to FIT and Engineer appropriate Workman's Compensation and New York State Disability insurance certificates for use in securing the required Work Permits to be posted at the site. The Contractor shall provide FIT's Facility Director with the appropriate insurance tracking numbers assigned to their firm by the NYC Department of Buildings.
- B. The Contractor shall submit to FIT and Engineer a copy of all Licenses as issued by the NYC Department of Buildings.
- C. Permits for the work shall be posted by the Contractor in a conspicuous location at the site at all times. No work shall begin until the necessary DOB work permits have been obtained by the Contractor.
- D. The Contractor shall be responsible for obtaining any other governmental permits and approvals required to undertake the work, and shall pay any and all fees associated therewith, **including but not limited to fees to the MTA for setting up a crane.**

VI. **PROJECT MANAGER**

1. The Contractor shall provide the services of an experienced Project Manager, who shall be in continual responsible charge of the work and shall have a valid Certificate of Fitness by the New York City Department of Buildings.

2. The Project Manager shall be on site at all times, shall speak fluent English, shall maintain on the site a complete set of these specifications (including any addenda and/or change orders, as well as all project drawings and all applicable manufacturers' instruction sheets), and shall have full authorization to make all field changes as directed by FIT's Facility Director and Architect.
3. The Project Manager shall be required to maintain a daily log at the site indicating the following:
 - the date
 - the number of workers at the site on said date
 - the specific portions and locations of the Work completed on said date
4. The Project Manager (or another authorized representative of the Contractor) shall telephone FIT's Facility Director at least once daily throughout the construction period, to report on the day's activities and the work planned for the following day.
5. The name of the Project Manager shall be submitted to FIT's Facility Director prior to initiation of the project. This Manager shall remain in charge of the project for its entire length, at FIT's discretion, unless said Manager no longer remains in the employ of the Contractor. In such case, a capable and experienced replacement shall be immediately assigned subject to approval by FIT's Facilities Director.
6. No telephone service is available at the site for use by the Contractor; therefore, the Contractor shall equip the Project Manager with a cellular telephone at the site for the duration of the Project. The Contractor shall provide FIT and Architect with the appropriate contact numbers at the initiation of the Project.

VII. SUBMISSIONS AND SUBSTITUTIONS

1. All submissions called for in the Contract Documents shall be submitted at least twenty (20) working days prior to proposed initiation of any related work.
2. FIT and FIT's Architect and Engineer will review and accept or take other appropriate action regarding Contractor submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. FIT's review of all shop drawings submitted by the Contractor shall be for concept only and does not remove the Contractor's responsibility for insuring that all specific details of the installation shall be performed in such a way so as to achieve satisfactory results. Acceptance by

FIT, the Architect & Engineer of Contractor submittals does not relieve the Contractor from responsibility for errors which may exist in the submitted data.

3. Where the phrase "or approved equal" or "equal as approved by FIT" occurs in the Contract Documents, the Contractor may not assume that the materials, equipment, or methods will be approved as equal unless the item has been specifically approved by FIT and the Architect.
4. Any proposed substitute products or procedures are to be submitted to FIT's assigned Architect/Engineer for prior approval with any proposed price adjustments to the contract within 14 days of the signing of the agreement between FIT and the Contractor, so that FIT, the Architect and Engineer are permitted adequate time for review.

VIII. PROGRESS PAYMENTS

1. All submissions called for in the Contract Documents shall be submitted at least twenty (20) working days prior to proposed initiation of any related work.
2. Progress payments will be made to the Contractor based solely on actual work completed. Furthermore, payment will not be made for the purchase of materials, nor for their transfer onto the site, nor for any costs associated with mobilization.
3. Payment requests shall be submitted to FIT's Facilities Director on AIA Documents G702 and G703.
4. Payments will be authorized based upon FIT's field visits and review of work. All FIT's decisions regarding progress payments shall be final.
5. The values quoted on the bid form shall constitute the Schedule of Values for AIA Document G703. Additional breakdown of the bid form shall be provided on the Schedule of Values and will be used for progress payments.
6. No progress payments will be processed without submission by the Contractor of properly executed Affidavit of Payment and Release of Liens (AIA Documents G706 and G706A or equivalent forms as may be requested by FIT), up-to-date weekly written reports and timeline in bar chart form, and all submittals, certificates, permits, etc. required pursuant to the terms of the contract.
7. A 10% retainage shall be deducted from all progress payments made by FIT.
8. Payment requests shall be submitted to FIT not more than once per month.
9. Contractor shall provide sufficient and appropriate documentation for all invoices to FIT including submittal of invoices for actual cost of materials,

labor rates and certified payrolls. Filing of such payrolls shall comply with the Labor Law and is a condition precedent to payment. FIT reserves the right to request additional information at any time. Contractor required to submit Monthly Contractor's Compliance Form with each Payment Requisition.

10. Contractor required to submit a Certificate of Monthly Payment signed by each Sub-contractor with each Payment Requisition.
11. Contractor shall be required to submit a detailed Trade Payment Breakdown.

IX. SITE VISITS BY ARCHITECT/ENGINEER

1. Failure by Architect/Engineer to detect and/or notify the Contractor of any aspect of the Contractor's actions or materials that are not in conformance with the Contract Documents shall not remove the Contractor's responsibility to adhere to the Contract Documents in all instances, including but not limited to the Contractor's responsibility to expeditiously correct and/or replace all defective work.
2. Architect/Engineer will be the final judge as to whether the work is satisfactorily performed, and shall have the authority to order that any work deemed unacceptable or not in conformance with the Contract Documents be redone by the Contractor at no cost to FIT.
3. Architect/Engineer shall have no responsibility for the presence, discovery, identification, handling, removal or disposal of, or exposure of persons to hazardous materials in any form at the Project site.

X. CHANGE ORDERS

1. FIT may order changes in the work of any quantity and without invalidating the Agreement so long as the Contract Sum and/or Contract Time of Completion are adjusted accordingly. All such changes in the work shall be authorized by written Change Order. All Change Orders shall be reviewed by Architect and Engineer and authorized by a representative of FIT.
2. No work shall be performed by the Contractor unless it is specifically included in the Contract Scope of Work or authorized in advance by a bulletin issued by the Architect which will serve as the backup paperwork for a change order. The contractor needs to submit a Change Order. All work to proceed prior to approval of change orders. Change Orders will be negotiated fairly in separate meetings. All written Change Orders are to be signed by all parties.
3. Any sums to be paid to Contractor as a result of any Change Order or any

sums to be credited to FIT as a result of any Change Order shall be computed by one of the following methods:

- (1) As agreed upon between the parties to the contract in writing prior to commencement of the work required by the Change Order, or;
- (2) By Unit Prices detailed in the Contract Documents or subsequently agreed upon.

XI. GUARANTEES

1. All work on this project shall be guaranteed by the Contractor for a period of not less than five (5) years, or longer where covered by manufacturer warranty. Warranty to start on the day of the final signoff by FIT.
2. If within the guarantee period any of the work is found to be defective or not in conformance with the Contract Documents, the Contractor shall correct it promptly at his own expense after receipt of written notice from FIT.

XII. FINAL PAYMENT

1. Final payment (retainage) shall be released to the Contractor thirty (30) days after the project has been signed off by FIT and Architect/Engineer and the Contractor has satisfied all requirements of the Contract Documents.
2. In addition to any other requirements of the Contract Documents final payment shall not become due until the Contractor has delivered to FIT and Architect a fully executed 1-year guarantee for all work performed under this project, as well as a complete release of all liens arising out of this Contract, or receipts in full covering all labor, materials, equipment, applicable finance charges, and fines for which a lien could be filed. If such lien remains unsatisfied after payments are made, the Contractor shall refund to FIT all money that FIT may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.
3. A Performance Bond and a Labor & Material Payment Bond, a copy of the "Contractor's Affidavit of Payment of Debts and Claims (AIA Document G706)" and "Consent of Surety to Final Payment (AIA Document G707)" shall be submitted by the Contractor prior to the release of final payment.
4. One (1) set each of record drawings (measuring 24 inches by 36 inches) indicating the "As- Built" manner of installation of all work, shall be submitted to FIT and Engineer prior to the release of final payment.
5. Once the project has reached substantial completion, FIT and Architect will

prepare a “Certificate of Substantial Completion”. This certificate must be signed by all parties (Engineer, FIT and Contractor), to acknowledge the date the project has reached substantial completion, and confirm agreement on a final punch-list of work to be performed. The Contractor shall be responsible for completing all punch-list items prior to release of final payment.

XIII. SUPPLEMENTAL CONDITIONS

Project Schedule. Contractor shall complete all work as specified within the time period specified in the Contract Documents, inclusive of rain days, but excluding any shutdowns authorized by FIT.

XIV. PREVENTIVE MAINTENANCE SCHEDULE

Prior to final payment, the contractor shall provide a recommended maintenance schedule from the manufacturer for quarterly, semi-annual and yearly requirements, including part numbers where applicable, upon completion of the job.

BID ANALYSIS FORM FOLLOWS

ATTACHMENT C – BID ANALYSIS FORM

**FASHION INSTITUTE OF TECHNOLOGY &
ADMISSIONS OFFICE
INVITATION FOR BID NUMBER C1536
NYS PREVAILING WAGE SCHEDULE PRC # 2022010602**

BID BREAKDOWN

Line	Description	Total Labor Cost	Total Materials, Tools & Equipment	Line Total
1	SELECTIVE DEMOLITION	\$	\$	\$
2	MASONRY	\$	\$	\$
3	CONCRETE	\$	\$	\$
4	METALS	\$	\$	\$
5	WOOD, PLASTICS & COMPOSITES	\$	\$	\$
6	THERMAL & MOISTURE PROTECTION	\$	\$	\$
7	OPENINGS	\$	\$	\$
8	FINISHES	\$	\$	\$
9	SPECIALTIES	\$	\$	\$
10	EQUIPMENT	\$	\$	\$
11	FURNISHINGS	\$	\$	\$
12	PLUMBING	\$	\$	\$
13	HVAC	\$	\$	\$
14	ELECTRICAL	\$	\$	\$
15	ELECTRONIC SAFETY & SECURITY	\$	\$	\$
16	GENERAL REQUIREMENTS	\$	\$	\$
17	GENERAL CONDITIONS	\$	\$	\$

TOTAL BID PRICE (1-17) \$ _____

As stated in Section IV of the front end documents: Subcontracting shall be permitted **not to exceed 70%** of the work of the project. Please provide the ratio of the contractors and subcontractors work that will be used on this project.

Contractor _____%, **Subcontractor(s)** _____%

For Bidding Purposes: the following sections pricing should cover the following items:

General Requirements: permits & licenses; project meetings; administrative overhead for submissions and shop drawings; progress photos; temporary facilities & controls; storage & protection of materials; project closeout; and project record documents.

General Conditions: supervision of work; all testing; coordination drawings; safety programs; insurance and performance & payment bonds.

The undersigned, having carefully examined all Contract Documents, including Notice to Bidders, Bid Terms and Conditions, Contract Terms and Conditions, General Requirements, General Conditions, Labor & Material Payment Bond, Performance Bond, Form of Bid, Non-Collusive Bidding Certification, Substitution Form Request, Contract, Affirmative Action Form, Change Order, Form, Contractor's Trade Payment Breakdown, Safety EHS Plan, Prevailing Wage Schedule, Specifications, and Drawings and having examined the existing conditions by on-site visit(s), hereby submits this Bid Analysis, covering all labor, materials, equipment, tools, machinery, licensing, insurance, taxes, and fees required to perform the specified work at the above-referenced site, in accordance with the Contract Documents. **No exclusions & no exceptions.**

Company Name and Address of Bidder:

Signature of Bidder _____ Date _____

Printed Name and Title of Representative: _____

Email Address: _____

Telephone #: _____

EIN #: _____

IMPORTANT:

This bid analysis form is the **only** pricing format acceptable. Bidders **must** submit pricing using this form. **FIT will not accept bid responses on any other form.**

NOTE:

FIT will not sign any bidder generated contract, agreement or scope of work. FIT Bid and Terms and Conditions apply. Bidder requirement for FIT to sign any document will be grounds for rejection. Bidder inclusion of any conditions, clarifications, exceptions or changes which are not in compliance with FIT Bid and Terms and Conditions will be grounds for rejection.

SECTION IV.
GENERAL REQUIREMENTS

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01010 -- SUMMARY OF THE WORK

.01 - Work Under The Contract

The Work shall be as described in the Contract Documents.

.02 - Work by Others

Should any other contractor be engaged by the Owner to perform work on the Site or in areas adjoining or adjacent to the Site, the Contractor and such other contractor shall coordinate the work of the Contractor and such other contractor.

.03 - Items Not Included

The following items shown on the drawings are not included in the Work:

- A. Items indicated "By Others".
- B. Items indicated "N.I.C." (Not in Contract)
- C. Existing construction not indicated or specified to be removed, replaced or altered.

.04 - Openings and Chases

- A. The Contractor shall build openings, including but not limited to channels, chases and flues as required to complete the Work as set forth in the Contract and as directed by the Owner before any work is installed.
- B. After the installation and completion of any work for which openings, including but not limited to, channels, chases and flues, have been provided for the Contractor, the Contractor shall build in, over, around and finish all such openings as required to complete the Work.
- C. If a contractor fails to furnish drawings and information required in connection with such openings before the General Construction Contractor performs any Work affected thereby, said contractor who so fails to furnish such drawings and information shall bear the cost of all cutting and refinishing including that part of the General Construction Contractor's Work affected.
- D. The Contractor shall Furnish and Install all sleeves, inserts, hangers and supports required for the execution of the Work.
- E. Specific instructions shall be obtained from the Owner or the Owner's Representative before cutting beams or other structural members, arches or lintels.
- F. The Contractor shall not endanger the Work and shall not cut or alter the Work unless prior approval and instructions are received from the Owner or the Owner's Representative.

.05 - Surveys and Layout

- A. If, for any reason, stakes, batter boards or monuments are disturbed, it shall be the responsibility of the Contractor to reestablish them.
- B. The Owner or the Owner's Representative may order construction work suspended at any time when location of monuments, stakes, bench marks and other layout markings established by the Contractor are not adequate to permit checking the Work.
- C. The Contractor shall Provide and shall maintain axis lines on each floor and shall establish and shall maintain grade marks 4' 0" above the finished floor on each floor level.
- D. The Contractor shall Furnish such stakes and other required equipment, tools and materials, and all labor as may be required in laying out any part of the Work.

.06 - Scheduling

- A. The Contractor shall deliver to the Owner schedules and forms in accordance with the Contract.
- B. The Owner or the Owner's Representative may require the Contractor to modify schedules which the Contractor has submitted either before or after such schedules are approved so that:
 - 1. The Work shall not be delayed.
 - 2. Changes in the Work are reflected in the schedules of the Contractor.

.07 - Contractor Use of Premises

While performing the Work, the Contractor shall take every precaution against injuries to persons and damage to property.

01080 -- PERMITS AND COMPLIANCE

.01 - Permits and Licenses

The Contractor shall obtain, maintain and pay for all permits and licenses necessary for the execution of the Work and for the use of such Work when completed.

Prior to final payment the Contractor shall deliver to the Owner's Representative all permits and certificates of approval issued by any agency having jurisdiction.

.02 - Compliance

The Contractor shall give all notices, pay all fees and comply with all laws, rules and regulations applicable to the Work.

.03 - Additional Compliance

The Contractor, Subcontractors, and the employees of the Contractor and Subcontractors, shall comply with all regulations governing conduct, access to the premises, operation of equipment and systems and conduct while in or near the premises and shall perform the Work in such a manner as not to unreasonably interrupt or interfere with the conduct of business of the Institution.

.04 - Royalties and Patents

It is the sole responsibility of the Contractor to determine what, if any, patents are applicable to the Project. The Contractor shall pay all royalties and/or license fees. The Contractor shall defend all suits or claims for infringement of any patent rights and save the Owner, Architect, Engineer, Environmental Consultant and Construction Manager harmless from loss, including attorney's fees, on account thereof.

01200 -- PROJECT MEETINGS

.01 - Project meetings shall be held to accomplish the following:

- A. Coordinate the Work.
- B. Establish a sound working procedure and relationship between all contractors, the Owner and the Owner's Representative.
- C. Review requisitions, proposals and change orders.
- D. Review the progress of the Work, review quality of work in place and review approval required by the Work and review delivery of materials.
- E. Expedite the Work to completion within the scheduled time limit.
- F. Review progress payments.

.02 - Initial Job Meeting (Orientation Meeting)

The Owner or the Owner's Representative shall call an initial job meeting which the Contractor shall attend. This meeting shall be called prior to the start of construction.

.03 - Job Progress Meetings

- A. Job progress meetings shall be scheduled by the Owner or the Owner's Representative during the course of construction. The Contractor or the Contractor's duly authorized representative and such Subcontractors as required by the Contractor or the Owner or the Owner's Representative shall be present at all job progress meetings. The Contractors and Subcontractors shall answer questions on progress, workmanship, approvals required, delivery of material and other subjects concerning the Work. The purpose of such meetings is to coordinate the efforts of all

concerned so that the Work proceeds without delay to completion as required by the Contract.

- B. The Owner or the Owner's Representative may require any schedule to be modified so that changes in the Work, delays or acceleration of any segment of the Work shall be reflected in such schedule. The Contractor shall cooperate with the Owner or the Owner's Representative in providing data for such changes in or modifications of schedules.

01300 -- SUBMITTALS

.01 - Schedules & Records

- A. Within the time set forth in the Contract, the Contractor is required to complete and submit to the Owner or the Owner's Representative the following forms:
 - 1. Submit construction progress schedule to the Owner or the Owner's Representative no later than thirty (30) calendar days after receipt by the Contractor of notice to proceed.
 - 2. Submit names and addresses of all Subcontractors to the Owner or the Owner's Representative within thirty (30) calendar days of approval of the construction progress schedule.
 - 3. Submit to the Owner or the Owner's Representative the date on which the Contractor proposes to award each subcontract a minimum of ten (10) days prior to such proposed award.
 - 4. Submit Shop Drawings and material sample schedule to the Owner or the Owner's Representative no later than thirty (30) days after approval of the construction progress schedule. Such schedule shall include the date of all Shop Drawings, samples and materials shall be submitted and the date approval is required.
 - 5. Submit to the Owner or the Owner's Representative on a form approved by the Owner, a schedule of anticipated monthly requisition amounts. Such schedule shall be submitted from time to time as directed by the Owner, the first such submission being required to be made by the Contractor within ten (10) days of receipt by the Contractor of a written order to proceed issued by the Owner. The amounts employed in preparing such schedules in no way shall be binding upon the Owner.
- B. Sample forms shall be provided by the Owner or the Owner's Representative for the above mentioned schedules and records.

01311 – PROJECT ANALYSIS

.01 - Project Control and Progress Meetings

- A. The Contractor shall attend all scheduling meetings as directed by the Owner or the Owner's Representative.
- B. In addition to the Owner or the Owner's Representative and the Contractor's Superintendent and Scheduling Coordinator, such meetings shall also be attended by representatives of such subcontractors as the Contractor, the Owner or the Owner's Representative may deem advisable. The agenda for such meetings shall include the progress and current status of the Work, proposed solutions for problem areas and a review of schedules for future Work in order to meet the Contractor's objectives and his obligations under the Contract. Consideration shall be given to establishing actual start dates, actual completion dates, planned starts and finishes, quantities installed, man hours worked, as well as other data relevant to the performance of the Contract.
- C. At least one week before each meeting described in subsection .01A of this Division 01311, the Contractor shall furnish progress data in the form required by the Owner or the Owner's Representative as follows:
 - 1. The status of all activities as of date determined by the Owner or the Owner's Representative.
 - 2. A list of actual start and completion dates for all activities.
 - 3. Projected durations of completion of those activities in progress.
 - 4. Relevant data of submittals in progress including equipment releases and equipment in fabrication.
 - 5. All other information which in the discretion of the Owner or its Representative, may be required to complete the Project Schedule Update.

.02 – Payment

The Contractor's Payment Breakdown and Monthly Requisition as called for by Section 17.01 of the General Conditions of the Contract shall be the basis by which the Contractor is to be paid.

.03 - Time of Completion

It is the sole responsibility of the Contractor to complete the Work within the time of completion required by the Contract.

01340 -- SHOP DRAWINGS AND SAMPLES

.01 - Contractor Submittal

- A. The Contractor shall submit the Shop Drawings and samples required by the Architect and the Contractor shall adhere to all submittal and scheduling requirements for Shop Drawings and samples. After examination of such Shop Drawings and samples by the Architect and the return of such items by the Architect to the Contractor, the Contractor shall make corrections indicated and shall furnish to the Architect the required number of corrected copies of Shop Drawings or samples.
- B. Shop Drawings shall be accompanied by a letter of transmittal to the Owner or the Owner's Representative requesting approval and date approval is desired.
- C. Each Shop Drawings and letter of transmittal shall be identified with the following information:
 - 1. Project title
 - 2. Contract name
 - 3. Date of the drawing, including dates of any revisions
 - 4. Name of Contractor, name of Subcontractor, material supplier and manufacturer, as applicable
 - 5. Name of person or firm preparing Shop Drawings
 - 6. Contract drawing numbers and specifications, section division and paragraph numbers used as references in preparing Shop Drawings, and titles of items to which the Shop Drawing refers.
- D. Shop Drawings shall show the design, dimensions, connections and other details necessary to insure that the Shop Drawings accurately interpret the Contract Documents and shall also show adjoining Work in such Detail as required to provide proper connections with said adjoining Work. Where adjoining connected Work requires Shop Drawings, such Shop Drawings shall be submitted to the Owner or the Owner's Representative for approval at the same time so that connections can be checked.
- E. The Contractor shall verify all field measurements. Measurements available prior to submittal of Shop Drawings shall be shown and so noted on the Shop Drawings. Measurements not available prior to submission of Shop Drawings shall be noted on the Shop Drawings as not available and such measurements shall be obtained prior to fabrication.

- F. The Contractor shall submit manufacturer's drawings and specifications when necessary to fully explain apparatus or equipment required by the Work. These manufacturer's drawings and specifications shall be treated as Shop Drawings. Manufacturer's catalog numbers alone are not acceptable as sufficient information for compliance with this requirement.
- G. Samples shall be accompanied by a letter of transmittal to the Owner or the Owner's Representative requesting approval, and date approval is desired.
- H. Each sample shall be labeled with the following information:
 - 1. Project title
 - 2. Contract name
 - 3. Date of submission
 - 4. Name and quality of the material
 - 5. Name of Contractor, name of Subcontractor, material supplier and manufacturer, as applicable
 - 6. Contract drawing numbers and specification section, division and paragraph numbers used as reference in preparing samples.
- I. Samples shall be of sufficient size and number to show the quality, type, color, finish and texture of the material required to be furnished by the Contractor pursuant to the Contract.

.02 - Contractor Review

The Contractor shall review, verify and determine all field measurements, field construction criteria, materials, catalog numbers and similar data, shall coordinate each Shop Drawing and sample with the requirements of the Contract and shall determine whether or not such Shop Drawings are in conformity with the provisions of the Contract before submitting the Shop Drawings to the Architect for approval.

.03 - Contractor Responsibility

The Architect's approval of Shop Drawings and samples shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract. The Contractor shall be responsible for the accuracy of the Shop Drawings and samples and for the conformity of Shop Drawings and samples with the Contract unless the Contractor has notified the Architect of the deviation in writing at the time of submission and has received from the Architect written approval of the specified deviations. The Architect's approval shall not relieve the Contractor of responsibility for errors or omissions in the Shop Drawings or samples.

.04 - Commencement of Work

No portion of the Work shall be commenced until required Shop Drawings or samples are approved by the Architect.

01380 -- PROGRESS PHOTOGRAPHS

.01 - Contractor Submission

- A. The Contractor shall furnish to the Owner, progress photographs of the Work as follows: three (3) 8" x 10" glossy prints of each of the following views:
1. Two (2) different views of the area in which the building or buildings are to be located, taken before excavation starts.
 2. Two (2) different views for each building when footings are in place and forms completed.
 3. Four (4) different views for each building when foundations are completed.
 4. Four (4) different views for each building when exterior wall is fifty per cent (50%) completed.
 5. Four (4) different views for each building when the structure is ready for roofing.
 6. Four (4) different exterior views in color for each building at completion.
 7. Six (6) interior views in color for each building as directed upon completion.
- B. A title identifying the view shown by each photograph and date taken shall appear on the back of each print.

01500 -- TEMPORARY FACILITIES AND CONTROLS

.01 - Requirements

The Contractor shall Provide the temporary facilities and controls as hereinafter specified and as required by law.

.02 - Temporary Lighting and Electric Service

The Contractor shall Provide and maintain all temporary lighting and power required in connection with the Contractor's operations from the commencement of the Work until the completion of each structure or for such other time as

directed by the Owner or the Owner's Representative. When the use of such temporary lighting and power is no longer required, all temporary wiring and equipment shall be completely removed by the Contractor. The Contractor shall make the necessary application to the lighting company and pay for all charges, costs and expenses incidental to the installation and maintenance of temporary lighting and power as required in connection with the Contractor's operations, and the Contractor shall pay for all power used. The minimum temporary lighting to be provided is at the rate of one-quarter watt per square foot and is to be maintained in each room and changed as required when interior walls are being erected. The required temporary lighting must be maintained for twenty-four (24) hours a day and seven (7) days a week at all stair levels and in all corridors below ground; in all other spaces temporary lighting is to be maintained only during working hours. All temporary wiring and equipment shall be in conformity with the National Electric Code. Three-phase temporary power circuits shall be installed as required to operate construction equipment of the various trades and to install and test equipment such as pumps and elevators. The Contractor shall install and maintain temporary or permanent service for the permanently installed building equipment such as sump pumps, boilers, boiler controls, fans, pumps, so that such equipment may be operated when required and so ordered by the Owner or the Owner's Representative for drainage or for temporary heat.

.03 - Material Hoists

A. General

1. Material hoists shall be operated by diesel, gasoline or steam engines and shall be complete with all equipment necessary for operation. Such hoists shall run from grade to roof, shall be installed immediately following the structural framing, centering or form work, and centering or form work unless otherwise approved by the Owner or the Owner's Representative. Electrically operated hoists shall not be used except as otherwise allowed by the Contract.
2. Material hoists shall meet any and all requirements of law, rule or regulation.
3. Hoist cars shall be of required size and design for the hoisting of all normal size building materials.

B. The Contractor shall:

1. Furnish, install, maintain and operate at the Contractor's expense, all hoisting equipment required for the Work.
2. Furnish all labor required for the Work.

.04 - Temporary Use of Permanent Elevator as Equipment Material Hoist

- A. The Contractor shall:
 - 1. Use the temporary hoists until a building is completed, or until the Contractor may, with the Owner's permission, use the equipment of one (1) elevator in a building for temporary service after the permanent elevator equipment and the permanent electric service have been installed.
 - 2. If the Contractor elects to use such permanent elevator equipment, the Contractor shall:
 - a. Provide adequate protection for such equipment and shall operate such equipment within a capacity not to exceed that allowed by law, rule or regulation.
 - b. Provide for the maintenance of the elevator equipment as approved by the Owner or the Owner's Representative.
 - c. Leave such equipment in perfect condition.
- B. The permanent elevator equipment shall be ready for use when required by the Work and shall permit any use approved by the Owner or the Owner's Representative.

.05- Temporary Enclosures

The Contractor shall:

- A. Provide, install and maintain any temporary weather resistant enclosures for all openings in exterior walls and roof that are not enclosed.
- B. After building is enclosed, maintain proper temperatures required by the Contract.

.06 - Temporary Fence Enclosures

The Contractor shall Provide, Install and maintain any temporary fence enclosures required by the Contract.

.07 - Maintenance of Permanent Roadways

The Contractor shall immediately remove dirt and debris which may collect on permanent roadways due to the Work.

.08 – Traffic Control

- A. Routes to and from the location of the Work shall be as indicated in the Contract or as directed by the Owner or the Owner's Representative.
- B. Parking areas for the use of those engaged in the Work shall be as indicated in the Contract or as directed by the Owner or the Owner's Representative.

.09 - Fire Prevention Control

The Contractor Shall:

- A. Provide private unlisted telephone service reserved for fire calls at a location or locations approved by the Owner or the Owner's Representative. Such service shall be in addition to any other telephone service. The Contractor shall pay all costs thereof until completion and acceptance of the Work or as otherwise directed by the Owner or the Owner's Representative.
- B. Comply with the safety provisions of the National Fire Protection Association's "National Fire Codes" pertaining to the Work and, particularly, in connection with any cutting or welding performed as part of the Work.

.10 - Pollution Control

The Contractor shall:

- A. Comply with all laws, rules and regulations governing pollution control, including but not limited to those of the Department of Environmental Conservation of the State of New York.
- B. Take all necessary precautions including, but not limited to digging and maintaining settling basins and dams; diverting streams, and taking all other actions that may be necessary to prevent silt, and waste of any kind from being deposited, silting and reduction of quality of streams below the construction area and downstream properties as a result of the Work.
- C. Refrain from the disposal of volatile fluid wastes into storm or sanitary sewer systems, approved sewage disposal systems or any waterway.
- D. Refrain from burning trash or waste materials.

.11 - Temporary Field Office

- A. The Contractor may Provide a temporary office structure, for the Contractor's use during the course of the Work.
 - 1. The Contractor must receive prior written approval from the Owner or the Owner's Representative for such temporary office structure in relation to location, type of structure, and included facilities.
 - 2. All toilet and sink facilities in any such office structure shall be connected to an approved sewage disposal system.
 - 3. The Contractor shall remove the temporary office structure from the Site and shall repair the Site and finish the area as directed by the Owner or the Owner's Representative.

- B. The Contractor shall:
 - 1. Provide a temporary office structure completely separate from any other office structures at a location approved by the Owner or the Owner's Representative until the Work is completed and is accepted.
 - 2. Provide such office structure for the exclusive use of the Owner.
 - 3. Bear all costs in relation to the furnishing, construction and removal of such office structure.
 - 4. Repair and refinish the area as directed by the Owner or the Owner's Representative.
 - 5. Construct such office structure and furnish such office structure as required by the Contract.
 - 6. Maintain such office structure in a sanitary condition and in proper repair, properly heat the structure, furnish the fuel and furnish all utilities and pay all utility charges.
 - 7. Install a telephone for the sole use of the Owner or the Owner's Representative and pay all service and local toll charges incurred as a result of the use of such telephone service.

- C. With the prior written approval of the Owner or the Owner's Representative any other Contractor may erect a substantial office structure at the Site for the use of such Contractor in relation to the Work.
 - 1. All toilet and sink facilities in any such office structure shall be connected to an approved sewage disposal system.

2. Such Contractor shall remove the temporary office structure from the Site and shall repair the Site and finish the area as directed by the Owner or the Owner's Representative.
- D. When adequate space is available in a building, the Contractor may transfer such office to available space with the prior written permission of the Owner or the Owner's Representative.
- E. Trailers providing comparable facilities may be accepted at the discretion of the Owner or the Owner's Representative.

.12 - Rubbish Removal

- A. The Contractor shall:
 1. Keep the Work free from rubbish at all times.
 2. Clean all enclosed structures daily.
 3. Remove rubbish from the Site at least once a week.
- B. The Contractor shall conform with the following:
 1. Burning of rubbish shall not be permitted.
 2. All rubbish shall be lowered by way of chutes, taken down by hoists, or lowered in receptacles. Under no circumstances shall any rubbish be dropped or thrown from one (1) level to another inside or outside any building.

.13 - Discontinuance, Changes and Removal

The Contractor shall:

- A. Discontinue all temporary services required by the Contract when so directed by the Owner or the Owner's Representative. The discontinuance of any such temporary service prior to the completion of the Work shall not render the Owner liable for any additional cost entailed thereby.
- B. Remove and relocate such temporary facilities as directed by the Owner or the Owner's Representative without additional cost to the Owner, and shall restore the Site and the work to a condition satisfactory to the Owner.

.14 - Project Identification

- A. No signs or advertisements shall be displayed on the site except as required by the Contract.

- B. The Contractor shall Furnish, erect and maintain the Site, the exact location thereof to be designated by the Owner or the Owner's Representative, a construction sign, in the form provided by the Contract.

.15 - Moisture and Condensation Control

The Contractor shall provide for ventilation of all structures until Physical Completion and acceptance of the Work and shall control such ventilation to avoid excessive rates of drying of construction materials, including but not limited to concrete and to plaster, and to prevent condensation on sensitive surfaces.

.16 - Protective Services

The Contractor shall provide security services required by the Contract.

01600 -- MATERIAL AND EQUIPMENT

.01 - Storage and Protection

- A. Materials stored on the Site shall be neatly piled and protected, and shall be stored in an orderly fashion in locations that shall not interfere with the progress of the Work or with the daily functioning of the Institution.
- B. Should it become necessary during the course of the Work to move materials or equipment stored on the Site, the Contractor, at the direction of the Owner or the Owner's Representative, shall move such material or equipment.

01700 -- PROJECT CLOSE OUT

.01 - Final Cleanup

- A. The Contractor shall leave the Work ready for use and occupancy without the need of further cleaning of any kind.
- B. The Contractor shall remove all tools, appliances, projects signs, material and equipment from the premises as soon as possible upon completion of the Work.
- C. The Work is to be turned over to the Owner in new condition, in proper repair and in perfect adjustment.

.02 - Required Close Out Documentation

- A. Prior to final payment the Owner shall receive the following documents as required by the Contract:

1. The Contractor's general guarantee.
 2. Specific guarantees, material, equipment and other items of work.
 3. All certificates obtained in connection with the Work.
 4. All final photographs of the Work.
- B. The Owner shall also receive from the Contractor prior to final payment:
1. A complete listing of all Subcontractors, business addresses and items supplied by each such Subcontractor.
 2. A listing of manufacturer's of major materials, equipment and systems installed in the Work.
 3. A copy of all test data taken in connection with the Work.
 4. Three (3) copies of all operation and maintenance manuals.
 5. All keys, tools, screens, spare construction material, finishing material and equipment required to be furnish to the Owner as part of the Work.

.03 - Orientation Instruction

Prior to final payment appropriate maintenance personnel of the Owner shall be oriented and instructed by the Contractor in the operation of all systems and equipment as required by the Contract.

.04 - Project Close Out Inspections

- A. When the Work has reached such a point of completion that the building or buildings, equipment or apparatus or any part thereof required by the Owner for occupancy or use can be so occupied and used for the purpose intended, the Owner or the Owner's Representative shall make a detailed inspection of the Work to insure that all requirements of the Contract have been met and that the Work is complete and is acceptable.
- B. A copy of the report of the inspection shall be furnished to the Contractor as the inspection progresses so that the Contractor may proceed without delay with any part of the Work found to be incomplete or defective.
- C. When the items appearing on the report of inspection have been completed or corrected, the Contractor shall so advise the Owner and the Owner's Representative. After receipt of the notification, the Owner or the Owner's Representative shall inform the Contractor of the date and time of final inspection. A copy of the report of the final inspection containing all

remaining contract exceptions, omissions and incompletions shall be furnished to the Contractor.

- D. After receipt of notification of completion and all remaining contract exceptions, omissions and incompletions from the Contractor, the Owner and the Owner's Representative shall make an inspection to verify completion of the exception items appearing on the report of final inspection.

01720 -- PROJECT RECORD DOCUMENTS

.01 - Project Record Drawings

- A. The purpose of the project drawings is to record the actual location of the Work in place including but not limited to underground lines, concealed piping within buildings, concealed valves and control equipment, and to record changes in the Work.
- B. In addition to the sets of contract drawings that are required by the Contractor on the Site to perform the Work, the Contractor shall maintain, at the Site, one (1) copy of all drawings, specifications and addenda that are part of the Contract as awarded. Each of these documents should be clearly marked "Project Record Copy", maintained in a clean and neat condition available at all times for inspection by the Owner or the Owner's Representative, and shall not be used for any other purpose during the progress of the Work.
- C. Project Record Requirements
 - 1. The Contractor shall mark-up the "Project Record Copy" to show:
 - (a) Approved changes in the Work.
 - (b) Location of underground Work and concealed Work.
 - (c) Details not shown in the original Contract Documents.
 - (d) Any relocation of Work.
 - (e) All changed in dimensions.
 - (f) All access doors.
 - (g) Location of all plumbing, heating, ventilating, air conditioning or electrical assemblies.
 - 2. Such information shall include, but shall not be limited to:

- (a) Footing depth in relation to finished grade elevations.
 - (b) Any change in floor elevations.
 - (c) Any structural changes.
 - (d) Any substitutions.
 - (e) Elevations and locations of all underground utilities, services, or structures referenced to permanent above-ground structures or monuments.
 - (f) Designation of all utilities as to the size and use of such utilities.
 - (g) All invert elevations of manholes.
 - (h) The location of all utilities, services and appurtenances concealed in building structures that have been installed different from that required by the Contract.
 - (i) Any approved change order.
- D. The Contractor shall keep the Project Record Documents up-to-date from day to day as the Work progresses. Appropriate documents are to be updated promptly and accurately; no Work is to be permanently concealed until all required information has been recorded.
- E. The project record drawings are to be submitted by the Contractor to the Owner or the Owner's Representative when all the Work is completed and is approved by the Owner and the Owner's Representative before the Contractor may request final payment.

01740 -- WARRANTIES, GUARANTEES, AND BONDS

See the Contract Documents for details.

SECTION V.
GENERAL CONDITIONS

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ARTICLE 1 -- DEFINITIONS

Section 1.01 - The following terms as used in the Contract Documents shall be defined as follows:

Beneficial Occupancy - The use, occupancy or operation by the Owner of the Work, or any part thereof, as evidenced by a notification of Beneficial Occupancy executed by the Owner.

Construction Completion - Acceptance by the Owner of the Work as evidenced by a Notification of Construction Completion executed by the Architect.

Construction Manager - A person, persons, firm, partnership or corporation, regularly engaged in the management of construction projects, and so designated by the Owner.

Consultant - A person, persons, firm, partnership or corporation providing Architectural, Engineering or other professional services, and so designated by the Owner.

Contract - The agreement between the Owner and the Contractor consisting of the Contract Documents including all amendments and supplements thereto.

Contract Documents - The Contract, Notice to Bidders, Bid Checklist, Bid Terms and Conditions, Contractor Reference Sheet, Contract Terms and Conditions, Bid Analysis Form, Affirmative Action Form, Change Order Form, Contractors Trade Payment Breakdown, Safety EHS Plan, Prevailing Wage Schedule, Information for Bidders, Form of Bid, General Conditions, General Requirements, Bonds, Drawings, Specifications, Addenda, Change Orders and any supplementary data together with all provisions of law deemed to be inserted in the Contract or incorporated by reference.

Contractor - A person, persons, firm, partnership or corporation with whom the Contract is entered into by the Owner to perform the Work.

Extra Work - Any work in addition to the Work initially required to be performed by the Contractor pursuant to the Contract.

Furnish - To deliver to the site ready for installation.

Install - To unload at the delivery point at the Site and perform every operation necessary to establish secure mounting and correct operation at the proper location.

Owner – The Fashion Institute of Technology and/or its auxiliary corporations, as applicable.

Owner's Representative - A person, persons, firm, partnership or corporation so designated by the Owner.

Project - Work at the Site(s) carried out pursuant to one or more sets of Contract Documents.

Provide - To Furnish and Install complete in place and ready for operation and use.

Shop Drawings - Diagrams, fabrication drawings, illustration, schedules, test data, performance charts, cuts brochures and other data which are submitted by the Contractor to the Architect and illustrate any portion of the Work. These drawings and data are reviewed and acted upon by the architect.

Site - The area within the Contract limit, as indicated by the Contract.

Subcontract - An agreement between the Contractor and Subcontractor for work on the Site.

Subcontractor - A person, persons, firm, partnership or corporation under contract with the Contractor, or under contract with any subcontractor, to provide labor and material at the Site.

Substantial Completion - Stage of construction at which the Architect determines there is a minimal amount of the Work to be completed, or Work to be corrected.

Work - The performance of all obligations imposed upon the Contractor by the Contract.

ARTICLE 2 -- CONTRACT DOCUMENTS

Section 2.01 - Captions

The table of contents, titles, captions, headings, running headlines and marginal notes contained herein and in said documents are solely to facilitate reference to various provisions of the Contract Documents and in no way affect the interpretation of the provisions to which they refer.

Section 2.02 - Conflicting Conditions

Should any provision in any of the Contract Documents be in conflict or inconsistent with any of the General Conditions or Supplements thereto, the General Conditions or Supplements thereto shall govern.

Section 2.03 - Notice and Service Thereof

Any notice to the Contractor from the Owner relative to any part of the Contract shall be in writing and service considered complete when said notice is mailed to the Contractor at the last address given by the Contractor, or when delivered in person to said Contractor or the Contractor's authorized representative.

Section 2.04 - Nomenclature

Materials, equipment or other Work described in words which have a generally accepted technical or trade meaning shall be interpreted as having said meaning in connection with the Contract.

Section 2.05 - Invalid Provisions

If any term or provision of the Contract Documents or the application thereof to any person, firm or corporation or circumstance shall, to any extent, be determined to be invalid or unenforceable, the remainder of the Contract Documents, or the application of such terms or provisions to persons, firms or corporations or circumstances other than those to which it is held invalid or unenforceable, shall not be affected thereby and each term or provision of the Contract Documents shall be valid and be enforced to the fullest extent permitted by law.

ARTICLE 3 -- INTERPRETATION OF CONTRACT DOCUMENTS

Section 3.01 – Owner/Architect

- A. The Owner's representative/Architect shall give all orders and directions contemplated under the Contract relative to the execution of the Work. The Architect shall determine the amount, quality, acceptability of the Work and shall decide all questions which may arise in relation to said Work. The Owner's estimates and decisions shall be final except as otherwise expressly provided. In the event that any question arises between the Owner and Contractor concerning the Contract, the decision of the Owner shall be a condition precedent to the right of the Contractor to receive any money or payment under the Contract.
- B. Any differences or conflicts concerning performance which may arise between the Contractor and other contractors performing Work for the Owner shall be adjusted and determined by the Owner's representative.
- C. The Owner may act through a representative designated by the Owner.

Section 3.02 - Meaning and Intent of Contract Documents

The meaning and intent of all Contract Documents shall be as interpreted by the Architect.

Section 3.03 - Order of Preference

- A. Figured dimensions shall take precedence over scaled dimensions. Larger scale drawings shall take precedence over smaller scale drawings. Latest addenda shall take precedence over previous addenda and earlier dated drawings and specifications.
- B. Should a conflict occur in or between or among any parts of the Contract Documents that are entitled to equal preference, the better quality or greater quantity of material, of the more specific compared to the general, shall govern, unless the Architect/Owner's representative directs otherwise.
- C. Drawings and specifications are complementary. Anything shown on the drawings and not mentioned in the specifications, or mentioned in the specifications and not shown on the drawings, shall have the same effect as if shown or mentioned in both.

ARTICLE 4 -- MATERIALS AND LABOR

Section 4.01 - Contractor's Obligations

- A. The Contractor shall, in a good workmanlike manner, perform all the Work required by the Contract Documents within the time specified in the Contract.
- B. The Contractor shall Furnish, erect, maintain, and remove such construction plant and such temporary Work as may be required for the performance of its work. The Contractor shall be responsible for the safety, efficiency and adequacy of the Contractor's plant, appliances and methods, and for damage which may result from failure or improper construction, maintenance or operation of said plant, appliances and methods. The Contractor shall comply with all terms of the Contract, and shall, carry on and complete the entire Work to the satisfaction of the Owner.
- C. Any labor, materials or means whose employment or utilization during the course of this Contract may tend to or in any way cause or result in strike, work stoppages, delays, suspension of Work or similar troubles by workmen employed by the Contractor, its subcontractors or material suppliers, or by any of the trades working in or about the buildings and premises where Work is being performed under this Contract, or by other contractors, their subcontractors or material suppliers pursuant to other contracts shall not be allowed. Any violation by the Contractor of this requirement may in the sole judgment of the Owner be considered as proper and sufficient cause for declaring the Contractor to be in default, and for the Owner to take action against the Contractor as set forth in the General Conditions Article entitled "Termination" or such other action as the Owner may deem proper.

Section 4.02 - Contractor's Title to Materials

- A. No materials or supplies for the Work shall be purchased by the Contractor or by any Subcontractor subject to any chattel mortgage or under a conditional sale or other agreement by which an interest is retained by any other party. The Contractor warrants that the Contractor has full, good and clear title to all materials and supplies used by the Contractor in the Work, or resold to the Owner pursuant to the Contract free from all liens, claims or encumbrances.
- B. All materials, equipment and articles which become the property of the Owner shall be new unless specifically stated otherwise.

Section 4.03 - "Or Equal" Clause

- A. Whenever a material, article or piece of equipment is identified on the plans or in the specifications by reference to manufacturers' or vendors' names, trade names, catalogue number or make, said identification is intended to establish a standard. Any material, article or equipment of other manufacturers and vendors which performs satisfactorily the duties imposed by the general design may be considered equally acceptable provided that, in the opinion of the Architect/Engineer, the material, article or equipment so proposed is of equal quality, substance and function and the Contractor shall not Provide, Furnish or Install any said proposed material, article or equipment without the prior written approval of the Architect/Engineer. The burden of proof and all costs related thereto concerning the "or equal" nature of the substitute item, whether approved or disapproved, shall be borne by the Contractor.
- B. Where the Architect/Engineer, pursuant to the provisions of this Section, approves a product proposed by the Contractor and said proposed product requires a revision of the Work covered by this Contract, or the Work covered by other contracts, all changes to the Work of all contracts, revision or redesign, and all new drawings and details required therefore shall be provided by the Contractor at the cost of the Contractor and shall be subject to the approval of the Consultant.
- C. No substitution will be permitted which may result in a delay to the Project.

Section 4.04 - Quality, Quantity and Labeling

- A. The Contractor shall Furnish materials and equipment of the quality and quantity specified in the Contract.
- B. When materials are specified to conform to any standard, the materials delivered to the Site shall bear manufacturer's labels stating that the materials meet said standards.

- C. The above requirements shall not restrict or affect the Owner's right to test materials as provided in the Contract.
- D. The Contractor shall develop and implement quality control plans to assure itself and the Owner that all Work performed by the Contractor and its Subcontractors complies fully with all Contract requirements, and shall submit the plans to the Owner as required by the Contract. See Submittals Section of the General Requirements. The Contractor's quality control plans shall be independent of any testing or inspection performed by or on behalf of the Owner.

ARTICLE 5 -- CONTRACTOR

Section 5.01 - Supervision by Contractor

- A. The Contractor shall provide full-time competent supervision for the duration of the Contract; during the course of on-site work the Contractor shall provide a full-time on-site superintendent who shall have full authority to act for the Contractor at all times. The Superintendent shall be able to read, write and speak English fluently, as well as communicate with the workers.
- B. If at any time the supervisory staff is not satisfactory to the Owner, the Contractor shall, if directed by the Owner, immediately replace such supervisory staff with other staff satisfactory to the Owner.
- C. The Contractor shall remove from the Work any employee of the Contractor or of any Subcontractor when so directed by the Owner.

Section 5.02 - Representations of Contractor

The Contractor represents and warrants:

- A. That it is financially solvent and is experienced in and competent to perform the Work, and has the staff, equipment, subcontractors and suppliers available to complete the Work within the time specified for the Contract price.
- B. That it is familiar with all Federal, State or other laws, ordinances, orders, rules and regulations that may in any way affect the Work.
- C. That any temporary and permanent Work required by the Contract can be satisfactorily constructed, and that said construction will not injure any person or damage any property.
- D. That it has carefully examined the Contract and the Site of the Work and that, from the Contractor's own investigations and through the bid process and requirements is satisfied as to the nature and materials likely to be encountered, the character of equipment and other facilities needed

for the performance of the Work, the general and local conditions and all other materials or items which may affect the Work.

- E. That it is satisfied that the Work can be performed and completed as required in the Contract, and warrants that it has not been influenced by any oral statement or promise of the Owner or the Consultant.

SECTION 5.03 – COPIES OF CONTRACT DOCUMENTS FOR CONTRACTORS

- A. The Owner shall furnish to the Contractor, without charge, up to five (5) copies of Contract Documents.
- B. Any sets in excess of the number mentioned above may be furnished to the Contractor at the cost of reproduction and mailing or delivery.

SECTION 5.04 - MEETINGS

The Contractor shall attend all meetings as directed by the Owner or the Owner's Representative.

SECTION 5.05 – RELATED WORK

To ascertain the relationship of its work to all Work required by the Contract Documents, the Contractor shall examine the Contract Documents for Work of its Contract and any related work of other contracts.

SECTION 5.06 – ERRORS OR DISCREPANCIES

The Contractor shall examine the Contract thoroughly before commencing the Work and report in writing any errors or discrepancies to the Owner or the Owner's Representative within five (5) days of discovery.

ARTICLE 6 -- SITE CONDITIONS

SECTION 6.01 – SUBSURFACE OR SITE CONDITIONS FOUND DIFFERENT

- A. The Contractor acknowledges that the Contract amount set forth in its bid includes such provisions which the Contractor deems proper for all Site

conditions the Contractor could reasonably anticipate encountering as indicated in the Contract or from the Contractor's inspection and examination of the Site prior to submission of bids.

SECTION 6.02 – VERIFYING DIMENSIONS AND CONDITIONS

- A. The Contractor shall take all measurements and verify all dimensions and conditions at the Site before proceeding with the Work. If said dimensions or conditions are found to be in conflict with the Contract, the Contractor immediately shall refer said conflict to the Architect in writing. The Contractor shall comply with any revised Contract Documents.
- B. During the progress of Work, the Contractor shall verify all field measurements prior to fabrication of building components or equipment and proceed with the fabrication to meet field conditions.
- C. The Contractor shall consult all Contract Documents to determine exact location of all Work and verify spatial relationships of all Work. Any question concerning said location or spatial relationships may be submitted in a manner approved by the Architect.
- D. Special locations for equipment, pipelines, ductwork and other such items of Work, where not dimensioned on plans, shall be determined in consultation with other affected contractors.
- E. The Contractor shall be responsible for the proper fitting of the Work in place.

SECTION 6.03 - SURVEYS

Unless otherwise expressly provided in the Contract, the Owner shall furnish the Contractor all surveys of the property necessary for the Work, but the Contractor shall lay out the Work.

ARTICLE 7 -- INSPECTION AND ACCEPTANCE

SECTION 7.01 – ACCESS TO THE WORK

The Owner, the Owner's Representative, and the architect shall at all times have access to the Work and the Contractor shall provide proper facilities for said access.

SECTION 7.02 – NOTICE FOR TESTING

If the Contract Documents, the Owner's instructions, laws, rules, ordinances or regulations require that any Work be inspected or tested, the Contractor shall give the Architect and/or Owner's representative a minimum of three (3) work days written notice of readiness of the Work for inspection or testing and the date fixed for said inspections or testing.

SECTION 7.03 – REEXAMINATION OF WORK

Reexamination of any part of the Work may be ordered by the Owner, and if so ordered, the Work must be uncovered by the Contractor. If said Work is found to be in accordance with the Contract, the Owner shall pay the cost of reexamination. If said Work is not found to be in accordance with the Contract, the Contractor shall pay the cost of reexamination and replacement.

SECTION 7.04 – INSPECTION OF WORK

All Work, all materials whether or not incorporated in the Work, all processes of manufacture and all methods of construction shall be, at all times and places, subject to the inspection of the Owner or the Owner's Representative or the architect, and the Architect shall be the final judge of the quality and suitability of the Work, materials, processes of manufacture and methods of construction for the purposes for which said Work, materials, processes of manufacture and methods of construction are used. Any Work not approved by the Architect shall be reconstructed, made good, replaced or corrected immediately by the Contractor including all Work of other contractors destroyed or damaged by said removal or replacement. Rejected material shall be removed immediately from the Site. Acceptance of material and workmanship by the Owner shall not relieve the Contractor from the Contractor's obligation to replace all Work which is not in compliance with the Contract.

SECTION 7.05 – DEFECTIVE OR DAMAGED WORK

If, in the opinion of the Owner, it is undesirable to replace any defective or damaged materials or to reconstruct or correct any portion of the Work damaged or not performed in accordance with the Contract, the compensation to be paid to the Contractor shall be reduced by an amount which, in the judgment of the Owner, shall be deemed to be equitable.

SECTION 7.06 - TESTING

All materials and equipment used in the Work shall be subject to inspection and testing in accordance with accepted standards to establish conformance with specifications and suitability for uses intended, unless otherwise specified in the Contract. If any Work shall be covered or concealed without the approval or consent of the Architect, said Work shall, if required by the Architect, be uncovered for examination. Any inspection by the Architect or by a testing laboratory on behalf of the Owner does not relieve the Contractor of the responsibility to maintain quality control of materials, equipment and installation to conform to the requirements of the Contract. If any test results are below specified minimums, the Architect may order additional testing. The cost of said additional testing, any additional professional services required, and any other expenses incurred by the Owner as a result of said additional testing shall be at the Contractor's expense. The Owner may deduct such costs from moneys due the Contractor.

SECTION 7.07 - ACCEPTANCE

No previous inspection shall relieve the Contractor of the obligation to perform the Work in accordance with the Contract. No payment, either partial or full, by the Owner to the Contractor shall excuse any failure by the Contractor to comply fully with the Contract Documents. The Contractor shall remedy all defects and deficiencies, paying the cost of any damage to other Work resulting therefrom.

ARTICLE 8 -- CHANGES IN THE WORK

SECTION 8.01 - CHANGES

- A. Without invalidating the Contract, the Owner/Architect may order Extra Work or make changes by altering, adding to, or deducting from the Work, the Contract consideration being adjusted accordingly. No claims for Extra Work shall be allowed unless such Extra Work is ordered in writing by the Owner/Architect. No changes in the Work shall be made unless such Work is ordered in writing by the Owner/Architect or Owner's Representative. If the time for completion is affected by this change, the revised time for completion shall be included in the change order. The Owner may order the Contractor to perform the Extra Work and proceed under the Dispute Article.

- B. The amount by which the Contract consideration is to be increased or decreased by any change order may be determined by the Owner by one or more of the following methods:
1. By applying the applicable unit price or prices contained in the Contract.
 2. By estimating the fair and reasonable cost of the Extra Work:
 - a. Labor, including all wages, required wage supplements and insurance required by law, paid to employees below the rank of superintendent directly employed at the Site. Wages are the prevailing rate of wages defined in the Contract Documents and supplemental updates.
 - b. Premiums or taxes paid by the Contractor for worker's compensation insurance, unemployment insurance, FICA tax and other payroll taxes as required by law, net of actual and anticipated refunds and rebates.
 - c. Materials
 - d. Equipment, excluding hand tools, which in the judgment of the Owner, would have been or will be employed in the Work. It is the duty of the Contractor to utilize either rented or self-owned equipment that is of a nature and size appropriate for the Work to be performed. The Owner reserves the right to determine reasonable and appropriate equipment sizing, and at the Owner's discretion, to adjust the costs allowed to reflect a smaller or less elaborate piece of equipment more suitable for performance of the Extra Work.
 3. By determining the actual cost of the Extra Work in the same manner as in Article 8, Section 8.01, Subsection B. 2. except that the actual costs of the Contractor shall be used in lieu of estimated costs.
- C. The Owner shall have the option of determining by which method the Contractor shall proceed with said Extra Work. Wages are the prevailing rate of wages defined in the Contract Documents and supplemental updates. The Contractor shall submit a signed and notarized Labor Rate Worksheet(s) to the Owner to be used to determine hourly rates for various classifications of workers. The Contractor agrees to provide documentation verifying costs and calculations at the Owner's request.

- D. Regardless of the method used by the Owner in determining the value of a change order, the Contractor shall, within the time-frame given by the Owner, submit to the Owner or Owner's Representative a detailed breakdown of the Contractor's estimate of the value of the omitted or Extra Work.
- E. Unless otherwise specifically provided for in a change order, the compensation specified therein for Extra Work includes full payment for the Extra Work covered thereby, and the Contractor waives all rights to any other compensation for said Extra Work, damage or expense.
- F. The Contractor shall furnish satisfactory bills, payrolls and vouchers covering all items of cost and when requested by the Owner shall give the Owner access to all accounts and records relating thereto, including records of subcontractors and material suppliers.
- G. Increased bonding costs for the Work which may result from Owner issued Changes in the Work will be addressed by the Owner at the completion of the Project Work upon submission of satisfactory proof of Contractor's increased cost.
- H. Increased contractual liability insurance premium costs which may result from changes in the Work will be addressed by the Owner at the completion of the Work upon submission of satisfactory proof of Contractor's increased cost.

SECTION 8.02 – OVERHEAD AND PROFIT ALLOWANCE

A. See Example A for changes in the Work performed directly by the Contractor, whether a base cost is arrived at by estimated cost or actual cost method; add to base cost a sum equal to twenty percent. See Exceptions - Paragraphs “D” and “E”.

Example A:

Contractor base cost	\$1,000
20% overhead and profit	<u>200</u>
Total	\$1,200

B. See Example B for changes in the Work performed by a Subcontractor under contract with the Contractor, where estimated or actual cost is Ten Thousand Dollars (\$10,000.00) or less; add to the base cost a sum equal to twenty percent of cost, for the benefit of the Subcontractor. For the benefit of the Contractor; add an additional sum equal to ten percent of the Subcontractor's base cost.

Example B:

Subcontractor base cost	\$1,000
20% Subcontractor overhead and profit	<u>200</u>
Subcontractor Total	\$1,200
10% Contractor overhead and profit on base cost	<u>100</u>
Total	\$1,300

C. See Example C for changes in the Work performed by a Subcontractor, under contract with the Contractor, which exceeds a base cost of Ten Thousand Dollars (\$10,000) in estimated or actual cost; add to the base cost a sum equal to twenty percent of cost for the benefit of the Subcontractor. For the benefit of the Contractor; add an additional sum equal to ten percent of the first Ten Thousand Dollars (\$10,000) of the Subcontractor's base cost, plus five percent of the next Ninety Thousand Dollars (\$90,000) of the Subcontractor's base cost, plus three percent of any sum in excess of One Hundred Thousand Dollars (\$100,000) of the Subcontractor's base cost.

Example C:

Subcontractor base cost	\$200,000
20% Subcontractor overhead and profit	<u>40,000</u>
Subcontractor Total	\$240,000
10% Contractor overhead and profit on first \$10,000 base cost	1,000
5% on next \$90,000 base cost	4,500
3% on base cost over \$100,000	<u>3,000</u>
Total	\$248,500

D. See Example D for overhead and profit on major equipment such as: switchgear, transformers, air handling units, boilers, etc. For extra equipment purchases by the Contractor or Subcontractors which exceeds a base cost of Ten Thousand dollars (\$10,000) in estimated or actual cost; add to the base cost for the benefit of the Contractor a sum equal to ten percent of the first Ten Thousand dollars (\$10,000) of the vendor's base cost plus five percent of the next Ninety Thousand dollars (\$90,000) of the vendor's base cost, plus three percent of any sum in excess of One Hundred Thousand dollars (\$100,000) of the vendor's base cost. If the equipment is supplied by the Subcontractor, the Contractor is entitled to a maximum of ten (10) percent of the first Ten Thousand dollars (\$10,000) of the base cost.

Example D:

Vendor base cost	\$200,000
10% Contractor or Subcontractor overhead and profit on first \$10,000 base cost	1,000
5% on next \$90,000 base cost	4,500
3% on base cost over \$100,000	<u>3,000</u>
Contractor or Subcontractor Total	\$208,500
10% Contractor overhead and profit on first \$10,000 base cost when equipment is supplied by the Subcontractor, no other mark-up allowed	<u>1,000</u>
Total	\$209,500

E. See Example E for overhead and profit on a material only Change Order. For increased material purchases by the Contractor or Subcontractors which exceed a base cost of Ten Thousand dollars (\$10,000) in estimated or actual costs; add to the base cost for the benefit of the Contractor a sum equal to ten percent of the first Ten Thousand dollars (\$10,000) of the supplier's cost plus five percent of the next Ninety Thousand dollars (\$90,000) of the supplier's cost, plus three percent of any sum in excess of One Hundred Thousand dollars (\$100,000) of the supplier's cost. If the material is supplied by the Subcontractor, the Contractor is entitled to a maximum of ten (10) percent of the first Ten Thousand dollars (\$10,000) of the base cost.

Example E:

Material cost (net difference between original contract and revised)	\$200,000
10% Contractor or Subcontractor overhead and profit on first \$10,000 base cost	1,000
5% on next \$90,000 base cost	4,500
3% on base cost over \$100,000	<u>3,000</u>
Contractor or Subcontractor Total	\$208,500
10% Contractor overhead and profit on first \$10,000 base cost when material is supplied by the Subcontractor, no other mark-up allowed	1,000
Total	\$209,500

F. Other than the overhead and profit described in General Conditions Section 7.02A, no further overhead and profit will be allowed for changes to the Work performed by a Subcontractor under Subcontract with the Contractor or for major equipment or material supplier determined to be an affiliate of or controlled by the Contractor. An affiliate is considered any firm or entity in which the Contractor or any individual listed on the Contractor's NYS Vendor Responsibility Questionnaire either owns 5% or more of the shares of, or is one of the five largest shareholders, a director, officer, member, partner or proprietor of said Subcontractor, major equipment or material supplier; a controlled firm is any firm or entity which, in the opinion of the Owner, is controlled by the Contractor or any individual listed on the Contractor's NYS Vendor Responsibility Questionnaire.

1. The Owner, in its sole and exclusive discretion, will determine if a firm or entity is an affiliate of or controlled by the Contractor.

G. No overhead and profit shall be paid for changes in the Work performed by a Subcontractor not under Subcontract with the Contractor. No overhead and profit shall be paid on the premium portion of overtime pay. Where the changes in the Work involve both an increase and a reduction in similar or related Work, the overhead and profit allowance shall be applied only to the cost of the increase that exceeds the cost of the reduction.

SECTION 8.02A – DEDUCT CHANGE ORDER

The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a decrease in the Contract amount shall be as determined by the Owner. The credit shall include the overhead and profit allocable to the deleted or changed Work unless the Owner, in its sole and exclusive discretion, determines otherwise.

SECTION 8.03 – FORM OF CHANGE ORDERS

All Change Orders shall be processed, executed and approved on AIA document G701, which is included herein and made part of the Contract Documents. No alteration to this form shall be acceptable to the Owner and no payment for Extra Work shall be due the Contractor unless it executes a Change Order on said form.

ARTICLE 9 -- TIME OF COMPLETION

SECTION 9.01 – TIME OF COMPLETION

- A. The Work shall be commenced at the time stated in the Owner's written notice to proceed, and shall be completed no later than the time of completion specified in the Contract Documents. Notwithstanding anything to the contrary, a schedule submitted by the Contractor showing a time of completion earlier than that specified in the Contract shall not entitle the Contractor to any additional compensation in the event the earlier time of completion is not realized.
- B. It is hereby understood and mutually agreed, by and between the Contractor and the Owner, that the time for completion of the Work, as specified in the Contract Documents, is an essential and material condition of the Contract.
- C. The Contractor agrees that the Work shall be prosecuted regularly, diligently and uninterruptedly at such rate of progress as shall insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for completion of the Work described herein is a reasonable time for completion of the same.
- D. If the Contractor shall neglect, fail or refuse to complete the Work within the time specified, or any proper extension thereof granted by the Owner, the Contractor agrees to pay to the Owner for loss of beneficial use of the structure an amount specified in the Contract, not as a penalty, but as liquidated damages, for each and every calendar day that the Contractor is in default. Default shall include abandonment of the Work by the Contractor.
- E. Said amount of liquidated damages is agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages which the Owner would sustain for loss of beneficial use of the structure in the event of delay in completion, and said amount is agreed to be the amount of damages sustained by the Owner and said amount may be retained from time to time by the Owner.

- F. It is further agreed that time is of the essence for each and every portion of the Work. In any instance in which additional time is allowed for the completion of any Work, the new time of completion established by said extension shall be of the essence. The Contractor shall not be charged with liquidated damages or any excess cost if the Owner determines that the Contractor is without fault and that the delay in completion of the Work is due:
1. to an unforeseeable cause beyond the control and without the fault of, or negligence of the Contractor, and approved by the Owner, including, but not limited to, acts of God or of public enemy, acts of the Owner, fires, epidemics, quarantine, restrictions, strikes, freight embargoes and unusually severe weather; and
 2. to any delays of Subcontractors or suppliers occasioned by any of the causes specified in Subsections 1. of this paragraph.

The Contractor shall, within ten (10) days from the beginning of any such delay, notify the Owner, in writing, of the causes of the delay.

- G. The time for completion can be extended only by Change Order approved by the Owner and may be extended for:
1. all of the Work, or
 2. only that portion of the Work altered by the Change Order.

- H. The foregoing liquidated damages are intended to compensate the Owner only for the loss of beneficial use of the structure. In addition, the Contractor shall be liable to the Owner for whatever actual damages (other than actual loss of beneficial use) the Owner may incur as a result of any actions or inactions of the Contractor or its Subcontractors including, without limitation, interest expense and carrying costs, liabilities to other Contractors working on the project or other third parties, job extension costs and other losses incurred by the Owner. The provisions of this paragraph are for the exclusive use of the Owner, and shall not accrue to other contractors or third parties.

ARTICLE 10 -- TERMINATION OR SUSPENSION

SECTION 10.01 – TERMINATION FOR CAUSE

In the event that any provision of the Contract is violated by the Contractor or by any Subcontractor, the Owner may serve written notice upon the Contractor and upon the Contractor's surety, if any, of the Owner's intention to terminate the Contract; such notice shall contain the reasons for the intention to terminate the Contract upon a date specified by the Owner. If the violation or delay shall not cease or arrangements satisfactory to the Owner shall not be made, the Contract shall terminate upon the date so specified by the Owner. In the event of any such termination, the Owner may take over the Work and prosecute same to completion by Contract or otherwise for the account and at the expense of the Contractor, and the Contractor and Contractor's surety shall be liable to the Owner for all costs occasioned the Owner thereby. In the event of such termination the Owner may take possession of and may utilize such materials, appliances and plant as may be on the Site and necessary or useful in completing the Work.

SECTION 10.02 – TERMINATION FOR CONVENIENCE OF OWNER

The Owner, at any time, may terminate the Contract in whole or in part. Any such termination shall be effected by delivering to the Contractor a notice of termination specifying the extent to which performance of Work under the Contract is terminated and the date upon which the termination becomes effective. Upon receipt of the notice of termination, the Contractor shall act promptly to minimize the expenses resulting from the termination. The Owner shall pay the Contractor for Work of the Contract performed by the Contractor and accepted by the Owner for the period extending from the date of the last approved Application for Payment up to the effective date of the termination, including retainage. In no event shall the Contractor be entitled to compensation in excess of the total consideration of the Contract. . In the event of such termination the Owner may take over the Work and prosecute the Contract to completion and may take possession of and may utilize such materials, appliances, and equipment as may be on the Site and necessary or useful in completing the Work.

SECTION 10.03 – OWNER'S RIGHT TO DO WORK

The Owner may, after notice to the Contractor, without terminating the Contract and without prejudice to any other right or remedy the Owner may have, perform or have performed by others all of the Work or any part thereof and may deduct the cost thereof from any moneys due or to become due the Contractor.

SECTION 10.04 – SUSPENSION OF WORK

- A. The Owner may order the Contractor in writing to suspend, delay or interrupt performance of all or any part of the Work for a reasonable period of time as the Owner may determine. The order shall contain the reason or reasons for issuance which may include but shall not be limited to the following: latent field conditions, substantial program revisions, acquisition of rights of way or real property, financial crisis, labor disputes, civil unrest or acts of God.
- B. Upon receipt of a suspension order, the Contractor shall, as soon as practicable, cease performance of the Work as ordered and take immediate affirmative measures to protect such Work from loss or damage.
- C. The Contractor specifically agrees that such suspension, interruption or delay of the performance of the Work pursuant to this Article shall not increase the cost of performance of the Work of this Contract.
- D. Time for completion of the Work may be extended to such time as the Owner determines shall compensate for the time lost by the suspension, interruption or delay, such determination to be set forth in writing.

ARTICLE 11 -- DISPUTES

SECTION 11.01 – CLAIMS FOR EXTRA WORK

- A. If the Contractor claims that any Work which the Contractor has been ordered to perform will be Extra Work, or that any action or omission of the Owner is contrary to the terms and provisions of the Contract and will require the Contractor to perform Extra Work the Contractor shall:
 - 1. Promptly comply with said order.
 - 2. File with the Owner and the architect within fifteen (15) working days after being ordered to perform the Work claimed by the Contractor to be Extra Work or within fifteen (15) working days after commencing performance of the Work, whichever date shall be earlier, or within fifteen (15) working days after the said action or omission on the part of the Owner occurred, a written notice of the basis of the Contractor's claim, including estimated cost, and request for a determination thereof.

3. Proceed diligently, pending and subsequent to the determination of the Owner with respect to any said disputed matter, with the performance of the Work in accordance with all instructions of the Owner.
- B. No claim for Extra Work shall be allowed unless the same was done pursuant to a written order of the Owner. The Contractor's failure to comply with any or all parts of this Article shall be deemed to be:
1. a conclusive and binding determination on the part of the Contractor that said order, Work, action or omission does not involve Extra Work and is not contrary to the terms and provisions of the Contract,
 2. a waiver by the Contractor of all claims for additional compensation or damages as a result of said order, Work, action or omission.
- C. The value of claims for Extra Work, if allowed, shall be determined by the methods described in the Contract.

SECTION 11.02 – CLAIMS FOR DELAY

No claims for increased costs, charges, expenses or damages of any kind shall be made by the Contractor against the Owner for any delays or hindrances from any cause whatsoever; provided that the Owner, in the Owner's discretion, may compensate the Contractor for any said delays by extending the time for completion of the Work as specified in the Contract.

SECTION 11.03 – FINALITY OF DECISIONS

- A. Any decision or determination of the Architect, Owner or the Owner's Representative shall be final, binding and conclusive on the Contractor unless the Contractor shall, within ten (10) working days after said decision, make and deliver to the Owner a verified written statement of the Contractor's contention that said decision is contrary to a provision of the Contract. The Owner shall determine the validity of the Contractor's contention. Pending the decision of the Owner, the Contractor shall proceed in accordance with the original decision.
- B. Wherever it is required in the Contract that an application must be made to the Owner or a determination made by the Owner, the decision of the Owner on said application or the determination of the Owner under the Contract shall be final, conclusive and binding upon the Contractor unless the Contractor, within ten (10) working days after receiving notice of the Owner's decision or determination, files a written statement with the Owner that the Contractor reserves the Contractor's rights in connection with the matters covered by said decision or determination.

ARTICLE 12 -- SUBCONTRACTS

SECTION 12.01 – SUBCONTRACTING

- A. The Contractor may utilize the services of Subcontractors subject to the bid terms and conditions.
- B. The Contractor shall submit to the Owner, in writing, the name of each proposed Subcontractor as required by the Contract or earlier when requested. The Owner reserves the right to disapprove any proposed Subcontractor. Such disapproval shall not result in additional cost to the Owner.
- C. The Contractor shall be fully responsible for the Work, acts and omissions of Subcontractors, and of persons either directly or indirectly employed by Subcontractors.
- D. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind Subcontractors to the Contractor by the terms of the Contract Documents insofar as applicable to the work of Subcontractors.
- E. The Contractor's use of Subcontractors shall not diminish the Contractor's obligation to complete the Work in accordance with the Contract Documents. The Contractor shall control and coordinate the work of Subcontractors.
- F. Nothing contained in the Contract or any subcontract shall create any contractual relationship between Subcontractors and the Owner.

ARTICLE 13 -- CONTRACT COORDINATION AND COOPERATION

SECTION 13.01 – COOPERATION WITH OTHER CONTRACTORS

- A. During the progress of the Work, other contractors may be engaged in performing work. The Contractor shall coordinate the Contractor's Work with the work of said other contractors in such a manner as the Owner may direct.
- B. If the Owner shall determine that the Contractor is failing to coordinate the Work with the work of other contractors as the Owner has directed:
 - 1. the Owner shall have the right to withhold any payments due under the Contract until the Owner's directions are complied with by the Contractor; and
 - 2. the Contractor shall assume the defense and pay on behalf of the Owner any and all claims or judgments or damages and from any costs or damages to which the Owner may be subjected or which the Owner may suffer or incur by reason of the Contractor's failure to promptly comply with the Owner's directions.
- C. If the Contractor notifies the Owner, in writing, that another contractor on the Site is failing to coordinate the work of said contractor with the Work, the Owner shall investigate the charge. If the Owner finds it to be true, the Owner shall promptly issue such directions to the other contractor with respect thereto as the situation may require. The Owner shall not be liable for any damages suffered by the Contractor by reason of the other contractor's failure to promptly comply with the directions so issued by the Owner, or by reason of another contractor's default in performance.
- D. Should the Contractor sustain any damage through any act or omission of any other contractor having a contract with the Owner or through any act or omission of any Subcontractor of said other contractor, the Contractor shall have no claim against the Owner for said damage.
- E. Should any other contractor having or which shall have a contract with the Owner sustain damage through any act or omission of the Contractor or through any act or omission of a Subcontractor, the Contractor shall reimburse said other contractor for all said damages and shall indemnify and hold the Owner harmless from all said claims.

- F. The Owner cannot guarantee the responsibility, efficiency, unimpeded operations or performance of any Contractor. The Contractor acknowledges these conditions and shall bear the risk of all delays including, but not limited to, delays caused by the presence or operations of other contractors and delays attendant upon any construction schedule approved by the Owner and the Owner shall not incur any liability by reason of any delay.

SECTION 13.02 – SEPARATE CONTRACTS

- A. The Owner may award other contracts, work under which may proceed simultaneously with the execution of the Work. The Contractor shall coordinate the Contractor's operations with those of other contractors as directed by the Owner. Cooperation shall be required in the arrangements for access, the storage of material and in the detailed execution of the Work.
- B. The Contractor shall keep informed of the progress and workmanship of other contractors and any Subcontractors and shall notify the Owner in writing immediately of lack of progress or defective workmanship on the part of other contractors or subcontractors, where said delay or defective workmanship may interfere with the Contractor's operations.
- C. Failure of a Contractor to keep so informed and failure to give notice of lack of progress or defective workmanship by others shall be construed as acceptance by the Contractor of said progress and workmanship as being satisfactory for proper coordination with the Work.
- D. Where the Contractor shall perform Work in close proximity to work of other contractors or subcontractors, or where there is evidence that Work of the Contractor may interfere with work of other contractors or subcontractors, the Contractor shall assist in arranging space conditions to make satisfactory adjustment for the performance of said work and the Work. If the Contractor performs work in a manner which causes interference with the work of other contractors or subcontractors, the Contractor shall make changes necessary to correct the condition.

SECTION 13.03 – COORDINATED COMPOSITE DRAWINGS

The Contractor shall prepare coordinated composite scale reproducible drawings and sections, on reproducible paper, clearly showing how the Work of the Contractor is to be performed in relation to work of other contractors or subcontractors.

ARTICLE 14 -- PROTECTION OF RIGHTS, PERSONS AND PROPERTY

SECTION 14.01 – ACCIDENT PREVENTION

The Contractor shall, at all times, take every precaution against injuries to persons or damage to property and for the safety of persons on or about the Site or engaged in the performance of the Work.

SECTION 14.02 – SAFETY PROGRAMS

The Contractor shall be responsible for the initiation, maintenance and supervision of safety precautions and programs in connection with the Work.

SECTION 14.03 – PROTECTION OF WORK AND PROPERTY

- A. The Contractor shall, at all times, guard the Owner's property from injury or loss in connection with the Work. The Contractor shall, at all times, guard and protect the Contractor's Work, and adjacent property. The Contractor shall replace or make good any said loss or injury unless said loss or injury is caused directly by the Owner.
- B. The Contractor shall have full responsibility to protect and maintain all materials and supplies on and off site in proper condition and forthwith repair, replace and make good any damage thereto until construction completion. The Contractor shall maintain an inventory of all materials and supplies for the Project that are delivered to the Site or approved for off-site storage facilities.
- C. The Contractor shall report any loss, theft, burglary, vandalism or damage of materials or installed work to the Owner by phone and fax as soon as it is discovered. If vandalism, theft, or burglary are suspected as the cause of the loss, the Contractor shall notify site security personnel and the municipal police. The Contractor shall also protect the place of the loss until released from protection by the Owner or the Owner's Representative. The Contractor shall insure that no potential evidence relating to the loss is removed from the place of the loss.

SECTION 14.04 – ADJOINING PROPERTY

The Contractor shall protect all adjoining property and shall repair or replace any said property damaged or destroyed during the progress of the Work.

SECTION 14.05 – RISKS ASSUMED BY THE CONTRACTOR

- A. The Contractor solely assumes the following distinct and several risks whether said risks arise from acts or omissions, whether supervisory or otherwise, of the Owner, of any Subcontractor, of third persons or from any other cause, including unforeseen obstacles and difficulties which may be encountered in the execution of the Work, whether said risks are within or beyond the control of the Contractor and whether said risks involve any legal duty, primary or otherwise, imposed upon the Owner, excepting only risks which arise from faulty designs as shown by the plans and specifications or from the negligence of the Owner or the Owner's members, officers, representatives or employees that caused the loss, damage or injuries hereinafter set forth:
1. The risk of loss or damage, includes direct or indirect damage or loss, of whatever nature to the Work or to any plant, equipment, tools, materials or property furnished, used, installed or received by the Owner, the Construction Manager, the Contractor or any Subcontractor, material or workmen performing services or furnishing materials for the Work. The Contractor shall bear said risk of loss or damage until construction completion or until completion or removal of said plant, equipment, tools, materials or property from the Site and the vicinity thereof, whichever event occurs last. In the event of said loss or damage, the Contractor immediately shall repair, replace or make good any said loss or damage.
 2. The risk of claims, just or unjust, by third persons against the Contractor or the Owner and the Construction Manager on account of wrongful death, bodily injuries and property damage, direct or consequential, loss or damage of any kind whatsoever arising or alleged to arise out of or as a result of or in connection with the performance by the Contractor of the Work, whether actually caused by or resulting from the performance of the Work, or out of or in connection with the Contractor's operations or presence at or in the vicinity of the Site. The Contractor shall bear the risk for all deaths, injuries, damages or losses sustained or alleged to have been sustained prior to the construction completion of the Work. The Contractor shall bear the risk for all deaths, injuries, damages or losses sustained or alleged to have been sustained resulting from the Contractor's negligence or alleged negligence which is discovered, appears or is manifested after acceptance by the Owner.

3. The Contractor assumes entire responsibility and liability for any and all damage or injury of any kind or nature whatsoever, including death resulting therefrom, to all persons, whether employees of the Contractor or otherwise, and to all property, caused by, resulting from, arising out of or occurring in connection with the execution of the Work. If any person shall make said claim for any damage or injury, including death resulting therefrom, or any alleged breach of any statutory duty or obligation on the part of the Owner, the Owner's Representative, Construction Manager, servants and employees, the Contractor shall assume the defense and pay on behalf of the Owner, the Owner's Representative, the Construction Manager, servants and employees, any and all loss, expense, damage or injury that the Owner, the Owner's Representative, Construction Manager, servants and employees, may sustain as the result of any claim, provided however, the Contractor shall not be obligated to indemnify the Owner, the Owner's Representative, Construction Manager, servants and employees for their own negligence, if any. The Contractor agrees to assume, and pay on behalf of the Owner and the Owner's Representative, Construction Manager, servants and employees, the defense of any action at law or equity which may be brought against the Owner and the Owner's Representative, Construction Manager, servants and employees. The assumption of defense and liability by the Contractor includes, but is not limited to the amount of any legal fees associated with defending, all costs of investigation, expert evaluation and any other costs including any judgment or interest or penalty that may be entered against the Owner and the Owner's Representative, Construction Manager, servants and employees, in any said action.
 4. The Contractor is advised that the Work required under this Contract may impose certain obligations and requirements mandated by the U.S. Department of Labor Occupational Safety and Health Administration regulations, Title 29 CFR Part 1926.62 Lead Exposure in Construction, relative to the potential exposure to lead by its employees. The Contractor assumes entire responsibility and liability for complying fully in all respects with these regulations.
- B. The Contractor's obligations under this Article shall not be deemed waived, limited or discharged by the enumeration or procurement of any insurance for liability for damages. The Contractor shall notify its insurance carrier within twenty four (24) hours after receiving a notice of loss or damage or claim from the Owner.

The Contractor shall make a claim on its insurer specifically under the provisions of the contractual liability coverages and any other coverages afforded the Owner including those of being an additional insured where applicable.

- C. Neither Final Acceptance of the Work nor making any payment shall release the Contractor from the Contractor's obligations under this Article. The enumeration elsewhere in the Contract of particular risks assumed by the Contractor or of particular claims for which the Contractor is responsible shall not be deemed to limit the effect of the provisions of this Article or to imply that the Contractor assumes or is responsible for only risks or claims of the type enumerated; and neither the enumeration in this Article nor the enumeration elsewhere in the Contract of particular risks assumed by the Contractor of particular claims for which the Contractor is responsible shall be deemed to limit the risks which the Contractor would assume or the claims for which the Contractor would be responsible in the absence of said enumerations.

Upon the conclusion of any action, proceeding or lawsuit, should a final binding determination of responsibility be made which allocates responsibility to the Owner, or the Owner's members, officers, employees or representatives, the Owner agrees that the obligation to indemnify and hold harmless shall not be applicable to the portion of any uninsured money judgment for which the Owner is responsible, and the Owner agrees to pay the Contractor the percentage of uninsured defense costs which the Contractor incurred based upon an apportionment of the Owner's allocated responsibility.

The Contractor agrees that any claim or costs of the Owner and/or Construction Manager arising from obligations in this Article and/or Article 15 shall be set off or deducted from payments due the Contractor.

ARTICLE 15--INSURANCE AND CONTRACT SECURITY

SECTION 15.01 – INSURANCE PROVIDED BY CONTRACTOR

- A. The Contractor shall procure and maintain all of the insurance required under this Article until all Work, including punch list items, is complete.

The Contractor shall provide insurance as follows:

1. Workers' Compensation and Employers Liability Insurance
 - a. Statutory Workers' Compensation (including occupational disease)

- b. Employers Liability (with a minimum limit of \$1,000,000) New York Statutory Endorsement
2. Commercial General Liability (CGL) with a combined single limit for Bodily Injury, Personal Injury and Property Damage of at least \$2,000,000 per occurrence & aggregate. The limit may be provided through a combination of primary and umbrella/excess liability policies.

Coverage shall provide and encompass the following:

- a. Written on an occurrence form;
 - b. Endorsement naming the following as additional insureds: The Fashion Institute of Technology, its auxiliary corporations, the State University of New York, the New York City Department of Education and the City and State of New York, the Construction Manager (if applicable) and other entities specified.
 - c. Policy or policies must be endorsed to be primary as respects the coverage afforded the Additional Insureds and such policy shall be primary to any other insurance maintained by the Owner. Any other insurance maintained by the Owner shall be excess of and shall not contribute with the Contractor's or Subcontractor's insurance, regardless of the "other insurance" clause contained in the Owner's own policy of insurance.
3. Commercial Automobile Liability and Property Damage Insurance covering all owned, leased, hired and non-owned vehicles used in connection with the Work with a combined single limit for Bodily Injury and Property Damage of at least \$1,000,000 per occurrence. The limit may be provided through a combination of primary and umbrella/excess liability policies.
4. Umbrella/excess liability insurance with limits of:
- \$5,000,000 per occurrence
 - \$5,000,000 general aggregate

- B. Before commencement of Work, the Contractor shall submit to the Owner for approval two (2) Certificates of Insurance, indicating the Project. Certificates shall provide thirty (30) days' written notice prior to the cancellation, non-renewal, or material modification of any policy. Upon request, the Contractor shall furnish the Owner and the Construction Manager with certified copies of each policy. In addition, where applicable, the Contractor shall provide copies of Certificates of Insurance to the Construction Manager.

Certificates shall be forwarded to Owner in care of:

Sam Li
Purchasing Deputy Director
FIT Purchasing
333 Seventh Avenue, 15th Floor
New York, NY 10001

Certificate(s) of Insurance, when submitted to the Owner, constitutes a warranty by the Contractor that the insurance coverage described is in effect for the policy term shown.

Should the Contractor engage a Subcontractor, the same conditions as are applicable to the Contractor under these insurance requirements shall apply to each Subcontractor of every tier. Proof thereof shall be supplied to the Owner at the address listed above.

- C. All insurance required to be procured and maintained must be procured from insurance companies licensed to do business in the State of New York and rated at least B+ by A.M. Best and Company, or meet such other requirements as are acceptable to the Owner.
- D. Should the Contractor fail to provide or maintain any insurance required by this Contract, the Owner may, after providing written notice to the Contractor, purchase insurance complying with the requirements of this Article and charge back such purchase to the Contractor.
- E. At any time that the coverage provisions and limits on the policies required herein do not meet the provisions and limits set forth above, the Contractor shall immediately cease Work on the Project. The Contractor shall not resume Work on the Project until authorized to do so by the Owner. Any delay or time lost as a result of the Contractor not having insurance required by this Article shall not give rise to a delay claim or any other claim against the Owner or the Client.
- F. Notwithstanding any other provision in this Article, the Owner may require the Contractor to provide, at the expense of the Owner, any other form or limit of insurance necessary to secure the interests of the Owner.
- G. The Contractor shall secure, pay for, and maintain Property Insurance necessary for protection against the loss of owned, borrowed or rented capital equipment and tools, including any tools owned by employees, and any tools or equipment, staging towers, and forms owned, borrowed or rented by the Contractor. The requirement to secure and maintain such insurance is solely for the benefit of the Contractor. Failure of the Contractor to secure such insurance or to maintain adequate levels of coverage shall not render the Additional Insureds or their

agents and employees responsible for any losses; and the Additional Insureds, their agents and employees shall have no such liability.

- H. Neither the procurement nor the maintenance of any type of insurance by the Owner, the Contractor or the Construction Manager shall in any way be construed or deemed to limit, discharge, waive or release the Contractor from any of the obligations or risks accepted by the Contractor or to be a limitation on the nature or extent of said obligations and risks.

SECTION 15.01A – OTHER INSURANCE PROVIDED BY CONTRACTOR

Railroad Protective Liability insurance: If any Work of the Contract is to be performed on or within fifty (50) feet of a railroad property or railroad right of way or will require entrance upon railroad property or right of way or will require assignment of a railroad employee, the Contractor shall provide and maintain a Railroad Protective Liability policy with the policy limits required by the owner(s) of the railroad, including the MTA. For purposes of this paragraph, a subway is a railroad. The policy form shall be ISO-RIMA or an equivalent form approved by the owner(s) of the railroad. The railroad owner(s) shall be the named insured on the policy and the definition of “physical damage to property” shall mean direct and accidental loss of or damage to all property of any named insured and all property in any named insured’s care, custody, or control. If the Contractor shall provide a Railroad Protective Liability insurance policy, the Contractor and any Subcontractor performing on or within fifty (50) feet of railroad property or railroad right of way or entering railroad property or right of way or requiring assignment of a railroad employee shall have their CGL insurance policy endorsed to delete the exclusion of coverage for Work within fifty (50) feet of railroad property.

SECTION 15.02 – GENERAL CONFORMANCE

The Contractor and Subcontractors shall not violate, or be permitted to violate, any term or condition of their insurance policies, and shall at all times satisfy the safety requirements of the Owner and of the insurance companies issuing such policies.

SECTION 15.03 – CONTRACT SECURITY

The Contractor shall furnish a surety bond in an amount at least equal to one hundred (100%) of the Contract price as security for the faithful performance of the Contract and also labor and material bond in the form set forth in the Contract in an amount at least equal to one hundred (100%) of the Contract price for the payment of all persons performing labor or providing materials in connection with the Work. The surety on said bond shall be a surety company authorized to do business in the State of New York and shall be rated at least B+ by A.M. Best and Company, or meet such other requirements as are acceptable to the Owner.

SECTION 15.04 – ADDITIONAL OR SUBSTITUTE BOND

If at any time the Owner shall become dissatisfied with any surety or sureties upon the performance bond, or the labor and material payment bond, or if for any other reason said bonds shall cease to be adequate security to the Owner, the Contractor shall, within five (5) days after notice from the Owner to do so, substitute an acceptable bond or bonds in such form and sum and signed by such other surety or sureties as may be satisfactory to the Owner. The premiums on said bond or bonds shall be paid by the Contractor. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable bond or bonds to the Owner.

SECTION 15.05 – FAILURE TO COMPLY WITH PROVISIONS OF ARTICLE 15

The Contract may, at the sole option of the Owner, be declared void and of no effect if the Contractor fails to comply with the provisions of Article 15.

ARTICLE 16 -- USE OR OCCUPANCY PRIOR TO ACCEPTANCE BY OWNER

SECTION 16.01 – OCCUPANCY PRIOR TO ACCEPTANCE

NOT APPLICABLE

ARTICLE 17 -- PAYMENT

SECTION 17.01 – PROVISION FOR PAYMENT

- A. The Owner may make a partial payment to the Contractor on the basis of an approved estimate of the Work performed during each preceding business month. The Owner shall retain ten percent (10%) of the amount of each said estimate.

The Contractor shall submit a detailed Contract Payment Breakdown prior to the Contractor's first application for payment. The model contract payment breakdown included in the Contract Documents shall establish the minimum level of detail required for the Contractor's payment breakdown. It is understood and the Contractor acknowledges that this model is included as an administrative tool for

the purpose of illustrating a format and minimum level of detail required for the Contract Payment Breakdown and shall not be considered as delineating the Contractor's Scope of Work. The Owner may request further and more detailed Contract Payment Breakdown. Further, the Owner reserves the right to accept only those cost distributions which, in the Owner's opinion, are reasonable, equitably balanced and correspond to the estimated quantities in the Contract Documents.

No payment shall be made by the Owner until the Contract Payment Breakdown is approved by the Owner.

Each monthly partial payment requisition must include Affirmative Action Form AAP 7.0, Contractor's Compliance Report, properly executed, as a condition precedent to requisition payment by the Owner.

- B. In preparing estimates for partial payment, material delivered to the Site and properly stored and secured at the Site, and Material approved to be stored off-site under such conditions as the Owner shall prescribe may be taken into consideration. All costs related to the storage of materials are the sole responsibility of the Contractor.

The Owner will provide an Agreement for Materials Stored Off-Site and specific forms which the Contractor must complete and submit with any request for approval of partial payment for such material. Required information includes but is not limited to: a general description of the material; a detailed list of the materials; a pre-approved storage area; segregation and identification of the material; insurance covering full value against all risks of loss or damage, with non-cancellation provision; immediate replacement agreement in event of loss or damage; agreement to pay the expense of all inspections of the material; ownership provisions; delivery guarantee; project completion statement; bill of sale, releases, and inventory.

- C. Any partial payment made shall not be construed as a waiver of the right of the Owner to require the fulfillment of all the terms of the Contract.
- D. After the Owner has determined Substantial Completion of the Work, the Contractor shall submit to the Owner, for the Owner's approval, a detailed estimate of the value of the known remaining items of Work as set forth by the Owner and a schedule of completion for said items of Work. The Owner shall review that estimate and make the final determination.

The Owner, when all the Work is substantially complete, shall pay to the Contractor the balance due the Contractor pursuant to the Contract, less:

1. two (2) times the value of any remaining items of Work to be completed or corrected; and
2. an amount necessary to satisfy any and all claims, liens or judgments against the Contractor.

As the remaining items of Work are completed and accepted by the Owner, the

Owner shall pay the appropriate amount pursuant to the duly completed and submitted monthly requisitions.

The list of remaining Work items may be expanded to include additional items of corrective or completion Work until final acceptance as certified by the Owner's execution of "Notification of Construction Completion". Appropriate payments may be withheld to cover the value of these items pursuant to this Section.

- E. All Monthly Requisitions submitted by the Contractor shall be on AIA documents G702 and G703. The Contractor shall furnish such affidavits, vouchers and receipts as to delivery and payment for materials as required by the Owner to substantiate each and every payment requested. The Contractor and its Subcontractors will submit with all applications for payment copies of the certified payrolls and certification of payment of wage supplements in a form satisfactory to the Owner. The submission of Contractor and Subcontractor certified payrolls is required at least monthly. No progress payments will be processed without submission by the Contractor of properly executed Affidavit of Payment and Release of Liens (AIA Documents G706 and G706A).”

Section 17.02 - Acceptance of the First Payment Pursuant to Section 17.01 D. of the Contract Constitutes Release

The acceptance by the Contractor of the first payment pursuant to Section 17.01 D. shall be and shall operate as a release to the Owner of all claims by and all liability to the Contractor for all things in connection with the Work and for every act and neglect of the Owner and others relating to or arising out of the Work. No payment, final or otherwise, shall operate to release the Contractor or the Contractor's sureties from any obligations under this Contract or the performance or labor and material payment bonds.

SECTION 17.03 – RELEASE AND CONSENT OF SURETY

Notwithstanding any other provision of the Contract Documents to the contrary, the first payment pursuant to Section 17.01 D. shall not become due until the Contractor submits to the Owner a General Release and a Consent of Surety to said payment pursuant to Section 17.01 D., both in form and content acceptable to the Owner.

SECTION 17.04 - LIENS

Upon the Owner's receipt of a lien, a sum which shall be one and one-half (1 1/2) times the amount stated to be due in the notice of lien shall be deducted from the current payment due the Contractor. This sum shall be withheld until the lien is discharged.

SECTION 17.05 – WITHHOLDING OF PAYMENTS

- A. The Owner may withhold from the Contractor any part of any payment as may, in the judgment of the Owner, be necessary:
1. to assure payment of just claims of any persons supplying labor or materials for the Work;
 2. to protect the Owner from loss due to defective Work not remedied; or
 3. to protect the Owner, Construction Manager or Consultant from loss due to failure to defend, loss due to injury to persons or damage to the Work or property of other contractors, Subcontractors or others caused by the act or neglect of the Contractor or Subcontractors.
 4. to assure payment of fines and penalties which may be imposed on the Contractor pursuant to the provisions of this Contract.
- B. The Owner shall have the right to apply any such amounts so withheld, in such manner as the Owner may deem proper to satisfy said claims, fines and penalties or to secure said protection. Said application of the money shall be deemed payments for the account of the Contractor.
- C. The provisions of this Article 17 are solely for the benefit of the Owner, and any action or non-action hereunder by the Owner shall not give rise to any liability on the part of the Owner.

SECTION 17.06 – OWNER’S RIGHT TO AUDIT AND INSPECTION OF RECORDS

The Contractor shall maintain and keep, for a period of at least six (6) years after the date of final payment, all records and other data relating to the Work, including records of Subcontractors and material suppliers. The Owner or the Owner's Representative shall have the right to inspect and audit all records and other data of the Contractor, Subcontractors and material suppliers relating to the Work.

SECTION 17.07 – FALSE STATEMENTS/INFORMATION

- A. False statements, information or data submitted on or with applications for payment may result in one or more of the following actions:
1. Termination of the Contract for cause;
 2. Disapproval of future bids or contracts and sub-contracts;
 3. Withholding of final payment on the Contract; and
 4. Civil and/or criminal prosecution.

- B. These provisions are solely for the benefit of the Owner, and any action or non-action hereunder by the Owner shall not give rise to any liability on the part of the Owner.

ARTICLE 18 -- TAX EXEMPTION

SECTION 18.01 – TAX EXEMPTION

- A. The Owner is exempt from payment of Federal, State, local taxes and sales and compensating use taxes of the State of New York and of cities and counties on all materials and supplies incorporated into the completed Work. These taxes are not to be included in bids. This exception does not apply to tools, machinery, equipment or other property leased by or to the Contractor or a Subcontractor, or to supplies and materials which, even though they are consumed, are not incorporated into the completed Work, and the Contractor and Subcontractors shall be responsible for and pay any and all applicable taxes, including sales and compensating use taxes, on said leased tools, machinery, equipment or other property and upon all said unincorporated supplies and materials.
- B. The Contractor and Subcontractors shall obtain any and all necessary certificates or other documentation from the appropriate governmental agency or agencies, and use said certificates or other documentation as required by law, rule or regulation.

ARTICLE 19 -- GUARANTEE

SECTION 19.01 - GUARANTEE

The Contractor shall in all respects guarantee the Work to the Owner and be responsible for all material, equipment and workmanship of the Work. The Contractor shall forthwith repair, replace or remedy in a manner approved by the Owner, any said material, equipment, workmanship, or other part of the Work found by the Owner to be defective or otherwise faulty and not acceptable to the Owner, which defect or fault appears during the minimum period of one (1) year, or such longer period as may be prescribed by the Contract, from the date of Construction Completion or any part thereof, by the Owner. The Contractor shall also pay for any damage to the Work resulting from said defect or fault.

ARTICLE 20 -- STANDARD PROVISIONS

SECTION 20.01 – PROVISIONS REQUIRED BY LAW DEEMED INSERTED

Each and every provision of law and clause required by law to be inserted in the Contract shall be deemed to be inserted therein and the Contract shall read and shall be enforced as though so included therein.

SECTION 20.02 – COMPLIANCE WITH LAWS, RULES AND REGULATIONS

The Contractor shall comply fully with all applicable laws, rules and regulations.

SECTION 20.03 – LAW GOVERNING THE CONTRACT

The Contract shall be governed by the laws of the state of New York.

SECTION 20.04 - ASSIGNMENT

The Contractor shall not assign the Contract in whole or in part without prior written consent of the Owner. If the Contractor assigns all or part of any moneys due or to become due under the Contract, the instrument of assignment shall contain a clause substantially to the effect that the Contractor and assignee agree that the assignee's right in and to any moneys due or to become due to the Contractor shall be subject to all prior claims for services rendered or materials supplied in connection with the performance of the Work.

SECTION 20.05 – NO THIRD PARTY RIGHTS

Nothing in the Contract shall create or shall give to third parties any claim or right of action against the Owner, the Fashion Institute of Technology, the State University of New York, Board of Education of the City of New York, the City or State of New York and the Construction Manager beyond such as may legally exist irrespective of the Contract.

SECTION 20.06 – CONTRACT DEEMED EXECUTORY

The Contractor agrees that the Contract shall be deemed executory to the extent of moneys available and that no liability shall be incurred by the Owner beyond the moneys available therefore.

SECTION 20.07 – ANTI-RIOT PROVISIONS

- A. The Contractor agrees that no part of the Contract funds shall be used to make payments, give assistance, or supply services, in any form, to any individual convicted in any Federal, State or local court of competent jurisdiction for inciting, promoting, or carrying on a riot or engaging in any group activity resulting in material damage to property or injury to persons found to be in violation of Federal, State or local laws designed to protect persons or property.
- B. The Contractor and each Subcontractor shall notify their employees of all rules and

regulations adopted pursuant to Article 129-A of the Education Law of the State of New York. Notices containing the text of the aforementioned rules and regulations shall be posted by the Contractor at the Site.

SECTION 20.08 – DOMESTIC STEEL

The Contractor agrees, that if the value of this contract exceeds \$100,000 all structural steel, reinforcing steel and other major steel items to be incorporated in the Work of this Contract shall be produced and made in whole or substantial part in the United States, its territories or possessions.

SECTION 20.09 – PROTECTION OF LIVES AND HEALTH

- A. Each Contractor and Subcontractor shall comply with all applicable provisions of the laws of the State of New York, the United States of America and with all applicable rules and regulations adopted or promulgated by agencies or municipalities of the State of New York or the United States of America. The Contractor's and Subcontractor's attention is specifically called to the applicable rules and regulations, codes and bulletins of the New York State Department of Labor and to the standards imposed under the Federal Occupational Safety and Health Act of 1970, as amended.
- B. The Contractor shall maintain an accurate record of all cases of death, occupational disease, and injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment of Work under the Contract, and shall immediately notify the Owner in writing of any injury which results in hospitalization or death. The Contractor shall provide to the Owner a copy of Form C-2, Employers Report of Injury/Illness within twenty- four (24) hours of any job related injury on the Owner's job site. Further, a copy of the OSHA Log of Injury and Illness shall also be provided to the Owner for any reporting period in which a job related injury or illness is recorded. The Contractor shall also provide a list of witnesses to the Owner. The list shall include at least the full name, home address, occupation and telephone number of each person who saw or has knowledge of the incident which caused the injury or illness.
- C. The Contractor alone shall be responsible for the safety, efficiency and adequacy of the Contractor's Work, plant, appliances and methods, and for any damage which may result from the failure or the improper construction, maintenance or operation of such Work, plant, appliances and methods.
- D. If, in the performance of the Work, a harmful hazard is created for which appliances or methods of elimination have been approved by regulatory authorities, the Contractor shall install, maintain and operate said appliances or methods.
- E. The Owner may impose a payment penalty on the Contractor for any act of non-compliance with this section. The payment penalty shall not exceed one twentieth

(1/20) of the Contract price or a maximum of One Thousand Dollars (\$1,000.00) for each time the Contractor fails to perform or to provide the information, reports or forms required in this section. This payment penalty is not exclusive, the Owner may avail itself of any other contractual remedy available.

- F. The Owner, Owner's Representative, or Architect may inspect the Site at any time without notice to the Contractor. If the Owner or its representatives find that the Contractor is not complying with Section 20.10 A or any other provision of Section 20.10, the Owner may send written notice to the Contractor to correct any deficiency. Upon re-inspection, if the Owner finds the deficiencies have not been corrected, or in instances where a safety violation (s) must be corrected before Work continues and the Contractor is given three (3) hours to make correction (s) and they are not made, the Owner may let a separate contract to correct any deficiencies and back charge the cost of the separate contract to the Contractor at a premium rate. The Contractor cannot pass these additional charges on to the Owner. No action taken under this section shall be deemed as a basis for any delay claim or any other claim against the Owner by the Contractor.

- G. The Contractor shall preserve and safeguard the scene of an accident involving a ladder, scaffold, mobile machinery, equipment, safety railing or uncovered floor opening or any other incident where the injured person required emergency medical treatment. The Contractor shall "tape off" the area, and not allow any material object or property to be altered, changed, moved or removed from the accident site. In addition to "taping off" the accident site, the Contractor shall telephone and send a facsimile or email to Owner immediately, and post a person at the accident site to protect it. Safeguarding and protecting the accident site shall only be abandoned by the Contractor upon release by the Owner or the Owner's Representative. Failure of the Contractor to comply with the provisions of this paragraph shall be deemed a breach of this Contract. In addition to any other contractual remedies available, the Owner may satisfy the breach by imposing the penalties set out in paragraph 20.10 E or void the entire Contract and retain any or all amounts due the Contractor under this Contract.

SECTION 20.10 – PROHIBITED INTERESTS / ETHICAL CONDUCT

- A. No officer, employee, architect, attorney, engineer, inspector or consultant of or for the Owner authorized on behalf of the Owner to exercise any legislative, executive, administrative, supervisory or other similar functions in connection with the Contract or the Work, shall become personally interested, directly or indirectly, in the Contract, material supply contract, subcontract, insurance contract, or any other contract pertaining to the Work.
- B. The Owner strongly discourages the Contractor from offering or giving anything of value to employees of the Owner under circumstances which may constitute, or even suggest, impropriety. Contractor, or its agents, shall not directly or indirectly offer or give any gift whether in the form of money, service, loan, travel, lodging, meals, refreshments, entertainment, discount, forbearance or promise, or in any other form, to an employee or any representatives of the Owner.
- C. To promote a working relationship with the Owner based on ethical business practices, the Contractor shall:
- furnish all goods, materials and services to the Owner as contractually required and specified,
 - submit complete and accurate reports to the Owner and its representatives as required,
 - not seek, solicit, demand or accept any information, verbal or written, from the Owner or its representatives that provides an unfair advantage over a competitor,
 - not engage in any activity or course of conduct that restricts open and fair competition on Owner-related projects and transactions,
 - not engage in any course of conduct with Owner employees or its representatives that constitutes a conflict of interest, in fact or in appearance, and
 - not offer or give any unlawful gifts or gratuities, or engage in bribery or other criminal activity.
- D. The Owner encourages the Contractor to advance and support ethical business conduct and practices among its directors, officers and employees, through the adoption of corporate ethics awareness training programs and written codes of conduct.
- E. Although the Contractor may employ relatives of Owner's employees, the Owner must be made aware of such circumstances as soon as possible, in writing, to ensure a conflict of interest situation does not arise. The Owner reserves the right to request that the Contractor modify the work assignment of a relative of an Owner's

employee or representative where a conflict of interest, or the appearance thereof, is deemed to exist.

- F. The Contractor may hire former employees of the Owner. However, as a general rule, former employees of the Owner may neither appear nor practice before the Owner, nor receive compensation for services rendered on a matter before the Owner, for a period of *two (2) years* following their separation from service with the Owner. In addition, former employees of the Owner are subject to a “*lifetime bar*” from appearing before the Owner or receiving compensation for services regarding any transaction in which they personally participated or which was under their active consideration during their tenure with the Owner.
- G. The Contractor agrees to notify Stephen Tuttle, Esq., the Owner’s attorney, at (212) 217-4030 of any activity by an employee of the Owner that is inconsistent with the contents of this Section.
- H. Any violation of these provisions shall justify termination of this Contract and may result in Owner’s rejection of the Contractor’s bids or proposals for future contracts.

SECTION 20.11 – STATE AND FEDERAL LABOR LAW PROVISIONS

- A. Although the Work of this Contract is not public work, the Owner intends that all applicable provisions of the Labor Law of the State of New York shall be carried out in the performance of the Work.
- B. The Contractor specifically agrees to comply with Labor Law, Sections 220 and 220-d as amended, that:
 - 1. no laborer, workman or mechanic, in the employ of the Contractor, Subcontractor or other person doing or contracting to do the whole or any part of the Work contemplated by the Contract shall be permitted or required to work more than eight (8) hours in any one (1) calendar day and more than five (5) days in any one week, except in the extraordinary emergencies set forth in the Labor Law;
 - 2. the wages paid for a legal day's work shall be not less than the prevailing rate of wages as defined by law;
 - 3. the minimum hourly rate of wage to be paid and supplement provided shall be not less than that stated in the Contract and as shall be designated by the Industrial Commissioner of the State of New York; and
 - 4. the Contractor and every Subcontractor shall post in a prominent and accessible place on the Site, a legible statement of all minimum wage rates and supplements to be paid or provided for the various classes of laborers and mechanics to be engaged in the Work and all deductions, if any,

required by law to be made from unpaid wages actually earned by the laborers and mechanics so engaged.

- C. The minimum wage rates, if any, herein specified for apprentices shall apply only to persons working with the tools of the trade which such persons are learning under the direct supervision of journeyman mechanics. Except as otherwise required by law, the number of apprentices in each trade or occupation employed by the Contractor or any Subcontractor shall not exceed the number permitted by the applicable standards of the New York State Department of Labor, or, in the absence of such standards, the number permitted under the usual practice prevailing between the unions and the employers' association of the respective trades or occupations.
- D. All employees of the Contractor and each Subcontractor shall be paid in accordance with the provisions of the Labor Law. Certified payroll copies shall be provided to the Owner as specified in these General Conditions and otherwise upon request.
- E. The Contractor agrees that, in case of underpayment of wages to any worker engaged in the Work by the Contractor or any Subcontractor, the Owner shall withhold from the Contractor out of payments due an amount sufficient to pay such worker the difference between the wages required to be paid under the Contract and the wages actually paid such worker for the total number of hours worked, and that the Owner may disburse such amount so withheld by the Owner for and on account of the Contractor to the employee to whom such amount is due. The Contractor further agrees that the amount to be withheld pursuant to this paragraph may be in addition to the percentages to be retained by the Owner pursuant to other provisions of the Contract.
- F. Pursuant to subdivision 3 of section 220 and section 220-d of the Labor Law the Contract shall be forfeited and no sum paid for any Work done thereunder upon a Contractor's or Subcontractor's second conviction for willfully paying or providing less than:
 - 1. the stipulated wage scale or supplement as established by the fiscal officer, or
 - 2. less than the stipulated minimum hourly wage scale as designated by the Industrial Commissioner.
- G. Pursuant Labor Law, Section 220-e, the Contractor specifically agrees:
 - 1. That in the hiring of employees for the performance of Work under the Contract or any subcontract hereunder, or for the manufacture, sale or distribution of materials, equipment or supplies hereunder, but limited to operation performed within the territorial limits of the State of New York, no Contractor, Subcontractor, nor any person acting on behalf of such Contractor or Subcontractor, shall by reason of race, creed, color, disability, sex or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the Work to which the employment relates;

2. That no Contractor, Subcontractor, nor any person on behalf of such Contractor or Subcontractor shall, in any manner, discriminate against or intimidate any employee hired for the performance of work under the Contract on account of race, creed, color, disability, sex or national origin;
3. That there may be deducted from the amount payable to the Contractor, by the Owner under the Contract, a penalty of fifty dollars (\$50.00) for each person for each calendar day during which such person was discriminated against or intimidated in violation of the terms of the Contract; and
4. That the Contract may be canceled or terminated by the Owner and all moneys due or to become due hereunder may be forfeited for a second or any subsequent violation of the terms or conditions of this section of the Contract, or when one final determination involves the falsification of payroll records or the kickback of wages and/or supplements.

H. The Contractor specifically agrees:

1. That the Contractor shall certify its payrolls and keep these certified records on site and available, and provide copies to the Owner upon request.
2. That the Contractor shall provide each worker with a written notice informing the worker of the prevailing wage requirements for the job. The notice shall contain a simple statement or declaration for the worker's

SECTION 20.12 - NONDISCRIMINATION

During the performance of the Work, the Contractor agrees as follows:

- A. The Contractor will not discriminate against any employee or applicant for employment because of race, religion/creed, color, sex, sexual orientation, gender, gender identity/expression, national origin, age, disability, marital status, or any other protected category.
- B. If directed to do so by the Commissioner of Human Rights, the Contractor will send to each labor union or representative of workers with which the Contractor has or is bound by a collective bargaining or other agreement or understanding, a notice, to be provided by the State Commissioner of Human Rights, advising such labor union or representative of the Contractor's agreement under clauses A through G (hereinafter called "non-discrimination clauses"). If the Contractor was directed to do so by the Owner as part of the bid or negotiation of this Contract, the Contractor shall request such labor union or representative to furnish a written statement that such labor union or representative will not discriminate because of race, creed, color, sex, national origin, age, disability or marital status, and that such labor union or representative will cooperate, within the limits of its legal and contractual authority, in the implementation of the policy and provisions of these nondiscrimination clauses and that it consents and agrees that recruitment, employment and the terms and conditions of employment under this Contract shall be in accordance with the purposes and provisions of these nondiscrimination clauses. If such labor union or representative fails or refuses to comply with such a request that it furnish such a statement, the Contractor shall promptly notify the State Commissioner of Human Rights of such failure or refusal.
- C. If directed to do so by the Commissioner of Human Rights, the Contractor shall post and keep posted in conspicuous places, available to employees and applicants for employment, notices to be provided by the State Commissioner of Human Rights setting forth the substance of the provisions of clauses A and B and such provisions of the State's laws against discrimination as the State Commissioner of Human Rights shall determine.
- D. The Contractor shall state, in all solicitations or advertisement for employees placed by or on behalf of the Contractor, that all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color, sex, national origin, age, disability or marital status.
- E. The Contractor shall comply with the provisions of Section 290-299 of the Executive Law and with the Civil Rights Law, will furnish all information and reports deemed necessary by the State Commissioner of Human Rights under these nondiscriminatory clauses and such sections of the Executive Law, and will permit access to the Contractor's books, records and accounts by the State Commissioner for the purposes of investigation to ascertain compliance with these nondiscrimination clauses and such sections of the Executive Law and Civil Rights Law.

- F. This Contract may be forthwith canceled, terminated or suspended, in whole or in part, by the Owner upon the basis of a finding made by the State Commissioner of Human Rights that the Contractor has not complied with these nondiscrimination clauses, and the Contractor may be declared ineligible for future contracts made by or on behalf of the State or a public authority or agency of the State, until the Contractor satisfies the State Commissioner of Human Rights that the Contractor has established and is carrying out a program in conformity with the provisions of these nondiscrimination clauses. Such finding shall be made by the State Commissioner of Human Rights after conciliation efforts by the Commissioner have failed to achieve compliance with these nondiscrimination clauses and after a verified complaint has been filed with the Commissioner, notice thereof has been given to the Contractor and an opportunity has been afforded the Contractor to be heard publicly in accordance with the Executive Law. Such sanctions may be imposed and remedies invoked independently of or in addition to sanctions and remedies otherwise provided by law.
- G. The Contractor shall include the provisions of clauses A through F above in every subcontractor purchase order in such a manner that such provisions will be binding upon each Subcontractor or vendor as to operation to be performed within the State of New York. The Contractor shall take such action in enforcing such provisions of such Subcontract or purchase order as the State Commissioner of Human Rights or the Owner may direct, including sanctions or remedies for noncompliance. If the Contractor becomes involved in or is threatened with litigation with a Subcontractor or vendor as a result of such direction by the State Commissioner of Human Rights or the Owner, the Contractor shall promptly so notify the Attorney General, requesting the Attorney General to intervene and to protect the interests of the State of New York.

SECTION 20.13 – LIMITATION ON ACTIONS

No action or proceeding shall lie in favor of or shall be maintained by the Contractor against the Owner unless such action shall be commenced within six (6) months after receipt by the Owner of the Contractor's final requisition or, if the Contract is terminated by the Owner, unless such action is commenced within six (6) months after the date of such termination.

SECTION 20.14 – WAIVER OF REMEDIES

Inasmuch as the Contractor can be compensated adequately by money damages for any breach of the Contract which may be committed by the Owner, the Contractor agrees that no default, act or omission of the Owner shall constitute a material breach of Contract entitling the Contractor to cancel or rescind the same or to suspend or abandon performance thereof; and the Contractor hereby waives any and all rights and remedies to which the Contractor might otherwise be or become entitled to because of any wrongful act or omission of the Owner saving only the Contractor's right to money damages.

SECTION 20.15 – WAIVER OF CERTAIN CAUSES OF ACTION

No action or proceeding shall lie or shall be maintained by the Contractor, nor anyone claiming under or through the Contractor, against the Owner upon any claim arising out of or based upon the Contract, relating to the giving of notices or information.

SECTION 20.16 – CONTRACTOR RELATIONSHIP

The relationship created by the Contract between the Owner and the Contractor is one of an independent contractor and it is no way to be construed as creating an agency relationship between the Owner and the Contractor nor is it to be construed as, in any way or under any circumstances, creating or appointing the Contractor as an agent of the Owner for any purpose whatsoever.

SECTION 20.17 – FAILURE TO COMPLY WITH THIS ARTICLE

The Contract shall be void and of no effect unless the Contractor complies with the provisions of this Article 20.

SECTION 20.18 – YEAR 2000 WARRANTY

SECTION DELETED

SECTION 20.19 – FALSE RECORDS/KICKBACKS

The Contractor agrees that this Contract may be canceled or terminated for cause by the Owner and all moneys due or to become due hereunder may be forfeited upon the Owner's determination that the Contractor has submitted false records to the Owner and/or that the Contractor has participated in the kickback of wages. Said determination by the Owner must first allow the Contractor an opportunity to show why its Contract should not be canceled or terminated for cause for said actions.

ARTICLE 21- COOPERATION WITH INVESTIGATIONS

The Contractor agrees to cooperate fully and faithfully with any investigation, audit or inquiry conducted by the Owner or any other duly authorized representative of the Owner ("Representative").

The Contractor shall grant the Owner or the Representative the right to examine all books, records, files, accounts, computer records, documents and correspondence, including electronically-stored information, in the possession or control of the Contractor, its subsidiaries and affiliated companies and any other company directly or indirectly controlled by the Contractor, relating to the Contract. These shall include, but not be limited to: Subcontracts; bid files; payroll and personnel records; cancelled checks; correspondence; memoranda; reports; audits; vendor qualification records; original estimate files; change order/amendment estimate files; detailed worksheets; Subcontractor, consultant and supplier proposals for both successful and unsuccessful bids; back-charge logs; any records detailing cash, trade, or volume discounts earned; insurance proceeds, rebates or dividends received; payroll and personnel records; tax returns, and the supporting documentation for the aforesaid books and records.

At the Owner's or the Representative's request, said materials shall be provided in a computer readable format, where available. At the request of the Owner or the Representative, the Contractor shall execute such documents, if any, as are necessary to give the Owner or the Representative access to Contract-related books, documents or records which are, in whole or part, under control of the Contractor but not currently in the Contractor's physical possession. The Contractor shall not enter into any agreement with a Subcontractor, consultant or supplier, in connection with the Contract, that does not contain a right to audit clause in favor of the Owner. The Contractor shall assist the Owner or the Representative in obtaining access to past and present Subcontractor, consultant and supplier amendment/change order files (including detailed documentation covering negotiated settlements), accounts, computer records, documents, correspondence, and any other books and records in the possession of Subcontractors, consultants and suppliers pertaining to the Contract, and, if appropriate, enforce the right-to-audit provisions of such agreements.

The Contractor shall assist the Owner or the Representative in obtaining access to, interviews with, and information from all former and current persons employed and/or retained by the Contractor, for purposes of the Contract.

The Contractor shall require each Subcontractor to include in all agreements that the

Subcontractor may hereinafter enter into with any and all Subcontractors, consultants and suppliers, in connection with the Contract, a right-to-audit clause in favor of the Owner conferring rights and powers of the type outlined in this section. The Contractor shall not enter into any Subcontract with a Subcontractor in connection with the Contract that does not contain such a provision.

The Contractor shall not make any payments to a Subcontractor, consultant or supplier from whom the Contractor has failed to obtain and supply to the Owner or the Representative complete, accurate and truthful information in compliance with a request from the Owner or the Representative to the Contractor.

Any violation of the provisions of this Article shall justify termination of this Contract and may result in the Owner's rejection of the Contractor's bids or proposals for future contracts.

SECTION VI.

LABOR & MATERIAL PAYMENT BOND

LABOR & MATERIAL PAYMENT BOND

KNOW ALL BY THESE PRESENTS:

That _____
(Here insert the name and address or legal title of the Contractor)

as Principal, hereinafter called Principal, and _____

(Here insert the legal title of Surety)

(Address)

as Surety, hereinafter called Surety, are held and firmly bound unto The Fashion Institute of Technology, as applicable, as Obligee, hereinafter called Owner, for the use and benefit of the claimants as hereinbelow defined, in the amount of _____

_____ and /100 Dollars (\$_____)

WHEREAS, Principal has by written agreement dated _____

entered into a Contract with Owner for _____

in accordance with the Contract Documents and any changes thereto, which are made a part hereof, and are hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Principal shall promptly make payment to all claimants as hereinafter defined, for all labor and material used or reasonably required for use in the performance of the Contract, then this obligation shall be void; otherwise such obligation shall remain in full force and effect, subject, however, to the following conditions:

1. A claimant is defined as one having a direct Contract with the Principal or with a Subcontractor of the Principal for labor, material, or both, used or reasonably required for use in the performance of the Contract, labor and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment directly applicable to the Contract.
2. The above named Principal and Surety hereby jointly and severally agree with the Owner that every claimant as herein defined, who has not been paid in full

before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, or materials were furnished by such claimant, may sue on this bond for the use of such claimant, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon. The Owner shall not be liable for the payment of any costs or expenses of any such suit.

3. No suit or action shall be commenced hereunder by any claimant:
 - a. Unless claimant, other than one having a direct contract with the Principal, shall have given written notice to any two (2) of the following: 1) the Principal, 2) the Owner, or 3) the Surety above named, within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal, Owner, or Surety, at any place where an office is regularly maintained by said Principal, Owner, or Surety for the transaction of business, or served in any manner in which legal process may be served in the State in which the aforesaid project is located, save that such service need not be made by a public officer.
 - b. After the expiration of one (1) year following the date on which Principal ceased work of said Contract, however, if any limitation embodied in this bond is prohibited by any law controlling the construction hereof such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.
 - c. Other than in a State court of competent jurisdiction in and for the county or other political subdivision of the State in which the project, or any part thereof, is situated, or in the United States District Court for the district in which the project, or any part thereof, is situated, and not elsewhere.
4. The penal sum of this Bond is in addition to any other Bond furnished by the Contractor and in no way shall be impaired or affected by any other Bond.
5. The amount of this Bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of Mechanics' Liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under and against this Bond.

Signed this _____ day of _____ 20__.

IN THE PRESENCE OF:

(Principal)

(Surety)

(Signature)

(Signature)

(Print Name and Title)

(Print Name and Title)

(Address)

(Address)

(City, State, Zip)

(City, State, Zip)

Telephone (____) _____

Fax No. _____

ACKNOWLEDGEMENT OF PRINCIPAL, IF A CORPORATION

STATE OF _____) ss:

COUNTY OF _____)

On the _____ day of _____ in the year 20__, before me personally came _____ to me known, who, being by me duly sworn, did depose and say that (s)he resides at _____, that (s)he is the _____ of _____, the corporation described in and which executed the above instrument; and that (s)he signed her/his name thereto by order of the Board of Directors of said corporation.

Notary Public

ACKNOWLEDGEMENT OF PRINCIPAL, IF A PARTNERSHIP

STATE OF _____)ss:

COUNTY OF _____)

On the _____ day of _____ in the year 20__, before me personally came

_____, to me known and known to me to be a member of the firm _____, described in and who executed the foregoing instrument, and (s)he duly acknowledged to me that (s)he executed the same for and in behalf of said firm for the uses and purpose mentioned therein.

Notary Public

ACKNOWLEDGEMENT OF PRINCIPAL, IF AN INDIVIDUAL

STATE OF _____) ss:

COUNTY OF _____)

On the _____ day of _____ in the year 20__, before me personally came _____, to me known and known to me to be the person described in and who executed the foregoing instrument and (s)he duly acknowledged that (s)he executed the same.

Notary Public

ACKNOWLEDGEMENT OF SURETY

STATE OF NEW YORK)

COUNTY OF _____) ss:

On the _____ day of _____ in the year 20__, before me personally came _____ to me known, who, being by me duly sworn, did depose and say that (s)he resides at _____, that (s)he is the _____ of _____, the corporation described in and which executed the above instrument; and that (s)he signed her/his name thereto by order of the Board of Directors of said corporation.

Notary Public

SECTION VII.
PERFORMANCE BOND

PERFORMANCE BOND

KNOW ALL BY THESE PRESENTS:

That _____
(Here insert the name and address or legal title of the Contractor)

as Principal, hereinafter called Principal, and _____

(Here insert the legal title of Surety)

(Address)

as Surety, hereinafter called Surety, are held and firmly bound unto The Fashion Institute of Technology, as applicable, as Obligee, hereinafter called Owner, in the amount of _____ and _____ /100 Dollars (\$ _____) for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, CONTRACTOR has by written agreement dated _____

entered into a Contract with Owner for _____

in accordance with the Contract Documents and any changes thereto, which are made a part hereof, and are hereinafter referred to as the Contract.

1. If the Contractor performs the Contract, the Surety and the Contractor shall have no obligation under this Bond, except to participate in conferences as provided in Subparagraph 2.1.
2. If there is no Owner default, the Surety's obligation under this Bond shall arise after:
 - 2.1 The Owner has notified the Contractor, the Surety at its address described in Paragraph 8. below that the Owner is considering declaring a Contractor in default.
 - 2.2 The Owner has declared a Contractor in default and formally terminated the Contractor's right to complete the Contract.

- 2.3 The Owner has agreed to pay the Balance of the Contract Price to the Surety in accordance with the terms of the Contract or to a Contractor selected to perform the Contract in accordance with the terms of the Contract with the Owner.
3. When the Owner has satisfied the conditions of Paragraph 2 herein., the Surety shall, at the Owner's option, promptly and at the Surety's expense take on the following actions:
 - 3.1 Arrange for the Contractor, with consent of the Owner, to perform and complete the Contract; or
 - 3.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
 - 3.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by the Owner and the Contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified Surety equivalent to the bonds issued on the Contract, and pay to the Owner the amount of damages as described in Paragraph 5. in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor default.
4. If the Surety does not proceed with reasonable promptness, the Surety shall be deemed to be in default on this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner.
5. After the Owner has terminated the Contractor's right to complete the Contract, and if the Surety elects to act under Subparagraph 3.1, 3.2, or 3.3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Contract. To the limit of the amount of this Bond, but subject to commitment by the Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, the Surety is obligated without duplication for:
 - 5.1 The responsibilities of the Contractor for correction of defective work and completion of the Contract;
 - 5.2 Additional legal, design, professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 3.; and
 - 5.3 Liquidated Damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of the Contractor. 3
6. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators or successors.
7. The Surety hereby waives notice of any change, including changes of time, to the Contract

or to related subcontracts, purchase orders, and other obligations.

8. Notice of the Surety and the Contractor shall be mailed or delivered to the address shown on the signature page. Notice to the Owner shall be mailed or delivered to the address shown in the preamble.
9. Definitions:
 - 9.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Contract.
 - 9.2 Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.
 - 9.3 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
 - 9.4 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

The penal sum of this Bond is in addition to any other Bond furnished by the Contractor and in no way shall be impaired or affected by any other Bond.

Any suit under this Bond must be instituted before the expiration of two (2) years from the date on which Final Payment is made under this Contract.

Signed this _____ day of _____ 20__.

IN THE PRESENCE OF:

(Principal)

(Surety)

(Signature)

(Signature)

(Print Name and Title)

(Print Name and Title)

(Address)

(Address)

(City, State, Zip)

(City, State, Zip)

Telephone (____) _____

Fax No. _____

ACKNOWLEDGEMENT OF PRINCIPAL, IF A CORPORATION

STATE OF _____) ss:

COUNTY OF _____)

On the _____ day of _____ in the year 20__, before me personally came

_____ to me known, who, being by me duly sworn, did depose and say that (s)he resides at _____, that (s)he is the _____ of _____, the corporation described in and which executed the above instrument; and that (s)he signed her/his name thereto by order of the Board of Directors of said corporation.

Notary Public

ACKNOWLEDGEMENT OF PRINCIPAL, IF A PARTNERSHIP

STATE OF _____)ss:

COUNTY OF _____)

On the _____ day of _____ in the year 20__, before me personally came

_____, to me known and known to me to be a member of the firm _____, described in and who executed the foregoing instrument, and (s)he duly acknowledged to me that (s)he executed the same for and in behalf of said firm for the uses and purpose mentioned therein.

Notary Public

ACKNOWLEDGEMENT OF PRINCIPAL, IF AN INDIVIDUAL

STATE OF _____) ss:

COUNTY OF _____)

On the _____ day of _____ in the year 20__, before me personally

came _____, to me known and known to me to be the person described in and who executed the foregoing instrument and (s)he duly acknowledged that (s)he executed the same.

Notary Public

ACKNOWLEDGEMENT OF SURETY

STATE OF NEW YORK)

COUNTY OF _____) ss:

On the _____ day of _____ in the year 20__, before me personally came

_____ to me known, who, being by me duly sworn, did depose and say that (s)he resides at _____, that (s)he is the _____ of _____, the corporation described in and which executed the above instrument; and that (s)he signed her/his name thereto by order of the Board of Directors of said corporation.

Notary Public

SECTION VIII.
FORM OF BID

SECTION IX.
NON-COLLUSIVE
BIDDING
CERTIFICATION

Non-collusive Bidding Certification

By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and, in the case of a joint bid, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief:

1. The prices in the bid have been arrived at independently without collusion, consultation, communication or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;
2. Unless otherwise required by law, the prices which have been quoted in the bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and
3. No attempt has been made or will be made by the bidder to induce any other person, partnership, or corporation to submit or not to submit a bid for the purpose of restricting competition.

Firm Name _____

Address _____

By _____
(Signature and Title)

Dated: _____

Telephone (____) _____ Fax No. (____) _____

(Taxpayer ID or Social Security Number)

ACKNOWLEDGEMENT OF BIDDER, IF A CORPORATION

STATE OF NEW YORK)
COUNTY OF _____) ss:

On the ____ day of _____, 20__ , before me personally came _____
to me known, who, being by me duly sworn, did depose and say that (s)he resides at _____
_____, that (s)he is the _____ of _____
_____, the corporation described in and which executed the above instrument;
and that (s)he signed her/his name thereto by order of the Board of Directors of said corporation.

Notary Public

ACKNOWLEDGEMENT OF BIDDER, IF A PARTNERSHIP

STATE OF NEW YORK)
COUNTY OF _____) ss:

On the ____ day of _____, 20__, before me personally came _____
to me known and known to me to be a member of the firm _____
_____, described in and who executed the foregoing instrument, and (s)he duly
acknowledged to me that (s)he executed the same for and in behalf of said firm for the uses and
purposes mentioned therein.

Notary Public

ACKNOWLEDGEMENT OF BIDDER, IF AN INDIVIDUAL

STATE OF NEW YORK)
COUNTY OF _____) ss:

On the ____ day of _____, 20__, before me personally came _____
to me known and known to me to be the person described in and who executed the foregoing
instrument, and (s)he duly acknowledged that (s)he executed the same.

Notary Public

SECTION X:

SUBSTITUTION FORM REQUEST

FASHION INSTITUTE OF TECHNOLOGY

SUBSTITUTION REQUEST FORM

1.1 CONDITIONS OF SUBSTITUTIONS

- A. Substitution indicated on this Form is a proposed substitute to requirements indicated in the Contract Documents. Substitution listed has not been included in an Addendum. Submit one Form for each proposed substitution.
- B. For each proposed Substitution, state difference in price or "No Change" where Substitution is offered.
- C. Attach complete technical data, specifications, and description of substitutions.
- D. Architect reserves the right to accept or reject any or all proposed substitutions.

1.2 SUBSTITUTION REQUEST

The following information is hereby submitted for a substitution to the specified item.

Specification Section and Title: _____

Paragraph _____ Page _____ Specified Item _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No: _____

Price Difference: _____ or No Change _____

The Undersigned certifies:

- A. Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- B. Same warranty will be furnished for proposed substitution as for specified product.
- C. Same maintenance service and source of replacement parts, as applicable is available.
- D. Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- E. Proposed substitution does not affect dimensions and functional clearances.
- F. Payment will be made for changes to the building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____ FAX: _____

ARCHITECT'S REVIEW AND ACTION

- Substitution Approved – Make submittals in accordance with General Requirements
- Substitution Approved As Noted – Make submittals in accordance with General Requirements.
- Substitution Rejected – Use specified materials.
- Substitution Request Received Too Late. Use specified materials.

Signed by: _____

Supporting Data Attached: Drawings Product Data Samples Tests
 Reports Other _____

SECTION XI.
CONTRACT

TO BE SIGNED ONLY UPON AWARD

CONTRACT

This Agreement made as of the _____ day of _____ 20____, by and between the _____, hereinafter referred to as the "OWNER" and _____ hereinafter referred to as the "Contractor", for Work at _____

WITNESSETH: That the **OWNER** and the Contractor for the consideration named agree as follows:

1. The Contractor shall Provide and shall perform all Work of every kind or nature whatsoever required and all other things necessary to complete in a proper and workmanlike manner the _____
_____ in strict accordance with the Contract Documents as defined in the General Conditions (and of which a listing of specifications and drawings are attached hereto) and in strict accordance with such changes as are ordered and approved pursuant to the Contract, and shall perform all other obligations imposed on such Contractor by the Contract.

2. The Contractor agrees to perform all Work and labor required, necessary, proper for, or incidental to the Work, and to Furnish all supplies and materials required, necessary, proper for, or incidental to the Work for the total sum of _____ and 00/100 Dollars (\$ _____ .00), which sum shall be deemed to be in full consideration for the performance by the Contractor of all the duties and obligations of such Contractor under the Contract.

3. The Contractor shall commence Work on the Contract at a time to be specified in a written notice to proceed issued by the OWNER and complete the project no later than _____.

IN WITNESS WHEREOF, the parties hereto have executed this Contract the day and year first above written.

Fashion Institute of Technology

Sherry Brabham, VP of Finance

(Name of Contractor)

By _____
(Signature)

(Print Name and Title)

ACKNOWLEDGEMENT OF CONTRACTOR, IF A CORPORATION

STATE OF _____)
COUNTY OF _____) ss:

On the _____ day of _____ in the year 20 ____, before me personally came _____ to me known, who, being by me duly sworn, did depose and say that (s)he resides at _____, that (s)he is the _____ of _____, the corporation described in and which executed the above instrument; and that (s)he signed her/his name thereto by order of the Board of Directors of said corporation.

Notary Public

ACKNOWLEDGEMENT OF CONTRACTOR, IF A PARTNERSHIP

STATE OF _____)
COUNTY OF _____) ss:

On the _____ day of _____ in the year 20 ____, before me personally came _____ to me known and known to me to be a member of the firm _____, described in and who executed the foregoing instrument, and (s)he duly acknowledged to me that (s)he executed the same for and in behalf of said firm for the uses and purpose mentioned therein.

Notary Public

ACKNOWLEDGEMENT OF CONTRACTOR, IF AN INDIVIDUAL

STATE OF _____)
COUNTY OF _____) ss:

On the _____ day of _____ in the year 20 ____, before me personally came _____, to me known and known to me to be the person described in and who executed the foregoing instrument and (s)he duly acknowledged that (s)he executed the same.

Notary Public

SECTION XII.
AFFIRMATIVE ACTION FORM

MONTHLY CONTRACTOR'S COMPLIANCE REPORT FORM AAP 7.0

INSTRUCTION SHEET

ALL PAYMENT REQUISITION, CONTRACTOR AND PROJECT INFORMATION ON THE TOP PORTION OF THE FORM MUST BE COMOPLETELY FILLED OUT. PLEASE NOTE:

False statements, information or data submitted on or with application for payment may result in one or more of the following actions: Termination of Contract for cause; Disapproval of future bids, or contracts or subcontracts; Withholding of final payments on the contract; and Civil and/or criminal prosecution.

PART B- PAYMENTS TO SUBCONTRACTORS AND SUPPLIERS

- 1) ALL FIRMS THAT YOU ARE UTILIZING ON THE JOB MUST BE LISTED EACH TIME **REGARDLESS** IF THEY ARE SCHEDULED TO RECEIVE PAYMENTS OUT OF THE PROCEEDS OF THE REQUISITION FOR PAYMENT.
- 2) All relevant information for each subcontractor and/or supplier must be filled in. This includes firm's complete name, address, phone number and Federal ID #. In addition, if the firm is a **NYS CERTIFIED MBEIWBE**, please indicate as such in the appropriate box.

AS A REMINDER, ONLY THOSE FIRMS THAT HAVE NYS CERTIFICATION BY THE EMPIRE STATE DEVELOPMENT CORPORATION CAN BE COUNTED TOWARDS THE MBE/WBE GOAL ACHIEVEMENT FOR THE PROJECT.
- 3) The percentage of the job or purchases completed must be filled in and in addition, please indicate the number of change orders issued on any subcontract agreement or the number of purchase orders issued to date if purchasing supplies.
- 4) A description of the work being performed by a subcontractor or the type of supplies being purchased must be filled in.

DEFINITIONS

INTENDED PAYMENT: This is the amount of money that you intend to pay to each firm with the money that you will receive from the accompanying requisition. **This is not** the amount that you intend to pay over the life of the contract.

AMOUNT PAID TO DATE: This is the amount of money that has **ACTUALLY** been paid to date from previous requisitions submitted. It does not include the amount that you intend to pay from this requisition. THIS AMOUNT WILL BE VERIFIED BY OUR OFFICE PRIOR TO CLOSE OUT OF THE JOB BY THE RECEIPT OF COPIES OF CANCELED CHECKS OR PAID INVOICES.

CURRENT VALUE OF SUBCONTRACT: This is the total value to date of any subcontract agreement that has been issued to the firm by your company. It should be inclusive of any change orders issued to the original contract. **NOTE:** THIS LINE IS FOR SUBCONTRACTOR INFORMATION ONLY. IF THE FIRM LISTED IS A SUPPLIER THAT YOU ARE PURCHASING SUPPLIES OR MATERIAL FROM, LEAVE BLANK AND GO TO THE NEXT LINE.

TOTAL VALUE OF ALL PURCHASE ORDERS: This is the total amount of **all** purchase orders that will be issued to the firm for the entire job. The number of purchase orders issued to date should be reflected in the area indicated to the left. **NOTE:** THIS LINE IS FOR SUPPLIER INFORMATION ONLY. IF THE FIRM IS A SUBCONTRACTOR, LEAVE THIS AREA BLANK. A SUBCONTRACTOR AGREEMENT SHOULD BE ISSUED WHICH WOIULD BE REFLECTED ON THE PREVIOUS LINE.

The current form that you should be utilizing is form: AAP 7.0 Revised 1/9/08. This form must be included with each payment requisition submitted or the payment will not be processed.

If the form is not filled out according to the above instructions, your next payment requisition may be held until corrections are made. In addition, each report submitted must have an original signature and date.

MONTHLY CONTRACTOR'S COMPLIANCE REPORT

Payment Requisition Date _____
Payment Requisition Amount \$._____
FIT Contract Number _____

CONTRACTOR INFORMATION

Name _____ Federal ID No. _____

Address _____

Contact Person _____ Telephone Number _____

PROJECT INFORMATION

Institution _____ City and Zip Code _____

Work Description _____

Part B - Payments to Subcontractors and Suppliers: Provide name, address and telephone number of ALL subcontractors to which you have awarded a subcontract or suppliers to which you have issued a purchase order. Place X in check box to indicate whether they are a New York State certified MBE or WBE or Other. In addition, for each firm listed below you must also include: the firms federal identification number; amount of intended payment to be made from proceeds of the accompanying requisition; percent complete, amount paid to date; the number of change orders or purchase orders; current value of subcontract (including change orders) or cumulative value of purchase orders; and a brief description of the work or service. All subcontractors or suppliers with whom you have an agreement should be listed below, even if they are not scheduled to receive a payment out of the proceeds of the attached requisition for payment. For further details, see Instruction Sheet

Firm _____ [] MBE [] WBE [] Other Fed. ID# _____

Address _____ Phone# _____ Intended Payment\$. _____

Address _____ Percent Complete _____ Amount Paid to Date\$ _____

No. of Change Orders. _____ Current Value of Subcontract \$ _____

No. of Purchase Orders Issued _____ Total Value of Purchase Orders \$ _____

Work Description _____

Firm _____ [] MBE [] WBE [] Other Fed. ID# _____

Address _____ Phone # _____ Intended Payment\$. _____

Address _____ Percent Complete _____ Amount Paid to Date\$ _____

No. of Change Orders. _____ Current Value of Subcontract \$ _____

No. of Purchase Orders Issued _____ Total Value of Purchase Orders \$ _____

Work Description _____

False statements, information or data submitted on or with application for payment may result in one or more of the following actions: Termination of Contract for cause; Disapproval of future bids, or contracts or subcontracts; Withholding of final payments on the contract; and Civil and/or criminal prosecution.

Name of Principal or Officer (Type or Print)

Title of Principal or Officer (Type or Print)

Signature of Principal or Officer

Date

SECTION XIII.
CHANGE ORDER FORM

CHANGE ORDER

TO:

Contractor: _____ Contract No. _____

Street: _____ Contract Date: _____

City, State, Zip: _____ Original Contract Amount: \$ _____

Phone No. _____ Total Approved Change Orders: _____

Current Contract Amount: \$ _____

You are hereby directed to perform all labor and to provide all materials necessary to carry out the Work described below:

Full consideration for this change order shall be on **INCREASE/DECREASE** of the original contract amount by:
_____ Dollars.

Labor = _____

Materials = _____

INCREASE/DECREASE of the original schedule by days. In accepting and executing this change order, the Contractor, its heirs, executors, administrators, successors, and assigns hereby release and forever discharge the Owner, its successors, and assigns from any and all actions, causes of action, claims and demands whatsoever in law or in equity which the Contractor ever had, now has, or may have against the Owner in any way arising out of this change.

Recommended by:
CONSTRUCTION MANAGER OR ARCHITECT

Name: _____

By: _____ Date: _____

Approved by:

Name: _____

By: _____ Date: _____

Accepted by:
CONTRACTOR

Name: _____

By: _____ Date: _____

OWNER

Name: _____

By: _____ Date: _____

SECTION XIV.
CONTRACTOR'S
TRADE PAYMENT BREAKDOWN

EXHIBIT A: SAFETY EHS PLAN

EXHIBIT A. SAFETY EHS PLAN

FASHION INSTITUTE OF TECHNOLOGY

**OUTLINE FOR PREPARING WORK-SPECIFIC
ENVIRONMENT, HEALTH AND SAFETY (EHS) PLAN**

Before commencing work on site at FIT, Contractor shall prepare a work-specific EHS Plan and submit the EHS Plan to both the Facilities Management and EHS Departments for review and approval. Such approval shall be given in a timely manner.

I) A work-specific EHS Plan is required in the following instances:

- A) When proposed work will:
 - 1) use regulated hazardous chemicals;
 - 2) have the potential to generate fumes, vapors or dusts;
 - 3) involve cutting torches or other spark-generating equipment (“hot” work);
 - 4) generate any waste;
 - 5) involve high-energy systems or
 - 6) require any type of air monitoring.
 - B) When work involves the removal of less than 25 linear feet, or 10 square feet, of asbestos-containing material (that is greater than 1% asbestos). For work involving more than these amounts of asbestos, Contractor must consult with the EHS Department for additional guidelines.
 - C) When work involves the use of tools and equipment in areas where FIT employees or students are present.
 - D) When work involves construction, other than minor repairs or alterations to on-campus facilities.
 - E) When work involves dangerous environments, such as confined spaces, hazardous energy, use scaffolds greater than 10 feet high, or vehicle-mounted articulated booms.
- II) Use the outline below to develop the work-specific EHS Plan. Contractor shall amend the work-specific EHS Plan as needed to accommodate work on-campus as it proceeds.**

DESCRIPTION OF CONTENTS OF WORK-SPECIFIC EHS PLAN

III) GENERAL INFORMATION – PROJECT PLANNING

- A) List primary information about Contractor’s firm and that of sub-

contractors, if any, Project Name, FIT Bid Number and Contractor's safety-related performance measurements on Table 1.

- B) Describe the scope of work and list a breakdown of its specific tasks.
- C) Provide a project schedule that, at a minimum, shows the anticipated start date of the work, the duration of each phase of the work, the anticipated date of completion of each phase, and the project completion date.
- D) List name of Contractor's on-site EHS Coordinator and the names of all OSHA-competent persons needed to carry out the scope of work on Table 2. The EHS Coordinator shall serve as the primary contact with FIT's Director of EHS Compliance during all work.

IV) WORK-SPECIFIC HAZARD ANALYSIS/RISK ASSESSMENT

- A) Describe each task associated with the work of the project.
- B) List the potential hazards, if any, associated with each task.
- C) Provide copies of Contractor's EH&S program applicable to scope of work.
- D) List the types of protective work practices or personal protective equipment (PPE) Contractor will employ to carry-out each task.
- E) Describe the types of exposure assessments that are needed to address potential hazardous exposures related to the work of the project. These include:
 - 1) Work practices and engineering controls Contractor will use to prevent exposure of Contractor's employees to hazardous chemicals or hazardous energy;
 - 2) Work practices and engineering controls Contractor will use to prevent exposure of FIT students and staff to any detectable chemical exposure;
 - 3) Contractor's use of respiratory protection and other protective equipment (PPE) and
 - 4) Qualitative or quantitative monitoring protocols, personal and area monitoring equipment, and contaminant action levels.
- F) Attach copies of certified documentation of "Hazard Assessment and Equipment Selection" required by 29 CFR 1910.132 (d)(2) that complies with 1910 Subpart I Appendix B for all tasks in the work-specific EHS Plan.
- G) Attach a copy of Contractor's written Hazard Communication Program that OSHA requires for the work-specific EHS Plan.

V) WORK-SPECIFIC ENVIRONMENTAL, HEALTH AND SAFETY ELEMENTS

- A) To address health and safety issues, the work-specific EHS Plan shall:
- 1) Describe criteria for upgrading or downgrading personal protective equipment (PPE) or modifying work practices to control hazardous exposures during the work;
 - 2) Describe criteria Contractor will use to set up exclusion zones, including physical barriers and decontamination zones, as needed to prevent spread of debris and restrict access of unauthorized persons to work areas;
 - 3) List equipment Contractor will use for routine and emergency on-site communication;
 - 4) Describe utility clearance and marking procedures to prevent damage to buried utilities, or to lines, piping, or cables located inside of walls and ceilings, if applicable;
 - 5) Describe decontamination and cleaning procedures for Contractor's employees and equipment to prevent the spread of debris. This includes procedures during work, at the end of each work day, and at the completion of the project before FIT's final inspection of the work area;
 - 6) Identify measures to manage dangerous environments, such as confined spaces, scaffold work greater than 10 feet, or articulated booms;
 - 7) List "Hot Work" procedures involved in the work of the project. This may include, but not be limited to, work such as welding, burning, open flames, tar melting or other type of melting pots, grinding that throws sparks. (See Appendix 1 - "Daily Safety Management Work Permit");
 - 8) Identify the need for air monitoring or special testing to carry out the work. Include a listing of monitoring equipment or special tests and the Action Levels that Contractor will apply to project work;
 - 9) Describe safety procedures for excavations more than four 4 feet deep and sloping or shoring procedures where excavations will exceed 5 feet deep;
 - 10) Describe fire protection and explosive hazard review;
 - 11) List the name and address of Contractor's on-contract Confined Space rescue team;
 - 12) Describe spill control procedures for chemical products Contractor will have on-campus during work. Include a listing of spill control or containment supplies that Contractor will have on-hand in case of a spill;
 - 13) Describe the need for site coordination with FIT employees, other contractors on-site and other adjacent work groups. This includes identification of hazardous energy Lock Out and Tag Out

requirements to make to work area safe and

- 14) Provide a listing of other safety equipment that Contractor will have on site during the work of the project.
- B) To address oil, chemical and waste management issues, the work-specific EHS Plan shall:
- 1) Provide estimates of the types and amounts of waste (both hazardous and non-hazardous) that Contractor anticipates the work will generate. As applicable, provide a copy of a waste analysis plan that lists the types of analysis required, the USEPA SW-846 method number and the method detection limits;
 - 2) Provide facility name, USEPA ID number, and a contact name for each facility that will transport and dispose of each of the waste streams identified above. Provide this information for any facility that will dispose of residuals from the treatment of project waste, as applicable;
 - 3) On a copy of a drawing that will be provided by FIT, identify location where Contractor proposes to accumulate waste during work, to set-up exclusion zones and to provide employee decontamination areas;
 - 4) Provide a statement that describes the methods that Contractor will use to minimize the amount of waste generated from the work of the project;
 - 5) Provide a tabular listing, along with copies of Safety Data Sheets (SDS), for any chemical products that Contractor intends to store or use on-site during the work. The listing shall include the product name, manufacturer's name, type, amounts, intended storage location on FIT site, the specific use of the chemical and identification of any NYCDEP/USEPA regulated hazardous substances that Contractor intends to store or use on-site during the work. In all cases, Contractor must submit the listing before chemical products are delivered to the FIT campus;
 - 6) On a copy of a drawing that will be provided by FIT, identify location where Contractor proposes to store chemical products on-site during work;
 - 7) Identify the need, if any, to amend existing FIT emergency contingency planning documents. Such documents include, but are not limited to: Spill Prevention Control and Countermeasure Plan, Spill Prevention Report, Right-to-Know Survey and
 - 8) List permits and Certificates of Fitness (NYCDEP, NYSDEC, USEPA, FDNY) needed to carry-out the scope of work and have copies on-site of permits and Certificates to carry-out project work.

VI) ON-SITE DOCUMENTATION

- A) Contractor shall record initial and daily safety-related procedures on Table 3. These shall include:

- 1) Before start of the work, FIT's Project Manager will conduct a FIT Hazard Communication briefing for Contractor's employees;
 - 2) Before start of the work, FIT's Project Manager and Contractor's on-site EHS Coordinator shall conduct a briefing for FIT employees in areas adjacent to work areas about proposed work;
 - 3) Review of FIT Emergency Evacuation Procedures;
 - 4) Listing of initial and ongoing project status meetings on-site with FIT Project Manager to address EHS concerns safety and health and
 - 5) Scheduled and unscheduled employee safety briefings, toolbox talks.
- B) Contractor shall provide a summary of the on-site EHS Coordinator's EHS-related training and experience relevant to the work of the project.
- C) Contractor's employees shall sign-in daily with FIT Security in the A-Building Lobby.
- D) For each work shift necessary to complete the project, Contractor's on-site EHS Coordinator shall open and fill out the "Daily Safety Management Work Permit" (See Appendix 1) at the start of each work shift and close the Permit at the end of each work shift.

VII) EMERGENCY RESPONSE PLANNING

Contractor shall review the summary of the Emergency Response Contact Names listed on Table 4 and provide the information as follows:

- A) On a site map that will be provided by FIT, identify the primary and secondary routes for the evacuation of Contractor's employees, including the "rally point" where Contractor's employees will assemble and carry-out an accountability check in case of an evacuation;
- B) List emergency response contacts with titles and telephone numbers. Contractor shall immediately call FIT Security and the FIT Project Manager in the event of a spill of oil, chemicals, waste water, or hazardous materials;
- C) Identify the name, address and route to nearest hospital or Contractor's wellness center and
- D) Provide a listing of emergency equipment for first aid, personal protection, spill response, fire protection and rescue.

TABLE 2

ON-SITE SUPERVISORY PERSONNEL of 2

Page 1

TITLE	: NAME(S) AND ON-SITE PHONE NUMBER
On-site EHS Coordinator	:
Contractor Project Managers	:
FIT's Project Manager(s)	:
<p><u>Contractor's Competent Persons</u></p>	<p>List all that Apply – Indicate not applicable areas for department /project work as “NA” For subcontractor employees, place subcontractor firm name in parenthesis after the employee's name</p>
<ul style="list-style-type: none"> • Confined Spaces 	:
<ul style="list-style-type: none"> • Excavations 	:
<ul style="list-style-type: none"> • Industrial Hygiene 	:
<ul style="list-style-type: none"> • Electrical--Lock Out/Tag Out 	:
<ul style="list-style-type: none"> • PPE, Respiratory Protection 	:
<ul style="list-style-type: none"> • Hazard Communication (Required for each department and project. Identify responsible employee for each subcontractor) 	:
<ul style="list-style-type: none"> • Fall Protection 	:
<ul style="list-style-type: none"> • Scaffolds 	:
<ul style="list-style-type: none"> • Cranes & Derricks 	:
<ul style="list-style-type: none"> • Blasting & Use of Explosives 	:

TABLE 2 (Cont'd)

ON-SITE SUPERVISORY PERSONNEL

Page 2 of 2

- Asbestos (Attach copies of Company license, supervisor and handler certificates for all employee that will perform work) :

- Lead

- Silica

- Hot Work (Complete and submit permits daily - see Appendix 1)

- FDNY Certificate of Fitness-Torch Operations

- FDNY Certificate of Fitness-Fire Guard

- FDNY Certificate of Fitness-Fire proofing

- FDNY Certificate of Fitness-Powder Activated Tools

- FDNY Certificate of Fitness-Air Compressors_____

- FDNY Certificate of Fitness-Use of LPG and Use in Tar Kettles

- FDNY REFRIGERATING SYSTEM OPERATING ENGINEER

- FDNY Certificate of Fitness-Other_____

- FDNY Certificate of Fitness-Other_____

-

-

TABLE 4

EMERGENCY CONTACT NAMES & TELEPHONE NUMBERS

1

TITLE	CONTACT NAME	EMERGENCY PHONE NUMBERS
Contractor: MAIN OFFICE		
Contractor President:		
On-site EHS Coordinator		
FIT Facilities Management	Executive Director: George Jefremow Assoc. Executive Director: Allen King	Phone: 212-217-4423 Phone: 212-217-4424
FIT Environmental, Health and Safety Department	Director: Paul DeBiase paul_debiase@fitnyc.edu Acting Coordinator: Kathy Espinoza-Caraba kathy_espinozacaraba@fitnyc.edu	Phone: 212-217-3752 Phone: 212-217-3754
Contractor Project Manager(s)		
FIT Public Safety	Central Control	212-217-7777, or Use Red Phone
Occupational Safety And Health Administration, – Area Director	Provide Zip Code for the location of Accident	800-321-6742
Location of nearest hospital and/or contractor’s wellness center		
Rally Point and Accountability Check Location	In case of Building Evacuation Alarm	

Note: Call FIT Central Control at 212-217-7777 in case or any emergency such as fire, chemical spills, injury requiring medical treatment, or exposure of contractor or FIT personnel to fumes, vapors, or dusts.

EXHIBIT B: PREVAILING WAGE SCHEDULE



Kathy Hochul, Governor

Roberta Reardon, Commissioner

Fashion Institute of Technolog
Sam Li, Deputy Director of Purchasing
227 W 27th Street
New York NY 10001

Schedule Year 2022 through 2023
Date Requested 09/14/2022
PRC# 2022010602

Location Fashion Institute of Technolog
Project ID# C1536
Project Type Provide labor to complete the Admissions Office Renovations Project. Contractor may begin survey and procurement of materials immediately following award.

PREVAILING WAGE SCHEDULE FOR ARTICLE 8 PUBLIC WORK PROJECT

Attached is the current schedule(s) of the prevailing wage rates and prevailing hourly supplements for the project referenced above. A unique Prevailing Wage Case Number (PRC#) has been assigned to the schedule(s) for your project.

The schedule is effective from July 2022 through June 2023. All updates, corrections, posted on the 1st business day of each month, and future copies of the annual determination are available on the Department's website www.labor.ny.gov. Updated PDF copies of your schedule can be accessed by entering your assigned PRC# at the proper location on the website.

It is the responsibility of the contracting agency or its agent to annex and make part, the attached schedule, to the specifications for this project, when it is advertised for bids and /or to forward said schedules to the successful bidder(s), immediately upon receipt, in order to insure the proper payment of wages.

Please refer to the "General Provisions of Laws Covering Workers on Public Work Contracts" provided with this schedule, for the specific details relating to other responsibilities of the Department of Jurisdiction.

Upon completion or cancellation of this project, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

NOTICE OF COMPLETION / CANCELLATION OF PROJECT

Date Completed: _____ Date Cancelled: _____

Name & Title of Representative: _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

General Provisions of Laws Covering Workers on Article 8 Public Work Contracts

Introduction

The Labor Law requires public work contractors and subcontractors to pay laborers, workers, or mechanics employed in the performance of a public work contract not less than the prevailing rate of wage and supplements (fringe benefits) in the locality where the work is performed.

Responsibilities of the Department of Jurisdiction

A Department of Jurisdiction (Contracting Agency) includes a state department, agency, board or commission; a county, city, town or village; a school district, board of education or board of cooperative educational services; a sewer, water, fire, improvement and other district corporation; a public benefit corporation; and a public authority awarding a public work contract.

The Department of Jurisdiction (Contracting Agency) awarding a public work contract MUST obtain a Prevailing Rate Schedule listing the hourly rates of wages and supplements due the workers to be employed on a public work project. This schedule may be obtained by completing and forwarding a "Request for wage and Supplement Information" form (PW 39) to the Bureau of Public Work. The Prevailing Rate Schedule MUST be included in the specifications for the contract to be awarded and is deemed part of the public work contract.

Upon the awarding of the contract, the law requires that the Department of Jurisdiction (Contracting Agency) furnish the following information to the Bureau: the name and address of the contractor, the date the contract was let and the approximate dollar value of the contract. To facilitate compliance with this provision of the Labor Law, a copy of the Department's "Notice of Contract Award" form (PW 16) is provided with the original Prevailing Rate Schedule.

The Department of Jurisdiction (Contracting Agency) is required to notify the Bureau of the completion or cancellation of any public work project. The Department's PW 200 form is provided for that purpose.

Both the PW 16 and PW 200 forms are available for completion [online](#).

Hours

No laborer, worker, or mechanic in the employ of a contractor or subcontractor engaged in the performance of any public work project shall be permitted to work more than eight hours in any day or more than five days in any week, except in cases of extraordinary emergency. The contractor and the Department of Jurisdiction (Contracting Agency) may apply to the Bureau of Public Work for a dispensation permitting workers to work additional hours or days per week on a particular public work project.

There are very few exceptions to this rule. Complete information regarding these exceptions is available on the ["Request for a dispensation to work overtime" form \(PW30\)](#) and ["4 Day / 10 Hour Work Schedule" form \(PW 30.1\)](#).

Wages and Supplements

The wages and supplements to be paid and/or provided to laborers, workers, and mechanics employed on a public work project shall be not less than those listed in the current Prevailing Rate Schedule for the locality where the work is performed. If a prime contractor on a public work project has not been provided with a Prevailing Rate Schedule, the contractor must notify the Department of Jurisdiction (Contracting Agency) who in turn must request an original Prevailing Rate Schedule form the Bureau of Public Work. Requests may be submitted by: mail to NYSDOL, Bureau of Public Work, State Office Bldg. Campus, Bldg. 12, Rm. 130, Albany, NY 12240; Fax to Bureau of Public Work (518) 485-1870; or electronically at the NYSDOL website www.labor.ny.gov.

Upon receiving the original schedule, the Department of Jurisdiction (Contracting Agency) is REQUIRED to provide complete copies to all prime contractors who in turn MUST, by law, provide copies of all applicable county schedules to each subcontractor and obtain from each subcontractor, an affidavit certifying such schedules were received. If the original schedule expired, the contractor may obtain a copy of the new annual determination from the NYSDOL website www.labor.ny.gov.

The Commissioner of Labor makes an annual determination of the prevailing rates. This determination is in effect from July 1st through June 30th of the following year. The annual determination is available on the NYSDOL website www.labor.ny.gov.

Payrolls and Payroll Records

Every contractor and subcontractor MUST keep original payrolls or transcripts subscribed and affirmed as true under penalty of perjury. As per Article 6 of the Labor law, contractors and subcontractors are required to establish, maintain, and preserve for not less than six (6) years, contemporaneous, true, and accurate payroll records. At a minimum, payrolls must show the following information for each person employed on a public work project: Name, Address, Last 4 Digits of Social Security Number, Classification(s) in which the worker was employed, Hourly wage rate(s) paid, Supplements paid

or provided, and Daily and weekly number of hours worked in each classification.

The filing of payrolls to the Department of Jurisdiction is a condition of payment. Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury. The Department of Jurisdiction (Contracting Agency) shall collect, review for facial validity, and maintain such payrolls.

In addition, the Commissioner of Labor may require contractors to furnish, with ten (10) days of a request, payroll records sworn to as their validity and accuracy for public work and private work. Payroll records include, but are not limited to time cards, work description sheets, proof that supplements were provided, cancelled payroll checks and payrolls. Failure to provide the requested information within the allotted ten (10) days will result in the withholding of up to 25% of the contract, not to exceed \$100,000.00. If the contractor or subcontractor does not maintain a place of business in New York State and the amount of the contract exceeds \$25,000.00, payroll records and certifications must be kept on the project worksite.

The prime contractor is responsible for any underpayments of prevailing wages or supplements by any subcontractor.

All contractors or their subcontractors shall provide to their subcontractors a copy of the Prevailing Rate Schedule specified in the public work contract as well as any subsequently issued schedules. A failure to provide these schedules by a contractor or subcontractor is a violation of Article 8, Section 220-a of the Labor Law.

All subcontractors engaged by a public work project contractor or its subcontractor, upon receipt of the original schedule and any subsequently issued schedules, shall provide to such contractor a verified statement attesting that the subcontractor has received the Prevailing Rate Schedule and will pay or provide the applicable rates of wages and supplements specified therein. (See NYS Labor Laws, Article 8 . Section 220-a).

Determination of Prevailing Wage and Supplement Rate Updates Applicable to All Counties

The wages and supplements contained in the annual determination become effective July 1st whether or not the new determination has been received by a given contractor. Care should be taken to review the rates for obvious errors. Any corrections should be brought to the Department's attention immediately. It is the responsibility of the public work contractor to use the proper rates. If there is a question on the proper classification to be used, please call the district office located nearest the project. Any errors in the annual determination will be corrected and posted to the NYSDOL website on the first business day of each month. Contractors are responsible for paying these updated rates as well, retroactive to July 1st.

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. To the extent possible, the Department posts rates in its possession that cover periods of time beyond the July 1st to June 30th time frame covered by a particular annual determination. Rates that extend beyond that instant time period are informational ONLY and may be updated in future annual determinations that actually cover the then appropriate July 1st to June 30th time period.

Withholding of Payments

When a complaint is filed with the Commissioner of Labor alleging the failure of a contractor or subcontractor to pay or provide the prevailing wages or supplements, or when the Commissioner of Labor believes that unpaid wages or supplements may be due, payments on the public work contract shall be withheld from the prime contractor in a sufficient amount to satisfy the alleged unpaid wages and supplements, including interest and civil penalty, pending a final determination.

When the Bureau of Public Work finds that a contractor or subcontractor on a public work project failed to pay or provide the requisite prevailing wages or supplements, the Bureau is authorized by Sections 220-b and 235.2 of the Labor Law to so notify the financial officer of the Department of Jurisdiction (Contracting Agency) that awarded the public work contract. Such officer MUST then withhold or cause to be withheld from any payment due the prime contractor on account of such contract the amount indicated by the Bureau as sufficient to satisfy the unpaid wages and supplements, including interest and any civil penalty that may be assessed by the Commissioner of Labor. The withholding continues until there is a final determination of the underpayment by the Commissioner of Labor or by the court in the event a legal proceeding is instituted for review of the determination of the Commissioner of Labor.

The Department of Jurisdiction (Contracting Agency) shall comply with this order of the Commissioner of Labor or of the court with respect to the release of the funds so withheld.

Summary of Notice Posting Requirements

The current Prevailing Rate Schedule must be posted in a prominent and accessible place on the site of the public work project. The prevailing wage schedule must be encased in, or constructed of, materials capable of withstanding adverse weather conditions and be titled "PREVAILING RATE OF WAGES" in letters no smaller than two (2) inches by two (2) inches.

The "Public Work Project" notice must be posted at the beginning of the performance of every public work contract, on each job site.

Every employer providing workers' compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers' Compensation Board in a conspicuous place on the jobsite.

Every employer subject to the NYS Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers, notices furnished by the State Division of Human Rights.

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the NYS Department of Labor.

Apprentices

Employees cannot be paid apprentice rates unless they are individually registered in a program registered with the NYS Commissioner of Labor. The allowable ratio of apprentices to journeyworkers in any craft classification can be no greater than the statewide building trade ratios promulgated by the Department of Labor and included with the Prevailing Rate Schedule. An employee listed on a payroll as an apprentice who is not registered as above or is performing work outside the classification of work for which the apprentice is indentured, must be paid the prevailing journeyworker's wage rate for the classification of work the employee is actually performing.

NYSDOL Labor Law, Article 8, Section 220-3, require that only apprentices individually registered with the NYS Department of Labor may be paid apprenticeship rates on a public work project. No other Federal or State Agency of office registers apprentices in New York State.

Persons wishing to verify the apprentice registration of any person must do so in writing by mail, to the NYSDOL Office of Employability Development / Apprenticeship Training, State Office Bldg. Campus, Bldg. 12, Albany, NY 12240 or by Fax to NYSDOL Apprenticeship Training (518) 457-7154. All requests for verification must include the name and social security number of the person for whom the information is requested.

The only conclusive proof of individual apprentice registration is written verification from the NYSDOL Apprenticeship Training Albany Central office. Neither Federal nor State Apprenticeship Training offices outside of Albany can provide conclusive registration information.

It should be noted that the existence of a registered apprenticeship program is not conclusive proof that any person is registered in that program. Furthermore, the existence or possession of wallet cards, identification cards, or copies of state forms is not conclusive proof of the registration of any person as an apprentice.

Interest and Penalties

In the event that an underpayment of wages and/or supplements is found:

- Interest shall be assessed at the rate then in effect as prescribed by the Superintendent of Banks pursuant to section 14-a of the Banking Law, per annum from the date of underpayment to the date restitution is made.
- A Civil Penalty may also be assessed, not to exceed 25% of the total of wages, supplements, and interest due.

Debarment

Any contractor or subcontractor and/or its successor shall be ineligible to submit a bid on or be awarded any public work contract or subcontract with any state, municipal corporation or public body for a period of five (5) years when:

- Two (2) willful determinations have been rendered against that contractor or subcontractor and/or its successor within any consecutive six (6) year period.
- There is any willful determination that involves the falsification of payroll records or the kickback of wages or supplements.

Criminal Sanctions

Willful violations of the Prevailing Wage Law (Article 8 of the Labor Law) may be a felony punishable by fine or imprisonment of up to 15 years, or both.

Discrimination

No employee or applicant for employment may be discriminated against on account of age, race, creed, color, national origin, sex, disability or marital status.

No contractor, subcontractor nor any person acting on its behalf, shall by reason of race, creed, color, disability, sex or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates (NYS Labor Law, Article 8, Section 220-e(a)).

No contractor, subcontractor, nor any person acting on its behalf, shall in any manner, discriminate against or intimidate any employee on account of race, creed, color, disability, sex, or national origin (NYS Labor Law, Article 8, Section 220-e(b)).

The Human Rights Law also prohibits discrimination in employment because of age, marital status, or religion.

There may be deducted from the amount payable to the contractor under the contract a penalty of \$50.00 for each calendar day during which such person was discriminated against or intimidated in violation of the provision of the contract (NYS Labor Law, Article 8, Section 220-e(c)).

The contract may be cancelled or terminated by the State or municipality. All monies due or to become due thereunder may be forfeited for a second or any subsequent violation of the terms or conditions of the anti-discrimination sections of the contract (NYS Labor Law, Article 8, Section 220-e(d)).

Every employer subject to the New York State Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers notices furnished by the State Division of Human Rights.

Workers' Compensation

In accordance with Section 142 of the State Finance Law, the contractor shall maintain coverage during the life of the contract for the benefit of such employees as required by the provisions of the New York State Workers' Compensation Law.

A contractor who is awarded a public work contract must provide proof of workers' compensation coverage prior to being allowed to begin work.

The insurance policy must be issued by a company authorized to provide workers' compensation coverage in New York State. Proof of coverage must be on form C-105.2 (Certificate of Workers' Compensation Insurance) and must name this agency as a certificate holder.

If New York State coverage is added to an existing out-of-state policy, it can only be added to a policy from a company authorized to write workers' compensation coverage in this state. The coverage must be listed under item 3A of the information page.

The contractor must maintain proof that subcontractors doing work covered under this contract secured and maintained a workers' compensation policy for all employees working in New York State.

Every employer providing worker's compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers' Compensation Board in a conspicuous place on the jobsite.

Unemployment Insurance

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the New York State Department of Labor.



Kathy Hochul, Governor

Roberta Reardon, Commissioner

Fashion Institute of Technolog
Sam Li, Deputy Director of Purchasing
227 W 27th Street
New York NY 10001

Schedule Year 2022 through 2023
Date Requested 09/14/2022
PRC# 2022010602

Location Fashion Institute of Technolog
Project ID# C1536
Project Type Provide labor to complete the Admissions Office Renovations Project. Contractor may begin survey and procurement of materials immediately following award.

Notice of Contract Award

New York State Labor Law, Article 8, Section 220.3a requires that certain information regarding the awarding of public work contracts, be furnished to the Commissioner of Labor. One "Notice of Contract Award" (PW 16, which may be photocopied), **MUST** be completed for **EACH** prime contractor on the above referenced project.

Upon notifying the successful bidder(s) of this contract, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

Contractor Information

All information must be supplied

Federal Employer Identification Number: _____		
Name: _____		
Address: _____ _____		
City: _____	State: _____	Zip: _____
Amount of Contract: \$ _____	Contract Type:	
Approximate Starting Date: ____/____/____	<input type="checkbox"/> (01) General Construction	
Approximate Completion Date: ____/____/____	<input type="checkbox"/> (02) Heating/Ventilation	
	<input type="checkbox"/> (03) Electrical	
	<input type="checkbox"/> (04) Plumbing	
	<input type="checkbox"/> (05) Other : _____	

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

Social Security Numbers on Certified Payrolls:

The Department of Labor is cognizant of the concerns of the potential for misuse or inadvertent disclosure of social security numbers. Identity theft is a growing problem and we are sympathetic to contractors' concern regarding inclusion of this information on payrolls if another identifier will suffice.

For these reasons, the substitution of the use of the last four digits of the social security number on certified payrolls submitted to contracting agencies on public work projects is now acceptable to the Department of Labor. This change does not affect the Department's ability to request and receive the entire social security number from employers during its public work/ prevailing wage investigations.

Construction Industry Fair Play Act: Required Posting for Labor Law Article 25-B § 861-d

Construction industry employers must post the "Construction Industry Fair Play Act" notice in a prominent and accessible place on the job site. Failure to post the notice can result in penalties of up to \$1,500 for a first offense and up to \$5,000 for a second offense. The posting is included as part of this wage schedule. Additional copies may be obtained from the NYS DOL website, <https://dol.ny.gov/public-work-and-prevailing-wage>

If you have any questions concerning the Fair Play Act, please call the State Labor Department toll-free at 1-866-435-1499 or email us at: dol.misclassified@labor.ny.gov .

Worker Notification: (Labor Law §220, paragraph a of subdivision 3-a)

Effective June 23, 2020

This provision is an addition to the existing wage rate law, Labor Law §220, paragraph a of subdivision 3-a. It requires contractors and subcontractors to provide written notice to all laborers, workers or mechanics of the *prevailing wage and supplement rate* for their particular job classification *on each pay stub**. It also requires contractors and subcontractors to *post a notice* at the beginning of the performance of every public work contract *on each job site* that includes the telephone number and address for the Department of Labor and a statement informing laborers, workers or mechanics of their right to contact the Department of Labor if he/she is not receiving the proper prevailing rate of wages and/or supplements for his/her job classification. The required notification will be provided with each wage schedule, may be downloaded from our website www.labor.ny.gov or be made available upon request by contacting the Bureau of Public Work at 518-457-5589. *In the event the required information will not fit on the pay stub, an accompanying sheet or attachment of the information will suffice.

(12.20)

**To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND**

Budget Policy & Reporting Manual

B-610

Public Work Enforcement Fund

effective date December 7, 2005

1. Purpose and Scope:

This Item describes the Public Work Enforcement Fund (the Fund, PWEF) and its relevance to State agencies and public benefit corporations engaged in construction or reconstruction contracts, maintenance and repair, and announces the recently-enacted increase to the percentage of the dollar value of such contracts that must be deposited into the Fund. This item also describes the roles of the following entities with respect to the Fund:

- New York State Department of Labor (DOL),
- The Office of the State of Comptroller (OSC), and
- State agencies and public benefit corporations.

2. Background and Statutory References:

DOL uses the Fund to enforce the State's Labor Law as it relates to contracts for construction or reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law. State agencies and public benefit corporations participating in such contracts are required to make payments to the Fund.

Chapter 511 of the Laws of 1995 (as amended by Chapter 513 of the Laws of 1997, Chapter 655 of the Laws of 1999, Chapter 376 of the Laws of 2003 and Chapter 407 of the Laws of 2005) established the Fund.

3. Procedures and Agency Responsibilities:

The Fund is supported by transfers and deposits based on the value of contracts for construction and reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law, into which all State agencies and public benefit corporations enter.

Chapter 407 of the Laws of 2005 increased the amount required to be provided to this fund to .10 of one-percent of the total cost of each such contract, to be calculated at the time agencies or public benefit corporations enter into a new contract or if a contract is amended. The provisions of this bill became effective August 2, 2005.

**To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND**

OSC will report to DOL on all construction-related ("D") contracts approved during the month, including contract amendments, and then DOL will bill agencies the appropriate assessment monthly. An agency may then make a determination if any of the billed contracts are exempt and so note on the bill submitted back to DOL. For any instance where an agency is unsure if a contract is or is not exempt, they can call the Bureau of Public Work at the number noted below for a determination. Payment by check or journal voucher is due to DOL within thirty days from the date of the billing. DOL will verify the amounts and forward them to OSC for processing.

For those contracts which are not approved or administered by the Comptroller, monthly reports and payments for deposit into the Public Work Enforcement Fund must be provided to the Administrative Finance Bureau at the DOL within 30 days of the end of each month or on a payment schedule mutually agreed upon with DOL.

Reports should contain the following information:

- Name and billing address of State agency or public benefit corporation;
- State agency or public benefit corporation contact and phone number;
- Name and address of contractor receiving the award;
- Contract number and effective dates;
- Contract amount and PWEF assessment charge (if contract amount has been amended, reflect increase or decrease to original contract and the adjustment in the PWEF charge); and
- Brief description of the work to be performed under each contract.

Checks and Journal Vouchers, payable to the "New York State Department of Labor" should be sent to:

Department of Labor
Administrative Finance Bureau-PWEF Unit
Building 12, Room 464
State Office Campus
Albany, NY 12240

Any questions regarding billing should be directed to NYSDOL's Administrative Finance Bureau-PWEF Unit at (518) 457-3624 and any questions regarding Public Work Contracts should be directed to the Bureau of Public Work at (518) 457-5589.

Required Notice under Article 25-B of the Labor Law

**Attention All Employees, Contractors and Subcontractors:
You are Covered by the Construction Industry Fair Play Act**

The law says that you are an employee unless:

- You are free from direction and control in performing your job, **and**
- You perform work that is not part of the usual work done by the business that hired you, **and**
- You have an independently established business.

Your employer cannot consider you to be an independent contractor unless all three of these facts apply to your work.

It is against the law for an employer to misclassify employees as independent contractors or pay employees off the books.

Employee Rights: If you are an employee, you are entitled to state and federal worker protections. These include:

- Unemployment Insurance benefits, if you are unemployed through no fault of your own, able to work, and otherwise qualified,
- Workers' compensation benefits for on-the-job injuries,
- Payment for wages earned, minimum wage, and overtime (under certain conditions),
- Prevailing wages on public work projects,
- The provisions of the National Labor Relations Act, and
- A safe work environment.

It is a violation of this law for employers to retaliate against anyone who asserts their rights under the law. Retaliation subjects an employer to civil penalties, a private lawsuit or both.

Independent Contractors: If you are an independent contractor, **you must pay all taxes and Unemployment Insurance contributions required by New York State and Federal Law.**

Penalties for paying workers off the books or improperly treating employees as independent contractors:

- **Civil Penalty** First offense: Up to \$2,500 per employee
 Subsequent offense(s): Up to \$5,000 per employee
- **Criminal Penalty** First offense: Misdemeanor - up to 30 days in jail, up to a \$25,000 fine and debarment from performing public work for up to one year.
 Subsequent offense(s): Misdemeanor - up to 60 days in jail or up to a \$50,000 fine and debarment from performing public work for up to 5 years.

If you have questions about your employment status or believe that your employer may have violated your rights and you want to file a complaint, call the Department of Labor at (866) 435-1499 or send an email to dol.misclassified@labor.ny.gov. All complaints of fraud and violations are taken seriously. You can remain anonymous.

Employer Name:

IA 999 (09/16)

Attention Employees

THIS IS A: **PUBLIC WORK PROJECT**

If you are employed on this project as a **worker, laborer, or mechanic** you are entitled to receive the **prevailing wage and supplements rate** for the classification at which you are working.

Chapter 629 of the Labor Laws of 2007:

These wages are set by law and must be posted at the work site. They can also be found at:

<https://dol.ny.gov/public-work-and-prevailing-wage>

If you feel that you have not received proper wages or benefits, please call our nearest office.*

Albany	(518) 457-2744	Patchogue	(631) 687-4882
Binghamton	(607) 721-8005	Rochester	(585) 258-4505
Buffalo	(716) 847-7159	Syracuse	(315) 428-4056
Garden City	(516) 228-3915	Utica	(315) 793-2314
New York City	(212) 932-2419	White Plains	(914) 997-9507
Newburgh	(845) 568-5156		

* For New York City government agency construction projects, please contact the Office of the NYC Comptroller at (212) 669-4443, or www.comptroller.nyc.gov – click on Bureau of Labor Law.

Contractor Name: _____

Project Location: _____

Requirements for OSHA 10 Compliance

Article 8 §220-h requires that when the advertised specifications, for every contract for public work, is \$250,000.00 or more the contract must contain a provision requiring that every worker employed in the performance of a public work contract shall be certified as having completed an OSHA 10 safety training course. The clear intent of this provision is to require that all employees of public work contractors, required to be paid prevailing rates, receive such training "prior to the performing any work on the project."

The Bureau will enforce the statute as follows:

All contractors and sub contractors must attach a copy of proof of completion of the OSHA 10 course to the first certified payroll submitted to the contracting agency and on each succeeding payroll where any new or additional employee is first listed.

Proof of completion may include but is not limited to:

- Copies of bona fide course completion card (*Note: Completion cards do not have an expiration date.*)
- Training roster, attendance record or other documentation from the certified trainer pending the issuance of the card.
- Other valid proof

**A certification by the employer attesting that all employees have completed such a course is not sufficient proof that the course has been completed.

Any questions regarding this statute may be directed to the New York State Department of Labor, Bureau of Public Work at 518-457-5589.

WICKS

Public work projects are subject to the Wicks Law requiring separate specifications and bidding for the plumbing, heating and electrical work, when the total project's threshold is \$3 million in Bronx, Kings, New York, Queens and, Richmond counties; \$1.5 million in Nassau, Suffolk and Westchester counties; and \$500,000 in all other counties.

For projects below the monetary threshold, bidders must submit a sealed list naming each subcontractor for the plumbing, HVAC and electrical and the amount to be paid to each. The list may not be changed unless the public owner finds a legitimate construction need, including a change in specifications or costs or the use of a Project Labor Agreement (PLA), and must be open to public inspection.

Allows the state and local agencies and authorities to waive the Wicks Law and use a PLA if it will provide the best work at the lowest possible price. If a PLA is used, all contractors shall participate in apprentice training programs in the trades of work it employs that have been approved by the Department of Labor (DOL) for not less than three years. They shall also have at least one graduate in the last three years and use affirmative efforts to retain minority apprentices. PLA's would be exempt from Wicks, but deemed to be public work subject to prevailing wage enforcement.

The Commissioner of Labor shall have the power to enforce separate specification requirements on projects, and may issue stop-bid orders against public owners for non-compliance.

Other new monetary thresholds, and similar sealed bidding for non-Wicks projects, would apply to certain public authorities including municipal housing authorities, NYC Construction Fund, Yonkers Educational Construction Fund, NYC Municipal Water Finance Authority, Buffalo Municipal Water Finance Authority, Westchester County Health Care Association, Nassau County Health Care Corp., Clifton-Fine Health Care Corp., Erie County Medical Center Corp., NYC Solid Waste Management Facilities, and the Dormitory Authority.

Contractors must pay subcontractors within a 7 days period.

(07.19)

Introduction to the Prevailing Rate Schedule

Information About Prevailing Rate Schedule

This information is provided to assist you in the interpretation of particular requirements for each classification of worker contained in the attached Schedule of Prevailing Rates.

Classification

It is the duty of the Commissioner of Labor to make the proper classification of workers taking into account whether the work is heavy and highway, building, sewer and water, tunnel work, or residential, and to make a determination of wages and supplements to be paid or provided. It is the responsibility of the public work contractor to use the proper rate. If there is a question on the proper classification to be used, please call the district office located nearest the project. District office locations and phone numbers are listed below.

Prevailing Wage Schedules are issued separately for "General Construction Projects" and "Residential Construction Projects" on a county-by-county basis.

General Construction Rates apply to projects such as: Buildings, Heavy & Highway, and Tunnel and Water & Sewer rates.

Residential Construction Rates generally apply to construction, reconstruction, repair, alteration, or demolition of one family, two family, row housing, or rental type units intended for residential use.

Some rates listed in the Residential Construction Rate Schedule have a very limited applicability listed along with the rate. Rates for occupations or locations not shown on the residential schedule must be obtained from the General Construction Rate Schedule. Please contact the local Bureau of Public Work office before using Residential Rate Schedules, to ensure that the project meets the required criteria.

Payrolls and Payroll Records

Contractors and subcontractors are required to establish, maintain, and preserve for not less than six (6) years, contemporaneous, true, and accurate payroll records.

Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury.

Paid Holidays

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

Overtime

At a minimum, all work performed on a public work project in excess of eight hours in any one day or more than five days in any workweek is overtime. However, the specific overtime requirements for each trade or occupation on a public work project may differ. Specific overtime requirements for each trade or occupation are contained in the prevailing rate schedules.

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays.

The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Supplemental Benefits

Particular attention should be given to the supplemental benefit requirements. Although in most cases the payment or provision of supplements is straight time for all hours worked, some classifications require the payment or provision of supplements, or a portion of the supplements, to be paid or provided at a premium rate for premium hours worked. Supplements may also be required to be paid or provided on paid holidays, regardless of whether the day is worked. The Overtime Codes and Notes listed on the particular wage classification will indicate these conditions as required.

Effective Dates

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. The rate listed is valid until the next effective rate change or until the new annual determination which takes effect on July 1 of each year. All contractors and subcontractors are required to pay the current prevailing rates of wages and supplements. If you have any questions please contact the Bureau of Public Work or visit the New York State Department of Labor website (www.labor.ny.gov) for current wage rate information.

Apprentice Training Ratios

The following are the allowable ratios of registered Apprentices to Journey-workers.

For example, the ratio 1:1,1:3 indicates the allowable initial ratio is one Apprentice to one Journeyworker. The Journeyworker must be in place on the project before an Apprentice is allowed. Then three additional Journeyworkers are needed before a second Apprentice is allowed. The last ratio repeats indefinitely. Therefore, three more Journeyworkers must be present before a third Apprentice can be hired, and so on.

Please call Apprentice Training Central Office at (518) 457-6820 if you have any questions.

Title (Trade)	Ratio
Boilermaker (Construction)	1:1,1:4
Boilermaker (Shop)	1:1,1:3
Carpenter (Bldg.,H&H, Pile Driver/Dockbuilder)	1:1,1:4
Carpenter (Residential)	1:1,1:3
Electrical (Outside) Lineman	1:1,1:2
Electrician (Inside)	1:1,1:3
Elevator/Escalator Construction & Modernizer	1:1,1:2
Glazier	1:1,1:3
Insulation & Asbestos Worker	1:1,1:3
Iron Worker	1:1,1:4
Laborer	1:1,1:3
Mason	1:1,1:4
Millwright	1:1,1:4
Op Engineer	1:1,1:5
Painter	1:1,1:3
Plumber & Steamfitter	1:1,1:3
Roofer	1:1,1:2
Sheet Metal Worker	1:1,1:3
Sprinkler Fitter	1:1,1:2

If you have any questions concerning the attached schedule or would like additional information, please contact the nearest BUREAU of PUBLIC WORK District Office or write to:

New York State Department of Labor
 Bureau of Public Work
 State Office Campus, Bldg. 12
 Albany, NY 12240

District Office Locations:	Telephone #	FAX #
Bureau of Public Work - Albany	518-457-2744	518-485-0240
Bureau of Public Work - Binghamton	607-721-8005	607-721-8004
Bureau of Public Work - Buffalo	716-847-7159	716-847-7650
Bureau of Public Work - Garden City	516-228-3915	516-794-3518
Bureau of Public Work - Newburgh	845-568-5287	845-568-5332
Bureau of Public Work - New York City	212-932-2419	212-775-3579
Bureau of Public Work - Patchogue	631-687-4882	631-687-4902
Bureau of Public Work - Rochester	585-258-4505	585-258-4708
Bureau of Public Work - Syracuse	315-428-4056	315-428-4671
Bureau of Public Work - Utica	315-793-2314	315-793-2514
Bureau of Public Work - White Plains	914-997-9507	914-997-9523
Bureau of Public Work - Central Office	518-457-5589	518-485-1870

New York County General Construction

Asbestos Worker

09/01/2022

JOB DESCRIPTION Asbestos Worker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour: 07/01/2022

Asbestos Worker \$ 44.00
Removal & Abatement Only*

NOTE: *On Mechanical Systems that are NOT to be SCRAPPED.

SUPPLEMENTAL BENEFITS

Per Hour:

Asbestos Worker \$ 8.70
Removal & Abatement Only

OVERTIME PAY

See (B, B2, *E, J) on OVERTIME PAGE

*Hours worked on Saturdays are paid at time and one half only if forty hours have been worked during the week.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8) on HOLIDAY PAGE

REGISTERED APPRENTICES

Apprentice Removal & Abatement Only:

1000 hour terms at the following percentage of Journeyman's rates.

1st	2nd	3rd	4th
78%	80%	83%	89%

SUPPLEMENTAL BENEFIT

Per Hour:

Apprentice
Removal & Abatement \$ 8.70

4-12a - Removal Only

Boilermaker

09/01/2022

JOB DESCRIPTION Boilermaker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES

Per Hour: 07/01/2022

Boilermaker \$ 63.38
Repairs & Renovations 63.38

SUPPLEMENTAL BENEFITS

Per Hour:

Boilermaker 32% of hourly
Repair \$ Renovations Wage Paid
+ \$ 25.38

NOTE: "Hourly Wage Paid" shall include any and all premium(s) pay.

Repairs & Renovation Includes replacement of parts and repairs & renovation of existing unit.

OVERTIME PAY

See (D, O) on OVERTIME PAGE

Repairs & Renovation see (B,E,Q)

HOLIDAY

Paid: See (8, 16, 23, 24) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 12, 15, 16, 22, 23, 24, 25) on HOLIDAY PAGE

NOTE: *Employee must work in pay week to receive Holiday Pay.

**Employee gets 4 times the hourly wage rate for working Labor Day.

REGISTERED APPRENTICES

Wage per hour:

(1/2) Year Terms at the following percentage of Boilermaker's Wage

1st	2nd	3rd	4th	5th	6th	7th
65%	70%	75%	80%	85%	90%	95%

Supplemental Benefits Per Hour:

Apprentice(s) 32% of Hourly Wage Paid Plus Amount Below

1st Term	\$ 19.41
2nd Term	20.26
3rd Term	21.11
4th Term	21.96
5th Term	22.82
6th Term	23.68
7th Term	24.52

NOTE: "Hourly Wage Paid" shall include any and all premium(s)

4-5

Carpenter

09/01/2022

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2022

Piledriver \$ 58.16
 + 9.54*

Dockbuilder \$ 58.16
 + 9.54*

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker \$ 44.54

OVERTIME PAY

See (B, E2, O) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE.

Paid: for 1st & 2nd yr.

Apprentices See (5,6,11,13,25)

Overtime: See (5,6,11,13,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wages per hour

(1)year terms:

1st	2nd	3rd	4th
\$24.60	\$30.20	\$38.58	\$46.97
+ 5.05*	+ 5.05*	+ 5.05*	+ 5.05*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:

All Terms: \$ 31.03

Carpenter

09/01/2022

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2022

Carpet/Resilient

Floor Coverer \$ 55.05
+ 8.25*

*This portion is not subject to overtime premiums

INCLUDES HANDLING & INSTALLATION OF ARTIFICIAL TURF AND SIMILAR TURF INDOORS/OUTDOORS.

SUPPLEMENTAL BENEFITS

Per hour: \$ 39.40

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (18, 19) on HOLIDAY PAGE.

Paid for 1st & 2nd yr.

Apprentices See (5,6,11,13,16,18,19,25)

Overtime: See (5,6,11,13,16,18,19,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wage per hour - (1) year terms:

	1st	2nd	3rd	4th
	\$ 24.80	\$ 27.80	\$ 32.05	\$ 39.93
	+ 1.85*	+ 2.35*	+ 2.85*	+ 3.85*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:

	1st	2nd	3rd	4th
	\$ 14.80	\$ 15.80	\$ 18.90	\$ 19.90

8-2287

Carpenter

09/01/2022

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per Hour: 07/01/2022

Marine Construction:

Marine Diver \$ 73.03
+ 9.54*

Marine Tender \$ 62.11
+ 9.54*

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker \$ 44.54

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (18, 19) on HOLIDAY PAGE
 Overtime: See (5, 6, 10, 11, 13, 16, 18, 19) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:
 One (1) year terms.

1st year	\$ 24.60 + 5.05*
2nd year	30.20 + 5.05*
3rd year	38.58 + 5.05*
4th year	56.97 + 5.05*

*This portion is not subject to overtime premiums

Supplemental Benefits
 Per Hour:

All terms \$ 31.03

8-1456MC

Carpenter

09/01/2022

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per hour: 07/01/2022

Building	
Millwright	\$ 57.80 + 12.62*

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per hour:

Millwright \$ 43.16

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (18,19) on HOLIDAY PAGE.

Overtime See (5,6,8,11,13,18,19,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wages per hour:
 One (1) year terms:

1st.	2nd.	3rd.	4th.
\$31.24	\$36.69	\$42.14	\$53.04
+ 6.75*	+ 7.92*	+ 9.09*	+ 11.43*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:

One (1) year terms:

1st.	2nd.	3rd.	4th.
\$29.01	\$31.54	\$34.72	\$39.14

8-740.1

Carpenter

09/01/2022

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per Hour:

07/01/2022

Timberman \$ 53.05
 + 10.01*

*This portion not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per Hour:

07/01/2022

\$ 43.75

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE.

Paid: for 1st & 2nd yr.

Apprentices See (5,6,11,13,25)

Overtime: See (5,6,11,13,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wages per hour:

One (1) year terms:

	1st	2nd	3rd	4th
	\$22.42	\$27.53	\$35.18	\$42.84
	+ 5.30*	+ 5.30*	+ 5.30*	+5.30*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:

All terms \$ 30.74

8-1556 Tm

Carpenter

09/01/2022

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Westchester

PARTIAL COUNTIES

Orange: South of but including the following, Waterloo Mills, Slate Hill, New Hampton, Goshen, Blooming Grove, Mountainville, east to the Hudson River.

Putnam: South of but including the following, Cold Spring, TompkinsCorner, Mahopac, Croton Falls, east to Connecticut border.

Suffolk: West of Port Jefferson and Patchogue Road to Route 112 to the Atlantic Ocean.

WAGES

Per hour:

07/01/2022

10/18/2022

Core Drilling:

Driller \$ 42.27 \$ 43.38
 + 2.30* + 2.50*

Driller Helper

33.47 34.47
 + 2.30* + 2.50*

Note: Hazardous Waste Pay Differential:

For Level C, an additional 15% above wage rate per hour

For Level B, an additional 15% above wage rate per hour

For Level A, an additional 15% above wage rate per hour

Note: When required to work on water: an additional \$ 3.00 per hour.

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per hour:

Driller and Helper \$ 28.30 \$ 28.85

OVERTIME PAY

See (B, G, P) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6) on HOLIDAY PAGE
 Overtime: See (5, 6) on HOLIDAY PAGE

8-1536-CoreDriller

Carpenter

09/01/2022

JOB DESCRIPTION Carpenter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, New York, Putnam, Queens, Richmond

PARTIAL COUNTIES

Nassau: That portion of the county that lies west of Seaford Creek and south of the Southern State Parkway.

WAGES

Per hour: 07/01/2022

Show Exhibit \$ 55.00
 + 9.50**

Bldg. Carpenter* \$55.05
 + 8.25**

* Not applicable in Putnam County

**This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per hour worked:

Show Exhibit \$ 44.20
 Bldg. Carpenter 39.40

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (18,19) on HOLIDAY PAGE.

Paid:for 1st & 2nd yr.

Apprentices See (5,6,11,13,16,18,19,25)

Overtime: See (5,6,11,13,16,18,19,25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wages per hour: Show Exhibit

(1) year terms:

1st.	2nd.	3rd.	4th.
\$22.00	\$27.50	\$35.75	\$44.00
+ 4.75*	+ 4.75*	+ 4.75*	+ 4.75*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:

All terms \$ 30.25

Wages per hour: Bldg. Carpenter

(1) year terms:

1st	2nd	3rd	4th
\$19.80	\$22.80	\$27.05	\$34.93
+ 1.85*	+ 2.30*	+ 2.80*	+ 3.80*

*This portion is not subject to overtime premiums.

Supplemental benefits per hour:

1st	2nd	3rd	4th
\$14.82	\$15.87	\$18.97	\$19.97

8-EXHIB

Carpenter - Building High Rise Concrete Form Work

09/01/2022

JOB DESCRIPTION Carpenter - Building High Rise Concrete Form Work

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

PARTIAL COUNTIES

Nassau: Work performed beginning at the Intersection of the City Line & North Shore of Long Island, then running Southerly to the Southern State Pkwy, then East to Seaford Creek in Nassau County, then South to Atlantic Ocean, then West to Southern tip of Richmond County

WAGES

Per hour: 07/01/2022
 Building High Rise:

Concrete Carpenter A \$ 50.78
 + 8.43**

Concrete Carpenter B* \$ 40.19
 + 1.85**

*NOTE: Tier B work excludes erection of decking, perimeter debris netting, leading edge work, self & climbing form systems and the installation of cocoon systems.

**This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per hour:

Concrete Carpenter A \$ 35.86
 Concrete Carpenter B \$ 15.75

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
 Overtime: See (5, 6, 8, 11, 13, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage per hour:

One (1) year terms:

Concrete Carpenter Apprentices	1st	2nd	3rd	4th
	\$ 18.27	\$ 24.70	\$ 31.28	\$ 38.90
	+ .65*	+ 1.78*	+ 1.91*	+ 2.06*

*This portion is not subject to overtime premiums

Supplemental benefits per hour:

Concrete Carpenter:
 Apprentices All Terms
 \$ 15.75

8-NYC Bldg/212

Carpenter - Heavy&Highway

09/01/2022

JOB DESCRIPTION Carpenter - Heavy&Highway

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

PARTIAL COUNTIES

Nassau: That portion of the county that lies West of Seaford Creek and South of the Southern State Parkway.

WAGES

Per hour: 07/01/2022

Heavy & Highway
 Carpenter \$ 58.16
 + 9.54*

*This portion is not subject to overtime premiums

SUPPLEMENTAL BENEFITS

Per hour worked:

Heavy & Highway
 Carpenter \$ 44.54

OVERTIME PAY

See (B, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
 Overtime: See (5, 6, 11, 13, 25) on HOLIDAY PAGE
 Paid : for 1st & 2nd yr
 Apprentices See (5, 6, 11, 13, 25)

REGISTERED APPRENTICES

Wage per hour:

One (1) year terms:

	1st	2nd	3rd	4th
Heavy & Highway	\$ 24.60	\$ 30.20	\$ 38.58	\$ 46.97
	+ 5.05*	+ 5.05*	+ 5.05*	+ 5.05*

*This portion is not subject to overtime premiums

Supplemental Benefits:

Per Hour:
 All terms
 \$ 31.03

8-NYC H/H

Electrician **09/01/2022**

JOB DESCRIPTION Electrician

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

Per hour:	07/01/2022	01/01/2023
Tree Trimmer	\$ 33.22	\$ 34.21
Ground Person	20.69	20.69

Applies to line clearance, tree work, and right-of-way preparation on all new or existing overhead, electrical, telephone, and CATV lines.

SUPPLEMENTAL BENEFITS

Per hour:

Tree Trimmer	\$ 12.44	\$ 12.81
Ground Person	7.75	7.75

OVERTIME PAY

See (B, *H, Q) on OVERTIME PAGE

*Worked performed on Sundays & Holidays outside of 7.00am - 4.00pm shall be paid at double time, in addition to the holiday pay if applicable.

HOLIDAY

HOLIDAY:

Paid: See (5,6,10,11,15,16,26) on HOLIDAY PAGE.

(An additional floating holiday after four years service)

Overtime: See (5,6,10,11,15,16,26) on HOLIDAY PAGE.

Electrician **09/01/2022**

JOB DESCRIPTION Electrician **DISTRICT 9**

ENTIRE COUNTIES
 Bronx, Kings, New York, Queens, Richmond

WAGES

Per hour:	07/01/2022	04/12/2023
Electrician	\$ 31.25	\$ 31.25
Telephone	31.25	31.25

Maintenance and Jobbing-Electrical and teledata work of limited duration and scope, consisting of repairs and/or replacement of electrical and teledata equipment.

- Includes all work necessary to retrofit, service, maintain and repair all kinds of lighting fixtures and local lighting controls and washing and cleaning of foregoing fixtures.

SUPPLEMENTAL BENEFITS

Journeyworker:

	07/01/2022	04/12/2023
	\$ 25.30	\$ 26.55
	27.28*	28.52*

* Applies to overtime hours

OVERTIME PAY
 See (B, H) on OVERTIME PAGE

HOLIDAY
 Paid: See (1) on HOLIDAY PAGE
 Overtime: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE

9-3m

Electrician **09/01/2022**

JOB DESCRIPTION Electrician **DISTRICT 9**

ENTIRE COUNTIES
 Bronx, Kings, New York, Queens, Richmond, Westchester

WAGES

Per hour:	07/01/2022	03/09/2023
Service Technician	\$ 35.40	\$ 36.40

Service and Maintenance on Alarm and Security Systems.

Maintenance, repair and /or replacement of defective (or damaged) equipment on, but not limited to, Burglar - Fire - Security - CCTV - Card Access - Life Safety Systems and associated devices. (Whether by service contract of T&M by customer request.)

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker:	\$ 20.18	\$ 21.07
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OVERTIME PAY
 See (B, E, Q) on OVERTIME PAGE

HOLIDAY
 Paid: See (5, 6, 11, 15, 16, 17, 25, 26) on HOLIDAY PAGE
 Overtime: See (5, 6, 11, 15, 16, 17, 25, 26) on HOLIDAY PAGE

9-3H

Electrician **09/01/2022**

JOB DESCRIPTION Electrician **DISTRICT 9**

ENTIRE COUNTIES
 Bronx, Kings, New York, Queens, Richmond

WAGES

Per Hour:	07/01/2022	04/13/2023
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Electrician		
Audio/Sound and Temporary Light/ Power	\$ 59.00	\$ 61.00

Evening(Swing Shift):

Electrician		
Audio/Sound and Temporary Light/ Power	69.23	71.57

Night (Graveyard Shift):

Electrician		
Audio/Sound and Temporary Light	77.54	80.17

Solar-Photovoltaic Systems

Group 1	59.00	61.00
All tasks not listed in Group 2		

Group 2	31.25	31.25
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D.C portion and associated mechanical equipment related to solar systems
 (excluding battery storage and its associated equipment) including work related to
 Weather Stations and Data Acquisitions/Monitoring Systems on solar photovoltaic systems.

Mounting of PV modules.

Mounting of DC optimizers to back of modules if the installation calls for this equipment.

Mounting of microinverters to back of modules and install trunk cabling on racking if called for.

Module to module connection of PV modules to adjacent modules. If racking manufacturer provides integrated inter-row cable management, install string jumper to complete the string in full in same sub-array.

If racking manufacturer does not provide integrated inter-row cable management, run conduit between rows, bond it and run string jumper to complete string in full in same sub-array.

Installation of weather stations and other weather station relevant sensors as specified.

Installation of data acquisition system (DAS) for PV system monitoring.

SUPPLEMENTAL BENEFITS

Per Hour:

Electrician	\$ 61.50 65.22*	\$ 63.84 67.69*
Swing Shift:	69.97 74.34*	72.58 77.10*
Graveyard Shift:	77.12 82.01*	79.96 85.02*
Temporary Light/Power:	28.10 31.16*	28.56 31.81*
Group 1:	61.50 65.22*	63.84 67.69*
Group 2:	25.30 27.28*	26.55 28.52*

* Applies when premium wages are paid.

Temporary Light and Power benefit rate applies for three or less workers.

Reduce benefit rate by 6.2% for any employee who has accumulated wages of \$137,700 for the same employer.

OVERTIME PAY

See (A, H) on OVERTIME PAGE

See (B) for Temporary Light and Power

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
 Overtime: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages Per Hour:

One (1) year terms		
First term:	07/01/2022	04/13/2023
0-6 mos.	\$ 18.00	\$ 18.00
7-12 mos.	18.50	18.50
Second term:		
0-6 mos.	19.50	19.50
7-12 mos.	20.50	20.50
Third term:		
0-6 mos.	21.50	21.50
7-12 mos.	22.50	22.50
Fourth term:		
0-6 mos.	23.50	23.50
7-12 mos.	25.50	25.50
Fifth term/MIJ:		
0-12 mos.	26.75	26.75
13-18 mos.	31.25	31.25

Supplemental Benefits per hour:

One (1) year terms:

First Term:	Regular	Overtime	Regular	Overtime
0-6 mos.	\$ 15.68	\$ 16.88	\$ 16.68	\$ 17.87
7-12 mos.	15.94	17.17	16.69	17.92
Second Term:				
0-6 mos.	16.47	17.76	17.48	18.78
7-12 mos.	16.99	18.35	17.74	19.10
Third Term:				
0-6 mos.	17.52	18.94	18.56	19.98
7-12 mos.	18.04	19.53	18.79	20.28
Fourth Term:				
0-6 mos.	18.56	20.12	19.63	21.19
7-12 mos.	19.61	21.30	20.36	22.05
Fifth Term/MIJ:				
1-12 mos.	22.88	24.57	24.13	25.82
13-18 mos.	25.30	27.28	26.55	28.52

9-3

Electrician - Highway and Street Lighting, Traffic Signals and Controls

09/01/2022

JOB DESCRIPTION Electrician - Highway and Street Lighting, Traffic Signals and Controls **DISTRICT 9**

ENTIRE COUNTIES
 Bronx, Kings, New York, Queens, Richmond

WAGES

Per hour:

	07/01/2022	04/19/2023
Electro Pole Electrician	\$ 59.00	\$ 61.00
Electro Pole Foundation Installer	44.66	46.66
Electro Pole Maintainer	38.61	40.61

SUPPLEMENTAL BENEFITS

Per Hour:

07/01/2022	04/19/2023
------------	------------

Electro Pole Electrician	\$ 63.50	\$ 65.91
	67.23*	69.77*
Electro Pole Foundation Installer	48.04	50.05
	50.86*	53.00*
Electro Pole Maintainer	43.40	45.40
	45.83*	47.97*

* Applies when premium wages are paid

Note: Reduce benefit rate by 6.2% for any employee who has accumulated wages in \$137,700 for the same employer.

OVERTIME PAY

See (A, B, E4, F, K) on OVERTIME PAGE

B - Applies to Electro Pole Foundation Installer

E4 - Applies to Electro Pole Maintainer

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE

9-3J

Elevator Constructor

09/01/2022

JOB DESCRIPTION Elevator Constructor

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

PARTIAL COUNTIES

Rockland: Entire County except for the Township of Stony Point

Westchester: Entire County except for the Townships of Bedford, Lewisboro, Cortland, Mt. Kisco, North Salem, Pound Ridge, Somers and Yorktown.

WAGES

Per hour:

	07/01/2022	03/17/2023
Elevator Constructor	\$ 75.14	\$ 77.49
Modernization & Service/Repair	59.09	60.89

Four(4), ten(10) hour days may be worked at straight time during a week, Monday thru Friday.

NOTE- In order to use the '4 Day/10 Hour Work Schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 IS NOT SUBMITTED you will be liable for overtime payments for work over the allotted hours per day listed.

SUPPLEMENTAL BENEFITS

Per Hour:

Elevator Constructor	\$ 43.914	\$ 45.574
Modernization & Service/Repairs	42.787	44.412

OVERTIME PAY

Constructor See (D, M, T) on OVERTIME PAGE.

Modern/Service See (B, F, S) on OVERTIME PAGE.

HOLIDAY

Paid: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

WAGES PER HOUR:

*Note: 1st, 2nd, 3rd Terms are based on Average wage of Constructor & Modernization.
 Terms 4 thru 9 Based on Journeyman's wage of classification Working in.

6 MONTH TERMS:

1st Term* 50%	2nd & 3rd Term* 50%	4th & 5th Term 55%	6th & 7th Term 65%	8th & 9th Term 75%
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SUPPLEMENTAL BENEFITS

Elevator Constructor

1st Term	\$ 0.00	\$ 0.00
2nd & 3rd Term	34.772	36.024
4th & 5th Term	35.606	36.943
6th & 7th Term	37.052	38.448
8th & 9th Term	38.497	39.953

Modernization & Service/Repair

1st Term	\$ 0.00	\$ 0.00
2nd & 3rd Term	34.672	35.694
4th & 5th Term	35.195	36.525
6th & 7th Term	36.571	37.948
8th & 9th Term	37.938	39.38

4-1

Glazier

09/01/2022

JOB DESCRIPTION Glazier

DISTRICT 8

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES

Per hour:	7/01/2022	11/01/2022
		Additional
Glazier	\$ 59.59	\$ 1.25
*Scaffolding	61.55	
Glass Tinting & Window Film	30.11	
**Repair & Maintenance	30.11	

*Scaffolding includes swing scaffold, mechanical equipment, scissor jacks, man lifts, booms & buckets 24' or more, but not pipe scaffolding.

**Repair & Maintenance- All repair & maintenance work on a particular building whenever performed, where the total cumulative contract value is under \$148,837. All Glass tinting, window film, regardless of material or intended use, and all affixing of decals to windows or glass.

SUPPLEMENTAL BENEFITS

Per hour:	7/01/2022
Journeyworker	\$ 37.55
Glass tinting & Window Film	22.01
Repair & Maintenance	22.01

OVERTIME PAY

See (B,H,V) on OVERTIME PAGE.

For 'Repair & Maintenance' and 'Glass Tinting & Window Film' see (B, B2, I, S) on overtime page.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
 Overtime: See (4, 6, 16, 25) on HOLIDAY PAGE
 For 'Repair & Maintenance' and 'Glass Tinting & Window Film' Only
 Paid: See(5, 6, 16, 25)
 Overtime: See(5, 6, 16, 25)

REGISTERED APPRENTICES

Wage per hour:

(1) year terms at the following wage rates:	7/01/2022	11/01/2022
1st term	\$ 21.15	TBD

2nd term	29.07
3rd term	35.20
4th term	47.38

Supplemental Benefits:

(Per hour)

1st term	\$ 17.15
2nd term	24.42
3rd term	27.06
4th term	32.15

8-1087 (DC9 NYC)

Insulator - Heat & Frost

09/01/2022

JOB DESCRIPTION Insulator - Heat & Frost

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour: 07/01/2022 06/01/2023

Insulators		Additional
Heat & Frost	\$ 70.01	\$ 1.10/Hr.

SUPPLEMENTAL BENEFITS

Per Hour:

Insulators	\$ 35.16
Heat & Frost	

OVERTIME PAY

See (B, E, *Q, V) on OVERTIME PAGE

* Triple time for Labor Day (If worked)

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages:

1 year terms.

Wages Per Hour:

1st	2nd	3rd	4th
\$ 28.00	\$ 35.02	\$ 42.01	\$ 49.02

Supplemental Benefits:

\$ 14.06	\$ 17.59	\$ 21.10	\$ 24.62
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4-12

Ironworker

09/01/2022

JOB DESCRIPTION Ironworker

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per Hour: 07/01/2022 01/01/2023

Stone Derrickmen Rigger	\$ 72.26	Additional + \$ 1.64
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Stone Handset Derrickman	70.11	+ \$ 1.11
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SUPPLEMENTAL BENEFITS

Per hour:

Stone Derrickmen Rigger	\$ 42.10
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Stone Handset Derrickman	42.09
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OVERTIME PAY

See (B, D1, *E, Q, **V) on OVERTIME PAGE

*Time and one-half shall be paid for all work on Saturday up to eight (8) hours and double time shall be paid for all work thereafter.

** Benefits same premium as wages on Holidays only

HOLIDAY

Paid: See (18) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 25) on HOLIDAY PAGE

Work stops at schedule lunch break with full day's pay.

REGISTERED APPRENTICES

Wage per hour:

Stone Derrickmen Rigger:

	1st	2nd	3rd	4th
07/01/2022	\$ 35.58	\$ 50.89	\$ 56.71	\$ 62.48

Supplemental benefits:

Per hour:

07/01/2022	21.61	31.97	31.97	31.97
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Stone Handset:

1/2 year terms at the following hourly wage rate:

	1st	2nd	3rd	4th
07/01/2022	34.50	49.43	54.99	61.00

Supplemental benefits:

Per hour:

07/01/2022	21.60	31.96	31.96	31.96
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9-197D/R

Ironworker

09/01/2022

JOB DESCRIPTION Ironworker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per Hour: 07/01/2022 01/01/2023

Ornamental	\$ 46.65	Additional
Chain Link Fence	46.65	\$ 1.25
Guide Rail	46.65	

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker: \$ 62.04

OVERTIME PAY

See (B, B1, Q, V) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Apprentices Hired after 9/1/18:

1 year terms

1st Term	\$ 20.63
2nd Term	24.22
3rd Term	27.80
4th Term	31.38

Supplemental Benefits per hour:

1st Term	\$ 17.90
2nd Term	19.15
3rd Term	20.41
4th Term	21.67

4-580-Or

Ironworker

09/01/2022

JOB DESCRIPTION Ironworker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

PER HOUR:

	07/01/2022	01/01/2023
Ironworker:		Additional
Structural	\$ 55.70	\$ 1.75
Bridges		
Machinery		

SUPPLEMENTAL BENEFITS

PER HOUR PAID:

Journeyman \$ 85.35

OVERTIME PAY

See (B, B1, Q, *V) on OVERTIME PAGE

*NOTE: Benefits are calculated for every hour paid

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 18, 19) on HOLIDAY PAGE

REGISTERED APPRENTICES

WAGES PER HOUR:

6 month terms at the following rate:

1st	\$ 28.97
2nd	29.57
3rd - 6th	30.18

Supplemental Benefits

PER HOUR PAID:

All Terms \$ 59.18

4-40/361-Str

Ironworker

09/01/2022

JOB DESCRIPTION Ironworker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

PARTIAL COUNTIES

Rockland: Southern section - south of Convent Road and east of Blue Hills Road.

WAGES

Per hour:

07/01/2022 07/01/2023

Reinforcing & Metal Lathing \$ 56.90 Additional \$ 1.50

"Base" Wage \$ 55.20 plus \$ 1.70

"Base" Wage is used to calculate overtime hours only.

SUPPLEMENTAL BENEFITS

Per hour:

Reinforcing & Metal Lathing \$ 41.18

OVERTIME PAY

See (B, E, Q, *X) on OVERTIME PAGE

*Only \$23.50 per Hour for non worked hours

Supplemental Benefit Premiums for Overtime Hours worked:

Time & One Half \$ 47.68
Double Time \$ 54.18

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
 Overtime: See (5, 6, 11, 13, *18, **19, 25) on HOLIDAY PAGE

*Note: Work performed after first 4 Hours.

REGISTERED APPRENTICES

(1) year terms at the following wage rates:

1st term	2nd term	3rd term	4th Term
Wage Per Hour: \$ 22.55	\$ 23.60	\$ 24.60	\$ 37.18
"Base" Wage \$ 21.00 plus \$1.55	\$ 22.00 plus \$1.60	\$ 23.00 plus \$1.60	\$ 35.60 plus \$1.58

"Base" Wage is used to calculate overtime hours ONLY.

SUPPLEMENTAL BENEFITS

Per Hour:

1st term	2nd term	3rd term	4th Term
\$ 18.17	\$ 17.17	\$ 16.22	\$ 22.50

4-46Reinf

Laborer

09/01/2022

JOB DESCRIPTION Laborer

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

Per hour: 07/01/2022 07/01/2023

Laborer/Excavation		Additional
**Asbestos and Lead Abatement & Removal, Hazardous Waste Removal (including soil)	\$ 44.00	\$ 2.30
Basic	44.00	
Flagman	44.00	
Pipelayer	44.00	
*Tree Work, *Landscape	44.00	

*Includes trimming, cutting, planting and/or removal of trees.

** Applies to Heavy & Highway projects

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker \$ 50.43

Note: No payment of Supplemental Benefits is required on paid holidays, when employees do not work.

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

When an observed holiday falls on a Saturday, work done shall be paid at double time.

HOLIDAY

Paid: See (2, 20) on HOLIDAY PAGE

Overtime: See (2, 5, 6, 11, 20) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage per hour:

1000 hour terms at the following hourly wage rate.

07/01/2022

1st	0 - 1000	\$ 22.00
2nd	1001-2000	26.40
3rd	2001-3000	33.00
4th	3001-4000	39.60

Supplemental Benefits per hour:

All Apprentices 50.43

9-731Ex

Laborer

09/01/2022

JOB DESCRIPTION Laborer

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

Per hour:

GROUP 14: Blasters.

GROUP 16: Tunnel workers - including Miners, Drill Runners, Iron Men, Maintenance Men, Conveyor Men, Safety Miners, Riggers, Block Layers, Cement Finishers, Rod Men, Caulkers, Powder Carriers, Miners' Helpers, Chuck Tenders, Track Men, Nippers, Brake Men, Derail Men, Form Men, Bottom Bell, Top Bell or Signal men, Form Workers, Movers, Concrete Workers, Shaft Men, Tunnel Laborers and Caulkers' Helpers.

GROUP 17: All others including: Powder Watchmen, Top Laborers and Changehouse Attendants.

Wages: (per hour) 07/01/2022

Laborer (Tunnel)-FREE AIR:

Group 14	\$ 71.94
Group 16	68.80
Group 17*	63.59

Small Bore Micro Tunnel Machines 80% of rates above

For Repairs on Existing Water Tunnels 90% of rates above

For Repairs of Sewer & Drainage Tunnels 85% of rates above

For Repair & Maintenance of all Subway & Vehicular Tunnels 80% of rates above

*An additional \$3.00 per day when using an air spade, jack hammer or pavement breaker.

Note: For jobs bid before July 1, 2010 employer shall pay \$6.00 per day for each one half (1/2) mile or fraction starting from a point 500 feet from the shaft. For all jobs bid after July 1, 2010, said premium shall be \$10.00 per day.

SUPPLEMENTAL BENEFITS

Per hour:

GROUP 14	\$ 51.27
GROUP 16	49.16
GROUP 17	45.51

Small Bore Micro Tunnel Machines 80% of rates above

For Repairs on Existing Water Tunnels 90% of rates above

For Repairs of Sewer & Drainage Tunnels 85% of rates above

For Repair & Maintenance of all Subway & Vehicular Tunnels 80% of rates above

OVERTIME PAY

OVERTIME: For Laborer (Free Air) See (D, M, R*) on OVERTIME PAGE.
 For Repair Categories See (B, F, R*) on OVERTIME PAGE.
 & Micro Tunneling
 * Straight time first 8 hours, double time after 8 hours.

HOLIDAY

Paid: See (5, 6, 9, 11, 12, 15, 16, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 9, 11, 12, 15, 16, 25) on HOLIDAY PAGE
 Good Friday may be exchanged for one of the holidays listed.

9-147Tnl/Free

Laborer

09/01/2022

JOB DESCRIPTION Laborer

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

Per hour: 07/01/2022

Laborer:

Laborer-Concrete

(including flag person) \$ 42.53
 + \$6.75*

* This portion is not subjected to overtime premiums.

SUPPLEMENTAL BENEFITS

Per Hour

\$ 19.70
 + \$8.00**

** This portion subjected to overtime premiums only on codes (E,Q)

OVERTIME PAY

OVERTIME: See (A,E,Q) on OVERTIME PAGE attached.
 See (B,E,Q,) for work below street level to top of foundation.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 11, 13, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

Terms based on hours listed:

1st	2nd	3rd
0-1334	1334-2668	2669-4000
\$ 19.04	\$ 21.26	\$ 26.83
+\$1.99*	+\$5.82*	+\$6.30*

* This portion is not subjected to overtime premiums.

Supplemental Benefits:

Per hour:

\$ 12.20	\$ 16.20	\$ 16.20
+\$2.00*	+\$2.45*	+\$3.55*

Journeyworker rate applies after 4000 hours

*This portion subjected to same premium as wages.

9-6A/18A/20-C

Laborer - Building

09/01/2022

JOB DESCRIPTION Laborer - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

Per hour: 07/01/2022 01/01/2023
 Additional

Basic Laborer and
 Mason Tender

\$ 42.70* \$ 1.25

*Before calculating premium wage deduct \$2.75

SUPPLEMENTAL BENEFITS

Per hour:

Basic Laborer and
 Mason Tender \$ 29.24

OVERTIME PAY

See (B, B2, E, E2, Q, R) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
 Overtime: See (5, 6, 25) on HOLIDAY PAGE
 (Easter is paid at Time and One-half if worked)

REGISTERED APPRENTICES

Wage per hour:

1000 hour terms at the following wage rate:

Term:	1st	2nd	3rd	4th
Basic Laborer and Mason Tender 07/01/2022	\$ 21.45*	\$ 23.40*	\$ 24.90*	\$ 27.40*

*Before calculating premium wage deduct \$0.50

Supplemental Benefits per hour:

07/01/2022
 All Terms \$ 10.32

9-MTDC(79)

Laborer - Building 09/01/2022

JOB DESCRIPTION Laborer - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

Per hour:

07/01/2022

Skilled Interior Demolition Laborer: \$ 39.19*
 General Interior Demolition Laborer: 28.38**

* Before calculating overtime wages deduct \$1.50

**General Demolition Laborer performs manual work and work incidental to demolition, such as loading and carting of debris from work site to an area where it can be loaded into trucks for removal. Also performs clean-up of the site when demolition is complete.

SUPPLEMENTAL BENEFITS

Per Hour:

Skilled Interior Demolition Laborer: 24.60
 General Interior Demolition Laborer: 18.92

OVERTIME PAY

See (B, B2, I, R) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
 Overtime: See (5, 6, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage Per Hour:

1000 hour terms at the following wage rate:

1st	2nd	3rd	4th
\$ 21.20*	\$ 23.15*	\$ 24.65*	\$ 27.15*

* Before calculating overtime wages deduct \$0.50

Supplemental Benefits per hour:

All Terms: 10.32

9-MTDC (79-ID)

Laborer - Building **09/01/2022**

JOB DESCRIPTION Laborer - Building **DISTRICT 9**

ENTIRE COUNTIES
 Bronx, Kings, New York, Queens, Richmond

WAGES

Per hour:	07/01/2022	01/01/2023
Building:		Additional
Plasterer Tender and Spray Fireproofing Tender	\$ 42.70*	\$ 1.25

* Before calculating overtime wages deduct \$2.75.

SUPPLEMENTAL BENEFITS

Per hour:
 Journeyworker \$ 29.24

OVERTIME PAY

See (B, B2, E, E2, Q, R) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
 Overtime: See (5, 6, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage per hour:

1000 hours terms at the following wage.

	1st	2nd	3rd	4th
	\$21.45*	\$23.40*	\$24.90*	\$27.40*

* Before calculating overtime wages deduct \$ 0.50

Supplemental Benefits per hour:

07/01/2022
 All Terms: \$ 10.32

9-30 (79)

Laborer - Building **09/01/2022**

JOB DESCRIPTION Laborer - Building **DISTRICT 4**

ENTIRE COUNTIES
 Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour: 07/01/2022

Asbestos, Lead
 and Hazardous
 Material Abatement
 Laborer

\$ 38.05

(Re-Roofing Removal See Roofer)
 NOTE: Asbestos removed from Mechanical Systems not to be scrapped
 See Asbestos Worker

SUPPLEMENTAL BENEFITS

Per Hour:
 Laborer \$ 19.10

OVERTIME PAY

See (B, B2, I) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
 Overtime: See (5, 6, 8, 28) on HOLIDAY PAGE

REGISTERED APPRENTICES

1000 hour terms at the following;
 Per Hour:

1st term	\$ 20.00
2nd Term	21.00
3rd Term	24.00
4th Term	26.00

SUPPLEMENTAL BENEFIT

Per Hour:

ALL TERMS \$ 14.25

4-NYDC(78)

Laborer - Building

09/01/2022

JOB DESCRIPTION Laborer - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

Per hour: 07/01/2022

Skilled Demolition Laborer: \$ 41.08*
 General Demolition Laborer: 29.66**

*Before calculating overtime wages deduct \$2.85
 **Before calculating overtime wages deduct \$2.20

**General Demolition Laborer performs manual work and work incidental to demolition, such as loading and carting of debris from work site to an area where it can be loaded into trucks for removal. Also performs clean-up of the site when demolition is complete.

NOTE: Total Demolition Only: Demolition shall be the complete demolition (wrecking) or dismantling of entire buildings or structures. Also may include the removal of all or any portion of a roof in which structural change is to occur. Structural change is defined as the removal of structural slabs, steel members, concrete members and penetration through the structural slab.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker:

Skilled Demolition Laborer: \$ 28.12
 General Demolition Laborer: 21.18

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
 Overtime: See (5, 6, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage per hour:
 (1) year terms at the following wage.

07/01/2022

1st	2nd	3rd	4th
\$ 21.20*	\$ 23.15*	\$ 24.65*	\$ 27.15*

*Before calculating overtime wages deduct \$0.40

Supplemental Benefits per hour:

All Terms: \$ 10.27

9-79/95

Laborer - Concrete & Asphalt Paving

09/01/2022

JOB DESCRIPTION Laborer - Concrete & Asphalt Paving

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

Group 1: Slurry Seal Coater, Maintenance Safety Surface, Small Power Tool Operator, Play Equipment Installer, Temporary Fence Installer & Repairs, Laborer.

Group 2: Production Paving Work: Shoveler, small equipment operator.

Per hour: 07/01/2022

Concrete Formsetter	\$ 55.10
Asphalt Screedman / Micro Paver	55.70
Asphalt Raker	55.10
Group 1	51.23
Group 2	51.23

SUPPLEMENTAL BENEFITS

Per hour:

Journeyworker \$ 43.44

Note: No payment of supplemental benefits is required on paid holidays, when employees do not work.

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

Note: Saturday premium rate applies from 7:00 am on Saturday to 6:59 am Sunday

Note: Sunday premium rate applies from Sunday 7:00 am to Monday 6:59 am.

HOLIDAY

Paid: See (5, *11, 20) on HOLIDAY PAGE

HOLIDAY:

Overtime: See (21,22)** on HOLIDAY PAGE.

Note: See (5,20) Holiday pay -at the single time pay rate-shall be prorated based on 25% of a day's wages and benefits for each day worked during that calendar week.

**New Year's Day and Christmas Day: If an employee is performing work on these (2) days the employee will receive the single rate plus 25%.

* Columbus Day shall be an unpaid holiday. In the event work is performed on Columbus Day, wages shall be paid on a double time basis.

Note-When Independence day falls on Saturday, it will be observed on that Saturday, however, when it occurs on a Sunday, it will be observed on the Monday.

REGISTERED APPRENTICES

Wage per hour:

2000 hours term:

1st term	2nd term
1-1999	2000-4000
\$ 37.11	\$ 38.75

Supplemental Benefits per hour:

2000 hours term:

1st term	2nd term
1-1999	2000-4000
\$ 17.15	\$ 17.15

9-1010H/H

Laborer - Trac Drill

09/01/2022

JOB DESCRIPTION Laborer - Trac Drill

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

Group 1: Chipper/Jackhammer, Powder Carrier, Hydraulic Chuck tender, Chuck Tender and Nipper, Magazine Keeper

Group 2: Hydraulic Trac Drill

Group 3: Air Trac, Wagon and Quarry bar

Group 4: Blaster

Per Hour: 07/01/2022

Group 1	\$ 44.00
Group 2	51.35
Group 3	50.52
Group 4	57.21

SUPPLEMENTAL BENEFITS

Per Hour:

All Classifications 50.43

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

When an observed holiday falls on a Saturday, work done shall be paid at double time.

HOLIDAY

Paid: See (2, 20) on HOLIDAY PAGE

Overtime: See (2, 5, 6, 11, 20) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage per hour:

1000 hour terms at the following hourly wage rate.

07/01/2022

1st	0 - 1000	\$ 22.00
2nd	1001-2000	26.40
3rd	2001-3000	33.00
4th	3001-4000	39.60

Supplemental Benefits per hour:

All Apprentices 50.43

9-731/29

Laborer - Tunnel

09/01/2022

JOB DESCRIPTION Laborer - Tunnel

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

GROUP 5: Blasters and Mucking Machine Operators

GROUP 6: Tunnel Workers* * (including Miners, Drill Runners, Iron Men, Maintenance Men, Inside Muck Lock Tender, Pumpmen, Electricians, Cement Finishers, Rod Men, Caulkers, Carpenters, Hydraulic Men, Shield Drivers, Monorail Operators, Motor Men, Conveyor Men, Safety Miners, Powder Carriers, Pan Men, Riggers, Miner's Helpers, Chuck Tenders, Track Men, Nippers, Brake Men, Form Workers, Concrete Workers, Tunnel Laborers, Caulker's Helpers), Hose Men, Grout Men, Gravel Men, Derail Men and Cable Men.

GROUP 7: Top Nipper

GROUP 8,9: Outside Man Lock Tender, Outside Muck Lock Tender, Shaft Men, Gauge Tender and Signal Men.

GROUP 10: Powder Watchmen, Top Laborers and Changehouse Attendants.

WAGES: (per hour)

07/01/2022

Laborer(Compressed Air):

GROUP 5	\$ 75.42
GROUP 6	72.73
GROUP 7	71.52
GROUP 8,9	70.09

GROUP 10 61.62

Note: For jobs bid before July 1, 2010 employer shall pay \$6.00 per day for each one half (1/2) mile or fraction starting from a point 500 feet from the shaft. For all jobs bid after July 1, 2010, said premium shall be \$10.00 per day.

SUPPLEMENTAL BENEFITS

SUPPLEMENTAL BENEFITS:
 per hour:

GROUP 5	\$ 53.35
GROUP 6	51.70
GROUP 7	50.66
GROUP 8,9	49.85
GROUP 10	47.25

OVERTIME PAY

See (D, M, *R) on OVERTIME PAGE

NOTE: Time and one-half to be paid for all overtime repair-maintenance work on existing equipment and facilities.

* Straight time first 8 hours, double time after 8 hours.

HOLIDAY

Paid: See (5, 6, 9, 11, 12, 15, 16, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 9, 11, 12, 15, 16, 25) on HOLIDAY PAGE

Good Friday may be exchanged for one of the holidays listed.

9-147Tnl/Comp Air

Mason

09/01/2022

JOB DESCRIPTION Mason

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour:	07/01/2022	07/01/2023
Brick/Block Layer	\$ 65.23	Additional \$ 2.41
Base Wage for OT Calculation	54.18	

SUPPLEMENTAL BENEFITS

Per Hour:

Brick/Block Layer \$ 30.60

OVERTIME PAY

See (A, E, E2, Q) on OVERTIME PAGE

Note: OT Calculated on Base Wage plus \$ 11.10/hr.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

(800 hour) Terms at the following Percentage of Journey workers "Base Wage" plus \$ 6.35/hr.:

1st	2nd	3rd	4th	5th
50%	60%	70%	80%	90%

Supplemental Benefits per hour:

All Apprentices \$ 21.45

4-1Brk

Mason - Building

09/01/2022

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Building

07/01/2022

Wages per hour:

Mosaic & Terrazzo Mechanic \$ 59.21

Mosaic & Terrazzo Finisher 57.60

SUPPLEMENTAL BENEFITS

Per hour:

Mosaic & Terrazzo Mechanic \$ 26.21*
 + \$11.73

Mosaic & Terrazzo Finisher \$ 26.21*
 + \$11.72

*This portion of benefits subject to same premium rate as shown for overtime wages.

OVERTIME PAY

See (A, E, Q) on OVERTIME PAGE

07/01/2022- Deduct \$7.00 from hourly wages before calculating overtime.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

Easter Sunday is an observed holiday. Holidays falling on a Saturday will be observed on that Saturday. Holidays falling on a Sunday will be celebrated on the Monday.

REGISTERED APPRENTICES

Wages Per hour:

1st	2nd	3rd	4th	5th	6th
0- 1500	1501- 3000	3001- 3750	3751- 4500	4501- 5250	5251- 6000
\$ 22.82	\$ 29.34	\$ 31.32	\$ 36.55	\$ 41.77	\$ 46.99

Supplemental Benefits per hour:

\$4.62*	\$5.94*	\$15.73*	\$18.35*	\$20.97*	\$23.59*
+\$6.56	+\$8.43	+\$11.24	+\$13.11	+\$14.99	+\$16.85

*This portion of benefits subject to same premium rate as shown for overtime wages.

9-7/3

Mason - Building

09/01/2022

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

Per hour:

07/01/2022

12/05/2022

06/05/2023

Additional

Additional

Tile Setters \$ 62.41

\$ 0.73

\$ 0.73

SUPPLEMENTAL BENEFITS

Per Hour:

\$ 26.06*
 + 10.04

*This portion of benefits subject to same premium rate as shown for overtime wages.

OVERTIME PAY

See (B, *E, Q, V) on OVERTIME PAGE

Work beyond 10 hours on Saturday shall be paid at double the hourly wage rate.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
 Overtime: See (5, 6, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage per hour:

750 hour terms at the following wage rate:

1st 1- 750	2nd 751- 1500	3rd 1501- 2250	4th 2251- 3000	5th 3001- 3750	6th 3751- 4500	7th 4501- 5250	8th 5251- 6000	9th 6001- 6750	10th 6501- 7000
\$21.23	\$26.11	\$33.26	\$38.14	\$41.67	\$45.04	\$48.60	\$53.47	\$56.25	\$60.33

Supplemental Benefits per hour:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$12.55*	\$12.55*	\$15.16*	\$15.16*	\$16.75*	\$18.30*	\$19.35*	\$19.40*	\$17.45*	\$22.80*
+\$.69	+\$.74	+\$.84	+\$.88	+\$1.28	+\$1.33	+\$1.70	+\$1.75	+\$5.90	+\$6.42

*This portion of benefits subject to same premium rate as shown for overtime wages.

9-7/52

Mason - Building

09/01/2022

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour: 07/01/2022

Building-Marble Restoration:
 Marble, Stone & \$ 46.60

Terrazzo Polisher, etc

SUPPLEMENTAL BENEFITS

Per Hour:
 Journeyworker:

Building-Marble Restoration:
 Marble, Stone &
 Polisher \$ 29.77

OVERTIME PAY

See (B, *E, Q, V) on OVERTIME PAGE

*ON SATURDAYS, 8TH HOUR AND SUCCESSIVE HOURS PAID AT DOUBLE HOURLY RATE.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
 Overtime: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE
 1ST TERM APPRENTICE GETS PAID FOR ALL OBSERVED HOLIDAYS.

REGISTERED APPRENTICES

WAGES per hour:

900 hour term at the following wage:

1st 1- 900	2nd 901- 1800	3rd 1801- 2700	4th 2701
\$ 32.61	\$ 37.28	\$ 41.94	\$ 46.60

Supplemental Benefits Per Hour:

27.07	27.97	28.87	29.77
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9-7/24-MP

Mason - Building **09/01/2022**

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Dutchess, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Sullivan, Ulster, Westchester

WAGES

Wages: 07/01/2022

Marble Cutters & Setters \$ 62.17

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker \$ 38.27

OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage Per Hour:

750 hour terms at the following wage.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
1-750	751-1500	1501-2250	2251-3000	3001-3750	3751-4500	4501-5250	5251-6000	6001-6751	6751-7500
\$ 24.88	\$ 27.97	\$ 31.08	\$ 34.17	\$ 37.29	\$ 40.39	\$ 43.51	\$ 46.61	\$ 52.82	\$ 59.05

Supplemental Benefits per hour:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 20.55	\$ 22.04	\$ 23.52	\$ 25.01	\$ 26.47	\$ 27.96	\$ 29.42	\$ 30.91	\$ 33.86	\$ 36.81 9-7/4

Mason - Building **09/01/2022**

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

Per hour: 07/01/2022 12/05/2022 06/05/2023

Tile Finisher \$ 48.00 Additional \$ 0.59 Additional \$ 0.60

SUPPLEMENTAL BENEFITS

Per Hour:

\$ 22.91*
+ \$9.86

* This portion of benefits is subject to same premium rate as shown for overtime wages.

OVERTIME PAY

See (A, *E, Q) on OVERTIME PAGE

Double time rate after 10 hours on Saturdays

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 11, 15, 16, 25) on HOLIDAY PAGE

9-7/88-tf

Mason - Building **09/01/2022**

JOB DESCRIPTION Mason - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour: 07/01/2022

Marble, Stone, etc.
Maintenance Finishers: \$ 27.01

Note 1: An additional \$2.00 per hour for time spent grinding floor using "60 grit" and below.

Note 2: Flaming equipment operator shall be paid an additional \$25.00 per day.

SUPPLEMENTAL BENEFITS

Per Hour:

Marble, Stone, etc
Maintenance Finishers: \$ 14.40

OVERTIME PAY

See (B, *E, Q, V) on OVERTIME PAGE

*Double hourly rate after 8 hours on Saturday

HOLIDAY

Paid: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 11, 15, 25) on HOLIDAY PAGE

1st term apprentice gets paid for all observed holidays.

REGISTERED APPRENTICES

WAGES per hour:

07/01/2022

0-750	\$ 21.67
751-1500	22.38
1501-2250	23.10
2251-3000	23.80
3001-3750	24.87
3751-4500	26.29
4501+	27.01

Supplemental Benefits:

Per hour:

0-750	11.52
751-1500	11.90
1501-2250	12.29
2251-3000	12.67
3001-3750	13.25
3751-4500	14.01
4501+	14.40

9-7/24M-MF

Mason - Building / Heavy&Highway

09/01/2022

JOB DESCRIPTION Mason - Building / Heavy&Highway

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour: 07/01/2022

Marble-Finisher \$ 48.97

SUPPLEMENTAL BENEFITS

Journeyworker:
per hour

Marble- Finisher \$ 35.76

OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

Work beyond 8 hours on a Saturday shall be paid at double the rate.

HOLIDAY

Overtime: See (5, 6, 8, 11, 15, 16, 25) on HOLIDAY PAGE
 When an observed holiday falls on a Sunday, it will be observed the next day.

9-7/20-MF

Mason - Building / Heavy&Highway **09/01/2022**

JOB DESCRIPTION Mason - Building / Heavy&Highway **DISTRICT 4**

ENTIRE COUNTIES
 Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour: 07/01/2022

Cement Mason \$ 53.77

SUPPLEMENTAL BENEFITS

Per Hour:

Cement Mason	\$ 34.16
1.5 X overtime rate	\$ 61.70
2 X overtime rate	\$ 68.32

OVERTIME PAY

See (B1, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
 Overtime: See (5, 6, 8, 11, 13, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

(1) year terms at the following Percentage of Journeyworkers Wage.

1st Term	\$ 19.92
2nd Term	\$ 24.82
3rd Term	\$ 30.22

Supplement Benefits per hour paid:

		1.5X OT	2X OT
1st Term	\$ 14.36	\$ 21.55	\$ 28.72
2nd Term	\$ 14.66	\$ 22.00	\$ 29.32
3rd Term	\$ 14.77	\$ 22.16	\$ 29.54

4-780

Mason - Building / Heavy&Highway **09/01/2022**

JOB DESCRIPTION Mason - Building / Heavy&Highway **DISTRICT 4**

ENTIRE COUNTIES
 Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

NOTE: Shall include but not limited to Precast concrete slabs (London Walks)Marble and Granite pavers 2'x 2' or larger.

Per Hour:

	07/01/2022	05/01/2023
Stone Setter	\$ 69.72	Additional \$ 2.17
Base Rate	52.06	

Stone Tender	52.12
Base Rate	44.54

SUPPLEMENTAL BENEFITS

Per Hour:

Stone Setter \$ 37.07

Stone Tender 21.35

OVERTIME PAY

See (*C, **E, Q) on OVERTIME PAGE

Base Rates are use to Calculate Overtime Premiums then adding in:

\$16.70/Hr. for Stone Setter and \$7.58/Hr. for Stone Tender

* On weekdays the eighth (8th) and ninth (9th) hours are time and one-half all work thereafter is paid at double the hourly rate.

** The first nine (9) hours on Saturday is paid at time and one-half all work thereafter is paid at double the hourly rate.

HOLIDAY

Paid: See (*18) on HOLIDAY PAGE

Overtime: See (5, 6, 10) on HOLIDAY PAGE

Paid: *Must work first 1/2 of day

REGISTERED APPRENTICES

Per Hour:

Stone Setter(800 hour) terms at the following Percentage of Stone Setters Base wage rate per hour plus \$8.16:

1st	2nd	3rd	4th	5th	6th
50%	60%	70%	80%	90%	100%

Supplemental Benefits:

All Apprentices \$ 23.95

4-1Stn

Mason - Heavy&Highway

09/01/2022

JOB DESCRIPTION Mason - Heavy&Highway

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour: 07/01/2022

Pointer, Caulkers & Cleaners \$ 59.09

SUPPLEMENTAL BENEFITS

Per Hour:

Pointer, Cleaners & Caulkers \$ 31.22

OVERTIME PAY

See (B, E2, H) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One (1) year terms at the following wage rates.

1st	2nd	3rd	4th
\$ 29.86	\$ 33.74	\$ 39.02	\$ 47.05

Apprentices Supplemental Benefits:

(per hour paid)

\$ 15.30	\$ 19.85	\$ 23.60	\$ 24.60
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4-1PCC

Operating Engineer - Building

09/01/2022

JOB DESCRIPTION Operating Engineer - Building

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Putnam, Queens, Richmond, Westchester

PARTIAL COUNTIES

Dutchess: that part of Dutchess County lying south of the North City Line of the City of Poughkeepsie.

WAGES

NOTE: Construction surveying

Party Chief--One who directs a survey party

Instrument Man--One who runs the instrument and assists Party Chief.

Rodman--One who holds the rod and assists the Survey Crew

Wages:(Per Hour) 07/01/2022

Building Construction:

Party Chief \$ 76.64
Instrument Man 60.50
Rodman 40.64

Steel Erection:

Party Chief 79.41
Instrument Man 62.85
Rodman 43.48

**Heavy Construction-NYC counties only:
(Foundation, Excavation.)**

Party Chief 84.60
Instrument man 63.79
Rodman 54.52

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2022

Building Construction \$ 26.69* +\$ 7.40

Steel Erection 27.29* +\$ 7.40

Heavy Construction 25.25* +\$ 7.15

* This portion subject to same premium as wages

Non-Worked Holiday Supplemental Benefit:

16.45

OVERTIME PAY

See (A, B, E, Q) on OVERTIME PAGE

Code "A" applies to Building Construction and has double the rate after 7 hours on Saturdays.

Code "B" applies to Heavy Construction and Steel Erection and had double the rate after 8 hours on Saturdays.

HOLIDAY

Paid: See (5, 6, 9, 11, 15, 16, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 9, 11, 15, 16, 25) on HOLIDAY PAGE

9-15Db

**Operating Engineer - Building, Maintenance, Steel Erection
& Heavy Construction**

09/01/2022

JOB DESCRIPTION Operating Engineer - Building, Maintenance, Steel Erection & Heavy Construction

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

STEEL ERECTION:

Group 1: Derrick, travelers, tower, crawler tower & climbing cranes

Group 2: Oiler (Truck Crane)

Group 3: Oiler (Crawler Crane)

BUILDING CONSTRUCTION:

Group 1: Installing, repairing, maintaining, dismantling of all equipment including Steel cutting & bending machines, mechanical heaters, mine hoists, climbing cranes, tower cranes, Linden Peine, Lorain, Liebherr, Mannes and machines of a similar nature; Well Point system, Deep Well pumps, Concrete mixers with loading devices, Concrete plants, motor generators (When used for temporary power and lights)(Driving maintenance trucks and mounted-welded machines)-All Pumps(excluding River Cofferdam Pumps and Well Point Pumps), Motorized Concrete Buggies(When three or more are on job site), Skid-Steer and similar machines

Group 2: Maintenance of: Pumps, Generators, Mixers, Heaters

Group 3: Oilers of all gasoline, electric, diesel or air operated Gradalls; Concrete Pumps, Overhead Cranes in Power Houses, Assist in oiling, greasing and repairing of all machines, including: Driving Truck Cranes, Driving and operating Fuel and Grease Trucks, Cherry Pickers(Hydraulic Cranes) over 70,000 GVW and machines of a similar nature

Group 4: Oiler on Crawler Cranes, Backhoes, Trenching Machines, Guniting Machines, Compressors(3 or more in battery)

Group 5: Maintenance on Radiant Mechanical Heaters

HEAVY CONSTRUCTION (Excavation, Foundations, etc)

Group 1: Maintenance of: Generators, Light Towers

Group 2: Maintenance of: Pumps, Mixers including mudsucking

Group 3: Base Mounted Tower Cranes

Group 4: Installing, repairing, maintaining, dismantling(of all equipment including Steel cutting & Bending machines, Fusion Coupling Machines, Vermeer Trenching machines, on-site crushing plant, mechanical heaters(1 through 7), Mine hoists, Tower Cranes, Linden Peine, Lorrain, Liebherr, Mannes or machines of a similar nature, Wellpoints)-Driving maintenance trucks and truck mounted welding machines, burning, welding-operating of accumulator for shield-driven tunnels, in addition to the performance of other duties: Handling, installation, jointing, coupling of all permanent steel and plastic pipe. RIDE UPON MOLES-tunnel boring machines-MICRO TUNNELING SYSTEMS, All temporary pipefitting; When three or more motorized concrete buggies(Ride type) are utilized on the jobsite they shall be serviced, maintained and repaired by the maintenance engineer. The Operating Engineer on autogrades(C.M.I.) is to be assisted by the maintenance engineer who shall in addition perform other duties.

WAGES:

Per hour: 07/01/2022

Steel Erection:

Group 1	\$ 78.26
Group 2	73.64
Group 3	57.51

Building Construction:

Group 1	\$ 73.13
Group 2	58.08
Group 3	69.81
Group 4	53.34
Group 5	46.79

Heavy Construction:

Group 1	\$ 55.76
Group 2	57.01
Group 3	103.68
Group 4	80.71

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2022

Building Construction	\$ 27.80* plus \$7.40
Steel Erection & Heavy	28.30* plus \$7.40

* This portion of benefits subject to same premium as wages.

Non-Worked Holiday Supplemental Benefits:

23.47

OVERTIME PAY

See (D, O) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 9, 11, 15, 16, 25) on HOLIDAY PAGE
Overtime: See (5, 6, 9, 11, 15, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages Per Hour:

(1) year terms at the following wage rates:

1st	2nd	3rd	4th.
\$ 36.11	\$ 42.97	\$ 46.40	\$ 49.83

Supplemental Benefits:

Per Hour:

All Terms \$ 12.55* Plus 7.40

* This portion of benefits subject to same premium as wages.

9-15Ab

Operating Engineer - Building / Heavy&Highway

09/01/2022

JOB DESCRIPTION Operating Engineer - Building / Heavy&Highway

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

EQUIPMENT COVERED: Jet-Rodder/Vacuum Truck, Flusher, Sewer Rodder, Stetco Hoist and similar, Sewer Winch/Tugger Hoist and similar, Vacall/Vactor, Closed Circuit Television Inspection Equipment, Chemical Grouting Equipment and similar, John Beame, Meyers and similar.

Per Hour: 07/01/2022

Maintenance Engineer \$ 80.71
(Sewer Systems)

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2022

Journeyman 26.05*
plus \$ 7.40

*This portion of benefits subject to same premium as wages.

Non-Worked Holiday Supplemental Benefits:

16.95

OVERTIME PAY

See (D, O) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 7, 11, 16) on HOLIDAY PAGE

Overtime: See (5, 6, 7, 11, 16) on HOLIDAY PAGE

REGISTERED APPRENTICES

Per Hour:

(1) year terms at the following wage rates.

1st	2nd	3rd	4th
\$36.11	\$42.97	\$46.40	\$49.83

Supplemental Benefits:

Per Hour:

All Apprentices: \$ 12.55* plus \$ 7.40

* This portion of benefits subject to the same premium as overtime wages

9-15Sewer

Operating Engineer - Building / Heavy&Highway

09/01/2022

JOB DESCRIPTION Operating Engineer - Building / Heavy&Highway

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour: 07/01/2022 08/01/2022

Well Driller	\$ 39.45	\$ 40.63
Well Driller Helper	34.17	34.17
Hazardous Waste Differential Added to Hourly Wage:		
Level A	\$ 3.00	\$ 3.00
Level B	2.00	2.00
Level C	1.00	1.00
Monitoring Well Work Add to Hourly Wage:		
Level A	\$ 3.00	\$ 3.00
Level B	2.00	2.00

SUPPLEMENTAL BENEFITS

Per Hour:

Well Driller & Helper	10% of straight time rate plus \$ 13.50	10% of straight time rate plus \$ 13.50
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Additional \$ 4.25/Hr. for Premium Time Hours Worked

OVERTIME PAY

See (B2, P, S) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 16, 23) on HOLIDAY PAGE
 Overtime: See (5, 6, 16, 23) on HOLIDAY PAGE

REGISTERED APPRENTICES

Apprentices at 12 Month Terms

Wages Per Hour:

1st Term	\$ 28.00	\$ 28.00
2nd Term	29.00	29.00
3rd Term	30.00	30.00

SUPPLEMENTAL BENEFITS

Per Hour:

All Terms 10% of Wage + \$ 13.50

Additional \$4.25/Hr. for premium time hours worked.

4-138well

Operating Engineer - Building & Steel Erection

09/01/2022

JOB DESCRIPTION Operating Engineer - Building & Steel Erection

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

Per Hour: 07/01/2022

STEEL ERECTION:

Three Drum Derricks	\$ 101.88
Cranes, Two Drum Derricks, Hydraulic Cranes & Fork Lifts, Boom Trucks	98.19
Compressors, Welding Machines	61.54
Compressors (not combined with welding machines)	58.96

BUILDING CONSTRUCTION:

Cranes, Stone Derrick, Boom Trucks, Hydraulic Cranes,	98.72
Double Drum	93.64
4 Pole Hoists and Single Drum Hoists	87.38

Fork Lifts, Plaster(Platform Machine)Plaster Bucket, Concrete Pumps and all other equipment used for hoisting	80.14
*House Cars and Rack & Pinion	70.75
*House Cars (New Projects)	58.07
Erecting and dismantling Cranes	88.24

Compressors, Welding Machines(Cutting Concrete-Tank Work),
 Paint Spraying, Sand Blasting, Pumps(With the exclusion of
 concrete pumps), House Car (Settlement basis only), All
 Engines irrespective of power(Power-Vac)used to drive
 auxiliary equipment Air, Hydraulic, etc., Boilers, Jacking System
 61.80

APPLICABLE TO ALL CATEGORIES:

CRANES: Crawler Or Truck

	In Addition To Above Crane Rates
100' to 149' Boom	\$ 1.75/hr
150' to 249' "	\$ 2.00/hr
250' to 349' "	\$ 2.25/hr
350' to 450' "	\$ 2.75/hr
Tower Crane	\$ 2.00/hr

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2022

All Operator Classes \$ 24.65*
 plus \$ 6.20

* This portion of the benefits is subject to the same premium as shown for overtime wages.

OVERTIME PAY

See (*B, **C, ***D, O) on OVERTIME PAGE

*Applies to House Cars and Rack & Pinion after 8 hours worked in a day, Saturday, Sunday and Holidays

**Applies to Building Construction category

***Applies to Steel Erection

HOLIDAY

Paid: See (5, 6, 7, 8, 11, 12, 16, 26) on HOLIDAY PAGE

Overtime: See (5, 6, 7, 8, 11, 12, 16, 26) on HOLIDAY PAGE

Codes 8 and 12 apply ONLY to Steel Erection

Code 16 applies ONLY to Building Construction

REGISTERED APPRENTICES

Wage Per Hour:

Apprentices (1) year terms at the following rates:

	1st	2nd	3rd
07/01/2022	\$ 41.98	\$ 50.77	\$ 59.56

Supplemental Benefits Per Hour:

07/01/2022

Straight Time \$ 13.65*
 plus \$ 5.95

* This portion of benefits subject to the same premium as shown for overtime wages.

9-14 B&S

Operating Engineer - Heavy Construction 1

09/01/2022

JOB DESCRIPTION Operating Engineer - Heavy Construction 1

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

(For Groups 23 - 28, see Operating Engineer - Heavy Construction 2)

- Group 1: Tower Crane/Climbing Crane
- Group 2: Backhoes (Including all track and rubber tire backhoes over 37,000 lbs), Power Shovels, Steel Erection: Hydraulic Clam Shells, Moles and machines of a similar nature
- Group 3: Mine Hoists, Cranes, etc, used as Mine Hoists
- Group 4: Gradalls, Keystones, Cranes (With digging buckets), Bridge Cranes, Trenching Machines, Vermeer Cutter and machines of a similar nature
- Group 5: Pile Drivers and Rigs (Employing Dock-Builders Foreman), Derrick Boats, Tunnel Shovels,
- Group 6: All Drills and machines of a similar nature
- Group 7: Back-Filling Machines and Cranes, Mucking Machines, Dual Drum Pavers
- Group 8: Mixers (Concrete with loading attachment), Concrete Pavers, Cableways, Land Derricks, Power House (Low pressure units)
- Group 9: Concrete Pumps, Concrete Plant, Stone Crushers, Double Drum Hoists, Power Houses (Other than above)
- Group 10: Concrete Mixer
- Group 11: Elevators
- Group 12: Concrete Breaking Machines, Single Drum Hoists, Load Masters, Locomotives and Dinkies (Over 10 tons), Hydraulic Crane-Second Engineer
- Group 13: On-Site Concrete Plant Engineers, On-Site Asphalt Plant Engineer and Vibratory Console
- Group 14: Barrier Mover, Barrier Transport and machines of a similar nature
- Group 15: Compressors (Portable, 3 or more), Truck Compressor (Engineer Driver), Tugger Machines, Well Point Pumps, Chum Drill
- Group 16: Boilers(High pressure),Compressors, Pumps(River Cofferdam) and Welding Machines(except where arc is operated by another Operating Engineer) Push Button Machines, All Engines, irrespective of power(Power Pac) used to drive auxiliary equipment, Air, Hydraulic, etc.
- Group 17: Utility-Horizontal Boring Rig
- Group 18: Utility Compressors
- Group 19: Paving-Asphalt Spreader, Autogrades (C.M.I.), Roto-Mill
- Group 20: Paving-Asphalt Roller
- Group 21 Paving-Asphalt Plant
- Group 22: Roller (non paving, all sizes)

WAGES:(per hour) 07/01/2022

Group 1	\$ 114.55
Group 2	95.85
Group 3	98.69
Group 4	96.50
Group 5	94.74
Group 6	91.28
Group 7	92.85
Group 8	90.39
Group 9	88.65
Group 10	85.08
Group 11	80.01
Group 12	81.61
Group 13	82.16
Group 14	74.51
Group 15	63.86
Group 16	59.91
Group 17	86.36
Group 18	59.57
Group 19	90.39
Group 20	88.27
Group 21	75.84
Group 22	88.27

Cranes: Crawler or Truck

100' to 149'	\$0.50 per hour additional to above Crane Rates
150' to 249'	\$0.75 per hour additional to above Crane Rates
250' to 349'	\$1.00 per hour additional to above crane Rates
350' to 450'	\$1.50 per hour additional to above crane Rates

SUPPLEMENTAL BENEFITS

Per Hour:

Groups 1-22	
Regular Time	\$ 24.65* plus \$ 6.20

* This portion of benefits subject to the same premium as shown for wages.

Non-Worked Holiday Supplemental Benefits:
 \$ 18.50

OVERTIME PAY

See (D, O) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 7, 11, 16) on HOLIDAY PAGE
 Overtime: See (5, 6, 7, 11, 16) on HOLIDAY PAGE

REGISTERED APPRENTICES

Per Hour:

(1) year terms at the following wage rates:

Groups 1-22	1st	2nd	3rd
	41.98	50.77	59.56

Supplemental Benefits:

Per Hour:

Groups 1-22

Regular Time \$ 13.65*
 plus \$ 5.95

* This portion of benefits is subject to the SAME PREMIUM as shown for overtime wages

9-14 HC

Operating Engineer - Heavy Construction 2

09/01/2022

JOB DESCRIPTION Operating Engineer - Heavy Construction 2

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

(For Groups 1 - 22, see Operating Engineer - Heavy Construction 1)

Group 23: Cherry Picker (Over 20 tons), Loader (Over 6 yards)

Group 24: Backhoes and Loaders (Up to 37,000lbs), Bulldozers, Scrapers, Turn-A-Pulls, Tugger Hoists, Tractors, Hysters, Roustabout Cranes, Conveyors, Ballast Regulators (Ride On), Track Removal Machine or similar, Motor Graders, Locomotives (10 tons and under),Curb & Gutter Pavers and machines of a similar nature

Group 25: Post Hole Digger, Ditch Winch, Road Finishing Machines, Rollers (5 tons and under, Dual Purpose Trucks, Forklifts, Dempsey Dumpsters, Fireman

Group 26: Service Engineer (Gradalls, Concrete Pumps, Cold Planers Grader)

Group 27: Service Mechanic (Shovels, Draglines, Crawler Cranes, Backhoes, Trenching Machines, Compressors (3 or more in battery)

Group 28: Steam Equipment Operator (Water rigs, steam shovels, power boilers, derrick boats)

WAGES:(per hour) 07/01/2022

Group 23	\$ 83.31
Group 24	81.06
Group 25	77.28
Group 26	73.48
Group 27	53.11
Group 28	77.28

Cranes: Crawler or Truck

100' to 149'	\$0.50 per hour additional to above Crane Rates
150' to 249'	\$0.75 per hour additional to above Crane Rates
250' to 349'	\$1.00 per hour additional to above crane Rates
350' to 450'	\$1.50 per hour additional to above crane Rates

SUPPLEMENTAL BENEFITS

Per Hour:

Groups 23-28

Regular Time 26.05* plus \$7.40

* This portion of benefits subject to the same premium as shown for wages.

Non-Worked Holiday Supplemental Benefits:

16.95

OVERTIME PAY

See (D, O) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 7, 11, 16) on HOLIDAY PAGE
 Overtime: See (5, 6, 7, 11, 16) on HOLIDAY PAGE

REGISTERED APPRENTICES

Per Hour:

(1) year terms at the following wage rates:

	1st	2nd	3rd	4th
Groups 23-28	\$36.11	\$42.97	\$46.40	\$49.83

Supplemental Benefits:

Per Hour:

Groups 23-28

Regular Time \$ 12.55* plus \$ 7.40

* This portion of benefits is subject to the SAME PREMIUM as shown for overtime wages

9-15 HC

Operating Engineer - Marine Dredging

09/01/2022

JOB DESCRIPTION Operating Engineer - Marine Dredging

DISTRICT 4

ENTIRE COUNTIES

Albany, Bronx, Cayuga, Clinton, Columbia, Dutchess, Essex, Franklin, Greene, Jefferson, Kings, Monroe, Nassau, New York, Orange, Oswego, Putnam, Queens, Rensselaer, Richmond, Rockland, St. Lawrence, Suffolk, Ulster, Washington, Wayne, Westchester

WAGES

These wages do not apply to Operating Engineers on land based construction projects. For those projects, please see the Operating Engineer Heavy/Highway Rates. The wage rates below for all equipment and operators are only for marine dredging work in navigable waters found in the counties listed above.

Per Hour:	07/01/2022	10/01/2022
CLASS A1 Deck Captain, Leverman Mechanical Dredge Operator Licensed Tug Operator 1000HP or more.	\$ 42.66	\$ 43.94
CLASS A2 Crane Operator (360 swing)	38.02	39.16
CLASS B Dozer, Front Loader Operator on Land	To conform to Operating Engineer Prevailing Wage in locality where work is being performed including benefits.	
CLASS B1 Derrick Operator (180 swing) Spider/Spill Barge Operator Operator II, Fill Placer, Engineer, Chief Mate, Electrician, Chief Welder, Maintenance Engineer Licensed Boat, Crew Boat Operator	36.89	38.00
CLASS B2 Certified Welder	34.73	35.77
CLASS C1 Drag Barge Operator, Steward, Mate, Assistant Fill Placer	33.78	34.79
CLASS C2 Boat Operator	32.69	33.67
CLASS D	27.16	27.97

Shoreman, Deckhand, Oiler,
Rodman, Scowman, Cook,
Messman, Porter/Janitor

SUPPLEMENTAL BENEFITS

Per Hour:

THE FOLLOWING SUPPLEMENTAL BENEFITS APPLY TO ALL CATEGORIES

All Classes A & B	\$ 11.40 plus 6% of straight time wage, Overtime hours add \$ 0.63	\$ 11.85 plus 6% of straight time wage, Overtime hours add \$ 0.63
All Class C	\$ 11.10 plus 6% of straight time wage, Overtime hours add \$ 0.48	\$ 11.60 plus 6% of straight time wage, Overtime hours add \$ 0.50
All Class D	\$ 10.80 plus 6% of straight time wage, Overtime hours add \$ 0.33	\$ 11.35 plus 6% of straight time wage, Overtime hours add \$ 0.38

OVERTIME PAY

See (B2, F, R) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 8, 15, 26) on HOLIDAY PAGE

4-25a-MarDredge

Operating Engineer - Survey Crew - Consulting Engineer

09/01/2022

JOB DESCRIPTION Operating Engineer - Survey Crew - Consulting Engineer

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Suffolk, Westchester

PARTIAL COUNTIES

Dutchess: That part in Dutchess County lying South of the North City line of Poughkeepsie.

WAGES

Feasibility and preliminary design surveying, any line and grade surveying for inspection or supervision of construction.

Per hour: 07/01/2022
Survey Classifications

Party Chief	\$ 46.44
Instrument Man	38.60
Rodman	33.64

SUPPLEMENTAL BENEFITS

Per Hour:

All Crew Members: \$ 21.60

OVERTIME PAY

OVERTIME:.... See (B, E*, Q, V) ON OVERTIME PAGE.

*Doubletime paid on the 9th hour on Saturday.

HOLIDAY

Paid: See (5, 6, 7, 11, 16) on HOLIDAY PAGE
Overtime: See (5, 6, 7, 11, 16) on HOLIDAY PAGE

9-15dconsult

Painter

09/01/2022

JOB DESCRIPTION Painter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Putnam, Queens, Richmond, Suffolk, Westchester

WAGES

Per hour:	07/01/2022
Brush	\$ 51.45*
Abatement/Removal of lead based or lead containing paint on materials to be repainted.	51.45*
Spray & Scaffold	\$ 54.45*
Fire Escape	54.45*
Decorator	54.45*
Paperhanger/Wall Coverer	53.83*

*Subtract \$ 0.10 to calculate premium rate.

SUPPLEMENTAL BENEFITS

Per hour:	
Paperhanger	\$ 33.15
All others	30.88
Premium	37.72**

**Applies only to "All others" category, not paperhanger journeyworker.

OVERTIME PAY

See (A, H) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
 Overtime: See (5, 6, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

One (1) year terms at the following wage rate.

Per hour:	07/01/2022
Appr 1st term...	\$ 19.95*
Appr 2nd term...	25.56*
Appr 3rd term...	31.00*
Appr 4th term...	41.52*

*Subtract \$ 0.10 to calculate premium rate.

Supplemental benefits:

Per Hour:	
Appr 1st term...	\$ 15.22
Appr 2nd term...	18.90
Appr 3rd term...	21.81
Appr 4th term...	27.58

8-NYDC9-B/S

Painter **09/01/2022**

JOB DESCRIPTION Painter

DISTRICT 8

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

PARTIAL COUNTIES

Nassau: Atlantic Beach, Ceaderhurst, East Rockaway, Hewlett, Hewlett Bay, Hewlett Neck, Hewlett Park, Inwood, Lawrence, Lido Beach, Long Beach, parts of Lynbrook, parts of Oceanside, parts of Valley Stream, and Woodmere. Starting on South side of Sunrise Hwy in Valley Stream running east to Windsor and Rockaway Ave, Rockville is the boundary line up to Lawson Blvd, turning right going west all the above territory. Starting at Union Turnpike & Lakeville Rd going north to northern Blvd. the west side of Lakeville Rd to Northern Blvd. At Northern Blvd doing east the district north of Northern blvd to Port Washington blvd. West of Port Washington blvd to St. Francis Hospital then north of first traffic light to Port Washington & Sands Point, Manor Haven, & Harbour Acres.

WAGES

Per hour:	07/01/2022
Drywall Taper	\$ 55.10

SUPPLEMENTAL BENEFITS

Per Hour:	
Journeyworker:	\$ 23.88

OVERTIME PAY

See (A, H) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (4, 6, 8, 11, 18, 19, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage per hour:

1st term	\$ 21.29
2nd term	27.84
3rd term	33.29
4th term	44.20

Supplemental Benefits per hour:

1st term	\$ 14.43
2nd term	18.16
3rd term	19.30
4th term	21.59

8-NYC9-1974-DWT

Painter - Bridge & Structural Steel

09/01/2022

JOB DESCRIPTION Painter - Bridge & Structural Steel

DISTRICT 8

ENTIRE COUNTIES

Albany, Bronx, Clinton, Columbia, Dutchess, Essex, Franklin, Fulton, Greene, Hamilton, Kings, Montgomery, Nassau, New York, Orange, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Suffolk, Sullivan, Ulster, Warren, Washington, Westchester

WAGES

Per Hour:

STEEL:

Bridge Painting:	07/01/2022	10/01/2022
	\$ 53.00	Additional
	+ 9.63*	\$ 3.00

ADDITIONAL \$6.00 per hour for POWER TOOL/SPRAY, whether straight time or overtime.

NOTE: All premium wages are to be calculated on base rate per hour only.

* For the period of May 1st to November 15th, this amount is payable up to 40 hours. For the period of Nov 16th to April 30th, this amount is payable up to 50 hours. EXCEPTION: First and last week of employment, and for the weeks of Memorial Day, Independence Day and Labor Day, where the amount is paid for the actual number of hours worked (no cap).

NOTE: Generally, for Bridge Painting Contracts, ALL WORKERS on and off the bridge (including Flagmen) are to be paid Painter's Rate; the contract must be ONLY for Bridge Painting.

SHIFT WORK:

When directly specified in public agency or authority contract documents for an employer to work a second shift and works the second shift with employees other than from the first shift, all employees who work the second shift will be paid 10% of the base wage shift differential in lieu of overtime for the first eight (8) hours worked after which the employees shall be paid at time and one half of the regular wage rate. When a single irregular work shift is mandated in the job specifications or by the contracting agency, wages shall be paid at time and one half for single shifts between the hours of 3pm-11pm or 11pm-7am.

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyworker:

\$ 10.90
+ 30.60*

* For the period of May 1st to November 15th, this amount is payable up to 40 hours. For the period of Nov 16th to April 30th, this amount is payable up to 50 hours. EXCEPTION: First and last week of employment, and for the weeks of Memorial Day, Independence Day and Labor Day, where the amount is paid for the actual number of hours worked (no cap).

OVERTIME PAY

See (B, F, R) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (4, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wage - Per hour:

Apprentices: (1) year terms

1st year	\$ 21.20 + 3.86
2nd year	\$ 31.80 + 5.78
3rd year	\$ 42.40 + 7.70
Supplemental Benefits - Per hour:	
1st year	\$.25 + 12.24
2nd year	\$ 10.90 + 18.36
3rd year	\$ 10.90 + 24.48

NOTE: All premium wages are to be calculated on base rate per hour only.

8-DC-9/806/155-BrSS

Painter - Line Striping

09/01/2022

JOB DESCRIPTION Painter - Line Striping

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

Per hour:

Painter (Striping-Highway):	07/01/2022	07/01/2023
Striping-Machine Operator*	\$ 39.00	Additional \$ 3.00
Linerman Thermoplastic	43.00	
Flagger - Traffic Safety*	37.00	

Note: * Includes but is not limited to: Positioning of cones and directing of traffic using hand held devices. Excludes the Driver/Operator of equipment used in the maintenance and protection of traffic safety.

SUPPLEMENTAL BENEFITS

Per hour paid:

Journeyworker	15.27
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OVERTIME PAY

See (B, H) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 8, 13) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 13) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

1st Term (1-2000 hours)	\$ 30.36
2nd Term (2001-4000 hours)	32.00

Supplemental Benefits per hour:

All Terms	15.27
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9-1010-LS

Painter - Metal Polisher

09/01/2022

JOB DESCRIPTION Painter - Metal Polisher

DISTRICT 8

ENTIRE COUNTIES

Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

	07/01/2022
Metal Polisher	\$ 37.78
Metal Polisher*	38.80
Metal Polisher**	41.78

*Note: Applies on New Construction & complete renovation

** Note: Applies when working on scaffolds over 34 feet.

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2022

Journeyworker: All classification	\$ 11.24
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OVERTIME PAY

See (B, E, P, T) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE
Overtime: See (5, 6, 9, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One (1) year term at the following wage rates:

	07/01/2022
1st year	\$ 16.00
2nd year	17.00
3rd year	18.00
1st year*	\$ 16.39
2nd year*	17.44
3rd year*	18.54
1st year**	\$ 18.50
2nd year**	19.50
3rd year**	20.50

*Note: Applies on New Construction & complete renovation

** Note: Applies when working on scaffolds over 34 feet.

Supplemental benefits:

Per hour:

1st year	\$ 7.99
2nd year	7.99
3rd year	7.99

8-8A/28A-MP

Plasterer

09/01/2022

JOB DESCRIPTION Plasterer

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per hour:	07/01/2022
Building: Plasterer/Traditional & Spraying Fireproofing	\$ 51.00*

SUPPLEMENTAL BENEFITS

Per hour:
Journeyworker \$ 23.15

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

*When calculating overtime pay, subtract \$5.00 from wages.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages:

(per hour)

800 hours term:

1st term	\$ 28.19
2nd term	30.59
3rd term	35.88
4th term	38.43

Supplemental Benefits:

(per hour):

(800) hours term:

1st term	\$ 14.70
2nd term	15.60
3rd term	17.43
4th term	18.35

9-262

Plumber

09/01/2022

JOB DESCRIPTION Plumber

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

Per hour:

07/01/2022

Plumber \$ 72.50

Temporary Service** \$ 58.08

** Temporary Service- Includes Maintenance of cooling & heating apparatus, maintenance work on pneumatic systems during the construction period, and work on temporary heat. All hours paid at straight time, including holidays.

**THERE ARE NO HELPERS UNDER THIS CLASSIFICATION.

On tower work, bridges, elevated highway, or buildings, where pipe is being installed, fifty (50) or more feet vertically in a free drop from its base, an additional \$1.00 per hour.

SHIFT WORK:

Shift work, when directly specified in public agency or authority contract documents, and continues for a period of not less than ten (10) consecutive work days. A shift shall consist of seven(7) hours with one-half (1/2) hour for lunch after the first four (4) hours of each shift. A premium of thirty percent (30%) for wages and supplemental benefits on shift work performed Monday through Friday on the 4 P.M. and midnight shifts.

For shift work performed on weekends the shift premium shall be fifty percent (50%) of wages and supplemental benefits.

For shift work performed on holidays designated below, double time wages and supplemental benefits shall be paid. Also noted that the normal workday Monday through Friday 8:00 A.M. to 3:00 P.M. is not considered shift work, and therefore not subject to shift premium.

SUPPLEMENTAL BENEFITS

Per hour:

Plumber \$ 41.45

Temporary Service \$ 33.08

OVERTIME PAY

Plumber See (C, O, V) on OVERTIME PAGE.

HOLIDAY

Plumber
 Overtime: See (5, 6, 11, 15, 16, 25) on HOLIDAY PAGE.
 Repairs & Maintenance
 Paid: See (1) on HOLIDAY PAGE.
 Overtime: See (5, 6, 25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wages per hour:

(1/2) year terms at the following wage:

1st	2nd	3rd&4th	5th&6th	7th&8th	9th	10th
\$16.78	\$19.78	\$28.99	\$31.09	\$33.99	\$35.34	\$47.41

Supplemental Benefits:

(1/2) year term at the following dollar amount:

1st	2nd	3rd-10th
\$5.43	\$6.43	\$21.95

9-1 Const

Plumber - Pump & Tank: Oil Trades Installation & Maintenance

09/01/2022

JOB DESCRIPTION Plumber - Pump & Tank: Oil Trades Installation & Maintenance

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

Per hour:

	07/01/2022
Pump & Tank	\$ 69.31

SUPPLEMENTAL BENEFITS

Per hour:

Plumber	\$ 26.33
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OVERTIME PAY

Pump & Tank See (B, F, H) on OVERTIME PAGE.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE.
 Overtime: See (5, 6, 10, 11, 12, 16, 25) on HOLIDAY PAGE.

9-1-P&T

Plumber - Repairs & Maintenance

09/01/2022

JOB DESCRIPTION Plumber - Repairs & Maintenance

DISTRICT 9

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

Per hour:

	07/01/2022
Repairs & Maintenance	\$ 47.50

*Repair & Maintenance work is any repair and/or replacement of present plumbing system that does not change existing roughing or water supply lines. Projects regardless of work type which have approved plans and specifications wherein the plumbing exceeds \$725,000 are excluded.

SUPPLEMENTAL BENEFITS

Per hour:

Repair	\$ 19.06
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Maintenance

OVERTIME PAY

Repairs & Maintenance See (B, H) on OVERTIME PAGE.

HOLIDAY

Repairs & Maintenance
 Paid: See (1) on HOLIDAY PAGE.
 Overtime: See (5, 6, 25) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Note: The Repairs & Maintenance Category has NO Apprentices.

9-1 R&M

Roofer

09/01/2022

JOB DESCRIPTION Roofer

DISTRICT 9

ENTIRE COUNTIES

Bronx, Dutchess, Kings, New York, Orange, Putnam, Queens, Richmond, Rockland, Sullivan, Ulster, Westchester

WAGES

Per Hour:	07/01/2022	05/01/2023
		Additional
Roofer/Waterproofer	\$ 45.25	\$ 2.00
	+ \$7.00*	

* This portion is not subjected to overtime premiums.

Note: Abatement/Removal of Asbestos containing roofs and roofing material is classified as Roofer.

SUPPLEMENTAL BENEFITS

Per Hour: \$ 30.62

OVERTIME PAY

See (B, H) on OVERTIME PAGE

Note: An observed holiday that falls on a Sunday will be observed the following Monday.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
 Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

(1) year term

	1st	2nd	3rd	4th
	\$ 15.84	\$ 22.63	\$ 27.15	\$ 33.94
		+ 3.50*	+ 4.20*	+ 5.26*
Supplements:				
	1st	2nd	3rd	4th
	\$ 3.88	\$ 15.48	\$ 18.50	\$ 23.04

* This portion is not subjected to overtime premiums.

9-8R

Sheetmetal Worker

09/01/2022

JOB DESCRIPTION Sheetmetal Worker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, Westchester

WAGES

Per Hour:	07/01/2022
Sign Erector	\$ 53.79

NOTE: Structurally Supported Overhead Highway Signs(See STRUCTURAL IRON WORKER CLASS)

SUPPLEMENTAL BENEFITS

Per Hour:	07/01/2022
Sign Erector	\$ 53.33

OVERTIME PAY

See (A, F, S) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 10, 11, 12, 16, 25) on HOLIDAY PAGE
 Overtime: See (5, 6, 10, 11, 12, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

Per Hour:
 6 month Terms at the following percentage of Sign Erectors wage rate:

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
35%	40%	45%	50%	55%	60%	65%	70%	75%	80%

SUPPLEMENTAL BENEFITS

Per Hour:

07/01/2022

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 14.34	\$ 16.26	\$ 18.17	\$ 20.10	\$ 28.02	\$ 30.47	\$ 33.72	\$ 36.27	\$ 38.77	\$ 41.29

4-137-SE

Sheetmetal Worker

09/01/2022

JOB DESCRIPTION Sheetmetal Worker

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour: 07/01/2022
 Sheetmetal Worker \$ 57.60

Temporary Operation or
 Maintenance of Fans
 47.33

SUPPLEMENTAL BENEFITS

Per Hour:
 Sheetmetal Worker \$ 49.24

Maintenance Worker
 49.24

OVERTIME PAY

See (B, E, E2, Q, V) on OVERTIME PAGE
 For Maintenance See Codes B,E, Q & V

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
 Overtime: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

Per Hour:Wages

Six(6) Month Terms As Follows:

1st & 2nd Term	\$ 20.19
3rd & 4th Term	25.96
5th & 6th Term	31.71
7th & 8th Term	40.37
9th Term	46.10

Per Hour: Supplemental Benefits

1st & 2nd Term	\$ 18.10
3rd & 4th Term	24.79
5th & 6th Term	29.25
7th & 8th Term	35.90
9th Term	40.37

4-28

Steamfitter

09/01/2022

JOB DESCRIPTION Steamfitter

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour: 07/01/2022

AC Service/Heat Service & Refrigeration \$ 43.85

Refrigeration, A/C, Oil Burner and Stoker Service and Repair.

NOTE: Refrigeration Compressor installation. (Not to exceed 5 Hp combined on any one project).

NOTE: Air Condition / Heating Compressor installation.(Not to exceed 15 tons combined on any one project).

SUPPLEMENTAL BENEFITS

Per Hour Worked:

AC Service/Heat Service \$ 19.96
Per Hour Paid: 16.45

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 11, 15, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

1 year terms

Wages per hour:

1st Term	\$ 21.23
2nd Term	25.63
3rd Term	29.85
4th Term	36.05

Benefits per hour Worked:	Per Hour Paid:	
1st Term	\$ 13.29	\$ 9.78
2nd Term	14.57	11.06
3rd Term	15.91	12.40
4th Term	17.72	14.21

4-638B-StmFtrRef

Steamfitter

09/01/2022

JOB DESCRIPTION Steamfitter

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, Nassau, New York, Queens, Richmond, Suffolk

WAGES

Per Hour: 07/01/2022

Sprinkler/Steam AC/Heat Fitter \$ 68.61

Temporary Heat & AC Fitter 52.16

Note: Add 15% to Hourly Wage for "Contracting Agency" Mandated Off Shift Work.

SUPPLEMENTAL BENEFITS

Per Hour:

Sprinkler/Steam Fitter \$ 52.74

Temporary Heat & AC Fitter 43.29

Note: Add 15% to Hourly Benefit for "Contracting Agency" Mandated Off Shift Work.

OVERTIME PAY

Note: The posted overtime rates are applicable after 8 hours plus Saturday, Sunday and Holidays on Fire Protection/Sprinkler contracts under \$3,000,000.00 and HVAC/Mechanical contracts under \$30,000,000.00:

Sprinkler/Steam	Wages \$ 137.22	Benefit \$ 103.50
Temp Heat/AC	Wages \$ 104.32	Benefit \$ 84.60

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
 Overtime: See (5, 6, 11, 16, 25) on HOLIDAY PAGE

REGISTERED APPRENTICES

1 year Terms at the Following:

WAGES per hour:

1st Term	2nd Term	3rd Term	4th Term	5th Term
\$ 27.48	\$ 34.34	\$ 41.19	\$ 48.05	\$ 54.90

SUPPLEMENTAL BENEFIT per hour:

1st Term	2nd Term	3rd Term	4th Term	5th Term
\$ 21.60	\$ 26.80	\$ 31.98	\$ 37.18	\$ 42.36

Premium Time Amounts:

41.52	51.86	62.18	75.52	82.84
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4-638A-StmSpFtr

Teamster - Heavy Construction **09/01/2022**

JOB DESCRIPTION Teamster - Heavy Construction

DISTRICT 4

ENTIRE COUNTIES

Bronx, Kings, New York, Queens, Richmond

WAGES

Per Hour:

Dump Trucks/Drivers (Debris Removal, Street Level and below)

07/01/2022

Dump Trucks	\$ 43.835
Tractor Trailers	46.115
Euclid/Turnapull	46.68

Effective 7/1/2020 an Additional \$2.75/Hr. to be allocated.

SUPPLEMENTAL BENEFITS

Per Hour:

Dump Trucks	
Up to 40 Hours Worked	\$ 51.5525

ALL OTHERS	
Up to 40 Hours Worked	51.5025

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 11, 15, 16, 25) on HOLIDAY PAGE

Note: Employees receive 2 hours of Holiday Pay for each day worked in holiday week (not to exceed 8 hours)

Note: Employees receive 5 1/3 hours of Holiday Pay for each day worked in Thanksgiving Holiday Week.

4-282

Welder **09/01/2022**

JOB DESCRIPTION Welder

DISTRICT 1

ENTIRE COUNTIES

Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

Per hour 07/01/2022

Welder: To be paid the same rate of the mechanic performing the work.*

*EXCEPTION: If a specific welder certification is required, then the 'Certified Welder' rate in that trade tag will be paid.

OVERTIME PAY

HOLIDAY

1-As Per Trade

Overtime Codes

Following is an explanation of the code(s) listed in the OVERTIME section of each classification contained in the attached schedule. Additional requirements may also be listed in the HOLIDAY section.

NOTE: Supplemental Benefits are 'Per hour worked' (for each hour worked) unless otherwise noted

- (AA) Time and one half of the hourly rate after 7 and one half hours per day
- (A) Time and one half of the hourly rate after 7 hours per day
- (B) Time and one half of the hourly rate after 8 hours per day
- (B1) Time and one half of the hourly rate for the 9th & 10th hours week days and the 1st 8 hours on Saturday.
Double the hourly rate for all additional hours
- (B2) Time and one half of the hourly rate after 40 hours per week
- (C) Double the hourly rate after 7 hours per day
- (C1) Double the hourly rate after 7 and one half hours per day
- (D) Double the hourly rate after 8 hours per day
- (D1) Double the hourly rate after 9 hours per day
- (E) Time and one half of the hourly rate on Saturday
- (E1) Time and one half 1st 4 hours on Saturday; Double the hourly rate all additional Saturday hours
- (E2) Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
- (E3) Between November 1st and March 3rd Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather, provided a given employee has worked between 16 and 32 hours that week
- (E4) Saturday and Sunday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
- (E5) Double time after 8 hours on Saturdays
- (F) Time and one half of the hourly rate on Saturday and Sunday
- (G) Time and one half of the hourly rate on Saturday and Holidays
- (H) Time and one half of the hourly rate on Saturday, Sunday, and Holidays
- (I) Time and one half of the hourly rate on Sunday
- (J) Time and one half of the hourly rate on Sunday and Holidays
- (K) Time and one half of the hourly rate on Holidays
- (L) Double the hourly rate on Saturday
- (M) Double the hourly rate on Saturday and Sunday
- (N) Double the hourly rate on Saturday and Holidays
- (O) Double the hourly rate on Saturday, Sunday, and Holidays
- (P) Double the hourly rate on Sunday
- (Q) Double the hourly rate on Sunday and Holidays
- (R) Double the hourly rate on Holidays
- (S) Two and one half times the hourly rate for Holidays

- (S1) Two and one half times the hourly rate the first 8 hours on Sunday or Holidays One and one half times the hourly rate all additional hours.
- (T) Triple the hourly rate for Holidays
- (U) Four times the hourly rate for Holidays
- (V) Including benefits at SAME PREMIUM as shown for overtime
- (W) Time and one half for benefits on all overtime hours.
- (X) Benefits payable on Paid Holiday at straight time. If worked, additional benefit amount will be required for worked hours. (Refer to other codes listed.)

Holiday Codes

PAID Holidays:

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

OVERTIME Holiday Pay:

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays. The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Following is an explanation of the code(s) listed in the HOLIDAY section of each classification contained in the attached schedule. The Holidays as listed below are to be paid at the wage rates at which the employee is normally classified.

- (1) None
- (2) Labor Day
- (3) Memorial Day and Labor Day
- (4) Memorial Day and July 4th
- (5) Memorial Day, July 4th, and Labor Day
- (6) New Year's, Thanksgiving, and Christmas
- (7) Lincoln's Birthday, Washington's Birthday, and Veterans Day
- (8) Good Friday
- (9) Lincoln's Birthday
- (10) Washington's Birthday
- (11) Columbus Day
- (12) Election Day
- (13) Presidential Election Day
- (14) 1/2 Day on Presidential Election Day
- (15) Veterans Day
- (16) Day after Thanksgiving
- (17) July 4th
- (18) 1/2 Day before Christmas
- (19) 1/2 Day before New Years
- (20) Thanksgiving
- (21) New Year's Day
- (22) Christmas
- (23) Day before Christmas
- (24) Day before New Year's
- (25) Presidents' Day
- (26) Martin Luther King, Jr. Day
- (27) Memorial Day
- (28) Easter Sunday

(29) Juneteenth



**New York State Department of Labor - Bureau of Public Work
State Office Building Campus
Building 12 - Room 130
Albany, New York 12240**

REQUEST FOR WAGE AND SUPPLEMENT INFORMATION

As Required by Articles 8 and 9 of the NYS Labor Law

Fax (518) 485-1870 or mail this form for new schedules or for determination for additional occupations.

This Form Must Be Typed

Submitted By:

(Check Only One)

Contracting Agency Architect or Engineering Firm Public Work District Office Date:

A. Public Work Contract to be let by: (Enter Data Pertaining to Contracting/Public Agency)

1. Name and complete address (Check if new or change)

Telephone: ()

Fax: ()

E-Mail:

2. NY State Units (see Item 5)

- | | |
|---|--|
| <input type="checkbox"/> 01 DOT | <input type="checkbox"/> 07 City |
| <input type="checkbox"/> 02 OGS | <input type="checkbox"/> 08 Local School District |
| <input type="checkbox"/> 03 Dormitory Authority | <input type="checkbox"/> 09 Special Local District, i.e.,
Fire, Sewer, Water District |
| <input type="checkbox"/> 04 State University
Construction Fund | <input type="checkbox"/> 10 Village |
| <input type="checkbox"/> 05 Mental Hygiene
Facilities Corp. | <input type="checkbox"/> 11 Town |
| <input type="checkbox"/> 06 OTHER N.Y. STATE UNIT | <input type="checkbox"/> 12 County |
| | <input type="checkbox"/> 13 Other Non-N.Y. State
(Describe) |

3. SEND REPLY TO check if new or change)
Name and complete address:

Telephone:()

Fax: ()

E-Mail:

4. SERVICE REQUIRED. Check appropriate box and provide project information.

New Schedule of Wages and Supplements.

APPROXIMATE BID DATE :

Additional Occupation and/or Redetermination

PRC NUMBER ISSUED PREVIOUSLY FOR THIS PROJECT :

OFFICE USE ONLY

B. PROJECT PARTICULARS

5. Project Title _____

Description of Work _____

Contract Identification Number _____

Note: For NYS units, the OSC Contract No. _____

6. Location of Project:
Location on Site _____

Route No/Street Address _____

Village or City _____

Town _____

County _____

7. Nature of Project - Check One:

- 1. New Building
- 2. Addition to Existing Structure
- 3. Heavy and Highway Construction (New and Repair)
- 4. New Sewer or Waterline
- 5. Other New Construction (Explain)
- 6. Other Reconstruction, Maintenance, Repair or Alteration
- 7. Demolition
- 8. Building Service Contract

8. OCCUPATION FOR PROJECT :

- | | |
|---|--|
| <input type="checkbox"/> Construction (Building, Heavy Highway/Sewer/Water) | <input type="checkbox"/> Guards, Watchmen |
| <input type="checkbox"/> Tunnel | <input type="checkbox"/> Janitors, Porters, Cleaners, Elevator Operators |
| <input type="checkbox"/> Residential | <input type="checkbox"/> Moving furniture and equipment |
| <input type="checkbox"/> Landscape Maintenance | <input type="checkbox"/> Trash and refuse removal |
| <input type="checkbox"/> Elevator maintenance | <input type="checkbox"/> Window cleaners |
| <input type="checkbox"/> Exterminators, Fumigators | <input type="checkbox"/> Other (Describe) |
| <input type="checkbox"/> Fire Safety Director, NYC Only | |

9. Has this project been reviewed for compliance with the Wicks Law involving separate bidding? YES NO

10. Name and Title of Requester

Signature



NEW YORK STATE DEPARTMENT OF LABOR
Bureau of Public Work - Debarment List

**LIST OF EMPLOYERS INELIGIBLE TO BID ON OR BE
AWARDED ANY PUBLIC WORK CONTRACT**

Under Article 8 and Article 9 of the NYS Labor Law, a contractor, sub-contractor and/or its successor shall be debarred and ineligible to submit a bid on or be awarded any public work or public building service contract/sub-contract with the state, any municipal corporation or public body for a period of five (5) years from the date of debarment when:

- Two (2) final determinations have been rendered within any consecutive six-year (6) period determining that such contractor, sub-contractor and/or its successor has WILLFULLY failed to pay the prevailing wage and/or supplements;
- One (1) final determination involves falsification of payroll records or the kickback of wages and/or supplements.

The agency issuing the determination and providing the information, is denoted under the heading 'Fiscal Officer'. DOL = New York State Department of Labor; NYC = New York City Comptroller's Office; AG = New York State Attorney General's Office; DA = County District Attorney's Office.

Debarment Database: To search for contractors, sub-contractors and/or their successors debarred from bidding or being awarded any public work contract or subcontract under NYS Labor Law Articles 8 and 9, or under NYS Workers' Compensation Law Section 141-b, access the database at this link: <https://applications.labor.ny.gov/EDList/searchPage.do>

For inquiries where WCB is listed as the "Agency", please call 1-866-546-9322

NYSDOL Bureau of Public Work Debarment List 09/12/2022

Article 8

AGENCY	Fiscal Officer	FEIN	EMPLOYER NAME	EMPLOYER DBA NAME	ADDRESS	DEBARMENT START DATE	DEBARMENT END DATE
DOL	DOL	****5754	0369 CONTRACTORS, LLC		515 WEST AVE UNIT PH 13NORWALK CT 06850	05/12/2021	05/12/2026
DOL	DOL	****4018	ADIRONDACK BUILDING RESTORATION INC.		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	AG	****1812	ADVANCED BUILDERS & LAND DEVELOPMENT, INC.		400 OSER AVE #2300HAUPPAUGE NY 11788	09/11/2019	09/11/2024
DOL	DOL	****1687	ADVANCED SAFETY SPRINKLER INC		261 MILL ROAD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	NYC	****6775	ADVENTURE MASONRY CORP.		1535 RICHMOND AVENUE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	NYC		AGOSTINHO TOME		405 BARRETTO ST BRONX NY 10474	05/31/2018	05/31/2023
DOL	NYC		AMJED PARVEZ		401 HANOVER AVENUE STATEN ISLAND NY 10304	01/11/2021	01/11/2026
DOL	DOL		ANGELO F COKER		2610 SOUTH SALINA STREET SUITE 14SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		ANGELO F COKER		2610 SOUTH SALINA STREET SUITE 14SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL		ANGELO GARCIA		515 WEST AVE UNIT PH 13NORWALK CT 06850	05/12/2021	05/12/2026
DOL	DOL		ANITA SALERNO		158 SOLAR ST SYRACUSE NY 13204	01/07/2019	01/07/2024
DOL	DOL		ANTONIO ESTIVEZ		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	NYC		ARADCO CONSTRUCTION CORP		115-46 132RD ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	DOL		ARNOLD A. PAOLINI		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
DOL	NYC		ARSHAD MEHMOOD		168-42 88TH AVENUE JAMAICA NY 11432	11/20/2019	11/20/2024
DOL	NYC	****2591	AVI 212 INC.		260 CROPSEY AVENUE APT 11GBROOKLYN NY 11214	10/30/2018	10/30/2023
DOL	NYC		AVM CONSTRUCTION CORP		117-72 123RD ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	NYC		AZIDABEGUM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	DOL	****8421	B & B DRYWALL, INC		206 WARREN AVE APT 1WHITE PLAINS NY 10603	12/14/2021	12/14/2026
DOL	NYC		BALWINDER SINGH		421 HUDSON ST SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	NYC	****8416	BEAM CONSTRUCTION, INC.		50 MAIN ST WHITE PLAINS NY 10606	01/04/2019	01/04/2024
DOL	DOL		BERNARD BEGLEY		38 LONG RIDGE ROAD BEDFORD NY 10506	12/18/2019	12/18/2024
DOL	NYC	****2113	BHW CONTRACTING, INC.		401 HANOVER AVENUE STATEN ISLAND NY 10304	01/11/2021	01/11/2026
DOL	DOL		BIAGIO CANTISANI			06/12/2018	06/12/2023
DOL	DOL	****3627	BJB CONSTRUCTION CORP.		38 LONG RIDGE ROAD BEDFORD NY 10506	12/18/2019	12/18/2024
DOL	DOL	****4512	BOB BRUNO EXCAVATING, INC		5 MORNINGSIDE DR AUBURN NY 13021	05/28/2019	05/28/2024
DOL	DOL		BOGDAN MARKOVSKI		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024
DOL	DOL		BRADLEY J SCHUKA		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025
DOL	DOL		BRUCE P. NASH JR.		5841 BUTTERNUT ROAD EAST SYRACUSE NY 13057	09/12/2018	09/12/2023
DOL	DOL	****0225	C&D LAFACE CONSTRUCTION, INC.		8531 OSWEGO RD BALDWINVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	****9383	C.C. PAVING AND EXCAVATING, INC.		2610 SOUTH SALINA ST SUITE 12SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL	****9383	C.C. PAVING AND EXCAVATING, INC.		2610 SOUTH SALINA ST SUITE 12SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL	****4083	C.P.D. ENTERPRISES, INC		P.O BOX 281 WALDEN NY 12586	03/03/2020	03/03/2025
DOL	DOL	****5161	CALADRI DEVELOPMENT CORP.		1223 PARK ST. PEEKSKILL NY 10566	05/17/2021	05/17/2026

NYSDOL Bureau of Public Work Debarment List 09/12/2022

Article 8

DOL	DOL	****3391	CALI ENTERPRISES, INC.		1223 PARK STREET PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	NYC		CALVIN WALTERS		465 EAST THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL		CANTISANI & ASSOCIATES LTD		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CANTISANI HOLDING LLC			06/12/2018	06/12/2023
DOL	DOL		CARMEN RACHETTA		8531 OSWEGO RD BALDWINVILLE NY 13027	02/03/2020	02/03/2025
DOL	DOL		CARMENA RACHETTA		8531 OSWEGO ROAD BALDWINVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	****3812	CARMODY "2" INC			06/12/2018	06/12/2023
DOL	DOL	****1143	CARMODY BUILDING CORP	CARMODY CONTRACTIN G AND CARMODY CONTRACTIN G CORP.	442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY CONCRETE CORPORATION			06/12/2018	06/12/2023
DOL	DOL		CARMODY ENTERPRISES, LTD.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY INC		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	****3812	CARMODY INDUSTRIES INC			06/12/2018	06/12/2023
DOL	DOL		CARMODY MAINTENANCE CORPORATION		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY MASONRY CORP		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	AG	****7247	CENTURY CONCRETE CORP		2375 RAYNOR ST RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	AG		CESAR J. AGUDELO		81-06 34TH AVENUE APT. 6EJACKSON HEIGHTS NY 11372	02/07/2018	02/07/2023
DOL	DOL	****0026	CHANTICLEER CONSTRUCTION LLC		4 BROTHERS ROAD WAPPINGERS FALLS NY 12590	10/20/2020	10/20/2025
DOL	NYC		CHARLES ZAHRADKA		863 WASHINGTON STREET FRANKLIN SQUARE NY 11010	03/10/2020	03/10/2025
DOL	DOL		CHRISTOPHER GRECO		26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026
DOL	DOL		CHRISTOPHER J MAINI		19 CAITLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	DOL		CHRISTOPHER PAPASTEFANO A/K/A CHRIS PAPASTEFANO		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL	****1927	CONSTRUCTION PARTS WAREHOUSE, INC.	CPW	5841 BUTTERNUT ROAD EAST SYRACUSE NY 13057	09/12/2018	09/12/2023
DOL	DOL	****3228	CROSS-COUNTY LANDSCAPING AND TREE SERVICE, INC.	ROCKLAND TREE SERVICE	26 NORTH MYRTLE AVENUE SPRING VALLEY NY 10956	02/18/2021	02/18/2026
DOL	DOL	****2524	CSI ELECTRICAL & MECHANICAL INC		42-32 235TH ST DOUGLSTON NY 11363	01/14/2019	01/14/2024
DOL	NYC		DALJIT KAUR BOPARAI		185-06 56TH AVE FRESH MEADOW NY 11365	10/17/2017	10/17/2022
DOL	DOL	****7619	DANCO CONSTRUCTION UNLIMITED INC.		485 RAFT AVENUE HOLBROOK NY 11741	10/19/2021	10/19/2026
DOL	DOL		DARIAN L COKER		2610 SOUTH SALINA ST SUITE 2CSYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DOL		DARIAN L COKER		2610 SOUTH SALINA ST SUITE 2CSYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	NYC		DAVID WEINER		14 NEW DROP LANE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
DOL	AG		DEBRA MARTINEZ		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL		DELPHI PAINTING & DECORATING CO INC		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL		DOMENICO LAFACE		8531 OSWEGO RD BALDWINVILLE NY 13027	02/03/2020	01/09/2023
DOL	DOL	****5175	EAGLE MECHANICAL AND GENERAL CONSTRUCTION LLC		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025

NYSDOL Bureau of Public Work Debarment List 09/12/2022

Article 8

DOL	DOL		EAST COAST PAVING		2238 BAKER RD GILLET PA 16923	03/12/2018	03/12/2023
DOL	AG		EDWIN HUTZLER		23 NORTH HOWELLS RD BELLPORT NY 11713	08/04/2021	08/04/2026
DOL	DA		EDWIN HUTZLER		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	****0780	EMES HEATING & PLUMBING CONTR		5 EMES LANE MONSEY NY 10952	01/20/2002	01/20/3002
DOL	NYC	****5917	EPOCH ELECTRICAL, INC		97-18 50TH AVE CORONA NY 11368	04/19/2018	04/19/2024
DOL	DOL		FAIGY LOWINGER		11 MOUNTAIN RD 28 VAN BUREN DRMONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL		FRANK BENEDETTO		19 CATLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	DOL	****4722	FRANK BENEDETTO AND CHRISTOPHER J MAINI	B & M CONCRETE	19 CAITLIN AVE JAMESTOWN NY 14701	09/17/2018	09/17/2023
DOL	NYC		FRANK MAINI		1766 FRONT ST YORKTOWN HEIGHTS NY 10598	01/17/2018	01/17/2023
DOL	DA		FREDERICK HUTZLER		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	NYC	****6616	G & G MECHANICAL ENTERPRISES, LLC.		1936 HEMPSTEAD TURNPIKE EAST MEDOW NY 11554	11/29/2019	11/29/2024
DOL	DOL		GABRIEL FRASSETTI			04/10/2019	04/10/2024
DOL	NYC		GAYATRI MANGRU		21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	DOL		GEOFF CORLETT		415 FLAGGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DA		GEORGE LUCEY		150 KINGS STREET BROOKLYN NY 11231	01/19/1998	01/19/2998
DOL	DOL		GIGI SCHNECKENBURGER		261 MILL RD EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DOL		GIOVANNI LAFACE		8531 OSWEGO RD BALDWINVILLE NY 13027	02/03/2020	01/09/2023
DOL	NYC	****3164	GLOBE GATES INC	GLOBAL OVERHEAD DOORS	405 BARRETTO ST BRONX NY 10474	05/31/2018	05/31/2023
DOL	NYC		GREAT ESTATE CONSTRUCTION, INC.		327 STAGG ST BROOKLYN NY 11206	10/10/2017	10/10/2022
DOL	DOL		GREGORY S. OLSON		P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		HANS RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	NYC	****3228	HEIGHTS ELEVATOR CORP.		1766 FRONT ST YORKTOWN HEIGHTS NY 10598	01/17/2018	01/17/2023
DOL	DOL	****5131	INTEGRITY MASONRY, INC.	M&R CONCRETE	722 8TH AVE WATERVLIET NY 12189	06/05/2018	06/05/2023
DOL	DOL		IRENE KASELIS		32 PENNINGTON AVE WALDWICK NJ 07463	05/30/2019	05/30/2024
DOL	DOL	****9211	J. WASE CONSTRUCTION CORP.		8545 RT 9W ATHENS NY 12015	03/09/2021	03/09/2026
DOL	DOL		J.A. HIRES CADWALLADER		P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		JAMES C. DELGIACCO		722 8TH AVE WATERVLIET NY 12189	06/05/2018	06/05/2023
DOL	DOL		JAMES J. BAKER		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL		JAMES LIACONE		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		JAMES RACHEL		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL		JASON P. RACE		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL	****7993	JBS DIRT, INC.		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL	****5368	JCH MASONRY & LANDSCAPING INC.		35 CLINTON AVE OSSINING NY 10562	09/12/2018	09/12/2023

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DOL	NYC		JENNIFER GUERRERO		1936 HEMPSTEAD TURNPIKE EAST MEADOW NY 11554	11/29/2019	11/29/2024
DOL	DOL		JIM PLAUGHER		17613 SANTE FE LINE ROAD WAYNEFIELD OH 45896	07/16/2021	07/16/2026
DOL	AG		JOHN ANTHONY MASSINO		36-49 204TH STREET BAYSIDE NY 11372	02/07/2018	02/07/2023
DOL	DOL		JOHN F. CADWALLADER		200 LATTA BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL	****4612	JOHN F. CADWALLADER, INC.	THE GLASS COMPANY	P.O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		JOHN GOCEK		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL		JOHN LUCIANO			05/14/2018	05/14/2023
DOL	DOL		JOHN MARKOVIC		47 MANDON TERRACE HAWTHORN NJ 07506	03/29/2021	03/29/2026
DOL	DOL		JOHN WASE		8545 RT 9W ATHENS NY 12015	03/09/2021	03/09/2026
DOL	AG	****0600	JOHNCO CONTRACTING, INC.		36-49 204TH STREET BAYSIDE NY 11372	02/07/2018	02/07/2023
DOL	DOL		JON E DEYOUNG		261 MILL RD P.O BOX 296EAST AURORA NY 14052	05/29/2019	05/29/2024
DOL	DOL		JORGE RAMOS		8970 MIKE GARCIA DR MANASSAS VA 20109	07/16/2021	07/16/2026
DOL	DOL		JORI PEDERSEN		415 FLAGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DOL		JOSE CHUCHUCA		35 CLINTON AVE OSSINING NY 10562	09/12/2018	09/12/2023
DOL	NYC		JOSEPH MARTINO		1535 RICHMOND AVENUE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	DOL		JOY MARTIN		2404 DELAWARE AVE NIGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL	****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL	****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026
DOL	DOL	****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL	****5116	JP RACE PAINTING, INC. T/A RACE PAINTING		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL		JULIUS AND GITA BEHREND		5 EMES LANE MONSEY NY 10952	11/20/2002	11/20/3002
DOL	DOL		KARIN MANGIN		796 PHELPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
DOL	DOL		KATE E. CONNOR		7088 INTERSTATE ISLAND RD SYRACUSE NY 13209	03/31/2021	03/31/2026
DOL	DOL		KATIE BURDICK		2238 BAKER RD GILLETT PA 16923	03/12/2018	03/12/2023
DOL	DOL	****2959	KELC DEVELOPMENT, INC		7088 INTERSTATE ISLAND RD SYRACUSE NY 13209	03/31/2021	03/31/2026
DOL	DOL		KIMBERLY F. BAKER		7901 GEE ROAD CANASTOTA NY 13032	08/17/2021	08/17/2026
DOL	DOL	****3490	L & M CONSTRUCTION/DRYWALL INC.		1079 YONKERS AVE YONKERS NY 10704	08/07/2018	08/07/2023
DOL	DA	****8816	LAKE CONSTRUCTION AND DEVELOPMENT CORPORATION		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	DOL		LAVERN GLAVE		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL	****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	06/24/2016	09/19/2022
DOL	DOL	****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	06/24/2016	09/19/2022
DOL	DOL	****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	01/17/2017	09/19/2022
DOL	DOL	****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022

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DOL	DOL	****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	08/14/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	01/17/2017	09/19/2022
DOL	AG	****3291	LINTECH ELECTRIC, INC.		3006 TILDEN AVE BROOKLYN NY 11226	02/16/2022	02/16/2027
DOL	DA	****4460	LONG ISLAND GLASS & STOREFRONTS, LLC		4 MANHASSET TRL RIDGE NY 11961	09/06/2018	09/06/2023
DOL	AG	****4216	LOTUS-C CORP.		81-06 34TH AVENUE APT. 6EJACKSON HEIGHTS NY 11372	02/07/2018	02/07/2023
DOL	DOL		LOUIS A. CALICCHIA		1223 PARK ST. PEEKSKILL NY 10566	05/17/2021	05/17/2026
DOL	NYC		LUBOMIR PETER SVOBODA		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	NYC		M & L STEEL & ORNAMENTAL IRON CORP.		27 HOUSMAN AVE STATEN ISLAND NY 10303	12/26/2019	12/26/2024
DOL	DOL	****2196	MAINSTREAM SPECIALTIES, INC.		11 OLD TOWN RD SELKIRK NY 12158	02/02/2021	02/02/2026
DOL	DA		MANUEL P TOBIO		150 KINGS STREET BROOKLYN NY 14444	08/19/1998	08/19/2998
DOL	DA		MANUEL TOBIO		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	NYC		MAREK FABIJANOWSKI		50 MAIN ST WHITE PLAINS NY 10606	01/04/2019	01/04/2024
DOL	NYC		MARIA NUBILE		84-22 GRAND AVENUE ELMHURST NY 11373	03/10/2020	03/10/2025
DOL	DOL		MASONRY CONSTRUCTION, INC.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	****3333	MASONRY INDUSTRIES, INC.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	NYC		MATINA KARAGIANNIS		97-18 50TH AVE CORONA NY 11368	04/19/2018	04/19/2023
DOL	DOL		MATTHEW P. KILGORE		4156 WILSON ROAD EAST TABERG NY 13471	03/26/2019	03/26/2024
DOL	DOL		MAURICE GAWENO		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		MICHAEL LENIHAN		1079 YONKERS AVE UNIT 4YONKERS NY 10704	08/07/2018	08/07/2023
DOL	AG		MICHAEL RIGLIETTI		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL	****4829	MILESTONE ENVIRONMENTAL CORPORATION		704 GINESI DRIVE SUITE 29MORGANVILLE NJ 07751	04/10/2019	04/10/2024
DOL	NYC	****9926	MILLENNIUM FIRE PROTECTION, LLC		325 W. 38TH STREET SUITE 204NEW YORK NY 10018	11/14/2019	11/14/2024
DOL	NYC	****0627	MILLENNIUM FIRE SERVICES, LLC		14 NEW DROP LNE 2ND FLOORSTATEN ISLAND NY 10306	11/14/2019	11/14/2024
DOL	AG		MSR ELECTRICAL CONSTRUCTION CORP.		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	NYC		MUHAMMED A. HASHEM		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	NYC		NAMOW, INC.		84-22 GRAND AVENUE ELMHURST NY 11373	03/10/2020	03/10/2025
DOL	DA	****9786	NATIONAL INSULATION & GC CORP		180 MILLER PLACE HICKSVILLE NY 11801	12/12/2018	12/12/2023
DOL	DOL	****3684	NATIONAL LAWN SPRINKLERS, INC.		645 N BROADWAY WHITE PLAINS NY 10603	05/14/2018	05/14/2023
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	03/01/2022	03/01/2027
DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	09/29/2021	09/29/2026

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DOL	DOL		NICHOLE E. FRASER A/K/A NICHOLE RACE		3469 STATE RT. 69 PERISH NY 13131	02/09/2022	02/09/2027
DOL	DOL	****7429	NICOLAE I. BARBIR	BESTUCCO CONSTRUCTION, INC.	444 SCHANTZ ROAD ALLENTOWN PA 18104	09/17/2020	09/17/2025
DOL	DOL	****1845	OC ERECTERS, LLC A/K/A OC ERECTERS OF NY INC.		1207 SW 48TH TERRACE DEERFIELD BEACH FL 33442	01/16/2018	01/16/2023
DOL	DOL		PAULINE CHAHALES		935 S LAKE BLVD MAHOPAC NY 10541	03/02/2021	03/02/2026
DOL	DOL		PETER STEVENS		11 OLD TOWN ROAD SELKIRK NY 12158	02/02/2021	02/02/2026
DOL	DOL	****0466	PRECISION BUILT FENCES, INC.		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	NYC		RASHEL CONSTRUCTION CORP		524 MCDONALD AVENUE BROOKLYN NY 11218	09/17/2020	09/17/2025
DOL	DOL	****1068	RATH MECHANICAL CONTRACTORS, INC.		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	DOL	****2633	RAW POWER ELECTRIC CORP.		3 PARK CIRCLE MIDDLETOWN NY 10940	01/30/2018	01/30/2023
DOL	DOL	****2633	RAW POWER ELECTRIC CORP.		3 PARK CIRCLE MIDDLETOWN NY 10940	07/11/2022	07/11/2027
DOL	AG	****7015	RCM PAINTING INC.		69-06 GRAND AVENUE 2ND FLOORMASPETH NY 11378	02/07/2018	02/07/2023
DOL	DA	****7559	REGAL CONTRACTING INC.		24 WOODBINE AVE NORTHPORT NY 11768	10/01/2020	10/01/2025
DOL	DOL		REGINALD WARREN		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL	****9148	RICH T CONSTRUCTION		107 WILLOW WOOD LANE CAMILLUS NY 13031	11/13/2018	11/13/2023
DOL	DOL		RICHARD MACONE		8617 THIRD AVE BROOKLYN NY 11209	09/17/2018	09/17/2023
DOL	DOL		RICHARD REGGIO		1617 MAIN ST PEEKSKILL NY 10566	03/03/2020	03/03/2025
DOL	DOL	****9148	RICHARD TIMIAN	RICH T CONSTRUCTION	108 LAMONT AVE SYRACUSE NY 13209	10/16/2018	10/16/2023
DOL	DOL		RICHARD TIMIAN JR.		108 LAMONT AVE SYRACUSE NY 13209	10/16/2018	10/16/2023
DOL	DOL		RICHARD TIMIAN JR.		108 LAMONT AVE SYRACUSE NY 13209	11/13/2018	11/13/2023
DOL	DOL		ROBBYE BISSE SAR		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	01/11/2003	01/11/3003
DOL	DOL		ROBERT A. VALERINO		3841 LANYARD COURT NEW PORT RICHEY FL 34652	07/09/2019	07/09/2024
DOL	DOL		ROBERT BRUNO		5 MORNINGSIDE DRIVE AUBURN NY 13021	05/28/2019	05/28/2024
DOL	DOL		RODERICK PUGH		404 OAK ST SUITE 101SYRACUSE NY 13203	07/23/2018	07/23/2023
DOL	DOL	****4880	RODERICK PUGH CONSTRUCTION INC.		404 OAK ST SUITE 101SYRACUSE NY 13203	07/23/2018	07/23/2023
DOL	DOL		ROMEO WARREN		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL		ROMEO WARREN		161 ROBYN RD MONROE NY 10950	07/11/2022	07/11/2027
DOL	DOL		RONALD MESSEN		14B COMMERCIAL AVE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL		ROSEANNE CANTISANI			06/12/2018	06/12/2023
DOL	DOL	****1365	S & L PAINTING, INC.		11 MOUNTAIN ROAD P.O BOX 408MONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL	****7730	S C MARTIN GROUP INC.		2404 DELAWARE AVE NIAGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL		SAL FRESINA MASONRY CONTRACTORS, INC.		1935 TEALL AVENUE SYRACUSE NY 13206	07/16/2021	07/16/2026
DOL	DOL		SAL MASONRY CONTRACTORS, INC.		(SEE COMMENTS) SYRACUSE NY 13202	07/16/2021	07/16/2026
DOL	DOL	****9874	SALFREE ENTERPRISES INC		P.O BOX 14 2821 GARDNER RDPOMPEI NY 13138	07/16/2021	07/16/2026
DOL	DOL		SALVATORE A FRESINA A/K/A SAM FRESINA		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13218	07/16/2021	07/16/2026

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DOL	DOL		SAM FRESINA		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13218	07/16/2021	07/16/2026
DOL	NYC	****0349	SAM WATERPROOFING INC		168-42 88TH AVENUE APT.1 AJAMAICA NY 11432	11/20/2019	11/20/2024
DOL	NYC		SANDEEP BOPARAI		185-06 56TH AVE FRESH MEADOW NY 11365	10/17/2017	10/17/2022
DOL	NYC	****1130	SCANA CONSTRUCTION CORP.		863 WASHINGTON STREET FRANKLIN SQUARE NY 11010	03/10/2020	03/10/2025
DOL	DOL	****2045	SCOTT DUFFIE	DUFFIE'S ELECTRIC, INC.	P.O BOX 111 CORNWALL NY 12518	03/03/2020	03/03/2025
DOL	DOL		SCOTT DUFFIE		P.O BOX 111 CORNWALL NY 12518	03/03/2020	03/03/2025
DOL	NYC	****6597	SHAIRA CONSTRUCTION CORP.		421 HUDSON STREET SUITE C5NEW YORK NY 10014	02/20/2019	02/20/2024
DOL	DOL	****1961	SHANE BURDICK	CENTRAL TRAFFIC CONTROL, LLC.	2238 BAKER ROAD GILLET PA 16923	03/12/2018	03/12/2023
DOL	DOL		SHANE BURDICK		2238 BAKER ROAD GILLET PA 16923	03/12/2018	03/12/2023
DOL	DOL		SHANE NOLAN		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL		SHULEM LOWINGER		11 MOUNTAIN ROAD 28 VAN BUREN DRMONROE NY 10950	03/20/2019	03/20/2024
DOL	DOL	****0816	SOLAR ARRAY SOLUTIONS, LLC		9365 WASHINGTON ST LOCKPORT IL 60441	07/23/2018	07/23/2023
DOL	DOL	****0440	SOLAR GUYS INC.		8970 MIKE GARCIA DR MANASSAS VA 20109	07/16/2021	07/16/2026
DOL	NYC		SOMATIE RAMSUNAHAI		115-46 132ND ST SOUTH OZONE PARK NY 11420	09/17/2020	09/17/2025
DOL	DOL	****2221	SOUTH BUFFALO ELECTRIC, INC.		1250 BROADWAY ST BUFFALO NY 14212	02/03/2020	02/03/2025
DOL	DOL	****3661	SPANIER BUILDING MAINTENANCE CORP		200 OAK DRIVE SYOSSET NY 11791	03/14/2022	03/14/2027
DOL	DOL		STANADOS KALOGELAS		485 RAFT AVENUE HOLBROOK NY 11741	10/19/2021	10/19/2026
DOL	DOL	****3496	STAR INTERNATIONAL INC		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	08/11/2003	08/11/3003
DOL	DOL	****6844	STEAM PLANT AND CHX SYSTEMS INC.		14B COMMERCIAL AVENUE ALBANY NY 12065	11/14/2019	11/14/2024
DOL	DOL	****9933	STEED GENERAL CONTRACTORS, INC.		1445 COMMERCE AVE BRONX NY 10461	05/30/2019	05/30/2024
DOL	DOL	****9528	STEEL-IT, LLC.		17613 SANTE FE LINE ROAD WAYNESFIELD OH 45896	07/16/2021	07/16/2026
DOL	DOL		STEFANOS PAPASTEFANO, JR. A/K/A STEVE PAPASTEFANO, JR.		256 WEST SADDLE RIVER RD UPPER SADDLE RIVER NJ 07458	05/30/2019	05/30/2024
DOL	DOL		STEVE TATE		415 FLAGER AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	DOL		STEVEN MARTIN		2404 DELWARE AVE NIAGARA FALLS NY 14305	09/12/2018	09/12/2023
DOL	DOL	****3800	SUBURBAN RESTORATION CO. INC.		5-10 BANTA PLACE FAIR LAWN PLACE NJ 07410	03/29/2021	03/29/2026
DOL	NYC	****5863	SUKHMANY CONSTRUCTION, INC.		185-06 56TH AVE FRESH MEADOW NY 11365	10/17/2017	10/17/2022
DOL	DOL	****1060	SUNN ENTERPRISES GROUP, LLC		370 W. PLEASANTVIEW AVE SUITE 2.329HACKENSACK NJ 07601	02/11/2019	02/11/2024
DOL	DOL	****8209	SYRACUSE SCALES, INC.		158 SOLAR ST SYRACUSE NY 13204	01/07/2019	01/07/2024
DOL	DOL		TALAILA OCAMPA		1207 SW 48TH TERRACE DEERFIELD BEACH FL 33442	01/16/2018	01/16/2023
DOL	DOL		TERRY THOMPSON		11371 RIDGE RD WOLCOTT NY 14590	02/03/2020	02/03/2025
DOL	DOL	****9733	TERSAL CONSTRUCTION SERVICES INC		107 FACTORY AVE P.O BOX 11070SYRACUSE NY 13208	07/16/2021	07/16/2026
DOL	DOL		TERSAL CONTRACTORS, INC.		221 GARDNER RD P.O BOX 14POMPEI NY 13138	07/16/2021	07/16/2026
DOL	DOL		TERSAL DEVELOPMENT CORP.		1935 TEALL AVENUE SYRACUSE NY 13206	07/16/2021	07/16/2026

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DOL	DOL		TEST		P.O BOX 123 ALBANY NY 12204	05/20/2020	05/20/2025
DOL	DOL	****6789	TEST1000		P.O BOX 123 ALBANY NY 12044	03/01/2021	03/01/2026
DOL	DOL	****5766	THE COKER CORPORATION	COKER CORPORATIO N	2610 SOUTH SALINA ST SUITE 14SYRACUSE NY 13205	12/04/2018	12/04/2023
DOL	DOL	****5766	THE COKER CORPORATION	COKER CORPORATIO N	2610 SOUTH SALINA ST SUITE 14SYRACUSE NY 13205	09/17/2020	09/17/2025
DOL	DA	****4106	TRIPLE H CONCRETE CORP		2375 RAYNOR STREET RONKONKOMA NY 11779	08/04/2021	08/04/2026
DOL	DOL	****6392	V.M.K CORP.		8617 THIRD AVE BROOKLYN NY 11209	09/17/2018	09/17/2023
DOL	DOL	****6418	VALHALLA CONSTRUCTION, LLC.		796 PHLEPS ROAD FRANKLIN LAKES NJ 07417	12/01/2020	12/01/2025
DOL	NYC	****2426	VICKRAM MANGRU	VICK CONSTRUCTI ON	21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	NYC		VICKRAM MANGRU		21 DAREWOOD LANE VALLEY STREAM NY 11581	09/17/2020	09/17/2025
DOL	DOL		VICTOR ALICANTI		42-32 235TH ST DOUGLSTON NY 11363	01/14/2019	01/14/2024
DOL	NYC		VIKTAR PATONICH		2630 CROPSEY AVE BROOKLYN NY 11214	10/30/2018	10/30/2023
DOL	DOL		VIKTORIA RATH		24 ELDOR AVENUE NEW CITY NY 10956	02/03/2020	02/03/2025
DOL	NYC		VITO GARGANO		1535 RICHMOND AVE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	NYC	****3673	WALTERS AND WALTERS, INC.		465 EAST AND THIRD ST MT. VERNON NY 10550	09/09/2019	09/09/2024
DOL	DOL	****3296	WESTERN NEW YORK CONTRACTORS, INC.		3841 LAYNARD COURT NEW PORT RICHEY FL 34652	07/09/2019	07/09/2024
DOL	DOL		WHITE PLAINS CARPENTRY CORP		442 ARMONK RD	06/12/2018	06/12/2023
DOL	DOL		WILLIAM G. PROERFRIEDT		85 SPRUCEWOOD ROAD WEST BABYLON NY 11704	01/19/2021	01/19/2026
DOL	DOL	****5924	WILLIAM G. PROPHY, LLC	WGP CONTRACTIN G, INC.	54 PENTAQUIT AVE BAYSHORE NY 11706	01/19/2021	01/19/2026
DOL	DOL	****4043	WINDSHIELD INSTALLATION NETWORK, INC.		200 LATTA BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL	****4730	XGD SYSTEMS, LLC	TDI GOLF	415 GLAGE AVE #302STUART FL 34994	10/31/2018	10/31/2023
DOL	NYC		ZAKIR NASEEM		30 MEADOW ST BROOKLYN NY 11206	10/10/2017	10/10/2022
DOL	NYC	****8277	ZHN CONTRACTING CORP		30 MEADOW ST BROOKLYN NY 11206	10/10/2017	10/10/2022

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**FASHION INSTITUTE OF TECHNOLOGY
ADMISSIONS OFFICE RELOCATION
COED RESIDENCE HALL**

PROJECT #C1536

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RA ENGINEERING – GEOTECHNICAL INVESTIGATION REPORT – JULY 22, 2022
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G-003.00	ACCESSIBILITY DIAGRAMS
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E-201.00 1ST & 2ND FLOOR ELECTRICAL POWER PLAN

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E-301.00 ELECTRICAL 1ST FLOOR MECHANICAL POWER PLAN

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P-601.00	PLUMBING RISER DIAGRAMS
P-900.00	PLUMBING CELLAR PIPING UNDERSLAB DEMOLITION PLAN
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FIRE PROTECTION

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SP-101.00	1 ST FLOOR SPRINKLER PLAN
SP-501.00	SPRINKLER DETAILS
SP-601.00	SPRINKLER RISER DIAGRAM ABBREVIATIONS, PLOT PLAN, AND DRAWING LIST
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SECTION 01 10 00 - SUMMARY OF WORK

PART 1 - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. The work to be done under the Contract, in accordance with the Contract Documents, consists of performing, installing, furnishing, and supplying all materials, equipment, labor and incidentals necessary or convenient for the construction of the referenced renovation project at the Fashion Institute of Technology and carrying out all of the duties and obligations imposed upon the Contractor by the Contract Documents.
- B. Contractor shall provide temporary lighting for the duration of the Project.
- C. The main features of the work as indicated in plans shall include, but not be limited to the following:

Project Scope:

The proposed relocation of the Admissions Office to the first floor and lower level of the western most part of the Coed Residence Hall. The new space, which is currently empty, will have its own street entrance, canopy and new storefront glass at the front and rear of the space. The new space will accommodate meeting rooms for potential students and their parents, a waiting room, reception desk, a security desk, as well as offices and workstations for the recruitment and operations department. A new elevator, ADA restrooms, new lighting and finishes are part of this renovation. New site work, signage and exterior fencing and light relocation are included.

Demolition: General Construction

- Portions of the lower-level slab to accommodate an elevator pit and sump pump. Dewatering will be required.
- Remove existing GWB walls, equipment, and outlets
- Remove existing 1st Floor door and frame
- Remove storefront
- Remove portions of rear masonry wall
- Remove VCT flooring down to slab and base
- Remove a section of slab between 1st and 2nd floor to accommodate elevator

- Remove GWB walls, existing windows, existing light-fixtures, 2x2 ACT and support system
- See the following drawings for all detail demolition:
 - 1) DM-100.00
 - 2) DM-101.00
 - 3) DM-102.00
 - 4) DM-400.00
 - 5) DM-401.00
 - 6) DM-402.00

Demolition – Mechanical/Plumbing/Electrical/Sprinkler/Fire Protection

See Demolition Drawings for the extent of Demolition

- Plumbing
- Piping
- Electrical conduits
- Floor drain
- Electrical panel and electrical risers
- Fire alarm devices and conduits

New General Construction:

- New GWB partitions
- New elevator and shaft
- New doors (HM and glass)
- New glass partition
- 3 new restrooms and all fixtures
- Carpeting
- Window coverings
- Tile, VCT, base
- New millwork
- New storefront
- New glass vestibule
- Column enclosures
- New ceilings 2x2 & GWB

- Paint

New Mechanical Work

- Installation of a new duct work system on cellar and 1st floor
- Installation of a new AC ductless split system with 2 condensing unit located outdoor
- Installation of an air curtain at the vestibule entrance
- Installation of a perimeter heating system on the exterior glass wall.
- Installation of new roof exhaust fans.
- Installation of an elevator shaft venting system

New Plumbing Work

- Installation of new plumbing fixtures in the toilet rooms
- Installation of a sump pump for elevator pit
- Replace the area drain in the back courtyard and all associated piping
- Installation of new kitchen sink
- Install the plumbing piping (cold & hot water, hot water recirculation, sanitary and vent) for new plumbing fixtures and connect them to existing plumbing systems.

New Fire Protection

- Remove existing sprinkler heads in the area work
- Install new sprinkler system as per new architectural layout.

New Electrical Work

- Installation of new electrical distribution through new panels via basement distribution equipment.
- Installation of branch circuit wiring for the following:
 - New HVAC equipment
 - Split System
 - Air curtain
 - New Elevator
 - New 'end user' wiring devices and lighting.

New Fire Alarm Work

- Installation of new notification and initiation devices through out the space on cellar, 1st and 2nd floors.

- Installation of required fire alarm initiation devices for mechanical systems

1.02 RELATED SECTIONS

- A. The entire project manual.

1.03 PHYSICAL COMPLETION DATE

- A. Physically complete the Work within FIT's established calendar after the Agreement is approved by the College.

1.04 ITEMS NOT INCLUDED

- A. The following items shown on the drawings are not included in this Contract:
1. Items indicated "NIC" (Not in Contract).
 2. Existing construction, except where such construction is to be removed, replaced, or altered.

1.05 EXAMINATION OF PREMISES

- A. Verification of Existing Conditions after Award
1. Various existing conditions at locations of the Work which cannot be determined until removals are under way cannot be indicated on the Drawings or described in the Specifications.
 2. Perform all such removals as required to verify all existing conditions before fabricating the work.
 3. Where applicable, before disturbing any structural work, make all possible preliminary investigations to verify the existing conditions threat. Notify Architect of any existing conditions not previously documented prior to proceeding with work.
 4. Where removals or preliminary investigations reveal existing conditions that differ materially from what is indicated or specified, or that may require changes, immediately notify the Architect in writing, and await instructions before proceeding further with that part of the work.
- B. Discrepancies in Existing Conditions:
1. During the process of the Work, should conditions be encountered that materially differ from those shown on the Drawings or indicated in the Specifications, or conditions which could not reasonably have been

anticipated, which conditions will materially affect the cost of the Work, such conditions shall immediately be called to the attention of the Architect, before they are further disturbed. The Architect will promptly investigate the conditions and if it is found that they do so materially differ, shall issue a clarification.

1.06 CONNECTION TO ELECTRICAL EQUIPMENT OR SYSTEMS

- A. Contractor will not be allowed to tie into electrical equipment or systems until the FIT Facilities Management Department has reviewed and approved the connection.
 - 1. Submit written procedures to the FIT Facilities Management Department, detailing how the connection Work is proposed to be performed.
 - 2. After procedures have been approved, notify the FIT Representative at least 3 working days prior to the connection Work so that arrangements can be made to have a FIT Facilities Management Department Representative witness the Work.

1.07 CONTRACTOR USE OF PREMISES

- A. Comply with the Facility's Visitor Identification Policy. A copy of the current policy will be distributed at the initial job meeting.
- B. Work hours shall be as established by the Facilities Department.
- C. Sign in with the Facility Representative, as directed, at the beginning of each workday. Furnish information regarding where employees will be working during the day and indicate what is the general nature of the work.
- D. Comply with applicable Federal and State of New York Right-to-Know Law provisions and supply copies of the appropriate Material Safety Data Sheets (MSDS) to the FIT Facility's Safety Information Officer.
- E. Do not diminish the level of life safety during performance of the Work.
- F. Contractor responsible to coordinate with Owner and make all necessary provisions to receive materials, stage material, and remove debris.

1.08 REFERENCE SPECIFICATIONS AND STANDARDS

- A. Comply with the requirements of the various standards referred to in these specifications, except where they conflict with the requirements of these

specifications. In case of conflict, notify architect prior to proceeding. Such reference standards shall be the date of latest revision in effect at the time of receiving bids unless another date or addendum is added.

1.09 LAYOUT

- A. Examine the Contract Documents thoroughly and promptly report any errors or discrepancies to the Architect before commencing the Work.
- B. Lay out the Work in accordance with the Contract Documents.

1.10 CLEAN UP

- A. Clean up and containerize the rubbish (refuse, debris, waste materials, and removed materials and equipment) resulting from the Work at the end of each workday and leave work areas broom swept clean. Locate containerized rubbish where directed.
- B. Remove piled rubbish from property at least once a week or more often if the rubbish presents a hazard. Properly dispose of rubbish according to waste management specification. Burning of rubbish will not be permitted.

1.11 SUSTAINABILITY REQUIREMENTS

- A. The Contractor shall meet sustainability performance and documentation requirements to comply with New York City Local Law 86 of 2005, and to achieve the following objectives: sustainable site use, water use reduction, conservation of energy and resources, and improvement of indoor environmental quality.
- B. Sustainability performance requirements include, but are not limited to: water use reduction, energy conservation, construction waste management, and indoor air quality controls during construction and prior to occupancy.
- C. Sustainability documentation requirements include, but are not limited to, Contractor's Certification Form, cost information, documentation on VOC content, urea-formaldehyde content and recycled and regional content.

1.12 NEW YORK CITY CODE OF 2014 IMPLEMENTATION

- A. Beginning July 1, 2008, Chapters 17 and 33 of the New York City Construction Code went into effect. These two chapters supersede the Controlled Inspections requirements contained in the 1968 Building Code, and Chapter 19 of the 1968 Building Code that deals with protection of the public.
1. References to “Controlled Inspections” and applicable code sections and “Controlled Inspector” referenced in the Contract Documents shall mean the equivalent “Special Inspection” and “Special Inspector” in accordance with the 2008 NYC Construction Code. It shall be noted that some individual “Controlled Inspection” items have been combined into one “Special Inspection” category.
 2. References to public protectives and code sections included in Chapter 19 of the 1968 code referenced in the Contract Documents shall mean those equivalent Sections contained in Chapter 33 of the NYC Construction Code. The Contractor shall be responsible for complying with all provisions of Chapter 33 of the NYC Construction Code.

END OF SECTION 01 10 00

**SECTION 01 31 46 - SPECIAL REQUIREMENTS FOR MECHANICAL
 AND ELECTRICAL WORK**

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PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. This Section is to be coordinated with and complementary to the General Conditions, AND ALL Sections of the Specifications, wherever applicable to Mechanical and Electrical Work.
- B. Where items of the General Conditions are repeated in this Section of the Specifications, it is intended to qualify or to call particular attention to them; it is not intended that any other parts of the General Conditions shall be assumed to be omitted if not repeated herein.
- C. This Section applies equally and specifically to all Contractors and Subcontractors supplying labor and/or equipment and/or materials as required under the Heating, Ventilating and Air Conditioning, Plumbing, Sprinkler and Electrical Sections of the Specifications.

1.02 DEFINITIONS

- A. "The Contractor" or "Each Contractor" means specifically, the Contractor or Subcontractor working under his respective Section (Heating, Ventilating and Air Conditioning, Plumbing, Sprinkler or Electrical) of this Specification.
- B. "Provide" means to supply, erect, install, and connect up in complete readiness for regular operation, the particular work referred to.
- C. "Furnish" means to supply and deliver to the job.
- D. "Piping" includes, in addition to pipe, all fittings, valves, hangers, and other accessories related to such piping.
- E. "Concealed" means hidden from sight as in chases, furred spaces, shafts, hung ceilings, or embedded in construction.
- F. "Exposed" means "not concealed" as defined above. Work in trenches, crawl spaces, and tunnels shall be considered "exposed" unless otherwise specifically noted. Work located in mechanical rooms, accessible attics, open storage rooms, janitor's closets, on the roof or anywhere outdoors shall be considered "exposed".
- G. "Approved equal" means any equipment or material which, in the opinion of the Architect, is equal in quality, durability, appearance, strength, design, performance, physical dimensions, and arrangement to the equipment or material specified, and will function adequately in accordance with the general design.
- H. "Governmental" means all municipal, state and federal governmental agencies.

- I. Where any device or part of equipment is herein referred to in the singular number (such as "the pump"), such reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the Drawings.
- J. "HVAC" means Heating, Ventilating and Air Conditioning.
- K. "Plumbing Contractor" means the Contractor doing Plumbing and Fire Protection Work including Sprinkler Work.

1.03 CODES AND STANDARDS

- A. NY State Building Code, Fire Code, Mechanical Code, Plumbing Code, Fuel Gas Code, Energy Conservation Construction Code
- B. NFPA National Fire Protection Association
- C. ASME American Society of Mechanical Engineers
- D. ANSI American National Standards Institute
- E. ASTM American Society for Testing Materials
- F. AWWA American Water Works Association
- G. IBR Institute of Boiler and Radiator Manufacturers
- H. NEMA National Electrical Manufacturers Association
- I. ASHRAE American Society of Heating, Refrigeration and Air Conditioning Engineers
- J. SMACNA Sheet Metal and Air Conditioning Contractors National Association, Inc.
- K. ARI Air Conditioning and Refrigeration Institute
- L. UL Underwriters' Laboratories
- M. AMCA Air Movement Control Association
- N. ADC Air Diffusion Council
- O. AABC Associated Air Balance Council
- P. 1980 National Standard Plumbing Code with all New Jersey State Amendments.
- Q. Local Water Company Rules and Regulations
- R. NFPA-90A Air Conditioning and Ventilation Systems

1.04 INTENT

- A. It is the intention of the Specifications and Drawings to call for finished work, tested, and ready for operation. All materials, equipment, and apparatus shall be new and of first-class quality.
- B. Any apparatus, appliance, material, or work not shown on Drawings, but mentioned in the Specifications, or vice versa, or any incidental accessories, or minor details not shown but necessary to make the work complete and perfect in all respects and ready for operation, even if not particularly specified, shall be provided without additional expense to the Owner.

1.05 DRAWINGS

- A. The Drawings are generally diagrammatic and are intended to convey the scope of work and indicate general arrangement of equipment, ducts, conduits, piping, and fixtures.
- B. The locations of all items shown on the Drawings or called for in the Specifications that are not definitely fixed by dimensions are approximate only. The exact locations necessary to secure the best conditions and results must be determined at the project and shall have the approval of the Architect before being installed. Do not scale Drawings.
- C. Follow Drawings in laying out work and check Drawings of other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. Where headroom and space conditions appear inadequate, Architect shall be notified before proceeding with installation.
- D. If directed by the Architect, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.
- E. Piping or ductwork connected to equipment may require different size connection than indicated on the Drawings. The Contractor shall provide transition pieces as required at the equipment.

1.06 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

- A. Any questions or disagreements arising as to the true intent of this Specification or the Drawings or the kind and quality of work required thereby shall be decided by the Architect, whose interpretations thereof shall be final, conclusive, and binding on all parties.
- B. In case of disagreement between Drawings and Specifications, or within either document itself, the better quality, greater quantity or more costly work shall be included in the Bid Price and the matter referred to the Architect's attention for decision and/or adjustment prior to the Contractor's submission of their Bid. If such ambiguity is identified by the Contractor during construction (after bid period), then the Architect shall be consulted

merely to decide on the proper technical approach; the more costly work's value shall be included.

- C. Maintain an awareness to avoid space conflict with other trades.
- D. Purchase the equipment and material required in accordance with field measurements taken at the proper time during the construction progress.

1.07 VISITING THE SITE

- A. Before submitting the final proposal, examine the site of the proposed work to determine the existing conditions that may affect the work, as this Section will be held responsible for any assumptions in regard.

1.08 EQUIPMENT AND MATERIALS

- A. All pipe, fittings and valves shall be manufactured in the United States of America.
- B. All proposed substitutions of equipment of other manufacturers than those specified shall be attached to the base bid in an itemized list. Directly opposite each item indicate the amount to be added to or deducted from the base bid if the proposal is accepted. Failure to furnish such an itemized list will be interpreted to mean that it is agreed to provide all items exactly as drawn and specified. The information given in the above itemized list will in no way affect the determination of low bidder.
- C. Substitutions of material and equipment of makes other than specifically named on the Drawings and in the Specifications and as provided for in the above paragraph will be approved for the following reasons only:
- D. The material or equipment proposed for substitution is equal to or superior to that specified; and that the material or equipment called for on the Drawings or in the Specifications cannot be delivered to the job in time to complete the work in proper sequence to the work of other trades, due to conditions beyond control.
- E. The words "or approved equal" shall be understood to apply only to those items of equipment and material listed under the paragraph "List of Approved Manufacturers" or as otherwise indicated on the Drawings or in the Specifications.
- F. Within twenty (20) working days after the acceptance of the proposal, and prior to the submission of any shop drawings for review, a complete list of manufacturers shall be submitted to the Architect of all equipment and materials proposed for the work. No reviews will be rendered on shop drawings submitted before the complete list of manufacturers is reviewed.
- G. If material or equipment is installed before the Contractor obtained "No Objections" comment from Architect, and/or in the opinion of the Architect the material or equipment

does not meet the intent of the Drawings and Specifications, the removal and replacement shall be made at no extra cost to the Owner.

- H. The materials, workmanship, design, and arrangement of all work installed under the Contract shall be subject to the approval of the Architect.
- I. The words "or approved equal" are understood to follow:
 - 1. The name of any manufacturer, vendor, equipment or materials.
 - 2. Any trade name, plate number, or catalog number.
 - 3. Any detailed description used to define equipment or material; except where otherwise indicated on the Drawings or in the Specifications.
 - 4. It is the intent of these Specifications that wherever a manufacturer of a product is specified, and the terms "other approved" or "or approved equal" are used, the substituted item must conform in all respects to the specified item. Consideration will not be given to claim that the substituted item meets the performance requirements with lesser construction (such as lesser heat exchange surface, etc.) Performance as delineated in schedules and in the Specifications shall be interpreted as minimum performance.
- J. All equipment and materials required for installation under these Specifications shall be new and without blemish or defect. All electrical equipment shall bear labels attesting to Underwriters' Laboratories approval. Where no specific indication as to the type or quality of the material or equipment is indicated, a first-class standard article shall be furnished.
- K. Where it is proposed to use an item of equipment other than that specified or detailed on the Drawings which requires any redesign of the structure, partitions, foundations, piping, wiring, or of any other part of the mechanical, electrical, or architectural layout, all such redesign, and all new drawings and detailing required therefore shall, with the review of the Architect and subsequent comments by the Architect "No Exception" or "Exception as Noted" on the shop drawings, be prepared at no additional cost to the Owner.
- L. Where such deviation from contract documents requires a different quantity and arrangement of ductwork, piping, wiring, conduit, and equipment from that specified or indicated on the Drawings, furnish and install any such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring, and conduit, and any other additional equipment required by the system, at no additional cost to the Owner.
- M. All equipment of one type (such as fan, coils, etc.) shall be the product of the same manufacturer.
- N. Note that the comments "No Exception" or "Exception as Noted" marked on the shop drawings or other information submitted in accordance with the requirements herein before specified does not assure that the Engineer, Architect, or any other Owner's representative attests to the dimensional accuracy or dimensional suitability of the material or equipment involved or the mechanical performance of equipment. Comments

on the shop drawings does not invalidate the Plans and Specifications if the shop drawings are in conflict with the Plans and Specifications.

1.09 SHOP DRAWINGS AND SUBMITTALS

- A. Prior to delivery to job site, but sufficiently in advance of requirements necessary to allow Architect ample time for review, submit copies (as stated in "General Conditions") of shop drawings of all equipment, materials, piping, sleeves, conduit, ductwork, and wiring diagrams, and further obtain written comments "No Exception" or "Exception as Noted" for same from the Architect, before installing any of these items.
- B. All shop drawings shall be prepared using AutoCAD. Manually drafted shop drawings are prohibited. If a Contractor is incapable of developing CAD drawings in-house, then they shall engage the services of an external drafting service in order to do so. The cost for such service shall be borne by the Contractor and included as part of their bid. Shop drawing submittals shall be on paper as described herein. While shop drawings are being developed and revised throughout the construction process, the Contractor shall continually update the CAD files. As construction approaches completion, these shop drawing CAD files will develop into "As-Built" drawings. As part of standard project close-out documents, in addition to providing conventional paper copies of As-Built Shop Drawings, the Contractor must also provide CD's containing electronic AutoCAD versions of same.
- C. Shop drawings shall consist of manufacturer's certified scale drawings, cuts, or catalogs, including descriptive literature and complete certified characteristics of equipment, showing dimensions, capacity, code requirements, motor and drive testing, as indicated on the Drawings or Specifications.
- D. Certified performance curves for all pumping and fan equipment shall be submitted for review.
- E. Shop drawings submitted with insufficient information shall be rejected without review.
- F. All shop drawings and submittals shall be sent via email in PDF format. Other electronic file formats will be rejected without review. Additionally, large format prints (larger than 18" x 24") shall also be sent in paper (hard copy) form, either mailed or hand delivered. If and where such hard copies are sent, the Contractor shall send a sufficient quantity of prints of each, knowing that one (1) copy will each be required for the Engineer's record, the Architect, the Owner and various subcontractors.
- G. Samples of materials or equipment, when requested by the Architect, shall be submitted for review.
- H. Provide a detailed Transmittal with all shop drawings, via email. Any Transmittal, Shop drawing, sample, specification, etc. which is not labeled with all of the following information shall be rejected without review:
 - 1. Project name

2. Project location
 3. Contractor's name and address, Subcontractor's name and address
 4. Applicable section and article number of specifications
 5. Contractor's approval stamp and signature
 6. Submission number
 7. Specific service for which material is to be used.
- I. Catalogs, pamphlets, or other documents submitted to describe items on which review is being requested, shall be specific and identification in catalog, pamphlet, etc., of item submitted shall be clearly made in ink. Data of a general nature such as tabulated charts will not be accepted.
- J. Shop drawings indicating an unsuitable manufacturer shall be rejected without review.
- K. The HVAC Subcontractor shall prepare ductwork shop drawings at $\frac{3}{8}''=1'-0''$ scale and submit to the Architect for their approval to prepare the coordination drawings as called for in paragraph 1.14. Ductwork shop drawings shall be drawn with double line ductwork and shall indicate the elevation above finished floor of all ducts, location and height of building structure (beams, etc.), lengths of fabrication pieces and fittings. Show new and existing work. Shop drawings submitted shall be ready for sheet metal fabrication.
- L. The comments "No Exception" or "Exceptions as Noted" rendered on shop drawings shall not be considered as a guarantee of measurements or building conditions. Where drawings are reviewed, said review does not in any way relieve responsibility, or necessity, of furnishing material or performing work as required by the Contract Drawings and Specifications.
- M. "EXCEPTIONS, AS NOTED" means, unless otherwise noted on the drawings to approved for construction, fabrication and/or manufacture subject the provision that the work shall be carried out in compliance with all annotations and/or corrections indicated on the shop drawings and in accordance with the requirements of the Contract Documents. If also marked "RESUBMIT", "EXCEPTIONS AS NOTED" is invalid and a corrected submittal of the drawing is required.
- N. If a shop drawing is resubmitted and does not comply with all of the comments indicated on the previous submission(s), and does not reflect specific reasons for such non-compliance, it shall be rejected without review.
- O. Label resubmitted shop drawings with a stamp indicating the submittal number, for example: SECOND SUBMISSION; THIRD SUBMISSION, etc. and send separate transmittals for each item being submitted so that one transmittal does not cover more than one specific item or group of items from one manufacturer.
- P. Failure to submit shop drawings in ample time for checking shall not entitle an extension of Contract time, and no claim for extension by reason of such default will be allowed.
- Q. Prior to submission of shop drawings, thoroughly check each shop drawing, reject those not conforming to the Specifications, and indicate (by signature) that the shop drawings

submitted meet Contract requirements. Deviations and/or exceptions to the contract documents should be clearly noted as being deviations and/or exceptions. The Contractor will later be required to correct such deviation and/or exceptions at his own expense, if they have not been noted and approved on the shop drawing.

- R. All shop drawings showing routing of ductwork, piping and conduit, shall be not less than $\frac{3}{8}$ " = 1'-0" scale.
- S. Incorporate a numbering system to help keep track of shop drawing submittals as follows:
 - 1. H..... HVAC shop drawings
 - 2. P Plumbing shop drawings
 - 3. SP Sprinkler shop drawings
 - 4. E Electrical shop drawings
- T. Concurrent numbers shall follow the prefix letter. Example: H-1, H-2, etc. In addition, shop drawings requiring resubmission should bear the number of the original submission and bear a suffix as follows: H-1A (second submission), H-1B (third submission), etc.
- U. Before request for acceptance and final payment for the work, write a letter to the Architect stating that all shop drawings are brought to a condition "No Exception" or "Exception as Noted". Any outstanding shop drawings must be cleared with the Engineer.

1.10 RECORD DRAWINGS

- A. The Contractor shall furnish, coordinate, produce and distribute record drawings as stated within the General Conditions of the Contract.
- B. During construction keep an accurate record of all deviations between the work as shown on the Drawings and that which is actually installed.
- C. On certain projects where Record Drawings must be on Mylar, secure from the Architect, a complete set of Drawings and note thereon all changes. Make a complete record of all changes and revisions in the original design which exist in the complete work. Furnishing of these transparencies and preparing these Record Drawings shall be at no additional cost to the Owner. When all revisions showing the work as finally installed are made, the corrected Mylar transparencies shall be submitted for review by the Architect. After review of the Record Drawings by the Architect, provide the Owner with one set of black-line prints and Mylar transparencies, at no additional cost to the Owner.
- D. Where record drawings are CAD type, provide CD's containing AutoCAD files of these drawings to the Architect, the Engineer and the Owner.

1.11 LAWS, ORDINANCES, PERMITS AND FEES

- A. Give all necessary notices, obtain all permits and pay all governmental taxes, fees, and other costs in connection with the work; file all necessary plans, prepare all documents,

and obtain all necessary approvals of all governmental departments having jurisdiction; obtain all required Certificates of Inspection for the work and deliver to the Architect before request for acceptance and final payment for the work. File for and obtain all required equipment use permits, controlled inspections, submission of fire alarm as-built drawings, backflow prevention device (BFP) sign-offs, boiler and domestic hot water heater filings with DEP and all other required filings.

- B. Include in the work, without extra cost to the Owner, any labor, materials, services, apparatus, drawings, (in addition to Contract Drawings and Documents) in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on Drawings and/or specified.
- C. All materials furnished and all work installed shall comply with the rules and recommendations of the National Fire Protection Association, with all requirements of local utility companies, with the recommendations of the fire insurance rating organization having jurisdiction, and with the requirements of all governmental departments having jurisdiction.
- D. Include in the bid, without extra cost to the Owner, retaining the service of a licensed professional engineer to obtain equipment use permits, filing of sprinkler drawings with hydraulic calculations, DEP BFP sign-off, all DEP chimney and boiler submissions, preparation of fire alarm as-built drawings, testing of all fire and fire smoke dampers, and approvals and all other required filings.

1.12 INDEMNIFICATION

- A. Pay all royalties and defend all suits or claims for infringement of any patent rights and save the Owner harmless from loss on account thereof.
- B. If process or article specified is an infringement of a patent, promptly notify the Architect in writing, and any necessary changes shall be as provided in the Contract for changes in the work. If the Contractor performs any work specified knowing it to be an infringement of patent, he shall bear all costs arising therefrom.
- C. Take out all necessary insurance, free of extra charge, and agree to indemnify and save harmless the party contracting for services against loss or expense, by reason of the liability imposed by law upon such party for damages because of bodily injuries, including death at any time resulting therefrom, accidentally sustained by any person or persons or on account of damage to property arising out of or in consequence of the performance of this Contract, whether such injuries to persons or damage to property are due or claimed to be due to any negligence in the performance of the Contract, the party contracting for services, employees or agents, or any other person.

1.13 ORGANIZATION OF WORK

- A. The work throughout shall be executed in the best and most thorough manner under the direction of and to the satisfaction of the Engineers, Owners and Architects, who will

jointly interpret the meaning of the Drawings and Specifications, and shall have the power to reject any work and materials which, in their judgment, are not in full accordance therewith.

- B. The work called for under this Contract shall be carried on simultaneously with the work of other trades in a manner such as not to delay the overall progress of the work. Furnish promptly to other trades involved at the project, all information and measurements relating to the work which they may require. Cooperate with them in order to secure the harmony necessary in the interest of the project as a whole.
- C. Furnish and install all work as expeditiously as possible in order to meet all construction schedules.
- D. Keep a competent superintendent in charge of the work at all times. Such superintendent shall be replaced if deemed unsatisfactory to the Owner.
- E. Upon award of contract, consult with the Architect and negotiate with subcontractors and manufacturers, and within thirty (30) days submit five (5) copies of a preliminary list of major equipment, for approval, complete with name of manufacturer, dates of purchase orders, and delivery dates to the site. Also submit within thirty (30) days, five (5) copies of a preliminary schedule of installation of the various systems. This list shall be revised monthly, and five (5) copies shall be submitted. The second submittal shall contain the names of manufacturers of scheduled equipment (with names, addresses, and telephone numbers of local representatives).
- F. Maintain a complete file of shop drawings at all times available to the Owner's representative.
- G. Every facility shall be provided to permit inspection of the work by the Owner's representative during the course of construction.
- H. Where items of equipment and/or materials are indicated in the Specifications as being furnished by other trades for installation, assume responsibility for the unloading of such equipment and/or materials from the delivery trucks, and for providing safe storage for same as required pending installation.
- I. Where the work is to be installed in close proximity to work of other trades, or where there is evidence that the work is to interfere with work of other trades, assist in working out space conditions to make a satisfactory adjustment.
- J. If so directed by the Architect, prepare composite working drawings and sections at a suitable scale not less than $\frac{3}{8}$ " = 1'-0" clearly showing how the work is to be installed in relation to the work of other trades. If the installation is made before coordinating with other trades, make all necessary changes in the work without extra charge to the Owner.
- K. Before submitting shop drawings for sleeves, piping and ductwork, the Heating, Ventilating and Air Conditioning Subcontractor shall prepare a combined $\frac{3}{8}$ " = 1'-0" scale

shop drawing for piping and ductwork indicating location of piping and ductwork with dimensions for each floor and Mechanical Rooms. A transparent copy of these shop drawings shall be given to the Electrical Contractor. The Electrical Contractor shall indicate the location of all lighting fixtures and conduit runs on these shop drawings. The Electrical Contractor shall give the transparent copy of these shop drawings, with lighting fixtures and conduit runs indicated to the Plumbing Contractor. The Plumbing and Sprinkler Contractor shall indicate his piping on these shop drawings. Each Contractor shall keep each transparent copy not more than three (3) working days.

- L. The Heating, Ventilating and Air Conditioning Contractor shall arrange a Coordination Meeting for each floor and Mechanical Equipment Room with Plumbing and Electrical Contractors under the supervision of the General Contractor. After coordination, each Contractor shall sign the transparent copy. The Heating, Ventilating and Air Conditioning Contractor shall submit these drawings to the Architect for review and he shall call any conflicts that could not be resolved in the coordination meetings, and/or deviation from original design to the Architect's attention. After receiving written review from the Architect, each Contractor shall prepare the shop drawings as required under the paragraph "Shop Drawings" in the Specifications.

1.14 PROTECTION OF WORK AND PROPERTY

- A. Maintain and protect all equipment, materials and tools from loss or damage from all causes until final acceptance by the Owner.
- B. Assume responsibility for the protection of any finished work or other trades from damage or defacement by the operations and remedy any such injury or damages.

1.15 SHUTDOWNS

- A. When installation of a new system requires the temporary shutdown of an existing operating system, the connection of the new system shall be performed at such regular time or at overtime when designated by the Owner at no additional cost to the Owner.
- B. The Owner shall be notified of the estimated duration of the shutdown period at least ten (10) days in advance of the date the work is to be performed.
- C. Work shall be arranged for continuous performance, including overtime, when approved by the Owner, if required, to assure that existing operating services will be shut down only during the time actually required to make necessary connections.

1.16 ACCESS DOORS IN FINISHED CONSTRUCTION

- A. Install all work so that all parts required are readily accessible for inspection, operation, maintenance and repair. Minor deviations from the Drawings may be made to accomplish this, but changes of magnitude shall not be made without prior written review from the Architect.

- B. Wherever mechanisms requiring access for maintenance, reading of instruments, or for operation are concealed in the structure and wherever else indicated on the Drawings, supply access doors of sizes necessary to provide ready access to the concealed items. Group together valves, controls, dampers, traps, expansion joints, cleanouts, gauges, switches, and other equipment requiring access in walls and furred spaces to reduce the number of access doors.
- C. Access doors shall be Milcor Style A, B or K, L or M, as manufactured by Inland Steel Products Co. or approved equal. Minimum access door shall be 12" x 12". For installation in plastered wall or ceiling, provide Style "K" or "L" as required. For installation in masonry walls, provide Style "M". For installation in acoustical tile surfaces, provide Style "AT". For installation in acoustical plaster surfaces provide Style "AP". Fire resistive access doors for suspended dry wall ceiling shall be Style ATC's. Provide fire rated access doors at fire rated shafts, stairwells, corridors and at all other walls with Fire Rating.
- D. Provide 24" x 24" access door for each duct or pipe shaft. Provide at least one (1) per floor, or as indicated on the drawings. Provide 18" x 24" access door in each outside air and exhaust air plenum.
- E. *Access doors shall be installed in building structure under a separate Section.
- F. All plumbing, electric and heating and ventilating access doors etc., shall be provided with Corbin #2722-1/2 master keyed cylinder locks. These locks shall be supplied and installed by the respective Contractor. These cylinder locks shall be purchased through the General Contractor's subcontractor for hardware after submission and review of the panel schedule as hereinafter specified.
- G. Prepare a schedule showing location of all panels, cabinets, etc. to receive the Corbin lock. This schedule shall designate, by building and room number, the panel or cabinet location and shall be submitted to the Architect. This schedule is required for use in preparation of keying information. Locks shall not be purchased prior to review of this schedule.
- H. Access doors for fire and smoke dampers shall be permanently identified on the exterior by a label having letters not less than 0.5 inch in height and reading: SMOKE DAMPER OR FIRE DAMPER. This shall include ceiling tiles which provide access to these dampers.

1.17 SCAFFOLDING, RIGGING, HOISTING

- A. Provide all scaffolding, rigging, hoisting and services necessary for erection and delivery into the premises of all equipment and materials furnished under this Section of the Specifications, and remove same from premises when no longer required.

- B. In the event that supplementary bracing of the basic building structure is required to assure a secure rigging procedure and a secure route for the equipment being handled, assume full responsibility for such supplementary bracing.

1.18 BASES AND SUPPORTS

- A. Provide all bases and supports not part of the building structure of required size, type and strength, as approved by the Architect, for all equipment and materials furnished by him. All equipment, bases, and supports shall be adequately anchored to the building structure to prevent shifting of position under operating conditions.
- B. The Section furnishing the equipment shall provide not less than six-inch high concrete bases for all pumps, refrigeration machines, compressors, fans, humidifier units, air handlers, boilers, etc. and rotating machinery. Bases shall extend six inches beyond machinery base in all directions, with top edge chamfered. Provide ½" x 6" steel dowels into floors to anchor bases. Provide anchor bolts set in pipe sleeves, two sizes larger than anchor bolts for securing machinery. After anchor bolts are aligned with equipment bases, fill sleeves with concrete and allow to set.
- C. Concrete pads shall also be provided below any floor-mounted duct support, pipe support and electrical panel support (including switchboards, power panels, starters, VFDs, pull boxes, etc.). Provide six inch high concrete pads below the mounting feet of any of the above duct, pipe or equipment support legs. Provide connection hardware (anchor bolts) as described above for rotating equipment.
- D. New concrete pads shall be doweled into the existing concrete with ½" rods at corners, drilled 6" deep and grouted. An epoxy bonding agent shall be applied between the old and new concrete. Concrete shall be 3000 psi reinforced with one middle layer 4 x 4 - w2.9 x w2.9.

1.19 SLEEVES, PIPE AND CONDUIT INSERTS AND ANCHOR BOLTS

- A. Provide and assume responsibility for the location and maintenance in proper position of all sleeves, inserts, and anchor bolts required for the work. In the event that failure to do so requires cutting and patching of finished work, it shall be done without additional cost to the Owner.
- B. All pipes and conduits passing through all walls or partitions shall be provided with sleeves having an internal diameter larger than the outside diameter of the pipe or insulation enclosing the pipe or conduit. Sleeves shall be Schedule 40 black steel pipe. Sleeves through non-masonry partitions shall be 22 gauge sheet steel, set flush with finished surfaces of partitions.
- C. Sleeves through foundation walls shall be James B. Clow & Sons No F-1430 or F-1435 cast iron wall sleeve with intermediate integral flange. Sleeves shall be set with ends flush with each face of wall. The space between sleeve and pipe shall be packed with a mechanical rubber seal, such as "Link Seal" manufactured by Thunderline Corp., (VICO)

and then with oakum to within 2" of each face of the wall. The remaining space shall be packed and made watertight with a waterproof compound.

- D. Sleeves through concrete floors or interior masonry walls shall be Schedule 40 black steel pipe, set flush with finished wall surfaces, but extending 1" above finished floors. The open sleeve space shall be packed with non-combustible materials.
- E. Inserts shall be preset concrete inserts with steel reinforced rods through the insert and both ends hooked over the reinforced mesh. Inserts shall be of individual type of malleable iron construction with accommodation for removable nuts and threaded rods up to $\frac{3}{4}$ " diameter, permitting lateral adjustment, except as otherwise noted. Individual inserts shall be Grinnell Fig. 279 up to 5" pipe and conduit, Fig. 282, 6" and up to 8" pipe and conduit, Fig. 152 above 8" and up to 12" pipe and conduit. For figures 282 and 152, they shall come with an opening at the tip to allow reinforcing rods up to $\frac{1}{2}$ " diameter to be passed through the insert body. Rods shall extend a minimum of 4" on either side of the insert. Pipes larger than 12" shall be suspended from steel members only.
- F. In general, all piping and conduit shall be supported from structural steel building members only or approved malleable steel inserts imbedded in concrete pours. Concentrated loads up to 100 lbs. can use inserts in concrete. All other loads shall be supported from steel building members. Inserts shall not be located in the same deck flute as ceiling tabs nor within 2 feet in any direction from ceiling tabs. Inserts shall not be spaced closer than 4 feet on center in all directions.
- G. Where layout revisions are required, and are approved after concrete deck is poured, piping conduit 3" and smaller may be supported at Intermediate Points by Phillips' $\frac{3}{4}$ " expansion bolts with lead shields, provided main supports are welded to structural steel and are not more than twenty feet on centers.
- H. Piping and conduit 3" and smaller shall be supported from existing slab by "Phillips" $\frac{3}{4}$ " expansion bolts with lead shields. Piping 4" and larger shall be supported by means of 4" x 4" x $\frac{3}{8}$ " clip knee angle with $\frac{3}{4}$ " expansion bolt in shear and supporting rod at 90° from another bolt or using two expansion bolts per hanging post - pipes 8" and larger shall be supported from steel building members. In concrete buildings, add supplementary steel tied into the concrete structural members. Support such piping, conduits and ductwork from the supplementary steel.
- I. Provide sleeves for pipes passing through roofs. Sleeves passing through roofs shall be as detailed on drawings extending min. 12" above finished roof. All pipes passing through roof shall be minimum of 10" from walls or other construction to permit proper flashing. Provide counter flashing.
- J. Where sleeves pass through waterproofed floors, they shall be IPS brass pipe sleeves of the required diameter, brazed at the bottom to 18" x 18", 16-ounce copper flashing for bond with waterproofing. The tops of the sleeves shall extend 1" above finished floor.

- K. No ductwork, piping, conduit or equipment shall be supported from corrugated decking construction. For this area provide supplementary steel to support ductwork, piping, conduit or equipment. Supplemental steel members shall be welded to building structural steel.
- L. All hangers, rods and supports shall be installed prior to construction fireproofing.
- M. The required fire resistance rating of floor or floor/ceiling assemblies and walls shall be maintained where a penetration is made for electrical, mechanical, plumbing pipes, conduits, ducts and systems. Fire stopping shall be provided at openings around vents, pipes, ducts, conduits at floor levels and walls with non-combustible materials. For openings around pipes and conduits and/or sleeves, 3M product Caulk CP 25 and Putty 303 or approved equal shall be provided.

1.20 ESCUTCHEONS

- A. Provide escutcheons on pipes wherever they pass through ceilings, walls, or partitions.
- B. Escutcheons on pipes passing through outside walls shall be Ritter Pattern and Casting Co., № 1, solid, cast brass, flat type secured to pipe with set screw.
- C. Escutcheons for pipes passing through floors shall be Ritter Pattern and Casting Co., № 36A, split-hinged, cast brass type, designed to fit pipe on one end and cover sleeve projecting through floor on the other end.
- D. Escutcheons for pipes passing through interior walls, partitions, and ceilings shall be Ritter Pattern and Casting Co., № 3A, split-hinged, cast brass chromium plated type.

1.21 MANUFACTURERS' IDENTIFICATION

- A. Manufacturer's nameplate, name or trademark, shall be permanently affixed to all equipment and material furnished under this Specification. Where such equipment is in a finished occupied space, the nameplate shall be in a concealed but accessible location. The nameplate of a Subcontractor or Distributor will not be acceptable.

1.22 EQUIPMENT NAMEPLATES

- A. Provide for each item of equipment, including panelboards, disconnects, breakers, starters, switches, and all control devices, pumps, fans, compressors, boilers, etc., a permanently attached nameplate made of black surface, white core laminated bakelite with incised letters. Subcontractor furnishing equipment shall provide nameplate. Pneumatic, electric and mechanically actuated gauges shall have a brief, but complete description of their function. Stating the air pressure or voltage range alone is not acceptable. Nameplates shall be a minimum of 3" long by 1½" wide and shall bear the equipment name and item number (tag number) in ½" high white letters as designated in the equipment schedule. Nameplates shall be attached to their respective equipment by screws or rivets.

1.23 TAGS AND CHARTS

- A. Furnish and attach to each valve as hereinafter specified, a 1½" diameter brass tag with ½" indented numerals filled with durable black compound. Tags shall be securely attached to stems of valves with wire and "S" hooks.
- B. Valve charts shall consist of schematic drawings of piping layouts, showing and identifying each valve and describing the function. Upon completion of the work, one (1) copy of each chart, sealed to rigid backboard with clear lacquer placed under glass and framed, shall be hung in a conspicuous location in the main equipment room, unless otherwise directed by the Architect. Two (2) additional unmounted copies in 8½" x 11" leather ring binders shall be delivered to the Architect. Also furnish three (3) copies of schematic flow chart with corresponding valve numbers noted on chart.
- C. Provide tags for the following valves:
 - 1. Zone control, bypass, shut-off, check and balancing valves.
 - 2. Building and area shut-off and balancing valves.
 - 3. Control, by-pass, shut-off, balancing and drain valves for major pieces of equipment such as boilers, domestic hot water heaters, heat exchangers, refrigeration machines, pumps, heating, ventilating and air conditioning units, cooling towers, etc.
 - 4. System drain valves, safety and relief valves. Vacuum breakers.
- D. Tags on control valves shall bear the valve tag numbers shown on the ATC shop drawings. These shall be brass 1¼" diameter tags, with ½" indented numerals filled with durable black compound. Tags shall be securely attached to stems of valves with wire and "S" hooks.

1.24 IDENTIFICATION

- A. Identification shall be in accordance with "Scheme for Identification of Piping System ANSI A13.1" and OSHA safety color regulation.
- B. Markers shall be snap-on type as manufactured by Craftmark, Fort Worth, TX or Seton Nameplate Corp., New Haven, CT (Setmark System), or Bunting Stamp Co. Inc., Pittsburgh, PA or approved equal. Markers shall completely encircle the pipe with a substantial overlap. No adhesive shall be used. They shall be manufactured of U.L. approved, self-extinguishing plastic. When the pipe, including insulation (if any), is larger than 4 inches diameter, markers shall be strap-on type. For piping located outdoors, all markers shall be strap-on type for all pipe diameters. Markers for medical gas piping shall be by means of metal tags, stenciling, stamping or with adhesive markers, in a manner which is not readily removable.*
- C. Provide identification for piping, ductwork and electrical conduits.
- D. All piping and ductwork shall be labeled, whether concealed above ceilings or exposed. Labels shall be installed at intervals no greater than 15 feet (unless noted otherwise) and

shall be installed after every turn or elbow. Where concealed above ceilings, a minimum of one (1) label shall occur above each room. Due to various above ceiling visual obstructions, the Engineer reserves the right to request additional labels in order to ensure visibility, at no additional cost to the Owner.

- E. Pipe shall be lettered and valves tagged in accordance with the schedule below. Lettering shall be located near each valve and branch connection and at intervals of not over 20 feet (10 feet on fire lines, and at least once in each room and in each story traversed for medical gas piping*) on straight runs of pipe. Provide flow arrows on all piping and ductwork labels. Adjacent to the legend, stencil the size of the pipe, conduit or ductwork. Letter Colors are as follows: Yellow with black letters, green with white letters, blue with white letters and red with white letters.

*Required by NYC Code RS 16 P114.12

LABEL AND VALVE TAG SCHEDULE			
Service	Label Designation	Color	Tag Designation
Cold Water	Cold Water	Green	C.W.
Hot Water (Plumbing)	Hot Water-Deg. F	Yellow	H.W.-Deg. F
Hot Water Circulating (Plumbing)	Hot Water Cir.	Yellow	H.W.C.
Fire Standpipe	Fire Standpipe	Red	FSP
Sprinkler	Sprinkler	Red	SP
Drinking Water Supply	Drinking Water	Green	D.W.
Drinking Water Return	Chilled Water Ret.	Green	D.W.R.
Condenser Water Supply	Condenser Water	Green	C.W.S.
Condenser Water Return	Condenser Water Ret.	Green	C.W.R.
Chilled Water Supply	Chilled Water	Green	CHWS
Chilled Water Ret.	Chilled Water Return	Green	CHWR
Dual Temperature Water Supply	Dual Temp. Water Supply	Green	CHS
	Dual Temp. Water Ret.	Green	CHR
Refrigerant Suction	Refrigerant Suction	Green	RS
Refrigerant Liquid	Refrigerant Liquid	Green	RL
Refrigerant Hot Gas	Refrigerant Hot Gas	Green	RHG

LABEL AND VALVE TAG SCHEDULE			
Service	Label Designation	Color	Tag Designation
Sanitary Sewer	San. Sewer	Green	----
Storm Sewer	Storm Sewer	Green	----
Combined Sewer	Comb. Sewer	Green	----
Storm Water Piping	St. W.	Green	----
Soil Piping	Soil	Green	----
Waste Piping	Waste	Green	----
Vent Piping	Vent	Green	----
Air Conditioning Drain	Air Conditioning Drain	Green	----
Heating Water Supply	Heat. Water Sup.	Green	H.W.S.
Heating Water Return	Heat. Water Ret.	Green	H.W.R.
Air Conditioned Supply Air	A.C. Supply Air	Green	----
Return Air	R.A.	Green	----
General Exhaust Air	General E.A.	Yellow	----
Toilet Exhaust Air	Toilet E.A.	Yellow	----
Outside Air	O.A.	Green	----
Mixed Air	M.A.	Green	----
Dual Temperature Water Supply	Dual Temp Water Sup.	Green	D.T.W.S.
Dual Temperature Water Return	Dual Temp Water Ret.	Green	D.T.W.R.

- F. Tanks, pumps, fans and other equipment shall be labeled to show the number, if any, and service.
- G. Exposed conduits for alarm and communication systems shall be banded at intervals of not over 10 feet. Bands shall be of the following colors:
1. Fire Alarm System Red
 2. Waterflow and Sprinkler Supervisory System..... Red & Yellow
 3. Combined Fire Alarm and Watchmen's Report System Red & Blue
 4. Mechanical & Electrical Supervisory System Green & Blue
- H. "HIGH VOLTAGE" in black letters two inches high, stenciled at 10-foot intervals over a continuous painted orange background.

- I. Except where other means of identification are specified, electric cabinets, switchboards, motor control centers, transformers, system control boards, disconnecting switches, remote control switches, individual motor starters and motor control pushbutton stations shall be stenciled to show the service and number, if any, of the equipment controlled, as appropriate. Panelboards and other electrical equipment located in finished areas, such as offices, shall have the identification placed on the inside of the cabinet doors.
- J. Cabinets housing 460Y/265 Volt panelboards shall have "460/265 volt" stenciled in 2-inch high yellow letters on the inside of the cabinet doors.
- K. Cabinet housing emergency lighting panelboards shall have the word "EMERGENCY" stenciled in 2-inch high red letters on the outside of the cabinet, in addition to other lettering required above.
- L. The bolted covers of housings for disconnecting switches or links in bus ducts between network transformers and switchboards shall be lettered to identify the equipment within.
- M. Serial numbers shall be stenciled on the tanks and covers of transformers having their nameplates attached to the high voltage switch chamber covers.
- N. Signs for Equipment Controlled through the BAS: For all fans, pumps and other motor driven equipment with start/stop control through the BAS provide a red surface, white core laminated Bakelite sign with incised letters, permanently mounted on the equipment indicating, "Warning. This Equipment Is Started and Stopped Automatically from the Building Automation System."

1.25 COORDINATION OF MECHANICAL AND ELECTRICAL EQUIPMENT LOCATIONS

- A. The space equal to the width and depth plus 6" on either side of the electrical equipment and extending to a height of 6 feet above the equipment or the structural ceiling, whichever is lower, shall be dedicated to the electrical installation and shall not contain piping ducts or other equipment foreign to the electrical installation. Electrical equipment shall include switchboards, panelboards, and motor control centers.
- B. Examine the drawings, and in cooperation with the Electrical Work confirm the final location of all electrical equipment to be installed in the vicinity of piping and ductwork. Plan and arrange all overhead piping no closer than three feet, and ductwork no closer than one foot from a vertical line to electric switchboards, panelboards, motor control centers or similar equipment.
- C. Where the installation of piping or ductwork does not comply with the requirements of foregoing paragraphs, where feasible, the piping and ductwork shall be relocated. Installation of a barrier between piping and ductwork and electrical equipment below will be considered if located more than six feet above the electrical equipment. Refer to NEC Article 110. If piping ductwork and foreign equipment cannot be located outside of the space dedicated to electrical installation, a drip pan as described below can be considered

to protect the electrical equipment from condensation, leaks or breaks, but shall be approved by the Engineer after the Contractor has demonstrated that piping, ductwork and/or equipment cannot be installed to avoid this space.

- D. Provide galvanized steel gutters as follows:
1. Provide a gutter of 18 gauge galvanized steel under every pipe and roof drain which is within 2'-0" (two feet) of being vertically over any motor, transformer, electrical controllers, switchboards, panelboards, generator or the like.
 2. Also provide drip pans below any drain piping located above the ceiling in food preparation or storage areas. In such areas, if piping also runs vertical through the floor slab above, then fully enclose the vertical portion with an extension of said drip pan and fully seal this enclosure to the underside of the floor slab above.
 3. Each gutter shall be made watertight, properly suspended; and carefully pitched to a convenient point for draining. Provide a $\frac{3}{4}$ inch drain, to nearest floor drain or slopsink.
 4. In lieu of such separate gutters, a continuous protecting sheet of similar construction, adequately supported and braced, properly rimmed, pitched and drained, may be provided over any such motor, and extending 3'-0" in all directions beyond the motor, over which such piping has to run.

1.26 CONDENSATE DISPOSAL

- A. Fuel Burning Appliances: Liquid combustion by-products of condensing appliances shall be collected and discharged to a plumbing fixture or disposal area in accordance with the manufacturer's installation instructions. Condensate piping shall be of corrosion-resistant material and shall not be smaller than the drain connection on the appliance. Such piping shall maintain a minimum horizontal slope in the direction of discharge of not less than $\frac{1}{4}$ unit vertical in a 12 units horizontal (1% slope).
1. Condensate Disposal: Condensate from all fuel burning appliances and associated flues shall be neutralized to a pH of at least 6 and no more than 8 prior to disposal to a sanitary system.
- B. Evaporators and Cooling Coils: Condensate drain systems shall be provided for equipment and appliances containing evaporators or cooling coils. Condensate drain systems shall be designed, constructed and installed with the following:
1. Condensate Disposal: Condensate from all cooling coils and evaporators shall be conveyed from the drain pan outlet to an approved place of disposal. Such piping shall maintain a minimum horizontal slope in the direction of discharge of to less than $\frac{1}{8}$ unit vertical in 12 units horizontal (1% slope). Condensate shall not discharge into a street, alley or other areas so as to cause a nuisance.
 2. Drain Pipe Materials and Sizes: Components of the condensate disposal system shall be copper pipe or tubing as specified in the piping section of this specification. All components shall be selected for the pressure and temperature rating of the installation. Condensate waste and drain line size shall be not less than $\frac{3}{4}$ " (19 mm)

internal diameter and shall not decrease in size from the drain pan connection to the place of condensate disposal. Where the drain pipes from more than one unit are manifolded together for condensate drainage, the pipe or tubing shall be sized in accordance with the following:

CONDENSATE DRAIN SIZING	
Equipment Capacity	Minimum Condensate Per Diameter
Up to 20 tons of refrigeration	3/4"
Over 20 tons to 40 tons of refrigeration	1"
Over 40 tons to 90 tons of refrigeration	1 1/4"
Over 90 tons to 125 tons of refrigeration	1 1/2"
Over 125 tons to 250 tons of refrigeration	2"

3. Auxiliary and Secondary Drain Systems: Where damage to any building components could occur as a result of overflow from the equipment primary condensate removal system, the following auxiliary protection methods shall be provided for each cooling coil or fuel-fired appliances that produces condensate: A water-level detection device shall be provided that will shut off the equipment served in the event that the primary drain is blocked. The device shall be installed in the primary drain line, the overflow drain line, or in the equipment-supplied drain pan, located at a point higher than the primary drain line connection and below the overflow rim of such pan.
Exception: Fuel-fired appliances that automatically shut down operation in the event of a stoppage in the condensate drainage system.
 - a. Water-Level Monitoring Devices: On down-flow units and all other coils that do not have a secondary drain or provisions to install a secondary or auxiliary drain pan, a water-level monitoring device shall be installed inside the primary drain pan. This device shall shut off the equipment served in the event that the primary drain becomes restricted. Devices installed in the drain line shall not be permitted.
4. Traps: Condensate drains shall be trapped as required by the equipment or appliance manufacturer.

1.27 TOOLS

- A. All special tools for proper operation and maintenance of the equipment shall be delivered to the Owner's representative and a receipt requested for same at no additional cost to the Owner.

1.28 QUIET OPERATION

- A. All equipment and material shall operate under all conditions of load without any sound or vibration which in the opinion of the Architect is objectionable. Where sound or

vibration conditions arise which are considered objectionable by the Architect, eliminate same in a manner reviewed by the Architect.

1.29 RUBBISH REMOVAL

- A. See to it that the project is at all times maintained free of all rubbish, rubble, waste material, packaging materials, etc. accumulating as a result of his work. Assume responsibility for the cleaning up of packaging removed from materials and equipment furnished by other trades for the installation. Note that final acceptance of the work is contingent upon the project being free of all excess and waste materials resulting from the work.
- B. Clean all parts of the building exterior spaces and adjacent roads, sidewalks, and pavement, free from material and debris resulting from the execution of the work. Debris resulting from interior construction shall be neatly stacked on each floor near elevators, material hoists and rubbish chutes, as directed by the Architect or his representative. Debris resulting from exterior construction shall be similarly stacked. All debris so stacked will be removed under other Sections. Excess material will not be permitted to accumulate either on the interior, exterior or on sidewalk.

1.30 CLEANING, PIPING, DUCTS AND EQUIPMENT

- A. Clean all piping, ducts, and equipment of all foreign substances inside and out before being placed in operation.
- B. If any part of a system should be stopped by foreign matter after being placed in operation, the system shall be disconnected, cleaned, and reconnected wherever necessary to locate and remove obstructions. Any work damaged in the course of removing obstructions shall be repaired when the system is reconnected at no additional cost to the Owner.
- C. During construction, properly cap all pipes and equipment nozzles so as to prevent the entrance of sand, dirt, etc.

1.31 DELIVERY OF MATERIAL

- A. Deliver the material and store same in spaces indicated by the Architect and assume full responsibility for damage to structure caused by any overloading of the material.

1.32 CUTTING AND PATCHING (IN EXISTING CONSTRUCTION)

- A. All cutting and patching shall be done under another Section. Furnish the sizes and locations of all chases and openings required for the installation for his work before the walls, floors and partitions are built.
- B. As a general rule, chases, shafts and wall openings as shown on the Drawings will be provided for most of the ducts and pipings, but promptly arrange with the Construction Supervisor for additional openings should any be required for the work.

- C. Provide the labor and materials for all work included under the Contract or Subcontract in ample time and sufficient quantities so that all of the work of the Contract or Subcontract may be installed in proper sequence to avoid unnecessary cutting of the floors and walls.
- D. Any cutting and patching required due to the failure to comply with the above provisions, shall be done at no extra cost to Owner. Such cutting and patching shall be done under Division One, as approved by the Architect.
- E. Where existing piping or ductwork insulation are damaged by the requirements of the work, replace all damaged insulation to match existing.
- F. Refer to Paragraph: "Sleeves, Inserts and Anchor Bolts" for additional requirements.
- G. Prior to performing any core drilling or cutting of existing floor or roof slabs, Contractor shall perform a scan of the slab using ground penetrating radar (GPR) to confirm that there are no existing conduits or pipes in area of core drill or cutting of slab.

1.33 ALTERATIONS

- A. When new work and alterations render equipment, piping and ductwork useless, such equipment, piping and ductwork when exposed to view, shall be removed and connections thereof to lines or ducts remaining shall be properly capped or plugged and left in construction. If construction, such as hung ceiling, furred beam, chase, etc., is opened up and removed during the course of the construction, the useless pipe and ducts therein shall be treated as though exposed to view. When required to accommodate new work, useless piping and ductwork concealed in construction shall be treated as though exposed to view.
- B. When existing piping and duct systems, at points of connection to new work or in rerouting are found defective, such defective portions shall be removed and replaced with new materials without cost to the Owner.
- C. Provide temporary supports where required.
- D. Where alterations reveal piping, ductwork, conduit circuits, wiring, and accessories that must necessarily remain in service, same shall be rerouted, replaced or altered as required to make same completely concealed in the new work at no additional cost to the Owner.
- E. Where existing piping or ductwork insulation is damaged by the requirements of the work, replace all damaged insulation to match existing.
- F. Cutting in existing building shall be done by each Contractor as reviewed by the Architect. Rough patching shall be done by each Contractor. Finish patching, ceiling construction removal, new ceiling in existing building will be done under another Section.

1.34 PAINTING

A. Painting Schedule

1. No on-site painting is required on the following items unless specifically indicated otherwise:
 - a. Stainless steel or monel sheet metal.
 - b. Stainless steel or monel piping.
 - c. Piping or ductwork to be insulated.
 - d. Insulation on piping or ductwork in unfinished spaces or concealed.
 - e. Insulated piping covered with stainless steel, aluminum or all service jacketing, unless otherwise specified.
 - f. Insulated piping in walk-in and non-walk-in tunnels.
 - g. Mechanical equipment with a factory applied baked-on enamel finish, not specified to be insulated or provided with an enameled steel insulated jacket.
 - h. Insulated equipment or smoke stacks specified or noted on the Drawings to be covered with stainless steel or aluminum sheet metal jacketing.
 - i. Factory fabricated multi-wall metal smoke flue piping.
 - j. Concealed piping.
2. Paint the following:
 - a. Uninsulated Black Steel Piping:
 - 1) Exposed in Finished Rooms or Finished Spaces: 1 coat of primer and 2 coats of latex semi-gloss enamel.
 - 2) Exposed in Unfinished Rooms, or Unfinished Spaces, or in Pipe Shafts: 1 coat of primer and 2 coats of finish.
 - 3) Exposed Exterior to a Building: 1 coat of primer and 2 coats of exterior acrylic latex gloss enamel.
 - b. Uninsulated Galvanized, Cast Iron, Brass or Copper Piping:
 - 1) Exposed in Finished Rooms or Finished Spaces: 1 coat of primer and 2 coats of latex semi-gloss enamel.
 - 2) Exposed Exterior to a Building: 1 coat of primer and 2 coats of exterior acrylic latex gloss enamel.
 - 3) Exposed in Unfinished Rooms or Unfinished Spaces: 1 coat of primer and 2 coats of finish.
 - c. Piping in floor trenches after fabrication: primer and finish.
 - d. Uninsulated Mechanical Equipment:
 - 1) Furnished with a Factory Applied Prime Coat Finish: 2 coats of acrylic latex semi-gloss enamel. No primer required.
 - e. Vessels, Tanks, and Like Equipment Specified to be Insulated: 1 coat of corrosion resistant paint, prior to the application of insulation.
 - f. Uninsulated Exposed Iron and Steel Surfaces of Boilers, Including the Steel Casing, Buck Stays, Boiler Fronts, Castings, Smoke Pipes, Breeching and the Exposed Surfaces of all Other Iron or Steel Installed in Conjunction with Boiler Work: 1 coat of primer and 2 coats of heat resistant enamel.
 - g. Hangers, Supports and Accessories:

- 1) Exposed: Paint to match adjacent piping, pipe insulation or ductwork insulation.
 - 2) All black steel or iron pipe hangers, rods, inserts, brackets and accessories for supporting piping systems and duct systems: 1 coat of primer and 2 coats of latex semi-gloss enamel. Paint black steel hanger rods, threaded on the job site, with a primer immediately after installation.
 - 3) Metal Fabrications in Finished Spaces: Paint over shop coat with 2 coats of alkyd gloss enamel.
 - h. Sheet Metal Work:
 - 1) Exposed Black Iron, Galvanized Iron, and Aluminum, including Hangers for Insulated and Uninsulated Ductwork, in Finished Rooms, Finished Spaces or Exterior to a Building: 1 coat of primer and 2 coats of latex semi-gloss enamel.
 - 2) Jacketing on Exposed Insulated Ductwork in Finished Rooms and Finished Spaces: 2 coats of latex semi-gloss enamel. No primer required.
 - i. Uninsulated Exposed Valves, Flanges, Unions and Irregular Surfaces in Piping Systems Installed in Finished Rooms or Finished Spaces: 1 coat of primer and 1 coat of black heat resistant enamel.
 - j. Underground pipe, ducts and conduits - two coats of black asphaltum paint.
- B. Color Coding:
1. Apply finish paints of colors indicated opposite the various items listed below where such items are installed in Mechanical Equipment Rooms, Machine Rooms, Boiler Rooms, Penthouse Mechanical Equipment Rooms:
 2. Piping, Exposed - Bare and Insulated on Unfinished Spaces and Rooms:
 3. Piping Not Listed Above: Color code by classification as follows:
 - a. Fire Protection Red
 4. Ductwork: Grey.
 5. Equipment - Bare and Insulated (Except Factory Painted): Grey.
- C. The inside of all ductwork where visible through openings shall be painted with two prime coats of flat black paint.
- D. Nameplates on all equipment shall be cleaned and left free of paint. Where equipment is to be painted, the Contractor shall carefully mask of all equipment nameplates and data tags prior to application of paint. Such masking shall be removed after paint has dried.
- E. All lead bends and lead safes and flashing shall be painted with two coats of waterproof black asphaltum varnish.
- 1.35 LUBRICATION**
- A. Assume responsibility that all rotating equipment is properly lubricated as soon as it is connected by the Electrical Subcontractor before operation of this equipment is started.

Assume responsibility for any damage to any equipment that is turned on without previously having been oiled or greased when connected up.

1.36 TESTS

- A. All piping, wiring, and equipment shall be tested as specified under the various sections of the work. Labor, materials, instruments and power required for testing shall be furnished under the particular Section of the Specifications.
- B. Tests shall be performed satisfaction of the Architect. The Architect will be present at such test, when he deems necessary and such other parties as may have legal jurisdiction.
- C. Pressure tests shall be applied to piping only before connection of equipment and installation of insulation. In no case shall piping, equipment, or accessories be subjected to pressure exceeding their rating.
- D. All defective work shall be promptly repaired or replaced and the tests shall be repeated until the particular system and component parts thereof receive the review of the Architect.
- E. Any damages resulting from tests shall be repaired or replaced and the tests shall be repeated until the particular system and component parts thereof receive the approval of the Architect.
- F. The duration of tests shall be as determined by all authorities having jurisdiction, but in no case less than the time prescribed in each Section of the Specifications.
- G. Equipment and systems which normally operate during certain seasons of the year shall be tested during the appropriate season. Tests shall be performed on individual equipment, systems, and their controls. Whenever the equipment or system under test is interrelated with and depends upon the operation of other equipment, systems and controls for proper operation, functioning, and performance, the latter shall be operated simultaneously with the equipment or system being tested.
- H. The electrical work shall include providing any assistance (such as removal of switchboard and panelboard trims and covers, pull and junction box covers, etc.) deemed necessary by the Architect to check compliance with the Drawings and Specifications.

1.37 OPERATING INSTRUCTIONS

- A. Two months prior to the completion of all work and the final inspection of the installation by the Owner, five (5) copies of a complete Instruction Manual, bound in booklet form and suitably indexed, shall be submitted to the Architect for review. All written material contained in the manual shall be typewritten or printed.
- B. The Manual shall contain the following items:

Table of Contents (Plumbing, HVAC and Electrical)

- I. Introduction - Explanation of Manual and its use.
- II. Description of Systems
 1. Complete schematic drawings of all systems.
 2. Functional and sequential description of all systems.
 3. Relationship of system where applicable to the supervisory data system.
- III. Systems Operation
 1. Start-up procedures.
 2. Shut-down procedures.
 3. Reset and adjustment and balancing procedures.
 4. Seasonal operation.
 5. All posted instruction charts.
- IV. Maintenance
 1. Cleaning and replacement - lines, components, filters, strainers, ducts, fans, etc.
 2. Lubrication.
 3. Charging and filling.
 4. Purging and draining.
 5. Systems trouble shooting charts.
 6. Instruments checking and calibration.
 7. Procedures for checking out functions with remote (Supervisory Data Console) indication and control.
 8. Recommended list of spare parts.
- V. Listing of Manufacturers
- VI. Manufacturer's Data (Where multiple model, type and size listings are included, clearly and conspicuously indicate those that are pertinent to this installation).
 1. Description - Literature, drawings, illustrations, certified performance charts, technical data, etc.
 2. Operation.
 3. Maintenance - including complete trouble-shooting charts.
 4. Parts List.
 5. Names, addresses and telephone numbers of local recommended repair and service companies.
 6. Guarantee data.
 7. Model No. and Serial No. of all equipment.

1.38 INSTRUCTION OF OWNER'S PERSONNEL

- A. During the operating period, fully instruct the Owner's representative in the complete operation, adjustment and maintenance of the entire installation.
- B. Provide training on the operation and maintenance for equipment, as indicated within the equipment specification. If not indicated within the equipment specification section, provide the following training:
 - 1. Automatic Temperature Controls: One (1) consecutive days within one (1) year of the Owner's acceptance.
 - 2. Split AC Units: One (1) day.
 - a. All training shall be by factory authorized representatives, fully trained in the systems and the equipment operation and maintenance.

1.39 GUARANTEE

- A. The Contractor guarantees by his acceptance of the Contract that all work installed will be free from any and all defects and that all apparatus will develop capacities and characteristics specified, and that if during a period of one year from date of completion and acceptance of work, one (1) entire heating and cooling season or eighteen (18) months from date of shipment, whichever is later, any such defects in workmanship, material or performance. He shall immediately replace, repair, or otherwise correct the defect or deficiency, including parts, labor and travel time, without cost to the Owner within a reasonable time. Notify the Architect in writing of the time required to do work. For heating systems the guarantee period must include one continuous heating season from November 1st to April 1st. For cooling systems the guarantee period must include one continuous cooling season from May 1st to October 1st.
- B. Replace or repair to the satisfaction of the Owner any and all damage done to the building or its contents or to the work of other trades in consequence of work performed in fulfilling guarantee.
- C. This Article is general in nature and will not waive stipulations of other claims which specify guarantee periods in excess of one (1) year.
- D. In the event default on this Guarantee, the Owner may have such work done as required & charge the cost to the Contractor.
- E. The date of acceptance shall be the date of final payment by the Owner or notice of acceptance by the Owner, whichever is later.

1.40 OPERATION PRIOR TO COMPLETION

- A. The Owner may require operation of parts or all of the installation for the beneficial occupancy prior to final completion and acceptance of the building.
- B. The operation shall not be construed to mean acceptance of the work by the Engineer for the Owner. The Owner will furnish supervisory personnel to direct operation of the entire

system and the Contractor shall continue to assume this responsibility until final acceptance.

1.41 INSTALLATION OF MOTORS AND CONTROL EQUIPMENT

- A. Motor Control Centers (MCC's) shall be furnished by the HVAC Contractor and shall be installed by the Electrical Contractor. The Electrical Contractor shall set and fully install the MCC on the concrete pad. Concrete pads shall be provided by the General Contractor.
- B. The Electrical Contractor shall furnish and install power wiring for all electrical devices, individual motor starters and MCC's, furnished to him at the job site by other trades.
- C. The HVAC Contractor shall provide all wiring for the Automatic Temperature Controls except as otherwise specified herein. This shall include low voltage wiring and 120 VAC power wiring unless electrical drawings show 120 VAC feed for the ATC panels.
- D. The Electrical Contractor shall, except where otherwise noted, provide wiring for all Plumbing and Sprinkler Control and Alarm Systems. The Plumbing Contractor shall provide all devices in connection with same.
- E. The Electrical Contractor shall provide all low voltage wiring and 120 VAC power to all auto smoke and combination fire/smoke dampers, which shall be controlled from the Fire Alarm Panel.
- F. For single phase motors which are not interlocked with other motors and which have temperature control or motor control devices in the power circuit, furnishing of control devices, installation and wiring shall be by the Electrical Contractor.
- G. For all HVAC 3-phase motors or HVAC equipment, temperature control wiring, motor control wiring and associated interlocks shall be provided by the HVAC Contractor, including the installation of all control devices. For all plumbing and sprinkler 3-phase motors, equipment control wiring, motor control wiring and associated interlocks shall be provided by the electrical Contractor, including the installation of all control devices.
- H. All wiring between fire/smoke dampers and fire alarm panel shall be by the Electrical Contractor. All wiring between the fire alarm panel and air handling equipment for automatic fire alarm shutdown shall be by the Electrical Contractor. All wiring for operation of smoke purge fan and associated floor dampers shall be by the Electrical Contractor.
- I. Electrically operated equipment supplied by other trades, which are to be installed and wired by the Electrical Contractor, shall be delivered with detailed instructions for their installation and wiring in sufficient time and proper sequence to meet the work schedule.
- J. Each contractor shall furnish all electrical motors, starters and other motor control devices for motor driven equipment required for the work. In his work, the Electrical Contractor

shall provide the code required disconnect switches for all motors, except where otherwise noted. The setting of all motors, required for mechanical equipment, including unmounted motors, shall be done as part of the mechanical work.

- K. If a motor is replaced (even with the same horsepower) a new starter shall be provided for that motor.
- L. Equipment which includes a group of electrical control devices mounted in a single enclosure or on a common base with equipment, shall be supplied completely wired as a unit with terminal boxes or leads ready for external wiring.
- M. All electrical items furnished and/or installed as part of the mechanical work shall conform to NEMA Standards, to the requirements of the National Fire Protection Association, and to the requirements of any local authority having jurisdiction. Any field modifications required to ensure such conformance shall be included as part of the mechanical work.
- N. The furnishing of floor mounted motor starting equipment shall include the purchase and delivery of channel sills for mounting.
- O. Whether or not shown on the drawings, the Electrical Contractor shall furnish and install a local disconnect switch at each motor which is not in sight from the controller location.
- P. The supplying of any and all "field instruction" diagrams deemed necessary by the Architect for the complete delineation of electrical wiring for mechanical equipment shall be included as part of the mechanical work.
- Q. The drawings describing the electrical or the mechanical work may include explanatory wiring diagrams indicating the function intended for the motor control circuits of certain motors. The "field instructions" wiring diagrams required as part of the mechanical work shall conform to these intended functions.
- R. Electric power required for control circuits shall be taken by the HVAC Subcontractor from the electric circuits in the junction boxes left by the Electrical Contractor Subcontractor for ATC use as indicated on the electrical drawings. Where junction boxes are not indicated on the electrical drawings, the HVAC Subcontractor shall run power wiring to the nearest electrical panel with spare circuits and provide required circuit breaker. The ATC Subcontractor shall provide and wire all required transformers for the ATC system.
- S. The HVAC Subcontractor shall coordinate the control systems with unit ventilator and VAV terminal box manufacturers. The HVAC Subcontractor shall provide all necessary control equipment which is not provided by the unit manufacturer to complete the sequence of operation as specified herein. The HVAC Subcontractor shall provide all field wiring.

1.42 ELECTRIC MOTORS

- A. Each Contractor shall provide all electric motors required for driving all motor driven equipment required to be furnished under his Section of the Specification.
- B. All motors shall be designed for 3 phase, 60 cycle alternating current operation with 200 volts across the motor terminals, except that, unless otherwise specified herein, all motors $\frac{1}{3}$ HP and smaller shall be designed for single phase, 60 cycle alternating current at 120 volts across the terminals. Before ordering motors, ascertain the actual voltages and other current characteristics that will be available and permissible for each motor. Report the same in writing to the Architect and obtain approval before ordering motors. The designation of current characteristics in these Specifications does not relieve the responsibility for ascertaining the actual conditions of electric service available for each motor or for the proper operation of all motors under the actual conditions.
- C. The speed, horsepower, type and other essential data for each motor, if not given under paragraphs describing the various motor driven apparatus, or in schedules on the drawings shall be obtained from the manufacturer of the respective apparatus and shall be submitted to the Architect for his review.
- D. All motors shall be built in accordance with the latest rules of the National Electrical Manufacturers Assn., and of the Institute of Electrical and Electronic Engineers and also as hereinafter specified.
- E. Motors $\frac{1}{2}$ HP and larger shall have Class B insulation. All motors shall be rated for continuous duty and shall be designed for temperature rises not to exceed 55°C for fully enclosed type, 55°C for splashproof types and 40°C for all other motors excepting as otherwise specified herein. Motors shall be capable of withstanding momentary overloads of fifty (50%) without injurious heating. They shall operate without excessive heating, flashing or sparking under any conditions within the specified capacity of load and speed. All motors shall operate quietly and shall be replaced if, in the Architect's opinion, they do not do so. All motors which are in the airstream of air conditioning units, shall be totally enclosed type.
- F. Motors $\frac{1}{2}$ HP and larger shall have ball or roller bearings with pressure grease lubrication, except where otherwise noted.
- G. Direct connected motors shall be furnished without an adjustable base. All motors connected to driven equipment by belt shall be furnished with adjustable sliding bases, except fractional motors with slotted mounting holes.
- H. All motor leads shall be permanently identified and supplied with connectors.
- I. Motors shall have nameplates giving manufacturer's name, serial number, horsepower, speed, voltage, phase and current characteristics.

- J. The insulation resistance between stator conductors and frames of motors at the time of final inspection shall be not less than one-half megohm.
- K. All motors shall be of the proper type for the duty and shall have sufficient torque to start and run the equipment to which they are connected and starting currents and running currents shall not exceed the limits imposed by the laws or rules and regulations of the public authorities having jurisdiction or of the electrical utility company. All motors shall have sufficient horsepower capacity and rated duty to operate the apparatus to which they are connected so as to give the speeds and performances specified, but the horsepower shall be in no case less than that stated herein or shown on the drawings. A schedule giving the characteristics of the motors proposed for each type of service shall be submitted to the Architect for approval.
- L. The maximum full load speed of each direct connected motor shall be suitable for the equipment it drives.
- M. Except where V-belt drive is specified, the fan wheels for ventilating fans shall be mounted on the motor shafts, which shall be designed for this duty.
- N. All motors except motors furnished as an integral part of equipment and factory installed on the equipment, shall be of same manufacture.
- O. Polyphase motors shall be squirrel cage induction high efficiency energy saver type, suitable for the starting torque and current requirements.
- P. Single phase motors shall be of the capacitor start induction run or split phase type as required for proper operation of the driven equipment.
- Q. Where used with VFD equipment, motor shall be rated for inverter service without excessive noise, vibration, hum or damage.
- R. All motors operated on variable frequency drives (VFD) shall be equipped with a maintenance-free, conductive microfiber, shaft grounding ring with a minimum of two rows of circumferential microfibers to discharge electric shaft currents within the motor and/or its bearings. Motors up to 100 HP shall be provided with a minimum of one shaft grounding ring installed either on the drive end or non-drive end. Motors over 100 HP shall be provided with an insulated bearing on the non-drive end and a shaft grounding ring on the drive end of the motor. Grounding rings shall be provided by the motor manufacturer or Contractor and shall be installed in accordance with the manufacturer's recommendations.
- S. The efficiency of energy efficient motors shall be verified in accordance with NEMA standard MG1-12.53a. Submittals and shop drawings for all equipment shall state the motor efficiency and shall meet or exceed that listed in the table below. Minimum acceptable efficiency shall be as follows:

Minimum Electric Motor Efficiencies							
Open Drip-Proof (ODP)				Totally Enclosed Fan Cooled (TEFC)			
Motor Size (hp)	Speed (rpm)			Motor Size (hp)	Speed (rpm)		
	1200	1800	3600		1200	1800	3600
1	82.5%	85.5%	77.0%	1	82.5%	85.5%	77.0%
1.5	86.5%	86.5%	84.0%	1.5	87.5%	86.5%	84.0%
2	87.5%	86.5%	85.5%	2	88.5%	86.5%	85.5%
3	88.5%	89.5%	85.5%	3	89.5%	89.5%	86.5%
5	89.5%	89.5%	86.5%	5	89.5%	89.5%	88.5%
7.5	90.2%	91.0%	88.5%	7.5	91.0%	91.7%	89.5%
10	91.7%	91.7%	89.5%	10	91.0%	91.7%	90.2%
15	91.7%	93.0%	90.2%	15	91.7%	92.4%	91.0%
20	92.4%	93.0%	91.0%	20	91.7%	93.0%	91.0%
25	93.0%	93.6%	91.7%	25	93.0%	93.6%	91.7%
30	93.6%	94.1%	91.7%	30	93.0%	93.6%	91.7%
40	94.1%	94.1%	92.4%	40	94.1%	94.1%	92.4%
50	94.1%	94.5%	93.0%	50	94.1%	94.5%	93.0%
60	94.5%	95.0%	93.6%	60	94.5%	95.0%	93.6%
75	94.5%	95.0%	93.6%	75	94.5%	95.4%	93.6%
100	95.0%	95.4%	93.6%	100	95.0%	95.4%	94.1%
125	95.0%	95.4%	94.1%	125	95.0%	95.4%	95.0%
150	95.4%	95.8%	94.1%	150	95.8%	95.8%	95.0%
200	95.4%	95.8%	95.0%	200	95.8%	96.2%	95.4%

1.43 INDIVIDUAL MOTOR STARTERS

- A. For single-phase motors 1/3 HP or smaller, starters shall be manual, 120 volts, single-pole or 240 volts, 2-pole with thermal overload protection and pilot light. Where interlocking or automatic control (other than for unit and cabinet heaters) is required, starters shall be combination circuit breaker and magnetic starter with pilot light.
- B. For 3-phase motors 1/2 HP and over, starters shall be full-voltage combination circuit breaker and magnetic across-the-line contactor, rated 208 or 480 volts, 3-pole. All magnetic starters shall have three thermal overloads.
- C. Unless otherwise specified, motors 25 HP and over, rated 200 volts and motors 50 HP and over, rated 460 volts shall be furnished with reduced voltage starters of the autotransformer closed transition type.

- D. For motors requiring electric interlocks, or automatic control features, starters shall be equipped with the necessary auxiliary relays and contacts to provide the control features desired. All starters shall be provided with "hand-off-auto" twist type switches mounted in cover. For two-speed motors, provide "high-low-off-auto" four position selector switch. Furnish adjustable 20-second time delay between high and low speeds for motors 10 HP and above.
- E. Electrical Control Devices
1. Allen-Bradley® Electrical Control Devices are the basis of design,
 2. The electrical control devices shall include:
 - a. Pilot Devices
 - b. Relays and Timers
 - c. Miniature Circuit Breakers
 - d. Terminal Blocks and Fuse Blocks
 - e. Alarms and Signals
 - f. Power Supplies
 - g. Panel-mounted disconnect switches
 3. The electrical control devices shall be interoperable with standard electrical equipment.
- F. Pilot Devices
1. 30.5 MM Push Buttons, Selector Switches and Pilot Lights
 - a. 30.5 mm push buttons, selector switches and pilot lights shall be Allen-Bradley heavy industrial Type 4/13 watertight/oiltight metal [Bulletin 800T].
 - b. 30.5 mm push buttons, selector switches and pilot lights shall provide EN/IEC 60529 IP66/65 degree of protection.
 - c. 30.5 mm push buttons, selector switches and pilot lights shall have electrical ratings of:
 - 1) Dielectric strength – 2200V for 1 minute [or 300V for 1 minute (Logic Reed)]
 - 2) Electrical design life cycles – 10,000,000 at max. rated load [200,000 at max rated load (Logic Reed)]
 - d. 30.5 mm push buttons, selector switches and pilot lights shall have an operating range of -40 to 131°F (-40 to 55°C).
 - e. Illuminated devices shall offer universal LED that accepts 12 to 130 VAC/VDC voltage input.
 - f. 30.5 mm push buttons shall have a diaphragm seal for protection from liquids, particles and corrosive agents.
 - g. 30.5 mm selector switches shall incorporate a positive detent to prevent the switch from hanging up between positions.
 2. Potentiometer Devices
 - a. 30.5 mm potentiometer devices shall be Allen-Bradley heavy industrial Type 4/13 watertight/oiltight metal [Bulletin 800T].
 - b. Potentiometer devices shall be rated for 300 VAC/VDC, 2 W maximum (6 VDC minimum):

- 1) Mechanical design life – Min. 25,000 cycles
 - 2) Rotational torque – 3 to 12 in-oz
 - 3) Stopping torque – Min. 12 in-lb
 - c. Potentiometer devices shall have single-turn operation, 312 degree rotation.
 - d. Potentiometer devices shall be finger-safe.
 3. Control Stations
 - a. Control stations shall provide Allen-Bradley heavy industrial 30.5 mm push button(s) or selector switch with appropriate contact action, button/lever type and color/legend marking. Devices shall be Type 4/13 watertight/oiltight metal [Bulletin 800T].
 - b. Control stations shall be constructed of die-cast aluminum
- G. Relays And Timers
1. Relays – Time Delay
 - a. Allen-Bradley time delay relays [Bulletin 700-HT] shall mount on tube-type bases with pin-style socket mounting.
 - b. Time delay relays shall have 10A, B300, DPDT contact ratings and coil voltages as shown on drawings.
 - c. Time delay relays shall have adjustable timing ranges [or fixed timing ranges to avoid tampering]. Timing ranges shall be as shown on drawings.
 2. Relays – General Purpose
 - a. Allen-Bradley general purpose relays [Bulletin 700-HA] shall have tube-base/Octal 8-pin [or 11-pin] terminals and ON/OFF flag indicators.
 - b. General purpose relay contacts shall be silver nickel [or silver nickel bifurcated or gold-plated bifurcated] and have 10A, B300, DPDT [or 3PDT] ratings. Coil voltages shall be as shown on drawings.
 - c. General purpose relays shall have an electrical schematic on the faceplate, a clear cover for visual inspection and snap-in marker ability.
 - d. General purpose relays shall have LED status indicators, push-to-test and manual override.
 3. Relays – Miniature
 - a. Allen-Bradley miniature relays [Bulletin 700-HC] shall be square-base, 4-pole, plug-in type with blade-style terminals and ON/OFF flag indicators.
 - b. Miniature relay contacts shall be silver nickel [or gold-plated silver nickel] and have 7A [or 10A], DPDT [or 4PDT] ratings. Coil voltages shall be as shown on drawings.
 - c. Miniature relays shall have an electrical schematic on the faceplate and a clear cover for visual inspection.
 - d. Miniature relays shall have LED status indicators and push-to-test button with incorporated manual override lever.
 4. Relays – Industrial-Type
 - a. Allen-Bradley industrial-type relays [Bulletin 700-P] shall be ruggedly constructed (10 million operation mechanical life), 2-pole [or 4-pole, 8-pole, 12-pole], configured N.O./N.C. as shown on drawings, and panel- [or strip-, DIN rail-] mounted.

- b. Industrial-type relays shall be finger-safe.
 - c. Industrial-type relay contacts shall be silver nickel with a double-break and bifurcated design and 10A, A600 rating for AC [5A, P600 rating for DC].
 - d. Accessories shall include adder decks, time delay, latching, surge suppressors and/or mounting strip.
5. Timers – Solid-State
- a. Allen-Bradley solid-state timers [Bulletin 700-FS] shall be DIN rail-mounted.
 - b. The solid-state timer contacts shall be available as SPDT or DPDT, 8A.
 - c. Solid-state timers shall be available with On-Delay, Off-Delay, On- and Off-Delay, One-Shot and Flasher operating modes as required on the drawings.
 - d. Solid-state timers shall have coil surge protection and adjustable timing ranges of 0.05 seconds to 60 hours as shown on drawings.
6. Timers – Programmable
- a. Allen-Bradley programmable timers [Bulletin 700-HX] shall be digital timing relays with LCD display and shall be socket- [or panel-] mounted.
 - b. Programmable timer contacts shall be SPDT, rated 5A, B300.
 - c. Programmable timer panel surface shall offer Type 4X/IP66 protection.
 - d. Programmable timers shall be configurable for Signal On-Delay, Power On-Delay, Off-Delay, Repeat Cycle, One-Shot and Cumulative operating modes as required on the drawings.
 - e. Programmable timers shall have timing ranges of 0.000 seconds to 9999 hours, depending on selected mode and as shown on drawings.
- H. Miniature Circuit Breakers
- 1. Miniature circuit breakers shall be Allen-Bradley Circuit Breakers [Bulletin 1489-M].
 - 2. Miniature circuit breakers shall be thermal-magnetic, current-limiting type, sized as specified on the drawings:
 - a. 0.5A to 63A current rating
 - b. 1-, 2- or 3-pole
 - c. Type C or Type D tripping characteristic
 - 3. Miniature circuit breakers shall be UL Listed (E197878), CSA Certified (259391), CE Marked, VDE and CCC Certified and RoHS Compliant. Standards compliances shall include:
 - a. UL 489
 - b. CSA C22.2, No. 5.1
 - c. EN 60947-2
 - d. GB 14048.2
 - 4. Miniature circuit breakers shall be rated for:
 - a. Voltage – Max. 480Y/277 VAC (UL/CSA); U_e 230/400 VAC (IEC)
 - b. Interrupting capacity – 10 kA (UL/CSA); 15 kA (IEC)
 - 5. Housing shall satisfy Insulation Group II/RAL 7035, shall have IP20 finger-safe design, shall be suitable for DIN rail mounting and shall include status indicator window and scratch- and solvent-resistant printing.

6. Miniature circuit breakers shall support reversible line and load connections and shall have dual terminals that:
 - a. Connect up to 4 wires, or 2 wires and a bus bar.
 - b. Clamp from both sides.
 - c. Have a unique design that directs wires into openings to prevent wiring misses.
 7. Miniature circuit breakers shall be compatible with UL 508 Listed bus bars, auxiliary contacts, signal contacts, shunt trips and toggle-mount lockout attachments.
- I. Terminal Blocks and Fuse Blocks
1. Terminal Blocks – Control, #22 to #8 AWG
 - a. Control terminal blocks shall be Allen-Bradley screw-type, feed-through [Bulletin 1492-J].
 - b. Control terminal blocks shall be certified:
 - 1) UR/CSA – #22 to #8 AWG wire range, 50A maximum current, 600 VAC/VDC voltage rating
 - 2) IEC – 6 mm² wire range, 41A maximum current, 800 VAC/VDC voltage rating
 - 3) ATEX – 6 mm² (#20 to #10 AWG) wire range, 36A maximum current, 550 VAC/VDC voltage rating
 - c. Control terminal blocks shall have a snap-in card marking system.
 2. Terminal Blocks – Power
 - a. Power terminal blocks shall be Allen-Bradley [Bulletin 1492-PD]:
 - 1) Open-style power distribution block with aluminum or copper connectors – 3-pole [or 1-pole], rated at 600 VAC/VDC, 175 to 760A
 - b. Power terminal blocks shall be certified by UR, CSA and CE.
 - c. Wire ranges and tightening torques shall be labeled on the block.
 - d. Power terminal blocks shall have a write-on marking surface or marker retention feature.
 3. Fuse Blocks
 - a. Allen-Bradley fuse block kits [Bulletin 1491] shall be used for protection of transformers and control circuits capable of delivering no more than 200,000 RMS symmetrical amps, 600V maximum.
 - b. Fuse block kits shall be 1-pole, 2-pole or 3-pole.
 - c. Each pole shall have a fuse cover.
- J. Alarms and Signals
1. Alarm Horn
 - a. The alarm horn shall be an Allen-Bradley High Performance Electronic Horn [Bulletin 855H] and shall have up to 4 stages and low current consumption.
 - b. The alarm horn shall have a UV-stable plastic housing and non-moving parts.
 - c. The alarm horn shall have an on-board microphone, 45 alarm tones selectable by DIP switch and fine volume control via potentiometer.
 - d. The alarm horn shall allow synchronized output in multi-horn installations and shall have the ability to replicate content to other devices (master/slave).

2. Alarm Beacon
 - a. The alarm beacon shall be an Allen-Bradley [Bulletin 855B] with high-intensity, minimum 5-Joule Xenon, minimum 20-Watt Halogen or LED illumination as required on the drawings.
 - b. The alarm beacon shall have polycarbonate housing and lens, available in square or round configuration, and Type 4/4X/13, IP65/IP66 ingress rating as required on the drawings.
 - c. Flashing frequency shall be 1 Hz.
 - d. Alarm beacon lens colors shall be red, green, amber, blue, yellow or clear as required on the drawings.
 3. Alarm Light Tower
 - a. The alarm light tower shall consist of Allen-Bradley Control Tower™ Stack Lights [Bulletin 854J or K], stacked 1 [or 2, 3, 4, 5] module(s) high and shall be surface- [or vertical-, quick-release-, pole-] mounted.
 - b. The alarm light tower shall be 40 mm [or 60 mm] size and the terminal block shall be top-mounted on the base.
 - c. The light modules shall be Type 4/4X/13, IP65 and are:
 - 1) LED (steady, flashing or strobe)
 - d. The alarm light tower shall include a continuous (or pulsing) piezo [or transducer] sound module.
 - e. The alarm light tower shall have a DeviceNet base.
 4. Signal Alarm (Panel Mount)
 - a. The signal alarm shall be an Allen-Bradley Panel Mount Signaling Alarm [Bulletin 855P] in a 30 mm [or 45 mm, 65 mm] size, that mounts in a standard 22.5 mm hole.
 - b. The signal alarm shall have polycarbonate base and lens.
 - c. The signal alarm shall be combination sounder and LED
 - d. The signal alarm shall be rear-securing and finger-safe.
- K. Power Supplies
1. Control Power Transformer
 - a. The control power transformer shall be an Allen-Bradley Global Control Transformer [Bulletin 1497], single-phase and sized as shown on drawings.
 - b. The control power transformer shall be epoxy encapsulated and shall offer EN 60-529 finger-safe protection.
 - c. The control transformer shall have a dual primary and secondary fuse block, pre-wired and top-mounted.
 2. 24 VDC Power Supplies
 - a. 24 VDC power supplies shall be Allen-Bradley [Bulletin 1606-XL] with active or passive PFC choke and input as shown in drawings [or auto-select input].
 - b. 24 VDC power supplies shall have low inrush current, and power supplies with greater than 100-Watt output shall incorporate a minimum 120% Power Burst design.
 - c. 24 VDC power supplies shall have NEC Class 2 “Limited Power” output.

3. UPS
 - a. The UPS shall be an Allen-Bradley Industrial Uninterruptible Power Supply [Bulletin 1609-B/D] with 120 VAC input voltage and output power as shown on drawings.
 - b. The UPS shall be back-of-panel- [or DIN rail-] mounted.
 - c. The UPS shall provide:
 - 1) Surge protection to 380 Joules
 - 2) Overload protection, resulting in delayed shutdown at 110 to 130% and immediate shutdown at 130%
 - 3) Protection against output short online – over-current protection from premises branch circuit
 - 4) Protection against output short on battery, resulting in shutdown
 - 5) Thermal protection
 - d. The UPS shall have USB communications and software, integrated remote on/off and dry I/O contacts.
 - e. The UPS shall have EtherNet/IP communications, expandable battery capacity and/or pure sine wave output.
 - f. The UPS shall perform to 40°C [50°C, with hi-temp battery].

- L. Disconnect/breakers shall be external flange mounted type, all metal construction with painted handle, lockable, similar to Allen Bradley Model 1494F-M1-412. Plastic switches, disconnects and breakers and twist types shall not be used.

- M. In addition to any auxiliary contacts required for interlocking purposes, each magnetic starter shall be equipped with one normally open auxiliary control circuit contact either for "sealing in" or as a spare for future use.

- N. Indicating lights shall be transformer or series resistor type. There shall be one red light for each single speed motor to indicate when motor is running. For multiple speed motors one indicating light for each speed shall be provided.

- O. The starter disconnecting means shall be circuit breakers. The external operating handle shall clearly indicate "ON" or "OFF" position of the switch and shall be interlocked with the door to require throwing the handle to the "OFF" position to open the door. The handle shall be arranged for locking both the door closed and the disconnect in the "OFF" position with up to 3 padlocks. Provide defeat device in cover to permit opening door in "ON" position.

- P. Circuit breakers in combination starter units shall be of the magnetic trip type with an adjustable trip setting for selecting instantaneous trip points of fault protection (motor circuit protector). Field adjustment of the instantaneous trip shall be performed by the Electrical Contractor. Select the trip setting at approximately 10 times the motor nameplate full-load current. If the circuit breaker trips on starting, incrementally increase the settings. In no case shall the trip setting exceed 13 times the motor full-load current.

- Q. Overload heaters shall be furnished for all starters and shall be sized in range of 115 to 125 percent of full load current. The motor starters shall be shipped with the overload heaters inside the compartment but not installed. The Electrical Contractor shall verify the ratings of the heater coils based on the motor nameplate data before installing the overloads. The Contractor supplying the starter shall replace any improperly selected heaters.
- R. A transformer shall be supplied in each starter unit for 120-volt control voltage. Transformer capacity shall be adequate to supply the holding coil requirements plus the solenoids, e-p switches, relays and other devices required to be controlled from the starter. A fuse shall be supplied in one secondary terminal of the control transformer. The other terminal shall be grounded to the housing of the starter. Fuses shall be also provided in the transformer primary leads per the National Electrical Code.
- S. All enclosures shall be NEMA Type 1 steel with hinged cover for general purpose indoor application, unless otherwise indicated. Enclosures shall be arranged for equipment or wall mounting. Weather resistant NEMA 3R steel enclosures shall be provided for all outdoor starters. All devices mounted on the outside of all enclosures shall be NEMA 4.
- T. Each starters shall be clearly identified by engraved nameplates after installation. The nameplates shall be bakelite black plates with ½" high white letters and shall be securely fastened to starter with mounting screws made of non-corrosive metals.
- U. Stainless steel flush mounted starter and enclosures shall be provided for all starters located in the kitchen and dishwasher areas.
- V. All starters, except those furnished as an integral part of equipment and factory installed on the equipment, shall be of the same manufacturer.
- W. Starters shall be as manufactured by Westinghouse, General Electric, Square D, Eaton/Cutler-Hammer, or Allen-Bradley.
- X. Shop drawings shall be provided with dimensions, ratings, wiring diagrams and schedule of nameplates for approval prior to fabrication.
- Y. If a motor is replaced (even with the same horsepower), a new starter shall be provided for that motor.

1.44 MOTOR CONTROLLERS

- A. Motor controllers shall be defined as control devices such as pushbuttons, switches, etc. which are not mounted in starter cover, required for remote control of motors.
- B. Unless otherwise noted, motor controllers shall be housed in NEMA Type 1 general purpose steel enclosures. Outdoor controllers shall be provided with weather resistant NEMA Type 3R steel enclosures. Provide nameplate to indicate the motor with which they are associated.

- C. Provide reduced voltage starters for all motors 10 HP and larger and provide time delay for restart.
- D. The controllers to be installed in finished area shall be flush mounted.
- E. The Electrical Contractor shall install and provide wiring for motor controllers. The contractor providing the motor shall furnish the controllers.
- F. Unless otherwise noted, pushbuttons shall be of the normal duty, spring return momentary type.
- G. Selector switches and pushbuttons shall be equipped with nameplates indicating the function of each of their positions as noted in the list of electric motors and motor controls or shown on the drawings.
- H. Pilot light shall be transformer or series resistor type for operation at 120 V.
- I. Pilot lights shall be equipped with nameplates indicating the operating conditions they annunciate as noted in the list of electric motors and motor controls or shown on the drawings.
- J. Electrical Control Devices
 1. Allen-Bradley® Electrical Control Devices are the basis of design,
 2. The electrical control devices shall include:
 - a. Pilot Devices
 - b. Relays and Timers
 - c. Miniature Circuit Breakers
 - d. Terminal Blocks and Fuse Blocks
 - e. Alarms and Signals
 - f. Power Supplies
 - g. Panel-mounted disconnect switches
 3. The electrical control devices shall be interoperable with standard electrical equipment.
- K. Pilot Devices
 1. 30.5 MM Push Buttons, Selector Switches And Pilot Lights
 - a. 30.5 mm push buttons, selector switches and pilot lights shall be Allen-Bradley heavy industrial Type 4/13 watertight/oiltight metal [Bulletin 800T].
 - b. 30.5 mm push buttons, selector switches and pilot lights shall provide EN/IEC 60529 IP66/65 degree of protection.
 - c. 30.5 mm push buttons, selector switches and pilot lights shall have electrical ratings of:
 - 1) Dielectric strength – 2200V for 1 minute [or 300V for 1 minute (Logic Reed)]
 - 2) Electrical design life cycles – 10,000,000 at max. rated load [200,000 at max rated load (Logic Reed)]

- d. 30.5 mm push buttons, selector switches and pilot lights shall have an operating range of -40 to 131°F (-40 to 55°C).
 - e. Illuminated devices shall offer universal LED that accepts 12 to 130 VAC/VDC voltage input.
 - f. 30.5 mm push buttons shall have a diaphragm seal for protection from liquids, particles and corrosive agents.
 - g. 30.5 mm selector switches shall incorporate a positive detent to prevent the switch from hanging up between positions.
2. Potentiometer Devices
- a. 30.5 mm potentiometer devices shall be Allen-Bradley heavy industrial Type 4/13 watertight/oiltight metal [Bulletin 800T].
 - b. Potentiometer devices shall be rated for 300 VAC/VDC, 2 W maximum (6 VDC minimum):
 - 1) Mechanical design life – Min. 25,000 cycles
 - 2) Rotational torque – 3 to 12 in-oz
 - 3) Stopping torque – Min. 12 in-lb
 - c. Potentiometer devices shall have single-turn operation, 312 degree rotation.
 - d. Potentiometer devices shall be finger-safe.
3. Control Stations
- a. Control stations shall provide Allen-Bradley heavy industrial 30.5 mm push button(s) or selector switch with appropriate contact action, button/lever type and color/legend marking. Devices shall be Type 4/13 watertight/oiltight metal [Bulletin 800T].
 - b. Control stations shall be constructed of die-cast aluminum
- L. Relays And Timers
1. Relays – Time Delay
- a. Allen-Bradley time delay relays [Bulletin 700-HT] shall mount on tube-type bases with pin-style socket mounting.
 - b. Time delay relays shall have 10A, B300, DPDT contact ratings and coil voltages as shown on drawings.
 - c. Time delay relays shall have adjustable timing ranges [or fixed timing ranges to avoid tampering]. Timing ranges shall be as shown on drawings.
2. Relays – General Purpose
- a. Allen-Bradley general purpose relays [Bulletin 700-HA] shall have tube-base/Octal 8-pin [or 11-pin] terminals and ON/OFF flag indicators.
 - b. General purpose relay contacts shall be silver nickel [or silver nickel bifurcated or gold-plated bifurcated] and have 10A, B300, DPDT [or 3PDT] ratings. Coil voltages shall be as shown on drawings.
 - c. General purpose relays shall have an electrical schematic on the faceplate, a clear cover for visual inspection and snap-in marker ability.
 - d. General purpose relays shall have LED status indicators, push-to-test and manual override.
3. Relays – Miniature

- a. Allen-Bradley miniature relays [Bulletin 700-HC] shall be square-base, 4-pole, plug-in type with blade-style terminals and ON/OFF flag indicators.
 - b. Miniature relay contacts shall be silver nickel [or gold-plated silver nickel] and have 7A [or 10A], DPDT [or 4PDT] ratings. Coil voltages shall be as shown on drawings.
 - c. Miniature relays shall have an electrical schematic on the faceplate and a clear cover for visual inspection.
 - d. Miniature relays shall have LED status indicators and push-to-test button with incorporated manual override lever.
4. Relays – Industrial-Type
- a. Allen-Bradley industrial-type relays [Bulletin 700-P] shall be ruggedly constructed (10 million operation mechanical life), 2-pole [or 4-pole, 8-pole, 12-pole], configured N.O./N.C. as shown on drawings, and panel- [or strip-, DIN rail-] mounted.
 - b. Industrial-type relays shall be finger-safe.
 - c. Industrial-type relay contacts shall be silver nickel with a double-break and bifurcated design and 10A, A600 rating for AC [5A, P600 rating for DC].
 - d. Accessories shall include adder decks, time delay, latching, surge suppressors and/or mounting strip.
5. Timers – Solid-State
- a. Allen-Bradley solid-state timers [Bulletin 700-FS] shall be DIN rail-mounted.
 - b. The solid-state timer contacts shall be available as SPDT or DPDT, 8A.
 - c. Solid-state timers shall be available with On-Delay, Off-Delay, On- and Off-Delay, One-Shot and Flasher operating modes as required on the drawings.
 - d. Solid-state timers shall have coil surge protection and adjustable timing ranges of 0.05 seconds to 60 hours as shown on drawings.
6. Timers – Programmable
- a. Allen-Bradley programmable timers [Bulletin 700-HX] shall be digital timing relays with LCD display and shall be socket- [or panel-] mounted.
 - b. Programmable timer contacts shall be SPDT, rated 5A, B300.
 - c. Programmable timer panel surface shall offer Type 4X/IP66 protection.
 - d. Programmable timers shall be configurable for Signal On-Delay, Power On-Delay, Off-Delay, Repeat Cycle, One-Shot and Cumulative operating modes as required on the drawings.
 - e. Programmable timers shall have timing ranges of 0.000 seconds to 9999 hours, depending on selected mode and as shown on drawings.
- M. Miniature Circuit Breakers
1. Miniature circuit breakers shall be Allen-Bradley Circuit Breakers [Bulletin 1489-M].
 2. Miniature circuit breakers shall be thermal-magnetic, current-limiting type, sized as specified on the drawings:
 - a. 0.5A to 63A current rating
 - b. 1-, 2- or 3-pole

- c. Type C or Type D tripping characteristic
3. Miniature circuit breakers shall be UL Listed (E197878), CSA Certified (259391), CE Marked, VDE and CCC Certified and RoHS Compliant. Standards compliances shall include:
 - a. UL 489
 - b. CSA C22.2, No. 5.1
 - c. EN 60947-2
 - d. GB 14048.2
4. Miniature circuit breakers shall be rated for:
 - a. Voltage – Max. 480Y/277 VAC (UL/CSA); U_e 230/400 VAC (IEC)
 - b. Interrupting capacity – 10 kA (UL/CSA); 15 kA (IEC)
5. Housing shall satisfy Insulation Group II/RAL 7035, shall have IP20 finger-safe design, shall be suitable for DIN rail mounting and shall include status indicator window and scratch- and solvent-resistant printing.
6. Miniature circuit breakers shall support reversible line and load connections and shall have dual terminals that:
 - a. Connect up to 4 wires, or 2 wires and a bus bar.
 - b. Clamp from both sides.
 - c. Have a unique design that directs wires into openings to prevent wiring misses.
7. Miniature circuit breakers shall be compatible with UL 508 Listed bus bars, auxiliary contacts, signal contacts, shunt trips and toggle-mount lockout attachments.

N. Terminal Blocks and Fuse Blocks

1. Terminal Blocks – Control, #22 to #8 AWG
 - a. Control terminal blocks shall be Allen-Bradley screw-type, feed-through [Bulletin 1492-J].
 - b. Control terminal blocks shall be certified:
 - 1) UR/CSA – #22 to #8 AWG wire range, 50A maximum current, 600 VAC/VDC voltage rating
 - 2) IEC – 6 mm² wire range, 41A maximum current, 800 VAC/VDC voltage rating
 - 3) ATEX – 6 mm² (#20 to #10 AWG) wire range, 36A maximum current, 550 VAC/VDC voltage rating
 - c. Control terminal blocks shall have a snap-in card marking system.
2. Terminal Blocks – Power
 - a. Power terminal blocks shall be Allen-Bradley [Bulletin 1492-PD]:
 - 1) Open-style power distribution block with aluminum or copper connectors – 3-pole [or 1-pole], rated at 600 VAC/VDC, 175 to 760A
 - b. Power terminal blocks shall be certified by UR, CSA and CE.
 - c. Wire ranges and tightening torques shall be labeled on the block.
 - d. Power terminal blocks shall have a write-on marking surface or marker retention feature.
3. Fuse Blocks

- a. Allen-Bradley fuse block kits [Bulletin 1491] shall be used for protection of transformers and control circuits capable of delivering no more than 200,000 RMS symmetrical amps, 600V maximum.
 - b. Fuse block kits shall be 1-pole, 2-pole or 3-pole.
 - c. Each pole shall have a fuse cover.
- O. Alarms and Signals
1. Alarm Horn
 - a. The alarm horn shall be an Allen-Bradley High Performance Electronic Horn [Bulletin 855H] and shall have up to 4 stages and low current consumption.
 - b. The alarm horn shall have a UV-stable plastic housing and non-moving parts.
 - c. The alarm horn shall have an on-board microphone, 45 alarm tones selectable by DIP switch and fine volume control via potentiometer.
 - d. The alarm horn shall allow synchronized output in multi-horn installations and shall have the ability to replicate content to other devices (master/slave).
 2. Alarm Beacon
 - a. The alarm beacon shall be an Allen-Bradley [Bulletin 855B] with high-intensity, minimum 5-Joule Xenon, minimum 20-Watt Halogen or LED illumination as required on the drawings.
 - b. The alarm beacon shall have polycarbonate housing and lens, available in square or round configuration, and Type 4/4X/13, IP65/IP66 ingress rating as required on the drawings.
 - c. Flashing frequency shall be 1 Hz.
 - d. Alarm beacon lens colors shall be red, green, amber, blue, yellow or clear as required on the drawings.
 3. Alarm Light Tower
 - a. The alarm light tower shall consist of Allen-Bradley Control Tower™ Stack Lights [Bulletin 854J or K], stacked 1 [or 2, 3, 4, 5] module(s) high and shall be surface- [or vertical-, quick-release-, pole-] mounted.
 - b. The alarm light tower shall be 40 mm [or 60 mm] size and the terminal block shall be top-mounted on the base.
 - c. The light modules shall be Type 4/4X/13, IP65 and are:
 - 1) LED (steady, flashing or strobe)
 - d. The alarm light tower shall include a continuous (or pulsing) piezo [or transducer] sound module.
 - e. The alarm light tower shall have a DeviceNet base.
 4. Signal Alarm (Panel Mount)
 - a. The signal alarm shall be an Allen-Bradley Panel Mount Signaling Alarm [Bulletin 855P] in a 30 mm [or 45 mm, 65 mm] size, that mounts in a standard 22.5 mm hole.
 - b. The signal alarm shall have polycarbonate base and lens.
 - c. The signal alarm shall be combination sounder and LED
 - d. The signal alarm shall be rear-securing and finger-safe.
- P. Power Supplies

1. Control Power Transformer
 - a. The control power transformer shall be an Allen-Bradley Global Control Transformer [Bulletin 1497], single-phase and sized as shown on drawings.
 - b. The control power transformer shall be epoxy encapsulated and shall offer EN 60-529 finger-safe protection.
 - c. The control transformer shall have a dual primary and secondary fuse block, pre-wired and top-mounted.
 2. 24 VDC Power Supplies
 - a. 24 VDC power supplies shall be Allen-Bradley [Bulletin 1606-XL] with active or passive PFC choke and input as shown in drawings [or auto-select input].
 - b. 24 VDC power supplies shall have low inrush current, and power supplies with greater than 100-Watt output shall incorporate a minimum 120% Power Burst design.
 - c. 24 VDC power supplies shall have NEC Class 2 “Limited Power” output.
 3. UPS
 - a. The UPS shall be an Allen-Bradley Industrial Uninterruptible Power Supply [Bulletin 1609-B/D] with 120 VAC input voltage and output power as shown on drawings.
 - b. The UPS shall be back-of-panel- [or DIN rail-] mounted.
 - c. The UPS shall provide:
 - 1) Surge protection to 380 Joules
 - 2) Overload protection, resulting in delayed shutdown at 110 to 130% and immediate shutdown at 130%
 - 3) Protection against output short online – over-current protection from premises branch circuit
 - 4) Protection against output short on battery, resulting in shutdown
 - 5) Thermal protection
 - d. The UPS shall have USB communications and software, integrated remote on/off and dry I/O contacts.
 - e. The UPS shall have EtherNet/IP communications, expandable battery capacity and/or pure sine wave output.
 - f. The UPS shall perform to 40°C [50°C, with hi-temp battery].
- Q. Disconnect/breakers shall be external flange mounted type, all metal construction with painted handle, lockable, similar to Allen Bradley Model 1494F-M1-412. Plastic switches, disconnects and breakers and twist types shall not be used.

1.45 SEMI-FINAL AND FINAL SITE VISITS FOR OBSERVATION

- A. As the project approaches completion, the Engineer and Architect, at their discretion shall determine a period of time in which they shall perform a Semi-Final Site Visit to observe the Mechanical and Electrical installation. At the conclusion of this Semi-Final Site Visit, a Semi-Final Punchlist shall be issued to the appropriate Contractor for the deficiencies in the work of his trade. Complete all work and perform all corrective measures as required by the Semi-Final Punchlist. After this corrective and completion work has been

accomplished, in writing, advise the Architect and the Engineer that every item on the Semi-Final Punchlist has been completed. After the Architect and Engineer make a Final Site Visit to observe the Mechanical and Electrical installation and make a Punchlist, a similar letter of Compliance shall be forwarded through the appropriate channels.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.01 INSTALLATION OF EQUIPMENT

- A. The Contractor shall be responsible for the installation of all equipment in accordance with the Manufacturer's Installation/Operation & Maintenance Manuals and instructions. If other requirements of this Specification contradict what is stated in the Manufacturer's instructions, the matter shall be brought to the attention of the Architect and Engineer for clarification. Any and all of the Manufacturer's requirements for utilities (electrical power and control wiring, piped water, drain, gas, fuel oil, steam, condensate, etc.), ducted supply or exhaust air, mounting and support shall be provided by the Contractor, regardless of how, or whether or not stated elsewhere in the Contract/Bid Documents.

END OF SECTION 01 31 46

SECTION 01 33 00 - SUBMITTALS

PART 1 - GENERAL

1.01 DEFINITIONS

- A. Deviation: Changes in products, materials, equipment and methods of construction from those required by the Contract Documents and proposed by the Contractor.

1.02 DEVIATIONS FROM REQUIREMENTS OF THE CONTRACT DOCUMENTS

- A. Deviations from the requirements of the Contract Documents will not be allowed unless a request for deviation is made in writing prior to or at the time of submission and the specific deviation is approved by the Owner or Architect. The submission of a deviation shall be done in a timely manner according to the schedule of submittals to allow the Architect sufficient time for review.

1.03 "OR EQUAL" TO BRAND NAME PRODUCTS

- A. Whenever a product is specified by brand name, a comparable brand, equal to that named, may be submitted for approval subject to:
 - 1. The contractor shall bear the burden of proving that the proposed product is equal to the specified product. The submission of an "or equal" shall be done in a timely manner to allow sufficient time to review the proposed product by the Architect.
 - 2. Whenever a color or pattern is indicated by a specific manufacturer's name or number, the intent is to communicate the required color or pattern of the material. Other manufacturers' comparable colors or patterns may be submitted for approval as equal.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Identify all submittals by project title and number. Include Contractor's name, date, and revision date. On shop drawings, product data and samples, also include the name of the supplier and subcontractor (if any), and applicable specification section number. Stamp each submittal and initial or sign the stamp to certify review and approval of submittal.
- B. Assemble submittals in accordance with the requirements in the individual sections of the Specifications and as required by this section. It is the Contractor's responsibility to review and verify that all information required for each submittal is included in the submittal package. Errors or omissions found by the Contractor are to be corrected prior to the

submission of the submittal package for approval. Incomplete submittal packages that have been submitted for review and approval will be returned.

1. It is the Contractor's responsibility to verify that portions of the submittal package to be provided by a subcontractor (or supplier) are complete, as well as portions of the submittal package being provided directly by the Contractor.
 2. Do not combine the submittals of more than one specification section with submittals required by other specification sections unless specifically stated in the contract specifications.
- C. If a submittal is based on, or the result of, a change order or field order to the Contract documents, include copies of the applicable change order or field order with the submittal.

1.05 COORDINATION DRAWINGS

- A. Provide coordination drawings showing scope of all work. Coordination drawings to indicate any conflicts between services or ceiling heights as indicated on Architectural Drawings or otherwise specified.

1.06 SHOP DRAWINGS

- A. Provide shop drawings in the format required by the specifications. Show the information, dimensions, connections and other details necessary to insure that the shop drawings accurately interpret the Contract Documents. Show adjoining construction in such detail as required indicating proper connections. Where adjoining connected construction requires shop drawings or product data, submit such information for approval at the same time so that connections can be accurately checked.
1. Submit 1 electronic copy of each shop drawing required by the Specifications.
- B. Have shop drawings prepared by a qualified detailer. Shop drawings shall be neatly drawn and clearly legible. Machine duplicated copies of Construction Drawings will not be accepted as shop drawings.
1. Where shop drawings are indicated to be drawn to scale:
 - a. Use scale normally found on an "Architect" scale.
 - b. Written Scale: Clearly label scales being used on each drawing and/or on each detail on the drawing.
 - 1) Examples: 1/8" = 1'-0"
 - c. Graphic Scale: Adjacent to each Written Scale, provide a graphic scale delineating the scale being used. Graphic scale shall be divided into measuring units relating to the accuracy required for the drawing or details.
 - d. Clearly dimension key elements of the drawing or detail.

2. When the drawing sheet is printed full size, the minimum text size shall be 1/8" (3.2 mm) and 3/32" (2.5 mm) for CADD drawings.
- C. The shop drawings will be reviewed and 1 stamped copy returned. If returned copy is stamped "DISAPPROVED" or "RETURNED FOR CORRECTION", promptly resubmit 1 copy of shop drawings meeting Contract requirements.
- D. Contractor is responsible for keeping one record set of all shop drawings on the job site, no matter the stamp.

1.07 PRODUCT DATA

- A. Provide product data in the format required by the specifications. Modify product data by deleting information that is not applicable to the project or by marking the product data to identify pertinent products. Supplement standard information, if necessary, to provide additional information applicable to project.
 1. Submit 1 electronic copy of product data as required by the Specifications.
- B. The product data will be reviewed and 1 stamped copy returned. If returned copy is stamped "DISAPPROVED" or "RETURNED FOR CORRECTION", promptly resubmit 1 electronic copy of product data meeting Contract requirements.
- C. Contractor is responsible for keeping one record set of product data on the job site, no matter the stamp.

1.08 QUALITY ASSURANCE

- A. Provide quality assurance information in the format required by the specifications, including supporting documentation as required.
 1. Submit 4 copies of quality assurance information as required by the Specifications.
- B. The quality assurance information will be reviewed and 3 stamped copies returned. If returned copies are stamped "DISAPPROVED" or "RETURNED FOR CORRECTION", promptly resubmit 6 copies of quality assurance information meeting Contract requirements.

1.09 SAMPLES

- A. Submit 2 (unless a different number is specified) of each sample required by the Specifications.
- B. One sample will become the property of the Owner when submitted and will not be incorporated in the Work unless specifically stated otherwise. One sample will be returned approved or rejected to the contractor.

1.10 REVIEW OF SUBMITTALS

- A. Items submitted for review will be reviewed for compliance with the contract documents, based upon the information submitted. The items will be acted upon with the following dispositions:
1. Approved (or No Exception Taken): Where the submittal is marked “Approved”, the work covered by the submittal may proceed provided it complies with the contract documents. Final acceptance will depend on that compliance.
 2. Approved as Noted (or Furnish as Noted): Where the submittal is marked “Approved as Noted”, the work covered by the submittal may proceed provided it complies with the review comments noted on the submittal and the contract documents. Final acceptance will depend on that compliance.
 3. Revise and Resubmit: Where the submittal is marked “Revise and Resubmit”, do not proceed with the work covered by the submittal, including purchasing, fabrication, delivery or other activity for the item submitted. Revise or prepare a new submittal according to the review comments noted on the submittal and meeting the contract documents.
 4. Disapproved (or Rejected): Where the submittal is marked “Disapproved”, do not proceed with the work covered by the submittal, including purchasing, fabrication, delivery or other activity for the item submitted. Prepare a new submittal according to the review comments noted on the submittal and meeting the contract documents.

1.11 SCHEDULES AND RECORDS

- A. Submit the following Schedules and Records information not later than 7 days after approval of the Contract unless an earlier submission is required to properly schedule or progress the Work.
1. SCHEDULE OF SUBMITTALS: On the Schedule of Submittals forms, indicate in the spaces following each item, the date the item will be submitted, the date approval is required, and the date delivery of the material or equipment is necessary for timely completion of the Work in accordance with the Project Schedule. The date entered for submittal of each item is the last day a deviation will be considered. Deliver the SCHEDULE OF SUBMITTALS to the Architect and Owner.
- B. Warrantees: Unless specified elsewhere contractor shall warrantee all work for (1) one year.

END OF SECTION 01 33 00

SECTION 01 73 29 - REMOVALS, CUTTING AND PATCHING

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

- A. Work under this section shall be governed by the Contract Documents. Provide materials, labor, equipment, and services necessary to furnish, deliver and install all work of this section as shown on the drawings, as specified herein, and/or as specified by job conditions.

1.02 DESCRIPTION OF WORK

- A. Provide materials, labor, equipment and services to complete cutting and patching as specified herein and as indicated on the Drawings.

1.03 RELATED WORK SHOWN ELSEWHERE

- A. Selective Removals and Demolition - Section 02 41 13

1.04 QUALITY ASSURANCES

- A. Codes and Regulations
 - 1. Work specified herein shall conform to all applicable State and Local codes and regulations having jurisdiction.

1.05 SUBMITTALS

- A. Product Literature
 - 1. Submit manufacturers' products literature, catalog cuts and data sheets for all products used in patching.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site, ready for use in the manufacturer's original and unopened containers and packaging, bearing labels as to type of material, brand name and manufacturer's name. Delivered materials shall be identical to approved samples.
- B. Store materials under cover in a dry and clean location, off the ground. Remove materials which are damaged or otherwise not suitable for installation from the job site and replace with acceptable materials.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Maintain a uniform temperature between 55- and 70-degrees F within the work area.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Match the appearance and performance of existing corresponding materials as closely as practicable, unless otherwise indicated.

PART 3 – EXECUTION

3.01 MANUFACTURERS

- A. Do not disturb any existing structure, piping, apparatus, or other construction unless required by the Contract.
- B. Cut and alter existing materials as required to perform the Work. Limit cutting to the smallest amount necessary. Core drill round holes and saw-cut other openings where possible.
- C. Remove existing construction as required to install and connect the Work to adjacent construction in an approved manner. Remove materials and equipment superseded by the Work unless specifically indicated otherwise.
- D. Provide temporary supports necessary to prevent settlement or other damage to existing construction which is to remain.
- E. Perform the cutting, drilling, and removals in a manner which will prevent damage to adjoining construction which is to remain.
- F. Prior to any cutting, drilling, or removal, investigate both sides of the surface involved.
- G. Determine the exact location of all structural members. Use ground penetrating radar (GPR) to detect structural members in slab. Do not cut, drill, or remove structural members such as joists, beams, or columns supporting construction that is to remain unless expressly required by the Work. If unforeseen obstructions are encountered, take all precautions necessary to prevent damage and obtain instructions from the FIT Representative before proceeding with the Work.
- H. If existing remaining items are within the damaged area, these items shall be removed and carefully stored until they can be reinstalled.
- I. Do not disturb or cut through existing conduits embedded in slab. Use GPR for location prior to cutting.

3.02 PATCHING

- A. Patch existing construction and finishes defaced, damaged, or left incomplete due to alterations and removals. Patching, except as otherwise indicated, shall be

- limited to the areas which have been cut or altered.
- B. Prepare existing surfaces properly to receive and, where required, bond with the Work.
 - C. Unless otherwise indicated, provide new materials to match the appearance and performance of existing corresponding materials as closely as practicable.
 - D. Paint patched areas and surfaces which will remain exposed by removals to match existing adjacent surfaces as closely as practicable using same type of paint. Painting, except as otherwise indicated, shall be limited to the areas which have been patched.

3.03 REINSTALLATION

- A. Where reinstallation of existing, remaining items removed during cutting is required, reinstall them to a condition equal to or better than their condition before removal.

END OF SECTION 01 73 29

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section includes requirements for Construction Waste Management (CWM), with criteria for recycling and/or salvaging demolition and construction waste generated during the project. A Construction Waste Management Plan shall be developed for approval by the Facilities Representative. The Plan shall be implemented throughout the duration of the project, and shall be documented in accordance with the SUBMITTALS Article below.
- B. Each contract shall supply the means for recycling job site waste. Locations for removal bins or dumpsters shall be coordinated with Facilities Representative. Following contract award, the Contractors may elect a single entity to act as the construction waste manager.

1.02 PERFORMANCE REQUIREMENTS

- A. The General Contractor shall prepare and submit a Construction Waste Management Plan (CWM) to the Facilities Representative for approval. The CWM Plan shall outline the provisions to be implemented to recycle and salvage demolition and construction waste generated during the project.
- B. Upon approval of the CWM Plan by the Facilities Representative, it shall be implemented throughout the duration of the project, and documented in accordance with the SUBMITTALS Article below.
- C. The Construction Waste Management Plan shall include, but not be limited to, the following components:
 - 1. Listing of Targeted Materials: Develop a list of the waste materials from the Project that will be targeted for reuse, salvage, or recycling. The following materials shall be accounted for (materials that will not be recycled shall be indicated as such):
 - a. Cardboard, paper, packaging.
 - b. Clean dimensional wood, palette wood.
 - c. Beverage containers.
 - d. Metals from banding, stud trim, ductwork, piping, rebar, windows, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - e. Gypsum board.
 - f. Paint.
 - g. Glass/Mirrors.
 - h. Plastics.

- i. Woods.
 - j. Tile
2. Information: Provide the name of the landfill(s) where trash will be disposed of and the applicable landfill tipping fee(s).
3. Sorting Method: Provide a description of the proposed means of sorting and transporting the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site for off-site sorting).
4. Packaging Waste: Provide an estimate of packaging materials generated, and note whether suppliers will eliminate or take back packaging.
5. Field Conditions: Include provisions in the Construction Waste Management Plan for addressing conditions in the field that do not adhere to the CWM Plan, including provisions to implement a stop work order, or to rectify non-compliant conditions.
6. Recycling facilities: Provide the name of the recycling facilities(s) where materials will be sent for recycling, how it will be recycled, and the applicable fee(s).
7. Additional Information: Include any additional information deemed relevant to describe the scope and intent of the CWM Plan to the Facilities Representative.
8. Re-Used materials/Equipment: Materials or equipment to be removed from the site or turned over to the College which are classified as recycled materials shall be documented. Documentation shall include the materials turned over, weight or quantity of materials/equipment and a letter on company letterhead indicating the intended use of items.
9. Subcontractor Requirements: Construction Waste Management and recycling requirements shall be incorporated into all Subcontractor's contracts.

1.03 SUBMITTALS

- A. Submittal Requirements:
 1. A copy of the Construction Waste Management Plan, as defined in the PERFORMANCE REQUIREMENTS Article above.
 2. In conjunction with payment applications, contractors shall submit a monthly Waste Management submission. This submission shall include waste receipts for the payment period and a completed Waste Management Form for the same payment period.
 3. Calculations and supporting documentation to demonstrate end-of-project recycling rates meeting the requirements of the Construction Waste Management Plan. The process for recording and assembling documentation shall be as follows:

- a. Record and document the total weight (in tons) of all demolition and construction waste materials sent to the landfill. Monthly Waste Management Reporting Forms (sample included at the end of this Section identified as Exhibit “A”) shall be used as the basis for determining the total amount of waste landfilled for the project. The monthly reporting forms shall specify:

- 1) The number of dumpsters or other containers sent to the landfill for that month.
- 2) The volume (in cubic yards) of each dumpster or container sent to the landfill for that month.
- 3) The type of waste contained in each dumpster or container.
- 4) The weight of the waste in each dumpster or container. If the weight of the waste is not directly measured for each dumpster or container, the following Solid Waste Conversion Factors shall be used to convert the volume of waste to weight:

Solid Weight Conversion Factors	
Mixed Waste	350 lbs/cubic yard
Wood	300 lbs/cubic yard
Cardboard	100 lbs/cubic yard
Gypsum Board	500 lbs/cubic yard
Rubble	1,400 lbs/cubic yard
Steel	1,000 lbs/cubic yard

- 5) Identification of the landfill. In addition, provide the name of the landfill that will be accepting the materials. Receipts or other proof of facility reception of materials is required.

- b. Record and document the total weight (in tons) of all demolition and construction waste materials recycled or salvaged. Monthly Waste Management Reporting Forms shall be used as the basis for determining the total amount of waste recycled or salvaged for the project. The monthly reporting forms shall specify:

- 1) The number of dumpsters or other containers of recycled or salvaged materials for that month.
- 2) The volume (in cubic yards) of each dumpster or container of recycled or salvaged materials for that month.
- 3) The type of recycled or salvaged material contained in each dumpster or container.
- 4) The weight of the recycled or salvaged material in each dumpster or container. If the weight of the material is not directly measured for each dumpster

or container, the Solid Waste Conversion Factors listed for landfill waste above shall be used, where applicable, to convert the volume of material to weight. For materials not contained in the Solid Waste Conversion Factors above propose a conversion factor for review by the Director's Representative.

- 5) In addition, provide the name of the receiving facilities/companies that will be purchasing or accepting the recycled or salvaged materials. Receipts or other proof of facility reception of materials is required.
 - 6) For materials separated for recycling off-site, establish a method for tracking the weight of the recycled material. The method shall be included in the CWM Plan for the Director's Representative review and approval.
- c. Calculate the end-of-project recycling rate percentage by dividing the recycled and salvaged waste (in tons) by the total waste generated (recycled, salvaged, and landfilled waste – also in tons), and multiplying by 100.
 - d. For materials turned over to others for reuse, provide documentation on company letterhead indicating the material(s), the quantity (either by weight or units), the date and the intended reuse of the product.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 IMPLEMENTATION

- A. The General Contractor shall be responsible for the provision of containers and the removal of all waste, non-returned surplus materials, and rubbish from the site in accordance with the Waste Management Plan. The General Contractor shall oversee and document the results of the Plan. The Sub-Contractors shall be responsible for collecting, sorting, and depositing in designated areas, their waste, non-returned surplus materials, and rubbish, as per the Waste Management Plan.
- B. Instruction. The General Contractor shall provide on-site instruction of appropriate separation, handling and recycling, salvage, reuse and return methods to be used by all parties in appropriate stages of the Project.
- C. Separation Facilities: The General Contractor shall lay out a specific area(s) to facilitate separation of materials for potential recycling, salvage, reuse and return. Each potential material shall be collected and stored to

avoid being mixed with other materials. Recycling and waste bin areas are to be kept neat and clean, and clearly marked.

3.02 MEETINGS

- A. Conduct Construction Waste Management meetings. Meetings shall include Subcontractors affected by the CWM Plan. At a minimum, waste management goals and issues shall be discussed at the following meetings:
 - 1. Pre-bid meeting.
 - 2. Pre-construction meeting.
 - 3. Regular job-site meetings.

3.03 MONTHLY WASTE MANAGEMENT REPORTING FORMS

- A. Monthly Waste Management Reporting Forms, as required in the SUBMITTALS Article above, shall be submitted to the Facilities Representative and Architect for review throughout the duration of the project.

END OF SECTION 01 74 19

SECTION 01 81 19.11 - CONSTRUCTION IAQ MANAGEMENT

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Sections is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.

1.02 DESCRIPTION OF WORK

- A. The work includes the providing of all labor, materials, equipment, accessories, services and tests necessary to adopt an IAQ management plan to protect the HVAC system and completed areas of construction during construction, control pollutant sources and interrupt contamination pathways. The IAQ management plans shall meet or exceed the recommended design approaches contained in Chapter 3 of the SMACNA IAQ Guideline for Occupied Buildings Under Construction, 1995. Each contractor shall sequence the installation of materials to avoid contamination of absorptive materials such as insulation, carpeting, ceiling tile and gypsum wall board during construction.

1.03 QUALITY ASSURANCE

- A. Construction related IAQ procedures and issues shall be presented by each contractor at every construction progress meeting. Each contractor shall report on the implementation of their IAQ plan. Issues related to coordination with other contractors should be addressed. Each contractor shall report to the Construction Manager who will function as the IAQ Manager for the project. As the IAQ Manager, the Construction Manager will identify IAQ problems and direct the responsible contractor as to required mitigation.
- B. Each contractor shall provide a minimum of 18 photographs, 6 photographs taken on 3 different occasions during construction: the beginning, the midpoint, and the end. The contractor shall identify each SMACNA approach, as described herein, featured by each photograph.

1.04 SUBMITTALS

- A. Refer to Section - Special Requirements for Mechanical and Electrical Work and submit shop drawings.
- B. Submit all declarations & photographs as required under “Quality Assurance” above.
- C. Before the start of construction, submit a narrative of the proposed IAQ plan to be implemented. This shall include the specific procedures which shall be used to implement

each of the five design approaches of the SMACNA IAQ Guideline for Occupied Buildings Under Construction 1995, Chapter 3; HVAC Protection, Source Control, Pathway Interruption, Housekeeping and Scheduling. The HVAC Contractor shall include catalog cuts of filters to be utilized and a description of the Building Flush-Out procedure to be implemented.

1.05 COORDINATION

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

PART 2 - NOT USED

PART 3 - EXECUTION

3.01 CONSTRUCTION IAQ MANAGEMENT PLAN: DURING CONSTRUCTION

- A. Requirements
 - 1. Each contractor shall develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building as follows:
 - a. During construction meet or exceed the recommended Design Approaches of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings under Construction, 1995, Chapter 3.
 - b. Protect stored on-site or installed absorptive materials from moisture damage.
 - c. When air handlers are used during construction, the HVAC Contractor shall provide filtration media with a minimum efficiency reporting value (MERV) of 8 at each return air grill. MERV shall be as determined by ASHRAE 52.2-1999.
 - d. The HVAC Contractor shall replace all air handler filtration media immediately prior to occupancy. Filtration media shall have a Minimum Efficiency Report Value (MERV) of 13, as determined by ASHRAE 52.2-1999 for media installed at the end of construction.
- B. The Plan shall address the protection of the ventilation system components during construction and cleanup of contaminated components after construction is complete. Required temporary ventilation and operation of the air handlers during construction shall be provided as required in the General Conditions of the construction contract.

Construction-related IAQ procedures should be included in the pre-construction and construction progress meeting agendas. The Construction Manager shall make efforts to ensure that all participants in the construction process are aware of the IAQ procedures and understand the importance of the goals of the IAQ Management Plan.

The referenced SMACNA standard recommends control measures in five areas: HVAC protection, source control, pathway interruption, housekeeping and scheduling. Review the applicability of each control measure and include those that apply in the final IAQ Management Plan.

- C. HVAC Protection - Shut down the return side of the HVAC system (which is, by definition, ductwork under negative pressure) whenever possible during heavy construction or demolition. The return side should also be isolated from the surrounding environment whenever possible. For example, all ceiling tiles for the ceiling plenum should be in place and all leaks in ducts and air handlers should be repaired promptly. When the ventilation system is operated during construction, it should be fitted with temporary filters that can be replaced with clean media just prior to substantial completion and occupancy.

The HVAC Contractor should insure that return side of the HVAC system is capped/dampered off in the heaviest work areas and return system openings shall be sealed with plastic. In addition to protection of the HVAC system, filter efficiency shall be upgraded where major loading is expected to occur on operating HVAC systems.

- D. Source Control - Use nontoxic materials such as paints, caulks, sealants, and cleaning products.
- E. Pathway Interruption - During construction, isolate areas of work to prevent contamination of clean or occupied spaces. Depending on the climate, ventilate using 100% outside air to exhaust contaminated air directly to the outside during installation of VOC emitting materials. Pressure differentials shall be utilized to prevent contaminated air from entering clean areas. Erect barriers between work areas and non-work areas.
- F. Housekeeping - Institute cleaning activities concentrating on HVAC and building spaces to remove contaminants from the building prior to occupancy. Building materials shall be protected from weather and stored in a clean area prior to unpacking for installation. All coils, air filters, and fans shall be cleaned before performing testing and balancing procedures and especially before conducting baseline air quality tests.
- G. Scheduling - Use construction sequencing that reduces absorption of VOCs by materials that act as sinks or contaminant sources. Complete applications of wet and odorous materials such as paints, sealants, and coatings before installing "sink" materials such as ceiling tiles, carpets, insulation, gypsum products, and fabric-covered furnishings. Materials directly exposed to moisture through precipitation, plumbing leaks, or condensation from the HVAC system are susceptible to microbial contamination.

END OF SECTION 01 81 19.11

SECTION 01 91 13 - COMMISSIONING-GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The purpose of the commissioning process is to provide the Owner/Operator of the facility with a high level of assurance that the mechanical and electrical systems have been installed in the prescribed manner and operate within the performance guidelines set in the design intent. The Commissioning Authority shall provide the Owner with an unbiased objective view of the system=s installation, operation, and performance. This process is not to take away or reduce the responsibility of the design professionals or installing contractors to provide a finished product. Commissioning is intended to enhance the quality of system start-up and aid in the orderly transfer of systems to beneficial use by the owner. The Commissioning Authority will be a member of the construction team, cooperating and coordinating all commissioning activities with the design professionals, construction manager, contractors, subcontractors, manufacturers and equipment suppliers.

1.02 SCOPE

- A. The functions and responsibility of the Commissioning Authority shall include:
1. Responsibility: The primary point of responsibility is to inform the Owner on the status, integration, and performance of systems to be commissioned within the facility.
 2. Information: The Commissioning Authority shall function as a catalyst and initiator to disseminate information and assist the design and construction teams in the completion of the construction process for the commissioned scope of work. This shall include system completeness, performance, and adequacy to meet the intended performance standards of each system. Services include construction observation, spot testing, supervision of verification and functional performance testing, and providing performance and operating information to the responsible parties, e.g., contractors, design professionals, and the Owner.
 3. Quality Assurance: Assist the responsible parties to maintain a high-quality level of installation and system performance.
 4. Observation of tests: Commissioning Authority shall observe, coordinate, and supervise testing as required to ensure system performance meets the design intent parameters.
 5. Documentation of tests: Commissioning Authority shall document the results of the performance testing directly and/or ensure that all testing is documented by the appropriate technicians. The Commissioning Authority shall provide standard forms to be used by all parties for consistency of approach and type of information to be recorded.
 6. Resolution of disputes: The Commissioning Authority is to remain an independent party present on the project with specific knowledge of the project. Should disputes

arise, the Commissioning Authority shall perform research to determine the scope and extent of the problem and educate the involved parties as to the nature and extent of the problem. This shall include technical and financial aspects of the dispute, including assistance to help identify who the responsible parties are to implement corrective action. The Owner/Architect shall preside over resolution of the problem.

7. Deficiencies: Provision of technical expertise to oversee and verify the correction of deficiencies found during the commissioning process.
 8. Acceptance: The Commissioning Authority shall determine and advise the Owner of the date of acceptance for each component and system for start of the warranty period.
 9. Provision of technical expertise to review and edit operating and maintenance descriptions by system.
- B. The Commissioning Agency is referred to as an independent contractor in this Division and shall work under a separate contract directly for the Owner.
- C. The Commissioning Agency shall not be financially, associated with any of the contractors on this project to avoid potential conflicts of interest.

1.03 SYSTEMS TO BE INCLUDED IN COMMISSIONING PROCESS

The following pieces of equipment and systems shall be subject to commissioning:

- A. HVAC
1. VFD
 2. Fans
 3. Piping System
 4. Ductwork System
 5. TAB
 6. Controls
 7. Split AC system
- B. Electrical
1. Lighting Controls

1.04 COORDINATION

- A. The Commissioning Authority shall receive directly from the design professional(s) and DDC a copy of all the construction documents, addenda, change orders, and appropriate approved submittals and shop drawings of all the equipment or system to be commissioned.
- B. The Commissioning Authority shall disseminate written information and documents to all responsible parties relative to the nature and extent of the communication.

- C. The Commissioning Authority is primarily responsible to the Owner, and as such, shall regularly apprise the Owner of progress, pending problems and/or disputes, and shall provide regular status reports on progress with each system to be commissioned. Any potential change in the contractual and/or financial obligations of the Owner (credits, change orders, schedule change, etc.) shall be identified and quantified as soon as possible.
- D. The Commissioning Authority shall coordinate the schedule of commissioning activities with the construction schedule. It is possible that some procedures will be implemented before the entire system is completed.

1.05 SCHEDULE

- A. Commissioning of systems shall proceed per the criteria established in the specific sections that follow, with activities to be performed on a timely basis. The Commissioning Authority shall be available to respond promptly to avoid construction delays.
- B. Start-up and testing of systems may proceed prior to final completion of systems to expedite progress. However, the Commissioning Authority shall not supervise standard, regular testing and checkout services that are the primary responsibility of the contractor/vendor in advance of their commissioning testing and checkout.
- C. Problems observed shall be addressed immediately, responsible parties notified, and actions to correct deficiencies coordinated in a timely manner.
- D. Contractor schedules and scheduling is the responsibility of the CM. The Commissioning Authority shall provide commissioning scheduling information to the CM for review and planning activities.

1.06 RELATED WORK SPECIFIED ELSEWHERE

- A. Commissioning requires support from the Contractors. The commissioning process does not relieve any Contractors from their obligations to complete all portions of work in a satisfactory and timely manner.
- B. Refer to Section 23 08 00 of Division 23 regarding roles and responsibilities relative to the commissioning process.

PART 2 - PRODUCTS

2.01 TEST EQUIPMENT

- A. All industry standard test equipment required for performing the specified tests shall be available at the project site. Any proprietary vendor specific test equipment shall be provided by that vendor or manufacturer.

- B. Any portable or hand-held setup / calibration devices required to initialize the control system shall be made available by the control vendor (at no cost) to the Commissioning Authority.
- C. The instrumentation shall meet the following standards:
 - 1. Be of sufficient quality and accuracy to test and/or measure system performance within the tolerances required.
 - 2. Be calibrated at the manufacturer's recommended intervals with calibration tags permanently affixed to the instrument.
 - 3. Be maintained in good repair and operating condition throughout the duration of use on this project.
 - 4. Be immediately re-calibrated or repaired if dropped and/or damaged in any way during use on this project.

PART 3 - EXECUTION

3.01 COMMISSIONING PLAN AND SCHEDULE

- A. The Commissioning Authority shall develop and submit a schedule for the commissioning process which shall be integrated with the construction schedule. Included shall be the required work by all team members (Commissioning Authority, design team, contractors, and the Owner). Overlay with the construction schedule, and include time for test and balance, verification, and functional performance testing.

3.02 CONSTRUCTION OBSERVATION

- A. This is an additional and separate activity from that provided by the design team. Construction observation is required as part of the commissioning and coordination process to be provided by the Commissioning Authority.

3.03 TEST AND BALANCE

- A. Air balance shall be accomplished by an independent test and balance firm. The Commissioning Authority shall spot check this work to verify accuracy of results.

3.04 VERIFICATION AND FUNCTIONAL PERFORMANCE TEST PROCEDURES AND ACCEPTANCE PROCEDURES

- A. Personnel experienced in the technical aspects of each system to be commissioned shall implement and document the commissioning procedure to be used outlined in the Checklists. Verification checklist and functional performance checklist shall be provided for each system and shall be reviewed by the appropriate design engineers for technical depth, clarity of documentation and completeness. Special emphasis shall be placed on testing procedures that shall conclusively determine actual system performance and compliance with the design intent.

- B. The Commissioning Authority shall determine the acceptance procedures for each commissioned system within Division 23 discipline. The acceptance procedures shall incorporate the commissioning standards and successful testing results as referred to throughout Division 23 specifications. >
- C. The appropriate contractor and vendor(s) shall be informed of what test are to be performed and the expected results. Whereas some test results and interpretations may not become evident until the actual test are performed, all parties shall have a reasonable understanding of the requirements.
- D. Acceptance procedures shall confirm the performance of systems to the extent of the design intent. When a system is accepted, the Owner shall be assured that the system is complete, works as intended, is correctly documented, and operator training has been performed.

3.05 SOFTWARE DOCUMENTATION REVIEW

- A. Review detailed software documentation for all DDC control systems related to the commissioned equipment and systems. This includes review of vendor documentation, their programming approach, and the specific software routines applied to this project. Discrepancies in programming approaches and/or sequences shall be reported and coordinated in order to provide the Owner with the most appropriate, simple, and straightforward approach to software routines.

3.06 OPERATING AND MAINTENANCE (O&M) MANUALS

- A. The Commissioning Authority shall review the draft form of the O&M manuals related to the commissioned equipment and system and provided by the Division 23 Contractor. The review process shall verify that O&M instructions meet specifications and are included for all equipment furnished by the contractor, and that the instructions and wiring diagrams are specific (edited where necessary) to the actual equipment provided for this project. Published literature shall be specifically tailored to the provided equipment, indicating required operation and maintenance procedures, parts lists, assembly/disassembly, diagrams emergency telephone numbers, and related information. The Contractor shall incorporate the standard technical literature into system specific formats for this facility as designed and as actually installed. The resulting O&M Information shall be system specific, concise, to the point, and tailored specifically to this facility. The Commissioning Authority shall review and edit these documents as necessary for final corrections by the contractor.
- B. The O&M manual review, and coordination efforts shall be completed prior to Owner training sessions, as these documents are to be utilized in the training sessions.

3.07 TRAINING

Schedule and coordinate training sessions for the Owner=s staff for each system to be commissioned. Training shall be in a classroom setting with the appropriate schematics, handouts, and visual/audio training aids on-site with equipment.

- A. The Commissioning Authority organizes, schedules, and directs the training sessions.
- B. The appropriate installing contractors shall provide training on all the major systems per specifications, including aspects, peculiarities specific to this project.
- C. The equipment vendors shall provide training on the specifics of each major equipment item subject to commissioning including philosophy, troubleshooting, and repair techniques.
- D. The automatic control vendor shall provide training on the control system per their specification section.

3.08 RECORD DRAWINGS

- A. The Commissioning Authority shall review the as-built contract documents to verify incorporation of both design changes and as-built construction details. Discrepancies noted shall be corrected by the appropriate party.

3.09 EXCLUSIONS

- A. Responsibility for construction means and methods: The Commissioning Authority is not responsible for construction means, methods, job safety, or any construction management functions on the job site.
- B. Hands-on work by the Commissioning Authority: The contractors shall provide all services requiring tools or the use of tools to start-up, test, adjust, or otherwise bring equipment and systems into, a fully operational state. The Commissioning Authority shall coordinate and observe these procedures (and may make minor adjustments) but shall not perform construction or technician services other than verification of testing, adjusting, balancing, and control functions.

END OF SECTION 01 91 13

Table I - Summary of Universal Waste & Miscellaneous Hazardous Materials Coed Residence Hall - Admissions Office Relocation Department of Residential Life Office Fashion Institute of Technology 227W 27th Street, New York, NY			
Description of Material	Location	Total Quantity	Unit

Legend

- ECB: Electrical circuit board
- FLB: Fluorescent light bulb
- LED: Light emitting diode
- NiCad: Nickel cadmium
- TBD: To be determined

B. Submittals

1. Before Start of Work: Submit the following to the Owner's Representative for review. Work shall not commence until these submittals are returned with approval from the Owner's Representative.
 - a. Copy of State or local license for hazardous waste hauler;
 - b. Certification of at least one on-site supervisor which has satisfactorily completed the OSHA 40 Hour Health and Safety Course for Handling Hazardous Materials
 - c. Certificates of workers which have successfully completed at least the OSHA 40-Hour Health and Safety Course for Hazardous Materials;
 - d. Certificates of workers which have successfully completed the required employee training for universal waste or appropriate type of training to the type of wastes being managed;
 - e. Schedule of start and finish times and dates for this work;
 - f. Name and address of the universal waste handler or a destination facility where the waste materials is to be treated, deposited or recycled in accordance with all regulatory requirements (include contact person and telephone numbers), if the universal waste meets the definition of hazardous waste, the name and address of the hazardous waste treatment, storage and disposal (TSD) facility;
 - g. Material Safety Data Sheets for all materials requiring removal;

- h. If Contractor introduces any chemical into the work environment, a MSDS for that chemical is required before use;
- i. Contingency Plan for handling emergency spills or leaks;
- j. Provide a copy of the NYS DEC Part 364 Waste Transporter permit for Universal Waste Transporters that transport more than 500 pounds of universal waste in a single shipment since they must be a permitted hazardous waste transporter.
- k. Large Quantity Handlers of universal waste must provide documentation of notification to the EPA and/or the appropriate local government agency in advance of its intentions to transport the waste and receive from the facility or provide an EPA identification number prior to exceeding 5,000 kilograms of waste on-site, and

C. Removals

- 1. Contractor to remove and turn over to FIT the following equipment **NOT** for disposal-
 - a. LED Lighting
 - b. Fire Extinguishers
- 2. Contractor to reclaim and recycle refrigerant gas (type and quantity unknown) associated with equipment to be removed and disposed of, to include:
 - a. Water fountain
 - b. AC Unit
- 3. Contractor to notify FIT of any WIFI router and/or security cameras present prior to demolition. It will be the responsibility of the College to remove.

D. Definitions

- 1. Large Quantity Handler (LQH) of Universal Waste shall be a waste handler who accumulates 5,000 kilograms or more of universal waste (batteries, pesticides, thermostats, or lamps, calculated collectively) at any time. This designation as a large quantity handler of universal waste is retained through the end of the calendar year in which 5,000 kilograms (11,000 pounds) or more total of universal waste is accumulated. The LQH shall notify the EPA, acquire or co-ordinate with a facility regarding an EPA identification number, and provide records for each shipment. The LQH shall ensure all employees are thoroughly familiar with proper waste handling and emergency procedures, relative to their responsibilities during normal facility operations and emergencies.
- 2. Small Quantity Handler of Universal Waste (SQH) shall be a waste handler who does not accumulate 5,000 kilograms (11,000 pounds) or more of total universal waste (batteries, pesticides, thermostats, or lamps, calculated collectively) at any time.
- 3. Destination Facility shall be a facility that legitimately and can legally accept universal waste from offsite so that the universal waste can be treated, disposed, or recycled in accordance with the regulatory requirements.
- 4. Universal Waste Transporter shall be anyone who transports universal waste. In New York, universal waste transporters that transport greater than 500 pounds of universal waste in a single shipment must be a permitted hazardous waste transporter pursuant to

- Federal and State regulations. Proper notification with the receiving handler agreeing to receive the shipment is required by the Universal Waste Transporter.
5. Employee training shall ensure that all employees are thoroughly familiar with proper waste handling and emergency procedures, relative to their responsibilities during normal operations and emergencies and to the type of waste they are handling.
 6. Universal Waste Regulations – Universal Waste Rule - 40 CFR Part 273, New York State – Standards for Universal Wastes 6 NYCRR Subpart 374-3.

1.02 PRODUCTS

A. Materials

1. Polyethylene Sheet: A single polyethylene film in the largest sheet size possible to minimize seams, 6.0 mil thick, clear, frosted, or black.
2. Duct Tape: Provide duct tape in 3" widths, with an adhesive which is formulated to stick aggressively to sheet polyethylene.
3. Spray Cement: Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.
4. Disposal Bags: Provide 6 mil thick leak-tight polyethylene bags.
5. Labels: As required by the EPA and OSHA for handling, transportation, and disposal of hazardous waste.
6. Drums: Recovery or salvage drums acceptable for disposal of hazardous waste. Prior approval of drums is required. Drums or containers must meet the required OSHA EPA (40 CFR Parts 264.265 and 300), and DOT regulations (49 CFR Parts 171-178). Use of damaged drums will not be allowed.

1.03 EXECUTION

A. Universal Waste

1. Once the properly labeled containers holding the universal waste have been filled and sealed, they shall be stored in designated accumulation areas as approved by the Owners Representative. The Contractor shall not store waste in transportation vehicles, or store waste onsite for more than one year from when the waste has been generated.
2. Documentation when a universal waste in storage was first accumulated shall be provided. This is to be done by dating and labeling the waste with the date of the earliest accumulation that can document the length of time the universal waste has been accumulated.
3. Maintenance of an inventory system on-site that identifies the earliest date that any universal waste in a group of universal waste items or a group of containers of universal waste became a waste was received.
4. Any waste developed from the work that exhibits one or more characteristics of hazardous waste must be handled accordingly and not as a universal waste.

- B. Off-Site Shipment of Universal Waste
1. Off-Site shipments shall meet the requirements for offsite shipments, as such, the Contractor is prohibited from sending or taking universal waste to a place other than a designated universal waste handler or a universal waste destination facility.
 2. LQH's of universal waste must notify EPA in writing and develop an EPA identification number or co-ordinate with the facility regarding use of their EPA identification number, prior to exceeding 5,000 kilograms of universal waste onsite.
 3. SQH's do not need to notify EPA, receive and EPA identification number or keep records of shipments of universal waste.
 4. LQH's must keep a record of all universal waste shipments received or sent offsite, and must retain those records for at least three years from the date of receipt or shipment. Records may include invoices, manifests, logs, bills or lading, or other shipping documents.
- C. Storage Of Hazardous Waste (if required)
1. Once the properly labeled containers holding the hazardous waste have been filled and sealed, they shall be stored in designated areas as approved by the Owners Representative. The Contractor shall not be allowed to store the hazardous waste for more than the storage limitations relating to quantities stored and the length of time the material may be stored.
 2. Documentation when a hazardous waste in storage was first stored shall be provided. This is to be done by dating and labeling the waste with the date of the earliest accumulation that can document the length of time the hazardous waste has been accumulated.
 3. Maintenance of an inventory system on-site that identifies the earliest date that any hazardous waste was placed into proper storage.
- D. Off-Site Shipment of Hazardous Waste
1. Off site shipments shall meet the requirements for offsite shipments and the Contractor is prohibited from sending or taking hazardous waste to a place other than an authorized treatment, storage and disposal (TSD) facility.
 2. An EPA identification shall be developed or provided by the facility.
 3. A copy of the transporter's Part 364 Permit shall be provided to the Owner's Representative and the facility representative.
 4. A copy of all waste manifests and any test results or waste analysis utilized for the off-site transportation and disposal shall be submitted to FIT.

E. Records

1. For all Universal Waste and Miscellaneous Hazardous Materials removed under this project, the Contractor shall provide a copy of the following documentation to the owner within 60 days of removing waste from campus:
 - i. Hazardous Waste Manifest for all Hazardous Waste removed, to include any and all associated weight tickets that clearly identify the quantity of material disposed. These documents shall be signed or stamped by the receiving facility as applicable.
 - ii. Bill or Lading for Universal Waste or Miscellaneous Hazardous Materials removed, to include any and all associated weight tickets that clearly identify the quantity of material disposed. These documents must be signed or stamped by the receiving facility as applicable.

END OF SECTION 02 08 30

SECTION 02 41 13 - SELECTIVE REMOVALS AND DEMOLITION

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Construction Waste Management - Section 01 74 19
- B. Cutting and Patching - Section 01 73 29
- C. Removal of Universal Waste and Miscellaneous Hazardous Materials – Section 02 08 30

1.02 SUMMARY

- A. Perform all demolition in accordance with the Contract Documents. The Work of this Section shall include but not be limited to the following:
 - 1. Removal of selected items to accommodate new construction
 - 2. Removal of interior finishes and other items, to accommodate new construction.
 - 3. Protect existing items to remain.
 - 4. The maintenance of the College's operations during selective demolition operations.
 - 5. Protection of the cables and utilities serving other buildings and other areas at the College Campus during the demolition and construction activities. The above services shall be maintained in operation without any interruption at all times unless otherwise scheduled and authorized by the Campus.

1.03 DEFINITIONS

- A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the College's property.
- B. Remove and Salvage: Items indicated to be removed and salvaged remain the College's property. Remove, clean, and pack or crate items to protect against damage. Identify contents of containers and deliver to the College's designated storage area.
- C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.
- D. Existing to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Architect, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.

1.04 SUBMITTALS

- A. Proposed schedule of operations including coordination for shutoff, capping, and continuation of utility services as required.
 - 1. Provide a detailed sequence of selective demolition and removal work to ensure uninterrupted progress of the College's on-site operations.
 - 2. Coordinate with the College's continuing occupation of certain portions of the existing building.
 - 3. Include proposed methods for dust and noise control measures.
 - 4. Contractor to submit intermediate life safety plan demonstrating how required government regulations will be maintained for occupied portions of the building.
 - 5. Provide a sequence of moving people from the elevator (occupied building above) to safe, approved exiting without going through the construction site.
 - 6. Two points of unobstructed egress must be available to building occupants throughout the duration of the contract.

1.05 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed selective demolition Work similar to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before starting selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction. Fluorescent tubes shall be considered hazardous waste and shall be disposed of according to the regulations of the New York State EPA.
 - 1. All demolition work shall comply with requirements of the College's operational requirements and authorities having jurisdiction.
 - a. Coordinate with the College's engineering department.
- C. Contractor shall verify all conditions at site prior to the start of Work.
- D. Notify appropriate agencies of any hazardous materials unearthed at the site. Do not proceed with removal of said substances until so instructed.

1.06 JOB CONDITIONS

- A. Condition of Structures: The College assumes no responsibility for actual condition of structures to be demolished.
 - 1. Conditions existing at time of inspection for bidding purpose will be maintained by the College insofar as practicable.
- B. Explosives: Use of explosives will not be permitted. Explosives will not be permitted for any Work of the project.

- C. Traffic: Conduct selective demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct exiting pathways, streets, walks, or other occupied or used facilities without permission from the College and authorities having jurisdiction. Provide alternate routes around closed or obstructed pedestrian and vehicular traffic ways as required by governing authorities or regulations.
- D. Protections: Ensure safe passage of persons around area of demolition. Conduct operations to prevent damage to adjacent buildings, structures, and other facilities and injury to persons.
 - 1. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structures to be demolished and adjacent facilities to remain.
- E. Damages: Promptly repair damages caused to adjacent areas and facilities by demolition operations.
- F. Flame Cutting: Do not use cutting torches for removal of material to be salvaged. Do not use cutting torches for demolition or removal until work area is cleared of flammable materials. Maintain portable fire suppression devices during flame-cutting operations.
- G. Utility Services: Maintain existing utilities indicated to stay in service and protect against damage during demolition operations.
 - 1. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities and/or the College.
- H. Utility Services: Do not start demolition work until utility disconnections have been completed and verified in writing.
- I. Environmental Controls: Use temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.
 - 1. Do not use water when it may create hazardous or objectionable conditions such as damage to finishes, flooding, and pollution.

1.07 SCHEDULING

- A. Arrange selective demolition schedule so as not to interfere with the College's on-site operations.

PART 2 - PRODUCTS

2.01 REPAIR MATERIALS

- A. Use repair materials identical to existing materials.
 - 1. Where identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 2. Use materials whose installed performance equals or surpasses that of existing materials.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. General: Prior to commencement of selective demolition operations, verify that existing utilities have been located, identified, disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Architect.
- E. Survey the condition of the building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during selective demolition. Design for shoring and bracing shall be prepared by an engineer licensed in the State of New York.
- F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.02 UTILITY SERVICES

- A. Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by the Architect and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to the Architect and to governing authorities.
 - a. Provide not less than 72 hours notice to the College if shutdown of service is required during changeover.
- B. Utility Requirements: Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.03 PREPARATION

- A. General: Provide shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.
 - 1. Cease operations and notify College Safety Officer immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations. Maintain interior and exterior shoring and bracing throughout the term of this Contract.
 - 2. Cover and protect equipment and fixtures from soilage or damage when selective demolition work is performed in areas where such items have not been removed.
 - 3. Erect and maintain dust-proof partitions and closures as required, to prevent spread of dust or fumes, to occupied portions of the building.
 - a. Where selective demolition occurs immediately adjacent to designated portions of the building, construct dust-proof partitions of minimum 3 5/8-inch studs at 16 inches on center, 5/8-inch drywall (joints taped) on occupied side, 1/2-inch fire-retardant plywood on demolition side. Fill partition cavity with sound-deadening insulation. Create dust-tight joints at edges and penetrations of dust-proof partitions.
 - b. Provide weatherproof closures for exterior openings resulting from demolition work.
 - 4. Locate, identify, stub off, and disconnect utility services that are not indicated to remain.
 - a. Provide bypass connections as necessary to maintain continuity of service to designated areas of building. Provide minimum of 72 hours advance notice to the College if shutdown of service is necessary during changeover.
- B. Pollution Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air. Comply with governing regulations pertaining to environmental protection.
 - 1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.
- C. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.
- D. Demolition, General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition work above each floor or tier before disturbing supporting members on lower levels.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to

remain or adjoining construction. To minimize disturbance of adjacent surfaces, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.

3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 5. Maintain adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Locate selective demolition equipment throughout the structure and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 8. Dispose of demolished items and materials promptly. On-site storage or sale of removed items is prohibited.
 9. Return elements of construction and surfaces to remain to condition existing before start of selective demolition operations.
- E. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to the Architect in written, accurate detail. Pending receipt of directive from the Architect, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

3.04 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: As a minimum, remove weekly from site accumulated debris, rubbish, and other materials resulting from demolition operations. However, more frequent off site removal of accumulated debris is required as soon as the dumpster is full.
1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
 2. Burning of demolished materials will not be permitted on site.
- B. Removal: Transport materials removed from demolished structures and legally dispose off site.

3.05 CLEANUP AND REPAIR

- A. General: Upon completion of demolition work, remove tools, equipment, and demolished materials from site.

1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start operations. Repair adjacent construction or surfaces soiled or damaged by demolition work.
2. Clean adjacent areas, of all dust, dirt, and debris caused by selective demolition, cutting, and patching operations. Daily and final clean up shall be satisfactory to the Architect.
3. Clean existing heating and cooling devices to remain.

END OF SECTION 02 41 13

SECTION 03 11 00 – CONCRETE FORMWORK

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Cast-In-Place Concrete: Section 03 30 00.
- B. Concrete Reinforcement: Section 03 20 00.

1.02 DESIGN REQUIREMENTS

- A. ACI 301, Section 2.1 – Formwork and formwork accessories, General:
 - 1. Add the following to 2.1.1 Description:

The formwork shall be designed for loads, lateral pressure, and allowable stresses outlined in Chapter 2 - Design of “Guide to Formwork for Concrete” (ACI 347-01).

1.03 SUBMITTALS

- A. Shop Drawings:
- B. Product Data: Manufacturer’s catalog sheets, specifications, and installation/application instructions for the following:
 - 1. Form systems and ties.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Chamfer Strips: Wood, metal, PVC or rubber; 1 inch chamfer, unless otherwise indicated on the Drawings.
- B. Rustication Strips: As required to provide rustication, patterns and profiles indicated on the Drawings.
- C. ACI 301, Section 2.1.2 - Submittals:
 - 1. Add the following to 2.3.2 Removal of formwork:
 - 2.3.2.7 After the ends or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less than 3/4 inch from the formed surfaces of concrete.

PART 3 EXECUTION

3.01 PREPARATION OF FORM SURFACES

- A. Apply form-coating material in accordance with manufacturer's instructions.

3.02 INSTALLATION

- A. Provide chamfer on all exposed external corners of concrete.
- B. Provisions for Work of Related Contracts: Provide openings in concrete formwork to accommodate Work of related contracts. Obtain information for size and location of openings, recesses and chases from contractor requiring such items.
- C. All formwork to be straight and true.
- D. All formwork to be inspected by an independent inspector, at the cost to the College, prior to any pours.

3.03 REMOVAL OF FORMS

- A. ACI 301, Section 2.3.2 - Removal of Forms:
 - 1. 2.3.2.5 Forms of concrete slabs and other structural members shall be removed in accordance with recommendations in paragraph 3.7.2.1 of Article 3.7 - Removal of Forms and Supports of "Recommended Practice for Concrete Formwork" (ACI 347-01).
 - 2. 2.3.2.7 All formwork shall be removed after the concrete has sufficiently hardened, except in inaccessible spaces where approved.

3.04 RE-USE OF FORMS

- A. Split, frayed, delaminated or otherwise damaged form facing material shall not be used.

END OF SECTION

SECTION 03 20 00 – CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Provide and install all reinforcement and associated items required for cast-in-place concrete.

1.02 RELATED SECTIONS

- A. Concrete Formwork: Section 03 11 00
- B. Cast-in-Place Concrete: Section 03 30 00

1.03 SUSTAINABILITY REQUIREMENTS

- A. The Contractor shall implement practices and procedures to meet the Project's sustainable requirements. The Contractor shall ensure that the requirements related to these goals, as defined in Specification Section 02 08 30, Removal of Universal Waste and Miscellaneous Hazardous Materials, and as specified in this Section, are implemented to the fullest extent. Substitutions or other changes to the work shall not be proposed by the Contractor or their sub-contractors if such changes compromise the stated Waste Removal Performance Criteria.

1.04 REFERENCES

References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.

- A. American Society of Testing and Materials (ASTM) standards, latest editions.
 - A615 Standard Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- B. American Concrete Institute (ACI) standards, latest editions.
 - ACI 315 Details and Detailing of Concrete Reinforcement.

ACI 318-11 Building Code Requirements for Reinforced Concrete (With modifications per Section BC 1908 of the **2014** NYC Building Code).

- C. Placing Reinforcing Bars - CRSI-WCRSI Recommended Practices, latest edition. Concrete Reinforcing Steel Institute.

1.05 DESIGN REQUIREMENTS

- A. Detailing requirements for reinforced concrete structures shall meet the structural integrity requirements as set in Section BC 1916 of the **2014** NYC Building Code.

1.06 SUBMITTALS

- A. Product Data

Submit manufacturers' information for the following:

1. Steel #4 rebar.
2. Supports

- B. Shop Drawings

1. Immediately after award of Contract, prepare shop drawings showing all fabrication dimensions and locations for placing of the reinforcing steel and accessories. Shop Drawings are to be prepared by a rebar detailer.
2. Shop drawings will be checked for size of material and spacing by the Architect, which shall not render the Architect responsible for any errors in construction dimensions, quantities, bends, etc. that have been made in preparation of the shop drawings. The Contractor shall assume full responsibility for the correctness of quantities, dimensions and fit.
3. Do not order or deliver reinforcement to job site prior to approval of drawings.

- C. Quality Control Submittals

1. Certificates

Submit certificate stating that reinforcement meets or exceeds the specified requirements.

2. Contractor Qualifications

Provide proof of Installer and Detailer qualifications specified under "Quality Assurance".

1.07 QUALITY ASSURANCE

A. Qualifications

1. Rebar Installer: Company specializing in performing the Work of this Section shall have five years minimum experience on successful projects of similar size.
2. Rebar Detailer: Company shall be specialized in the detailing of reinforcing bar shop drawings with a minimum of five years experience.

B. Regulatory Requirements

1. Building Code

Work of this section shall conform to all requirements of the NYC Building Code. Deliveries will be rejected unless:

- a. All reinforcing bars are identifiable as to point of origin, grade of steel, and size.

2. Industry Standards

Details of Concrete reinforcement not covered herein shall be in accordance with "Building Code Requirements for Reinforced Concrete" (ACI 318) and "Details and Detailing of Concrete Reinforcement" (ACI 315), latest editions and the Concrete Reinforcing Steel Institute Manual on "Placing Reinforcing Bars" (CRSI).

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store in location to prevent rusting, etc.
- B. Protect reinforcement before, during, and after installation.
- C. Insure proper identification after bundles are broken.
- D. WWR is shipped in two forms; rolls or sheets. At all times during off loading of materials, caution must be exercised and all safety regulations and practices must be observed.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Reinforcing Bars

1. All reinforcing bars, except those to be welded, shall be of deformed type of new billet steel conforming to current requirements of ASTM A615. No rail or re-rolled steel will be permitted. Reinforcement to be welded shall conform to the requirements of ASTM A706.
2. Grade or yield strength of reinforcing bars is indicated on Drawings. Verify grade of reinforcing bars is shown on Drawings.

B. Supports for Reinforcement

1. Supports for reinforcement supported by formwork or deck shall consist of metal bolsters and chairs of adequate strength, size, and number. Provide CRSI Class C supports (plastic tipped) for formed concrete surfaces.

2.02 FABRICATION

- #### **A. Fabricate reinforcing bars in accordance with fabricating allowances given in ACI 315.**

PART 3 - EXECUTION

3.01 PLACEMENT

A. General

1. Place reinforcement in accordance with CRSI "Placing Reinforcement Bars" and Section BC 1907.5.
2. Unless otherwise permitted, welding of crossing bars (tack welding) for assembly of reinforcement is prohibited.

B. Supports

1. Support and fasten together all reinforcement to prevent displacement by construction loads or placing of concrete.
2. Provide supports specified in Article 2.01.

- C. Cover
 - 1. Provide minimum protective cover given in Section BC 1907.7.1 if not indicated on Drawings.
- D. Embedment Lengths
 - 1. All embedment lengths not shown on the Project Drawings shall be shown on the shop drawings and approved by the Architect of Record.

3.02 TOLERANCES

- A. Place reinforcing bars in accordance with the tolerances given in Section BC 1907.5.2 .
- B. Move bars as necessary to avoid interference with other reinforcement, conduits, or imbedded items. If bars are moved more than one bar diameter, or enough to exceed the above tolerances, the resulting arrangements are subject to approval by the Architect of Record.

3.03 FIELD QUALITY CONTROL

- A. The College will assign a Special Inspector to inspect the size and placement of reinforcement. A record will be made of all inspection of reinforcement at the bending bench and in place.
- B. Do not proceed with concreting until all reinforcing in place has been approved and recorded.
- C. Promptly correct all reinforcement displaced during pouring of concrete.
- D. Damaged reinforcement shall not be used.

3.04 CLEANING

- A. Steel reinforcement shall be free of all rust, scale, oil, paint, grease, loose mill scale, and all other foreign matter that will prevent bonding of concrete and steel just prior to pouring of concrete.

END OF SECTION 03 20 00

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE (FOUNDATIONS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Perform the work of this Section in accordance with the General Conditions, AIA Document A201/2007, Supplementary Conditions, and all other requirements of the Contract Documents.

1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes for foundation work.
- B. Cast-in-place Concrete includes the following:
 - 1. Foundations and grade beams.
 - 2. Slabs-on-grade.
 - 3. Foundation walls, exterior and interior.
 - 4. Elevator and mechanical pit walls and slabs on ground.
- C. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 01 73 29: Construction Waste Management.
 - 2. Division 3

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others as requested by Architect.
- C. Shop drawings for reinforcement, prepared by registered Professional Engineer for fabrication, bending, and placement of concrete reinforcement. Comply with ACI SP-66 (04), "ACI Detailing Manual," showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement

required for openings through concrete structures.

- D. Samples of materials as requested by Architect, including names, sources, and descriptions, as follows:
 - 1. Reglets.
 - 2. Waterstops.
- E. Laboratory test reports for concrete materials and mix design test.
- F. Materials certificates in lieu of materials laboratory test reports when permitted by Architect. Materials certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:
 - 1. American Concrete Institute (ACI) 301, "Standard Specifications for Structural Concrete for Buildings".
 - 2. ACI 318, "Building Code Requirements for Structural Concrete."
 - 3. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."
- B. Concrete Testing Service: Engage an Approved testing laboratory acceptable to Architect and Engineer of Record to perform material evaluation tests and to design concrete mixes.
- C. Materials and installed work may require testing and retesting at any time during progress of work. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest

practicable sizes to minimize number of joints and to conform to joint system shown on drawings.

1. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 mg/l volatile organic compounds (VOCs) that will not bond with stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to exposed surface.
1. Provide ties that, when removed, will leave holes not larger than 1-inch diameter in concrete surface.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Epoxy-Coated Reinforcing Bars: ASTM A 775.
- C. Steel Wire: ASTM A 82, plain, cold-drawn steel.
- D. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.
- E. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire-bar-type supports complying with CRSI specifications.
1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 2. For exposed-to-view concrete surfaces, where legs of supports are

in contact with forms, provide supports with legs that are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I.
 - 1. Use one brand of cement throughout project unless otherwise acceptable to Architect.

- B. Supplementary Cementitious Materials
 - 1. Fly Ash: ASTM C618, Type F may be used up to a maximum of 25 percent of the total cementitious content.
 - 2. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120 may be used up to a maximum of 40 percent of the total cementitious content.
 - 3. The exact percentages used shall be based on a successful test placement on-site.
 - 4. In mass concrete, fly ash may be increased to 50% and the slag content may be increased to 80% of the total cementitious content.

- C. Normal Weight Aggregates: ASTM C 33 and as herein specified. Provide aggregates from a single source for exposed concrete.
 - 1. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
 - 2. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Architect.

- D. Lightweight Aggregates: ASTM C 330.

- E. Water: Potable.

- F. Fiber Reinforcement:
 - 1. Structural Macro Fiber: ASTM C 1116, minimum of 2 inches (50 mm) length, aspect ratio of 50 to 90, minimum toughness rating of $R_{10,50} = 60$ (approximate) according to ASTM C 1018.

- a. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work are:
 - 1) Tuf-Strand SF, Euclid Chemical.
 - 2) Strux 90/40, W.R. Grace.

- G. Admixtures, General: Provide admixtures for concrete that contain not more than 0.05 percent chloride ions.

- H. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work are:
 - a. Air-Mix or AEA 92, Euclid Chemical Co.
 - b. Darex AEA or Daravair, W.R. Grace & Co.
 - c. MB-VR or Micro-Air, Degussa Co.

- I. Water-Reducing Admixture: ASTM C 494, Type A.
 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work are:
 - a. Eucon WR-91 or Plastol 341, Euclid Chemical Co.
 - b. WRDA with Hycol or Adva 140, 170, 190, W.R. Grace & Co.
 - c. Pozzolith 322 or Polyheed 997, Degusssa Co..
 - d. Plastocrete 161, Sika Corp.

- J. Water-Reducing, Accelerating Admixture (non-chloride): ASTM C 494, Type E.
 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work are:
 - a. Accelguard 80 or Accelguard 90, Euclid Chemical Co.
 - b. Polarset, W.R. Grace & Co.
 - c. Pozzutec 20, BASF, Inc.

- K. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work are:
 - a. Eucon Retarder 75 or Eucon W.O., Euclid Chemical Co.
 - b. Daratard-17, W.R. Grace & Co.
 - c. Pozzolith R, BASF, Inc.

- L. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.
 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work are:
 - a. Eucon 37/1037 or Plastol 341/5000, Euclid Chemical Co.
 - b. Adva 575, 555, 190, 170, 140, W.R. Grace & Co.
 - c. Rheobuild 1000 or Glenium 3030, Degussa Company
 - d. Sikament 300, Sika Corp.

- M. Corrosion Inhibiting Admixture: 30% calcium nitrite (where called for in the specifications or on the drawings).
 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work at 3 gal/cy are:
 - a. Eucon CIA, Euclid Chemical Co.
 - b. DCI, DCI-S W.R. Grace & Co.
 - c. Rheocrete CNI, Degussa Company.

- N. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.

- O. Certification: Written conformance to the above-mentioned requirements and the chloride ion content of admixtures will be required from the admixture manufacturer prior to mix design review by the Engineer

2.4 RELATED MATERIALS

- A. Reglets: Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.0217 inch thick (26-gage) galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.

- B. Dovetail Anchor Slots: Hot-dip galvanized sheet steel, not less than 0.0336 inch

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thick (22 gage) with bent tab anchors. Fill slot with temporary filler or cover face opening to prevent intrusion of concrete or debris.

- C. Waterstops: Provide flat, dumbbell-type or centerbulb-type waterstops at construction joints and other joints or Volclay type as indicated on the drawings. Size to suit joints.
- D. Rubber Waterstops: Corps of Engineers CRD-C 513.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
 - a. The Burke Co.
 - b. Progress Unlimited.
 - c. Williams Products, Inc.
- E. Polyvinyl Chloride Waterstops: Corps of Engineers CRD-C 572.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
 - a. The Burke Co.
 - b. Greenstreak Plastic Products Co.
 - c. W.R. Meadows, Inc.
 - d. Progress Unlimited.
 - e. Schlegel Corp.
 - f. Vinylex Corp.
- F. Sand Cushion: Clean, manufactured, or natural sand.
- G. Vapor Barrier: Provide vapor barrier which conforms to ASTM E1745, Class A. The membrane shall have a water-vapor transmission rate no greater than 0.008 gr./ft²/hr when tested in accordance with ASTM E96. The vapor barrier shall be placed over prepared base material where indicated below slabs on grade. Vapor barrier shall be no less than 15 mil thick.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work are:
 - a. Stego Wrap (15 mil) Vapor Barrier, Stego Industries LLC.

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- b. Zero Perm, Alumiseal
 - c. Premoulded Membrane with PLASMATIC CORE, W.R. Meadows
- H. Contraction Joint Protection: Load plate shall be smooth steel plate bars, ASTM A36, and shall be Load Plate Basket or PD³ Basket by PNA Construction Technologies. Locate Load Plate Baskets at contraction joints so noted on the plans. Do not shear. Remove burrs.
- I. Clear Curing and Sealing Compound (350 g/l): Liquid type membrane-forming curing compound, clear styrene acrylate type, complying with ASTM C1315, Type I, Class A, 25% solids content minimum. Moisture loss shall be not more than 0.40 Kg/m² when applied at 300 sq. ft./gal. Manufacturer's certification is required.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work are:
 - a. Super Diamond Clear VOX, Euclid Chemical Company
 - b. Masterkure 100W, BASF
- J. Curing Compound (Strippable): The compound shall conform to ASTM C309. For use on slabs receiving subsequent applied finishes and where noted on the drawings. Provide “Kurez DR VOX or Kurez W VOX or Horncure WB 30” by The Euclid Chemical Company. Install in strict accordance with the manufacturer’s recommendation and supervision.
- K. Underlayment Compound: Free-flowing, self-leveling, pumpable, cement-based compound for applications from 1 inch thick to feathered edges.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work are:
 - a. K-15, Ardex, Inc.
 - b. Super Flo-Top or Level Magic, Euclid Chemical Co.
- L. Repair Topping: Self-leveling, polymer modified high strength topping. Product shall be “Thin-Top Supreme, Concrete Top Supplement or Tammspatch II” by The Euclid Chemical Co.
- M. Epoxy Adhesive: ASTM C 881, two-component, 100% solids, 100% reactive compound suitable for use on dry or damp surfaces. Provide material type, grade,

and class to suit Project requirements.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work are:
 - a. Euco Epoxy System #452 or Duralcrete Series, Euclid Chemical Co.
 - b. Sikadur 32 Hi-Mod, Sika Corp.

- N. Polymer Repair Compound: Polymer and microsilica modified cementitious based compounds.
 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work are:

Horizontal
 - a. Thin Top Supreme or Concrete Top Supreme or Tammspatch II, Euclid Chemical
 - b. Sikatop 121 or 122, Sika Chemical
Vertical or Overhead
 - a. Verticoat or Verticoat Supreme, Euclid Chemical
 - b. Sikatop 123, Sika Chemical

2.5 PROPORTIONING AND DESIGN OF MIXES

- A. Prepare design mixes for each type and strength of concrete by laboratory trial batch methods as specified in ACI 301. For the trial batch method use an independent testing agency acceptable to Architect and Engineer of Record for preparing and reporting proposed mix designs. The report shall be filed with Authority Having Jurisdiction as required.

- B. Design mixes to provide normal weight concrete with the properties, as indicated on drawings and schedules.

- C. Water Cementitious Ratio: Provide concrete for following conditions with maximum water-cement (W/cm) ratios as follows:
 1. Subjected to freezing and thawing: W/C 0.45.
 2. Subjected to deicers/watertight: W/C 0.40.
 3. Subjected to brackish water, salt spray, or deicers: W/C 0.40.

- D. Slump Limits: Recommended proportion and design mixes to result in concrete slump at point of placement as follows:
1. Ramps, slabs, and sloping surfaces: Not more than 3 inches.
 2. Reinforced foundation systems: Not less than 3 inch and not more than 5 inches.
 3. Concrete containing high-range water-reducing admixture (superplasticizer): Not more than 9 inches after adding admixture to site-verified 2 to 3 inch water slump concrete.
 4. Other concrete: Not more than 4”.
 5. Self Consolidating concrete (SCC) a slump/flow between 20 to 30 inches.

Note: If the forgoing recommendation is not achievable the contractor shall consult the Engineer of Record for further instruction before proceeding.

- E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Engineer of Record. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Engineer of Record before using in work.
- F. Fiber Reinforcement: Add macro fibers at the rate of 4.0 lbs. per cubic yard to all non-reinforced slabs on grade and toppings.
- H. Corrosion Inhibiting Admixture (where called for on drawings): A calcium nitrite based corrosion inhibitor shall be added at a rate of 3 gallons per cubic yard of concrete and shall inhibit corrosion when exposed up to 9 pounds of chloride.

2.6 ADMIXTURES

- A. Use water-reducing admixture or high-range water reducing admixture (superplasticizer) in concrete, as required for placement and workability.
- B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).
- C. Use high-range water-reducing admixture in pumped concrete, architectural concrete, self-consolidating concrete, macro fiber concrete, parking structure slabs, concrete required to be watertight, and concrete with water-cementitious ratios below 0.50, unless otherwise approved by Engineer of Record.
- D. Use air-entraining admixture in exterior exposed concrete unless otherwise

indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content of 6.0 percent with a tolerance of plus or minus 1-1/2 percent.

1. Other concrete (not exposed to freezing, thawing, or hydraulic pressure) or to receive a surface hardener: 2 percent to 4 percent air.
2. All interior trowel finished floors: 3% air maximum.

E Use admixtures for water reduction and set control in strict compliance with manufacturer's directions.

2.7 CONCRETE MIXING

- A. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as specified.
1. Provide ticket for each truck discharged and used in work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.
 2. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 GENERAL

- A. Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.

3.2 FORMS

- A. General: Design, erect, support, brace, and maintain formwork to support vertical and lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances complying with ACI 347.

1. Provide Class A tolerances for concrete surfaces exposed to view.

2. Provide Class C tolerances for other concrete surfaces.
- B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leakage.
 - C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
 - D. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
 - E. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
 - F. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
 - G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing before concrete placement as required to prevent mortar leaks and maintain proper alignment.

3.3 VAPOR BARRIER INSTALLATION

- A. General: Place vapor barrier sheeting with longest dimension parallel with direction of pour.
- B. Lap joints 6 inches and seal vapor barrier joints with manufacturers' recommended mastic and pressure-sensitive tape.

- C. This installation must be approved prior to concrete placement.

3.4 PLACING REINFORCEMENT

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as herein specified.
 - 1. Avoiding cutting or puncturing vapor retarder during reinforcement placement and concreting operations.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Architect.
- D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

- A. Construction Joints: Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Architect and/or Engineer of Record.
- B. Provide keyways at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Accepted bulkheads designed for this purpose may be used for slabs.
- C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as otherwise indicated. Do not continue reinforcement through sides of strip placements.
- E. Use bonding agent or epoxy adhesive on existing concrete surfaces that will be

joined with fresh concrete.

- F. Waterstops: Provide waterstops in construction joints as indicated. Install waterstops to form continuous diaphragm in each joint. Make provisions to support and protect exposed waterstops during progress of work. Field-fabricate joints in waterstops in accordance with manufacturer's printed instructions.
- D. Isolation Joints in Slabs-on-Ground: Construct isolation joints in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.
 - 1. Joint filler and sealant materials are specified in Division 7 Sections of these specifications.
- E. Contraction (Control) Joints in Slabs-on-Ground: The Soff-Cut saw shall be used immediately after final finishing and to a depth of 1-1/4". A conventional saw shall be used as soon as possible without dislodging aggregate and to a depth of 1/4 slab thickness.

3.6 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.
- B. Install reglets to receive top edge of foundation sheet waterproofing and to receive thru-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
- C. Install dovetail anchor slots in concrete structures as indicated on drawings.

3.7 PREPARATION OF FORM SURFACES

- A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.
- B. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

3.8 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other crafts to permit installation of their work.
- B. General: Comply with ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.
- C. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete to avoid segregation at its final location.
- D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 - 1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.
 - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.
- E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.
 - 1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Bring slab surfaces to correct level with straightedge and strike off. Use highway bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

3. Maintain reinforcing in proper position during concrete placement.
- F. Cold-Weather Placing: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- G. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 2. Use only the specified non-corrosive accelerator. Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.
- H. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F (32 deg C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
 3. Fog spray forms, reinforcing steel, and subgrade just before concrete. Keep subgrade moisture uniform without puddles or dry areas.
 4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.

3.9 FINISH OF FORMED SURFACES

- A. Rough Form Finish: For formed concrete surfaces not exposed to view in the finish work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective

areas repaired and patched and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

- B. Smooth Form Finish: For formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 MONOLITHIC SLAB FINISHES

- A. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and as otherwise indicated.
 - 1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances of Ff 20 - F1 15. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- B. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.
 - 1. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and

appearance, and with surface leveled to tolerances of Ff 25- F1 17. Grind smooth surface defects that would telegraph through applied floor covering system.

- C. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow by slightly scarifying surface with a fine broom. Texture shall be as approved by Architect from sample panel.
- D. Nonslip Broom Finish: Apply nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- E. Nonslip Aggregate Finish: Apply nonslip aggregate finish to concrete stair treads, platforms, ramps, sloped walks, and where indicated.
 - 1. After completion of float finishing and before starting trowel finish, uniformly spread 25 lbs. of dampened nonslip aggregate per 100 sq. ft. of surface. After broadcasting and tamping, apply trowel finishing as as specified.
 - 2. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose nonslip aggregate.

3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

3.12 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather, protect concrete from

rapid moisture loss before and during finishing operations with an evaporation-control material. Apply in accordance with manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- C. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified.
- D. Provide moisture curing by one of the following methods.
 - 1. Keep concrete surface continuously wet by covering with water.
 - 2. Use continuous water-fog spray.
 - 3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.
 - 4. Cure with the specified curing and sealing compound or strippable curing compound. Apply curing compound immediately after final finishing.
- E. Curing and Sealing Compound: All exposed interior slabs, not receiving a liquid densifier shall be cured with the specified curing and sealing compound. All floors receiving adhesive applied finishes may be cured with this compound upon receipt of a proper compatibility letter from the adhesive manufacturer. Exterior slabs, sidewalks, curbs, and architectural concrete, not receiving a penetrating sealer, shall be cured with the specified clear, non-yellowing curing and sealing compound. Maximum coverage shall be 400 ft²/gallon on steel troweled surfaces and 300 ft²/gallon on floated or broomed surfaces.
- F. Strippable Curing Compound: Use the specified strippable curing compound on surfaces to be covered with finish or coating material applied directly to concrete, such as liquid densifier/sealer, waterproofing, dampproofing, membrane roofing, flooring, painting, and other coatings and finish materials. Apply in accordance with manufacturer's instructions.
- G. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- H. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping,

and other flat surfaces, by application of appropriate curing method.

3.13 REMOVAL OF FORMS

- A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.

3.14 REUSE OF FORMS

- A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces except as acceptable to Architect.

3.15 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.
- B. Mix dry-pack mortar, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No.16 mesh sieve, using only water as required for handling and placing.
 - 1. Cut out honeycomb, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar before bonding compound has dried.
 - 2. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

- C. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry-pack mortar, or precast cement cone plugs secured in place with bonding agent.
1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove, and replace concrete.
- D. Repair of Unformed Surfaces: Test unformed surfaces, such as slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having required slope.
1. Repair finished unformed surfaces that contain defects that affect durability of concrete. Surface defects, as such, include crazing and cracks more than 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.
 2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
 3. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with patching compound. Finish repaired areas to blend into adjacent concrete. The specified underlayment or repair topping shall be used when acceptable to Architect.
 4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- E. All structural repairs shall be made with prior approval of the Engineer, as to

method and procedure, using the specified repair mortar or epoxy adhesive and/or epoxy mortar. Where epoxy injection procedures must be used, an approved low viscosity epoxy made by the manufacturers previously specified shall be used.

- F. Repair methods not specified above may be used, subject to acceptance of Architect.

3.16 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. General: The Owner will employ a testing laboratory to perform tests and to submit test reports.
- B. Sampling and testing for quality control during placement of concrete may include the following, as directed by Architect.
 - 1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - a. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed. Water content shall be verified by use of the microwave test, AASHTO T318, as directed by the Engineer.
 - b. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
 - c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
 - d. Compression Test Specimen: ASTM C 31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cure test specimens are required.
 - e. Compressive Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. more than the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 7 days, three specimens tested at 28 days, and as otherwise noted on the drawings.
 - 2. When strength of field-cured cylinders is less than 85 percent of

- companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
3. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.
- C. Test results will be reported in writing to Architect, Structural Engineer, Ready-Mix Producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
 - D. Non-Compliant Test Reports: All test reports indicating non-compliance should be e-mailed for faxed immediately to all parties on the test report distribution list. Copies shall be on different colored paper.
 - E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
 - F. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.17 INSPECTIONS AND SERVICES

- A. The owner will retain the services of Approved Special Inspection Agency approved to provide special inspection of concrete operations as required by the Building Code.
- B. When the services of the Architect and/or Structural Engineer of Record are required for any temporary construction demands such as hoists, cranes, temporary material loading, truck loading etc., this service shall be paid for by the concrete contractor at the prevailing hourly rates.

END OF SECTION 03300

**FASHION INSTITUTE OF TECHNOLOGY
ADMISSIONS OFFICE RELOCATION
COED RESIDENCE HALL**

PROJECT #C1536

CONCRETE MIX DESIGN SUBMITTAL FORM

Project: _____
City: _____
General Contractor: _____
Concrete Contractor: _____
Concrete Strength (Class): _____
Use (describe): _____

Design Mix Information

Based on Standard Deviation Analysis *Please check one*
 Trial Mix Test Data

Design Characteristics:

Density pcf
 Strength psi (28 day)
 Air % specified

MATERIALS

	<i>Type/ Source</i>	<i>Specific Gravity</i>	<i>Weight/lb.</i>	<i>Absolute Vol. cu.ft.</i>
Cement				
Fly Ash				
Slag				
Coarse Aggregate				
Fine Aggregate				
Water				
Air				
Other				
TOTAL				27.0 cu. ft.

* Water/Cementitious Ratio (lbs. water/lbs. cement) = _____ %

**FASHION INSTITUTE OF TECHNOLOGY
ADMISSIONS OFFICE RELOCATION
COED RESIDENCE HALL**

PROJECT #C1536

<u>ADMIXTURES</u>	Manufacturer	Dosage oz/cwt
Water Reducer		
Air Entraining Agent		
High Range Water Reducer		
Non-Corrosive Accelerator		
Other		

Slump before HRWR _____ inches
 Slump after HRWR _____ inches

Standard Deviation Analysis (from experience records):

# of Test Cylinders Evaluated:	
Standard Deviation:	

USE THE LARGER VALUE:

$$f'_{cr} = f'c + 1.34s \text{ or } f'_{cr} = f'c + 2.33s - 500 \text{ for } 5000 \text{ PSI or less}$$

$$f'_{cr} = 0.90 f'c + 2.33s \text{ for higher strengths}$$

(Refer to ACI 301 for increased deviation factor when less than 30 tests are available)

LABORATORY TEST DATA

Compressive Strength

Age (days)	Mix # 1	Mix #2	Mix #3
7	psi	psi	psi
7	psi	psi	psi
28	psi	psi	psi
28	psi	psi	psi
28 average	psi	psi	psi

$$F'_{cr} = f'c + 1200 \text{ psi for } 5000 \text{ psi or less}$$

$$\text{Or } 1.10 f'c + 700 \text{ psi for strengths higher than } 5000 \text{ psi at } 28 \text{ days}$$

REQUIRED ATTACHMENTS:

Combined Aggregate Gradation Report

Standard Deviation Analysis of Compressive Strength Data or Trial Mixture Test Data

PART 1 ADMIXTURE COMPATIBILITY CERTIFICATION LETTER

Please Check

**FASHION INSTITUTE OF TECHNOLOGY
ADMISSIONS OFFICE RELOCATION
COED RESIDENCE HALL**

PROJECT #C1536

Submitted by:
Name:
Address:
Phone #:
Main Plant Location:
Miles from Project:
Secondary Plant Location:
Miles from Project:
Date:

SECTION 03 54 00 – SELF-LEVELING UNDERLAYMENT CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Work of this section includes leveling over existing floors after tiles have been removed by abatement contractor to receive new floor covering materials. Self-leveling to take place prior to installation of turnstiles (by others).

1.2 SECTION INCLUDES PRODUCTS BY ARDEX

- A. ARDEX K 15™ Self-Leveling Underlayment Concrete
- B. ARDEX P 51™ Primer
- C. ARDEX P 82™ Ultra Prime
- D. ARDEX E 25™ Resilient Emulsion
- E. ARDEX MC™ Moisture Control Systems
- F. Approved Equal

1.3 QUALITY ASSURANCE

- A. Installation of self leveling material must be by a factory-trained applicator, such as an ARDEX level Master Elite Installer, using mixing equipment and tools approved by the manufacturer, or equal.
- B. Manufacturers Representative shall review existing conditions prior to the Work. Contractor shall provide written approval from the Manufacturer that the substrate is acceptable to be installed with the Self Leveling Underlayment Concrete.
- C. Underlayment shall be able to be installed at 1/8" typical for 85% of the area to be covered and 1" plus or minus for the remaining 15%.
- D. Underlayment compressive strength shall be 4100 psi after 28 days per ASTM C109/mod (air cure only).
- E. Underlayment shall be walkable after 2 hours and allow floor covering to be installed after 16 hours at 70 degrees Fahrenheit.
- F. Manufacturer's certification that the product is cement-based having an inorganic binder content which is 100% cement, to include Portland cement per ASTM C150: Standard specification for Portland Cement and other specialty hydraulic cements.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in their unopened packages and protect from extreme temperatures and moisture. Protect liquids from freezing.

1.5 SITE CONDITIONS

- A. ARDEX K 15 is a cementitious material. Observe the basic rules of concrete work. Do not install below 50°F surface temperature. Install quickly if floor is warm and follow hot weather precautions available from the ARDEX Technical Service Department. Never mix with cement or additives other than ARDEX-approved products.

1.6 SUBMITTALS

- A. Manufacturer's technical information for all material and installation.
- B. MSDS Sheets

PART 2 - PRODUCTS

2.1 MATERIALS

- A. The cement-based self-leveling underlayment shall be ARDEX K 15 Self-Leveling Underlayment Concrete.
- B. Primer for non-porous subfloors such as burnished concrete, terrazzo, quarry, and ceramic tile shall be ARDEX P 82 ULTRA PRIME.
- C. Aggregate shall be well graded, washed gravel (1/8" to 1/4" or larger) for use when underlayment is installed over 1 1/2" thick (if required).
- D. Water shall be clean, potable, and sufficiently cool (not warmer than 70 degrees Fahrenheit).

2.2 MIX DESIGNS

- A. Standard mixing ratio: ARDEX K 15 is mixed in 2-bag batches at one time. Mix each bag of ARDEX K 15 (55 lb.) with 7 quarts of water. Product shall be mixed in an ARDEX T-10 Mixing Drum using an ARDEX T-1 Mixing Paddle and a 1/2" heavy-duty drill (min. 650 rpm). Mix thoroughly for approximately 2-3 minutes to obtain a lump-free mixture. Follow written instructions per the ARDEX K 15 bag label.
- B. Resilient mix for applications over cutback and non-water soluble adhesive residues, wood and metal: Use 6 qt. of water and 2 qt. of ARDEX E 25 Resilient Emulsion for each bag of ARDEX K 15.
- C. For pump installations, ARDEX K 15 shall be mixed using the ARDEX Levelcraft Automatic Mixing Pump. Start the pump at 210 gallons of water per hour, and then adjust to the minimum water reading that still allows self-leveling properties. **DO NOT OVERWATER!** Check the consistency of the product on the floor to ensure a uniform distribution of the sand aggregate at both the top surface and bottom of the pour. If settling is occurring, reduce the water amount and

recheck. Conditions during the installation, such as variations in water, powder, substrate, and ambient temperature, require that the water setting be monitored and adjusted carefully to avoid overwatering.

PART 3 - EXECUTION

3.1 PREPARATION

- A. All subfloors must be sound, solid, cleaned, and primed:
 - 1. All concrete subfloors must be of adequate strength, clean, and free of all oil, grease, dirt, curing compounds and any substance that might act as a bondbreaker before priming. Mechanically clean if necessary, using shot blasting or other. Acid etching and the use of sweeping compounds and solvents are not acceptable.
 - 2. Non-porous subfloors such as ceramic and quarry tile as well as terrazzo should be clean and free of all waxes and sealers. If necessary, have the surface professionally cleaned.
 - 3. All cracks in the subfloor shall be repaired to minimize telegraphing through the underlayment.
 - 4. Substrates shall be inspected and corrected for moisture or any other conditions that could affect the performance of the underlayment or the finished floor covering.
- B. Joint Preparation
 - 1. Moving Joints – honor all expansion and isolation joints up through the underlayment.
 - 2. Saw Cuts and Control Joints – fill all non-moving joints with ARDEX FEATHER FINISH or ARDEX SD-P if required.
- C. Priming
 - 1. Primer for standard absorbent concrete subfloors: Mix ARDEX P 51, 1:1 with water and apply evenly with a soft push broom. Do not leave any bare spots. Remove all puddles and excess primer. Allow to dry to a clear, thin film (min. 3 hours, max. 24 hours). Underlayment shall not be applied until the primer is dry. Primer coverage is approximately 400 to 600 sq. ft. per gallon.
 - 2. Primer for non-porous subfloors, or cutback and other non-water soluble adhesive residues over concrete: Prime with ARDEX P 82. Mix Part A (red) with Part B (white) and apply with a short-nap or sponge paint roller, leaving a thin coat of primer no heavier than a thin coat of paint. Do not leave any bare spots. Remove all puddles and excess primer. Allow to dry to a clear, slightly tack film (minimum 3 hours, maximum 24 hours). Underlayment shall not be installed until primer is dry. Primer coverage is approximately 200 to 400 square feet per gallon.
 - 3. Minimum drying time for ARDEX P 82 over cutback adhesive is 18 hours.

3.2 APPLICATION OF UNDERLAYMENT

- A. Installation
 - 1. Pour or pump the liquid ARDEX K 15 and spread in place with the ARDEX t-4 Spreader. Use the ARDEX t-5 Smoother for featheredge and touch-up. Wear baseball shoes with non-metallic cleats to avoid leaving marks in the liquid ARDEX K 15. Underlayment can be walked on in 2-3 hours at 70 degrees Fahrenheit.

3.3 PREPERATION FOR FLOORING INSTALLATION

- A. Underlayment can accept finish floor covering materials after 16 hours at 70 degrees Fahrenheit and 50% relative humidity.
- B. Due to the wide range of adhesives that are used to install floor coverings, some adhesives may dry more quickly over ADREX underlayments than over other substrates. If this condition occurs, priming the surface of the underlayment with ARDEX P 51 Primer diluted 1:3 with water will even out the drying of the adhesive. Allow the primer to dry 1-3 hours before proceeding with the adhesive installation.

3.4 FIELD QUALITY CONTROL

- A. Where specified, field sampling of the ARDEX underlayment is to be done by taking an entire unopened bag of the product being installed to an independent testing facility to perform compressive strength testing in accordance with ASTM C 109/modified: air-cure only. There are no in situ test procedures for the evaluation of compressive strength.

3.5 PROTECTION

- A. Prior to installation of the finish flooring, the surface of the underlayment should be protected from abuse by other trades by the use of plywood, Masonite or other suitable protection course.

END OF SECTION 03 54 00

SECTION 04 01 21 - MASONRY RESTORATION

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Formwork: Section 03 11 00.
- B. Cast-in-Place-Concrete: Section 03 30 00.
- C. Mortar and Masonry: Section 04 05 13.

1.02 SUBMITTALS

- A. Product:
 - 1. Existing CMU is to be carefully removed and stacked for reuse. Stacking should be on palette. CMU is not to touching the ground directly. Air movement is required underneath.
- B. Samples: Deliver to the Site for comparison with existing masonry.
 - 1. Mortar for Exposed Joints and Cracks: Each required type, minimum 12 inches long by full thickness, showing finish and color.
 - 2. Masonry Units: Each required type, full size, showing finish and full color range.
- C. All existing CMU indicated on drawings to be removed, shall be reused as facing CMU once openings are made and complete to accept the CMU.

1.03 QUALITY ASSURANCE

- A. If not, enough CMU is available or for rational reason cannot be reused on the existing building façade, contact architect immediately for a substitution.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Products:
 - 1. Deliver all accessory materials to the site in manufacturer's original, sealed containers. Do not deliver materials which have exceeded shelf life limitation set forth by the manufacturer.
 - 2. Comply with manufacturer's printed instructions for storing and protecting materials.

- B. Bulk Aggregate: Store in a manner which will keep aggregate clean and protected from the weather elements.

1.05 PROJECT CONDITIONS

- A. Environmental Requirements:
1. For factory packaged products, comply with the manufacturer's printed limitations and instructions.
 2. At temperatures below 40 degrees F, maintain mortar temperature between 40 degrees F and 120 degrees F unless otherwise recommended by the material manufacturer. If necessary, heat mixing water and sand to produce the required results.
 3. At temperatures between 32 degrees F and 20 degrees F, provide wind breaks and cover the restored masonry to prevent wetting and freezing. Maintain restored masonry above freezing for not less than 16 hours using auxiliary heat or insulating blankets.
 4. At temperatures below 20 degrees F, provide heated enclosures for performing the Work. At the end of the workday, maintain the enclosures and keep the Work from freezing for not less than 24 hours.
 5. Do not lower freezing point of mortar by use of antifreeze, calcium chloride, or other additives.
 6. Do not use frozen materials or materials coated with ice or frost.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Mortar Types:
1. Type N Mortar: ASTM C 270, Type N.
 2. Modified Type N Pointing Mortar: ASTM C 270, Type N, modified with an acrylic additive in accordance with the additive manufacturer's printed instructions for the intended usage.
 3. Type C-1 Patching Mortar: "Thorite" by Thoro System Products; "Sonopatch" by Sonneborn Building Products; "Deco-Rez TPM 722" or "Deco-Rez TPM 723" by General Polymers Corp.; "SikaTop 122" or "SikaTop 123" by Sika Corp.; "Emaco R300 CI" or "Emaco R320 CI" or "Emaco R350 CI" or "Emaco S88 CI" by Master Builders, Inc.
- B. Mortar Color: For exposed Type N mortar and Modified Type N pointing mortar, select materials (complying with the requirements) and proportion pigments with other ingredients as necessary to match the color of existing corresponding materials.

- C. Mortar Pigments: High purity, finely ground, chemically inert, unfading, lime proof mineral oxides specially prepared for use in mortar.
- D. Acrylic Additive: “Acryl 60” by Thoro System Products; “Sonocrete” by Sonneborn Building Products; “Anchor - IT” by Anti-Hydro Waterproofing Co.
- E. Masonry Units: Match existing units in type, grade, size, appearance, and texture unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Protection: Protect adjacent surfaces not being restored. Protect sills, ledges, and projections from material droppings.
- B. Surface Preparation:
 - 1. Prepare surfaces to be restored in compliance with product manufacturer’s printed instructions and as specified.
 - 2. Remove dirt, dust, and foreign material from surfaces to be restored.
 - 3. Clean areas to be restored with compressed air or water flushing, except as otherwise recommended by the mortar manufacturer.
- C. Materials Preparation:
 - 1. Dry concrete masonry units and stone that have become wet. Do not wet these masonry units.
 - 2. Wet bricks that have a high absorption rate. Wet bricks until water runs off. Install bricks when surface is slightly damp.
 - 3. Prepare exposed Type N mortar and Modified Type N pointing mortar to match the color and appearance of existing adjoining mortar.

3.02 REPOINTING JOINTS

- A. Rake or cut out joints to a minimum depth of 5/8 inch and until sound surface is reached. Where cutting is required to remove existing mortar and joint filler, use a rotary power masonry saw wherever possible without damaging masonry. Cut the mortar and joint filler cleanly from the sides of the joints, leaving square corners. Flush joints clean with water or compressed air.
- B. Dampen joints slightly before application of mortar, making sure there is no free water. Backpack joints tightly out to a depth of 5/8 inch from the

face of masonry with Modified Type N pointing mortar. After backpacking mortar has attained initial set, redampen remaining 5/8 inch depth of joints, fill with Modified Type N pointing mortar, and finish joints to match existing adjoining joints.

2. Where joint sealant is required, cut out the joints or backpack the joints (as required by existing conditions) to the depth shown on the Drawings.

3.03 REPLACING MASONRY UNITS

- A. Provide temporary shoring or other supports as required to prevent displacement of existing masonry which is to remain. Perform the removal Work with such care as may be required to prevent damage to adjoining masonry which is to remain.
- B. Remove the deteriorated and damaged masonry units to their full depth, including the surrounding joint mortar. Wherever possible without damaging masonry, use a rotary power masonry saw for cutting Work. Leave square corners at adjoining masonry which is to remain. Clean joints and cavities by flushing with water or compressed air.
- C. Dampen contact surfaces slightly before application of mortar, making sure there is no free water. Install matching masonry units with Type N mortar. Install units to match and align with existing masonry. Maintain bonding and coursing pattern of existing masonry. Use presoaked wood wedges where necessary to properly set the units and maintain uniform matching joints. Backpack and fill joints full of mortar. Finish joints to match existing adjoining joints.

3.04 FILLING JOINTS

- A. Rake out loose mortar until sound surface is reached. Flush joints clean with water or compressed air.
- B. Dampen joints slightly before application of mortar, making sure there is no free water. Fill joints with Modified Type N pointing mortar flush with adjoining masonry.

3.05 FILLING CRACKS

- A. Non-Moving Cracks: Clean cracks with water flushing or compressed air. Dampen contact surfaces. Fill cracks with Modified Type N pointing mortar flush with adjoining masonry.

1. Enlarge cracks 1/8 inch or less in width to 1/4 inch wide by minimum 3/8 inch deep prior to cleaning and filling. Use masonry saw or power chisel.

- B. Moving Cracks: Cut out cracks more than 1/8 inch in width (for sealant) as required to provide joint configuration shown on the Drawings. Use masonry saw or power chisel. Clean and dry the contact surfaces.

3.06 PATCHING MASONRY SURFACES

- A. Remove all loose and deteriorated material. Prepare substrate surface. Remove paint, oil, grease, and salt deposits from surface to be restored. Use cleaning agent, recommended by manufacturer of patching mortar, where required. Fill the depressed area or void with Type C-1 patching mortar. Provide a uniform wood float finish, flush and even with the adjacent existing surfaces. If necessary, apply the patching mortar in layers to fill the depression. Comply with manufacturer's printed instructions.

3.07 CLEANING

- A. As the Work proceeds and after completion of Work, remove excess mortar, droppings, smears, stains, and other soiling substances resulting from the Work of this Section. Remove misplaced materials from surfaces immediately.

END OF SECTION 04 01 21

SECTION 04 05 13 – MORTAR AND MASONRY GROUT

PART 1 GENERAL

1.1 REFERENCES

- A. Standards:
 - 1. Mortar: ASTM C 270, except as otherwise specified.
 - 2. Grout: ASTM C 476.

1.2 SUBMITTALS

- A. Product Data:
 - 1. Portland Cement: Brand and manufacturer's name.
 - 2. Masonry Cement: Brand and manufacturer's name.
 - 3. Lime: Brand and manufacturer's name.
 - 4. Sand(s): Location of pit, name of owner, and previous test data.
 - 5. Color Pigments: Brand and manufacturer's name.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials in a manner which will insure the preservation of their quality and fitness for the Work.
- B. Store cement and lime on raised platforms under waterproof, well ventilated cover.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Cement: One of the following complying with the indicated requirements:
 - 1. Portland Cement: ASTM C 150, Type 1, of natural color or white as required to produce the desired color.
 - a. Fly Ash: Comply with ASTM C593.
 - 1) Recycled Content: Minimum 15 percent pre-consumer recycled content at contractor's option.
 - a) Type 1: 81 g, 15 percent.
 - 2. Masonry Cement: ASTM C 91, of natural color or custom color as required to produce the desired color.
 - a. Fly Ash: Comply with ASTM C593.
 - 1.) Recycled Content: Minimum 5 percent post-consumer recycled content, or minimum 20 percent

pre-consumer recycled content at contractor's option.

- a) Type M: 27 g, 5 percent; 108 g 20 percent.
- b) Type S: 26 g, 5 percent; 102 g, 20 percent.
- c) Type N: 24 g, 5 percent; 96 g 20 percent.

- B. Hydrated Lime: ASTM C 207, Type S.
- C. Mortar Sand: ASTM C 144, except that for joints less than 1/4 inch thick use sand graded with 100 percent passing the No. 16 sieve.
- D. Grout Sand: ASTM C 404.
- E. Color Pigments: High purity, finely ground, chemically inert, unfading, lime proof mineral oxides specially prepared for use in mortar.
- F. Water: Clean and free of deleterious amounts of acids, alkalis, and organic materials.

2.2 MIXES

- A. Mortar for Unit Masonry: Comply with ASTM C 270, proportion specifications, except limit materials to those specified.
- B. Grout: Comply with ASTM C 476. If grout types are not indicated on Drawings, furnish type (fine or coarse) most suitable for the particular job conditions to completely fill cavities and embed reinforcement and other built-in items.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Refer to sections of Specifications which require mortar and masonry grout.

END OF SECTION 04 05 13

SECTION 05 17 00 - SUPPORT SYSTEM FOR SUSPENDED CEILINGS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Provide structural ceiling suspension system as indicated on the Drawings and as specified herein, for all suspended ceiling systems.
- B. This suspension system shall include the attachment to overhead slab, steel angle, plate hanger, and running (carrying) channels and supports
- C. Provide supports for furred areas, and for opening frames, lighting fixtures, furred ceilings and other items.
- D. Furring members and other attachments for the various ceiling materials and systems shall be as specified in the respective Section.

1.02 REFERENCES

- A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.
- B. American Society for Testing and Materials (ASTM)
 - 1. A36 - Specification for Structural Steel
 - 2. A307 - Specification for low Carbon Steel Externally Threaded Standard Fasteners.
 - 3. A446 - Standard Specifications for Steel sheet, Zinc-Coated by the Hot-Dip Process, Structural Quality.
 - 4. A525 - Standard Spec. for General Requirements for Steel Sheet, Zinc-Coated by the Hot-dip Process.
 - 5. A568 - Standard Spec. for Steel, Sheet, Carbon, and High Strength, Low-alloy, Hot-rolled and Cold-rolled, General Requirements for.

1.03 SUBMITTALS

- A. Submit Shop Drawings showing suspension assembly, indicating all components, connections and anchorages.
- B. Submit product data for all components, connections and anchorages.
- C. Submit one (1) samples of each component of the assembly.
- D. Submit sample of anchor and descriptive literature indicating its characteristics; submit laboratory report certifying pullout and shear capabilities for the anchor embedded in the materials to be used in this Project.
- E. "Coordination Drawings" per Part 3 of this Specification Section.

1.04 REGULATORY REQUIREMENTS

- A. New York City Building Code.
- B. New York City Materials Equipment Acceptance (MEA).

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Hangers and Clips
 - 1. Steel Angle and Plate Hanger
ASTM A36. Provide angle 3"x3"x3/16"x1" wide, with 1³/₈" long slot for 3/8" bolt. Provide plate hanger 1" wide x 1/8" minimum thickness, with 1³/₈" long slot for 3/8" bolt. Increase thickness of plate hanger where required to support all loads suspended therefrom plus an additional 200 pounds located at midspan between hangers. Provide painted units at all locations unless indicated otherwise.
 - 2. 3/8" rods attached to ceiling with approved attachment.
- B. Bolts
 - 1. ASTM A307, 3/8" diameter, with lock washers and nuts. Provide shop coat of paint.
- C. Running (Carrying) Channels
 - 1. Minimum dimensions: 1¹/₂" deep x 7/16" wide flanges; S(in.³) = .0538, I(in.⁴) .0404; 475 lbs. per 1000' painted; 508 lbs. per 1000' galvanized; and as indicated on the Drawings. Provide galvanized channels for kitchen ceilings. Provide shop painted channels at other locations unless indicated otherwise on the drawings.
 - 2. Increase size of channels where required such that midspan deflection, under all loads supported therefrom, shall not exceed 1/360 of the span, in accordance with the New York City Building Code. Loads shall include all ceiling materials, lighting fixtures, and other equipment and items supported by the channels.
 - 3. ASTM A568 for painted channels.
- D. Anchors (hanger assembly to deck)
 - 1. Manufacturers
 - a. Hilti Fastening Systems.
 - b. Illinois Tool Works, Inc.
 - c. ITW Ramset
 - d. Simpson Strong-Tie Co., Inc.
 - 2. Stainless Steel or Galvanized
 - 3. Anchors
 - a. Expansion bolt or powder actuated fastener of capacity indicated below.
 - b. Threaded stud or internally threaded sleeve anchor of capacity

indicated below.

4. Safe working loads: For pullout 300 lbs. (minimum); for shear 300 lbs. (minimum); for strength of concrete (minimum 3,000 p.s.i. lightweight concrete). Provide increased pullout capacity as required to ensure that each hanger is capable of carrying all loads suspended therefrom plus additional 200 pounds loads located at midspan of running channels.
5. Isolators - Mason Industry 30 NCC. Precompressed 30N hanger with ceiling channel clamps.

2.02 PAINTING

- A. All steel members and accessories of the support system unless galvanized or of stainless steel, shall be dipped or painted with one coat approved asphaltum paint.

PART 3 - EXECUTION

3.01 COORDINATION WITH OTHER TRADES

- A. Coordinate this Work with the various trades who may have ducts, pipes, conduits, or other Work in the spaces above the suspended ceilings, in order that anchors, hangers and running channels may be properly placed to avoid such ducts, pipes, conduits, and other obstructions. Any changes required to be made in the locations of anchors, hangers, and running channels by reason of the Contractor's failure to observe this requirement shall be made by the Contractor without additional cost to the Owner.
- B. Coordinate Work with ceiling systems work.
- C. Provide "Coordination Drawings" of any Work above suspended ceilings. Such "Coordination Drawings" shall indicate all penetrations and interferences with the ceiling height.
 1. The "Coordination Drawings" shall be drawn at a scale of no less than $3/8" = 1'-0"$ and shall represent the coordinated Work of all the following building elements (if required):
 - structure
 - ceiling construction
 - mechanical
 - electrical
 - plumbing
 - fire protection

3.02 SUPPORT SYSTEM LOCATIONS

- A. Provide support system: for all suspended ceiling systems and for enclosures or furring systems indicated on the Drawings or specified herein.

3.03 INSTALLATION

- A. Secure 3" x 3" steel angle to structural concrete deck or structural steel with approved anchors. To accommodate the running channel layout space anchors at 48" o.c. maximum in each direction, and as indicated on the Drawings.
- B. Attach steel plate hangers to angle with 3/8" diameter bolt, lock washer, and nut.
- C. Attach running channels to plate hangers with 3/8" diameter bolt, lock washer and nut.
- D. Install channels level, true to grid layout, at proper height, ready to receive the ceiling system: furring members for lath and plaster or gypsum board. Provide type of clip required to maintain indicated ceiling height in coordination with clearances required for equipment above the ceiling.
- E. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

3.04 CEILING OPENINGS

- A. Provision shall be made for the installation of lighting fixtures, ventilating or air conditioning equipment, sprinkler heads, access openings, and other ceiling openings.
- B. Rigid frames of furring members shall be provided around openings, adequately braced and reinforced.

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 GENERAL

1.01 WORK OF THIS SECTION INCLUDES:

All structural steel framing and framing to support various architectural components.

1.02 REFERENCES

- A. Except as shown or specified otherwise, the Work of this Section shall meet the requirements of the following:
1. Design and Fabrication of Cold-Formed Shapes: "Specification for the Design of Cold-Formed Steel Structural Members", by the American Iron and Steel Institute (AISI Specification).
 2. Welding: "Structural Welding Code - Steel, AWS D1.1", or "Structural Welding Code - Sheet Steel, AWS D1.3", by the American Welding Society (AWS Codes).
- B. Organizations:
1. AISI: American Iron and Steel Institute, 1140 Connecticut Ave., NW, Suite 705, Washington, D.C. 20036, (202) 452-7100, www.steel.org.
 2. AWS: American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126, (800) 443-9353, www.aws.org.
 3. ANSI: American National Standards Institute, 1819 L Street, NW, 6th Floor, Washington, DC 20036, (202) 293-8020, www.ansi.org.
 4. ASME: ASME International, 3 Park Ave., New York, NY 10016-5990, (800) 843-2763, www.asme.org.
 5. ASTM: ASTM International, 100 Barr Harbor Dr., PO Box C700, West Conshohocken, PA, 19428-2959, (610) 832-9500, www.astm.org.
 6. MPI: The Master Painters Institute Inc., 2808 Ingleton Ave., Burnaby, BC, V5C 6G7, (888) 674-8937, www.specifypaint.com.
 7. SSPC: The Society for Protective Coatings, 40 24th Street, 6th Floor, Pittsburgh PA 15222-4656, (877) 281-7772, www.sspc.org.

1.03 SUBMITTALS

- A. Shop Drawings: Show application to project. Furnish setting drawings and templates for installation of bolts and anchors in other Work. Indicate shop and field welds by standard AWS welding symbols in accordance with AWS A2.4.
- B. Product Data: Catalog sheets, specifications, and installation instructions for each fabricated item specified, except submit data for fasteners only when directed.

1.04 DELIVERY AND STORAGE

- A. Coordinate delivery of items to be built into other construction to avoid delay.
- B. Promptly cover and protect steel items delivered to the Site.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Steel Shapes, Plates, and Bars: ASTM A 36.
- B. Steel Plates to be Cold-Formed: ASTM A 283, Grade C.
- C. Steel Bars and Bar-Size Shapes: ASTM A 675, Grade 70; or ASTM A 36.
- D. Cold-Finished Steel Bars: ASTM A 108, grade as selected by fabricator.
- E. Steel Tubing: Hot-formed, welded or seamless, structural tubing; ASTM A 501.
- F. Cold-Drawn Steel Tubing: ASTM A 512, buttwelded, cold-finished carbon steel tubing, sink drawn and stress relieved.
- G. Cast Iron Castings: ASTM A 48, gray iron castings, Class 30.
- H. Steel Pipe: ASTM A 53, type as selected, Grade A; black finish unless galvanizing is required; standard weight (Schedule 40), unless otherwise shown or specified.
- I. Anchors: Except where shown or specified, select anchors of type, size, style, grade, and class required for secure installation of metal fabrications. For exterior use and where built into exterior walls, anchors shall be galvanized or of corrosive-resistant materials.
 - 1. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent test agency.
 - a. Carbon Steel: Zinc-Plated; ASTM B 633, Class Fe/Zn 5.
 - b. Stainless Steel: Bolts, Alloy Group 1 or 2; ASTM F593, Nuts; ASTM F 594.

- J. Fasteners: Except where shown or specified, select fasteners of type, size, style, grade, and class required for secure installation of metal fabrications. For exterior use and where built into exterior walls, fasteners shall be galvanized.
1. Standard Bolts and Nuts: ASTM A 307, Grade A, regular hexagon head.
 2. Stainless Steel Fasteners: ASTM A 666; Type 302/304 for interior Work; Type 316 for exterior Work; Phillips flathead (countersunk) screws and bolts for exposed Work unless otherwise specified.
 3. Eyebolts: ASTM A 489.
 4. Machine Bolts: ASME B18.5 or ASME B18.9, Type, Class, and Form as required.
 5. Machine Screws: ASME B18.6.3.
 6. Lag Screws: ASME B18.2.1.
 7. Wood Screws: Flat head, ASME B18.6.1.
 8. Plain Washers: Round, ASME B18.22.1.
 9. Lock Washers: Helical, spring type, ASME B18.21.1.
 10. Toggle Bolts: Spring Wing Type; Wing AISI 1010, Trunion Nut AISI1010 or Zamac Alloy, Bolt Carbon Steel ANSI B18.6.3.
- K. Shop Paint (General): Universal shop primer; fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- L. Shop Paint for Galvanized Steel: Epoxy zinc-rich primer; complying with MPI#20 and compatible with topcoat.
- M. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.02 MISCELLANEOUS FRAMING AND SUPPORTS

- A. Fabricate metal framing and supports to support related items required by the Work. Fabricate of welded construction unless otherwise indicated. Preassemble to largest extent possible, off site.

2.03 MISCELLANEOUS STEEL TRIM

- A. Fabricate trim of shapes, sizes, and profiles shown, with continuously welded joints and ground smooth exposed edges, unless otherwise indicated or approved. Use concealed field splices wherever possible. Furnish necessary cutouts, fittings, and anchorages.

2.04 FABRICATION

- A. Use materials of size and thickness indicated. If not indicated, use material of required size and thickness to produce adequate strength and durability for the intended use of the finished product. Furnish suitable, compatible anchors and fasteners to support assembly.
- B. Fabricate items to be exposed to view of material entirely free of surface blemish, including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove surface blemishes by grinding or by welding and grinding prior to cleaning, treating, and finishing. Ease exposed edges to a radius of approximately 1/32 inch unless otherwise shown.
- C. Joints: Fabricate accurately for close fit. Weld exposed joints continuously unless otherwise indicated or approved. Dress exposed welds flush and smooth.
- D. Connections: Form exposed connections with flush, smooth, hairline joints. Use concealed fasteners wherever possible. Use Phillips flathead (countersunk) bolts or screws for exposed fasteners, unless otherwise shown or specified.
 - 1. Furnish flat washer under connections requiring raised bolt heads.
 - 2. Furnish lock washer under nuts when through-bolting occurs.
- E. Punch, reinforce, drill, and tap metal Work as required to receive hardware and other appurtenant items.
- F. Galvanizing:
 - 1. Unless otherwise specified or noted, items indicated to be galvanized shall receive a zinc coating by the hot-dip process, after fabrication, complying with the following:
 - a. ASTM A 153 for iron and steel hardware.
- G. Shop Painting:
 - 1. Cleaning Steel: Thoroughly clean all steel surfaces. Remove oil, grease, and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning". Remove loose mill scale, loose rust, weld slag and spatter, and other detrimental material in accordance with SSPC SP-2 "Hand Tool Cleaning", SSPC SP-3 "Power Tool Cleaning", or SSPC SP-7 "Brush-Off Blast Cleaning".
 - 2. Apply one coat of shop paint to all steel surfaces except as follows:
 - a. Do not shop paint steel surfaces to be field welded.
 - b. Apply 2 coats of shop paint, before assembly, to steel surfaces inaccessible after assembly or erection. Paint color to be determined by Architects.

3. Apply paint and compound on dry surfaces in accordance with the manufacturer's printed instructions, and to the following minimum thickness per coat:
 - a. Shop Paint (General): 4.0 mils wet film.
 - b. Cold Galvanizing Compound: 2.0 mils dry film.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Fit and set fabricated metal Work accurately in location, alignment, and elevation. Securely fasten in place. Cut off exposed threaded portion of bolts flush with nut.

END OF SECTION 05 50 00

SECTION 05 55 00 – METAL STAIR TREADS & NOSINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Safety treads and nosings for stairs, including the following types:
 - 1. Extruded aluminum safety treads and nosings.

1.2 RELATED SECTIONS

NONE

1.3 REFERENCES

- A. Americans with Disabilities Act (ADA).
- B. ASTM International (ASTM):
 - 1. ASTM B 30 - Standard Specification for Copper Alloys in Ingot Form.
 - 2. ASTM D 635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
 - 3. ASTM D 4828 - Standard Test Methods for Practical Washability of Organic Coatings.
 - 4. ASTM D 3648 - Standard Practices for the Measurement of Radioactivity.
- C. International Standards Organization (ISO): ISO 17398 - Safety colors and safety signs -- Classification, performance and durability of safety signs.
- D. SMP 800C: Toxic gas sampling and analytical procedures.
- E. Pressure Sensitive Tape Council Standards (PSTC): PSTC101 Peel Adhesion of Pressure Sensitive Tape.
- F. Federal Test Method Standards: 501a - Standard for Fire Safety Criteria for Manufactured Home Installations, Sites, and Communities.
- G. New York City Building Code Reference Standards: RS 6-1 - Photoluminescent exit path markings.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.
 3. Neoprene Contact Cement.
 4. Installation methods.
 5. Cleaning and maintenance instructions.
- C. Shop Drawings: Provide shop drawings indicating details of construction and installation.
- D. Selection Samples: Submit two sets of samples showing available colors, patterns, textures, and finishes.
- E. Verification Samples: For each product specified, two samples, representing actual materials.

1.5 QUALITY ASSURANCE

- A. Slip Resistance: Provide units that comply with authorities having jurisdiction, including but not limited to ADA, OSHA and local building codes and accessibility codes.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations and industry standards. Protect from damage.
- B. Store products in manufacturer's labeled packaging until ready for installation.

1.7 SEQUENCING AND SCHEDULING

- A. Conference: Convene a pre-installation conference to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

1.8 WARRANTY

- A. Warranty for Safety Treads for Renovation: Manufacturer's standard limited warranty for materials and workmanship.
1. Warranty Period: 2 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: American Stair Treads: 152 Rollins Ave. #102; Rockville, MD 20852; Tel: 800-762-9010; Fax: 240-780-3309; Email: help@americanstairtreads.com); Web: www.americanstairtreads.com

- B. Or approved equal.

2.2 EXTRUDED ALUMINUM SAFETY TREADS AND NOSINGS

- A. Extruded Aluminum Safety Treads and Nosings: Grit Strip Stair Treads
 1. Type: 9/32" thick at nosing. Nosing 1-1/8" deep.
 2. Tread color: Black.
 3. Size: 48" long, 11" deep.
 4. Anchoring: Neoprene contact cement.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.
- B. Do not proceed with installation until substrates have been properly prepared and deviations from manufacturer's recommended tolerances are corrected. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Commencement of installation constitutes acceptance of conditions.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's written instructions and recommendations, including but not limited to the following.
 1. Remove protective tape, if used, upon completion of installation.
 2. Close area after installation; permit no use for 24 hours.

3.3 CLEANING AND PROTECTION

- A. Cleaning: Clean treads and nosings as recommended by manufacturer. Remove scuff and heel marks prior Substantial Completion.
- B. Protection: Protect installed work from damage due to subsequent construction activity on the site.

END OF SECTION

SECTION 05 71 00 – MISCELLANEOUS METALS

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

1. Installation accessories.
2. Channels, metal pans and plates.
3. Metal blocking

1.2 REFERENCE STANDARDS

- A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.

1. American Society for Testing and Materials (ASTM).
 - A501 Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
 - A568 Standard Specification for Steel, Sheet, Carbon, and High Strength Low Alloy, Hot Rolled and Cold Rolled
 - A325 Standard Specification for Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength Structural Bolts
 - A563 Standard Specification for Carbon and Alloy Steel Nuts
 - E70 Standard Test Method for PH of Aqueous Solutions with the Glass Electrode
 - E985 Standard Specification for Permanent Metal
2. ANSI/BHMA (A156.9-2003) American National Standard for Cabinet Hardware
3. American Welding Society (AWS).
 - D1.1 “Structural Welding Code – Steel”
 - D1.2 “Structural Welding Code – Sheet Steel”

1.3 SUBMITTALS

- A. Shop Drawings
1. Submit Shop Drawings for all grilles, control joints and trims. Installation to be coordinated with field conditions, adjacent materials installation. Sizes will vary.
- B. Manufacturer’s Data
- Submit manufacturers catalog data for:

1. Paint Grade Products
2. Adjustable Shelving Metal Brackets

1.4 PERFORMANCE CRITERIA

- A. Assume all responsibility for the correctness and accuracy of installation, and take and verify all measurements at the Building. The Contractor shall assume full responsibility for the correctness of dimensions and fit.

1.5 QUALITY ASSURANCE

- A. Fabricators: Five (5) years minimum experience in steel fabrications of similar Work.
- B. Welding – Shop & Field: Certify that each welder has satisfactorily passed qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- C. Comply with requirements specified herein of the New York City Building Code.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Fry Reglet Reveals and Moldings:
- | | |
|--|--|
| 1. Fry Reglet Corporation
1377 Stonefield Court
Alpharetta, GA 30004
Phone: 800-237-9773
Fax: 800-200-4397 | Fry Reglet Corporation
12342 Hawkins Street
Santa Fe Springs, CA 90670
Phone: 800-237-9773
Fax: 800-200-4397 |
|--|--|
2. Or approved equal.

2.2 MATERIALS

- A. Steel pipes, plate, angles, channels, beams, bars and other hot-rolled Sections: ASTM A36.
- B. Bolts: ASTM A325: a563 nuts.
- C. Fry Reglet Reveals and Moldings:
1. Reveal: Reveal Channel Screed DCS-625-50
 - a. Reveal Finish: Anodized Aluminum
 2. Molding: L Trim Molding DRML-625
 - a. Molding Finish: Paint to match adjacent wall, as per the Design Documents.

2.3 PAINTING

- A. Remove oil, grease and similar contaminants in accordance with SSPC SP-1 “Solvent Cleaning”, prior to any additional surface preparation specified.
- B. Immediately after surface preparation, paint as per Painting Section.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate and furnish anchorages, shop drawings, diagrams, instructions, and directions for installation of anchorages, such as inserts, sleeves, anchor bolts and miscellaneous items having integral anchors.

3.2 INSTALLATION

- A. Fastening to Construction: See details on drawings.

3.3 CONNECTIONS

- A. Other connections: Fillet welds; grind smooth, where exposed.
- B. Field Welding: Comply with AWS for procedures of welding, appearance and quality of welds made, and methods used in correcting welding work.
- C. Coordination: Coordinate and schedule this work with the work of other trades. Provide soffit clips on stringers required for securing other work, so as to achieve the proper fire rating.

END OF SECTION 05 71 00

SECTION 06 06 70 – PLASTIC SURFACING MATERIALS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Decorative Laminates for Millwork.

1.2 RELATED SECTIONS

- A. Section 06 10 00 – Rough Carpentry
- B. Section 06 40 00 – Architectural Woodwork

1.3 REFERENCES

- A. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.
- B. ASTM D 790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- C. ASTM D 2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by means of a Barcol Compressor.

1.4 SUBMITTALS

- A. Samples:
 - 1. Verification Samples: Submit two samples, each 12 inches square, illustrating selected surfacing material in specified color, pattern, and finish
- B. Manufacturer's Instructions:
 - 1. Submit manufacturer's printed installation instructions for each product.
 - 2. Submit Manufacturer's Safety Data Sheets (M.S.D.S.) for each adhesive and laminate

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products in accordance with General provisions.
- B. Store surfacing materials to prevent breakage and marring of surfaces in accordance with manufacturer's printed instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Wilsonart International
2400 Wilson Place, P. O. Box 6110

Temple, TX 76503-6110
Tel: (254) 207-7000
Fax: (254) 207-2384
Response Line: (800) 433-3222.
email: smartline@wilsonart.com
website: www.wilsonart.com

2. Formica
Cardinal Sales Inc.
301 E. 58th Street
New York, NY 10022
212.888.8400
3. Nevamar
Panolam Industries International, Inc.
20 Progress Drive
Shelton, CT 06484
203.925.1556

2.2 DECORATIVE LAMINATES

- A. Acceptable Product:
 1. Wilsonart Laminate, Formica Laminate, Nevamar Laminate
- B. Product Description:
 1. Decorative surface papers, impregnated with melamine resins, bonded under heat and pressure to kraft papers impregnated with phenolic resins.
- C. Standard Decorative Laminate - General Purpose Type:
 1. Laminate having the following physical characteristics:
 - a. Sheet thickness: 0.048 inch nominal (1.22mm)
 - b. Exceeding performance requirements of NEMA LD 3 current revision Grade HGS.
 - c. Surface burning characteristics in accordance with ASTM E 84; unbonded.
 - d. Pattern: As indicated on Finish Legend.

2.3 ACCESSORY MATERIALS

- A. Adhesives: Provide types as specified in manufacturer's printed installation instructions.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface preparation: Precondition surfacing materials and surfaces to receive surfacing materials in accordance with manufacturer's printed installation instructions.

3.2 APPLICATION

- A. Install materials in accordance with manufacturer's printed instructions.

END OF SECTION 06 06 70

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions shall apply to the Work of this section.

1.2 DESCRIPTION OF WORK

- A. Provide rough carpentry Work as indicated on the Drawings, as required for the completed Work of this Contract, and as specified herein, including, but not limited to, the following:
 - 1. Wood grounds, nailing strips, blocking, furring, nailers, and framing.
 - 2. Rough hardware, including nails, screws, anchors, brackets, braces, bolts, nuts, fittings, and other devices required for the proper fitting, connecting, and erecting of the Work.
 - 3. Fire-retardant treatment for wood.
 - 4. Miscellaneous lumber and plywood.

1.3 REFERENCES

- A. U.S. Department of Commerce.
- B. American Plywood Association (APA).
- C. Western Wood Product Association (WWPA).
- D. Southern Pine Inspection Bureau (SPIB).
- E. Redwood Inspection Service (RIS).
- F. American Wood Preservers' Association (AWPA).
- G. American Society for Testing and Materials (ASTM).
- H. Underwriters Laboratories, Inc. (UL).
- I. Federal Specifications (FS).
- J. American Lumber Standards Committee (ALSC).
- K. West Coast Lumber Inspection Bureau (WCLIB).
- L. American Wood Preservers Bureau (AWPB).
- M. National Fire Protection Association (NFPA).

1.4 SUBMITTALS

- A. Quality Control Submittals
 - 1. Certificates: Certification for the following wood treatments:

- a. Dip Treatment: Certification by treating plant stating chemical solutions used, submersion period, and conformance with applicable standards.
- b. Pressure Treatment: Certification by treating plant stating chemicals and process used, net amount of chemical preservative retained, and conformance with specified standards.
- c. Waterborne Preservatives: Certified written statement that moisture content of treated materials was reduced to a maximum of 19 percent prior to shipment to Project site.
- d. Fire-Retardant Treatment: Certification by treating plant stating treated material complies with specified standards and treatment will not bleed through specified finishes.

1.5 QUALITY ASSURANCE

- A. Mill and Producers Mark
Each piece of lumber and plywood shall be gradestamped indicating type, grade, mill, and grading agency certified by the Board of Review of the American Lumber Standards Committee. Mark shall appear on unfinished surface, or ends of pieces with finished surfaces.
 1. Fire-Retardant Treated Material: Accredited testing agency mark on each piece of wood indicating compliance with the fire hazard classification.
- B. Standards
Comply with the following unless otherwise specified or indicated on the Drawings:
 1. Lumber: American Softwood Lumber Standard PS 20 by the U.S. Department of Commerce. Comply with applicable provisions by each indicated use.
 2. Plywood: Product Standard PS 1 for Softwood Plywood, Construction and Industrial by the U.S. Department of Commerce.
 3. Plywood Installation: APA Design/Construction Guide, by the American Plywood Association (APA), except as indicated otherwise.
 4. Grading Rules:
 - a. Douglas Fir, Hem-Fir, Idaho White Pine, and other Western Woods: Western Wood Products Association (WWPA) or West Coast Lumber Inspection Bureau (WCLIB).
 - b. Southern Pine: Southern Pine Inspection Bureau (SPIB).
 - c. Redwood: Redwood Inspection Service (RIS).
 5. Fire-Retardant Treatment: American Wood Preservers' Association (AWPA) Standards.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Keep materials dry during delivery. Store materials 6" minimum above ground surface. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber and plywood, and provide air circulation between stacks.
- B. Cover stored materials until ready for use for protection from moisture. Place and anchor covering in a manner which will assure good ventilation under the covering.

1.7 PROJECT CONDITIONS

- A. Correlate location of supporting members to allow proper attachment of other Work.

PART 2 - PRODUCT

2.1 LUMBER

- A. General:
Furnish seasoned dimensional lumber dressed to nominal sizes indicated with 19 percent maximum moisture content at time of dressing, marked "S-DRY". Comply with dry size requirements of PS 20.
 - 1. Dress: Surfaced 4 sides (S4S) unless otherwise indicated.
- B. Miscellaneous Lumber:
Standard grade, No. 3 grade, or better grade of the following species unless otherwise indicated:
 - 1. Nailers and Blocking: Douglas Fir, Hem-Fir, Idaho White Pine or Southern Pine.
 - 2. Furring: Douglas Fir or Southern Pine.

2.2 MISCELLANEOUS MATERIALS

- A. Adhesive:
APA Specification AFG-01.

2.3 FIRE-RETARDANT TREATMENT

- A. All lumber is to be fire-retardant treated, provide "FR-S" lumber, complying with AWWA Standards for pressure impregnation with fire-retardant chemicals to achieve a flamespread rating of 25 or less, when tested in accordance with UL Test 723, ASTM E84 or NFPA Test 255.
 - 1. Provide UL label or identifying mark on each piece of fire-retardant lumber.

2. Redry treated items to a maximum moisture content of 19 percent after treatment.
- B. Fire-retardant Treated Plywood:
Comply with APA requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
Examine substrate and supporting structure on which rough carpentry is to be installed for defects that will adversely affect the execution and quality of the Work. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION - GENERAL

- A. Do not use units of material with defects which impair the quality of the Work and units, which are too small to fabricate the Work with minimum joints or with optimum joint arrangement.
- B. Install Work accurately to required lines and levels with members plumb and true, accurately cut and fitted and securely fastened. Closely fit rough carpentry to other associated construction.
- C. Securely attach carpentry Work to substrates by anchoring and fastening as indicated, or, if not indicated, as required by the referenced standards. Select fasteners of size that will not penetrate through members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required. Set nail heads in exposed Work which is to be painted or stained and fill resulting holes.
- D. Fire-retardant Wood
Do not rip or mill; only end cuts, drilling holes and joining cuts shall be permitted.

3.3 WOOD NAILERS, BLOCKING, AND GROUNDS

- A. Install required items where indicated and where required for support, attachment or screeding of other Work. Form to shapes indicated or required. Coordinate locations and cut and shim as required to provide items at true and level planes to receive Work to be attached. Install closure strips to nailers at all edges.
1. Attach to substrates as indicated; if not indicated, size and space fasteners as required to support applied loading. Maximum spacing of fasteners shall not exceed 16".

3.4 PLYWOOD APPLICATIONS

- A. Comply with printed installation requirements of the APA Design Construction Guide for plywood application unless otherwise noted.

3.5 ROUGH HARDWARE

- A. Furnish all rough hardware, such as nails, bolts, clips, and all other rough hardware required to secure the carpentry work in place, unless otherwise specified.

END OF SECTION 06 10 00

SECTION 06 10 53 - WOOD NAILERS AND BLOCKING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Rough Carpentry: Section 06 10 00.

1.02 QUALITY ASSURANCE

- A. Mill and Producer's Stamp: Each piece of lumber shall bear a stamp indicating type, grade, mill, and grading agency.
 - 1. Pressure treated wood shall bear a stamp or tag indicating the name of the treating company, year treated, preservative used, the level of treatment, intended use (appropriate AWWPA Standard), and logo of inspecting company.
- B. Gypsum Board Assemblies: 09 29 00

1.03 STORAGE

- A. Store lumber a minimum of 6 inches off the ground, in a dry, well-ventilated place, protected from the weather.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Lumber: "Standard" Grade Douglas Fir, Hem-Fir, White Pine, Southern Pine, or Spruce-Pine-Fir pressure preservative treated in accordance with the American Wood Preservers Association (AWPA) Standard U1, Commodity Specification A for the requirements listed under Use Category UC2 and kiln dried to 19 percent moisture content after treatment.
 - 1. Use Category UCFA and UCFB: Wood nailers and blocking intended for fire protection and is used in either interior weather protected (UCFA) or exterior construction, exposed to weather (UCFB).
- B. Nails, Screws, and Bolts: ASTM A653 Class G185 hot dipped galvanized, zinc or cadmium plated, or silicon bronze.
 - 1. Screws and Bolts for fastening to Aluminum: Stainless steel, Type 304 or 316.

- C. Expansion Anchors: G185 Hot dipped galvanized steel wedge anchors, FS FF-S-325, Group II, Type 4, Class 1.
- D. Toggle Bolts: Cadmium or zinc plated tumble - wing type; FS FF-B-588.
- E. Self Threading Masonry Screws: Zinc Plated; "Tapcon" by Elco Industries, Inc., 1111 Samuelson Rd., PO Box 7009, Rockford, IL 61125-7009, (815) 397-5151.
- F. Separation Membrane For Aluminum Metals: Self adhering, self sealing, rubberized asphalt sheet membrane.
 - 1. Physical Properties:
 - a. Thickness: 40 mils minimum ASTM D 3767 Method A.
 - b. Tensile strength: 250 psi ASTM D 412.
 - c. Elongation (ultimate failure of the rubberized asphalt) 250% ASTM D 412 Die C Modified).
 - d. Permeance: 0.05 Perms max.) ASTM E 96.
 - 2. "Ice And Water Shield" by W.R. Grace Co., 62 Whittemore Ave., Cambridge, MA 02140, (800) 354-5414; "Deck Guard" by Polyguard Products Inc., P.O. Box 755, Ennis, TX 75120, (800) 541-4994; "MetalSeal" by NEI Advanced Composite Technology, 50 Pine Road, Brentwood, NH, (800) 998-4634.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install nailers and blocking true to line and plane within a tolerance of 1/8 inch in 10 feet.
- B. Fit joints neatly with no more than 1/16 inch space between abutting members.
- C. Do not install nailers or blocking across bonding expansion joints.
- D. Attach nailers and blocking securely as required to properly support the items that will be attached to them.
- E. Space fasteners equally at not more than 16 inches on center and 4 inches from each end of each member, unless noted otherwise. Secure the nailers and blocking with the following types of fasteners:
 - 1. To Cast-In-Place Concrete, Solid Concrete Masonry Units, and Brick: Use expansion anchors or self-threading masonry screws.
 - 2. To Faces of Hollow Concrete Masonry Units: Use toggle bolts.
 - 3. To Tops of Hollow Concrete Masonry Units: Use anchor bolts extending to course below, embedded in 3000 psi concrete filled cores.
 - 4. To Wood: Use nails or screws.
 - 5. To Metal: Use bolts or self-tapping screws.

- F. Countersink fasteners if they interfere with the proper installation of items to be attached to the nailers and blocking.

END OF SECTION

SECTION 06 20 00 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Wood Nailers and Blocking: Section 06 10 53.
- B. Architectural Woodwork: Section 06 40 00.

1.2 REFERENCES

- A. Comply with the applicable provisions of the "Architectural Woodwork Quality Standards, Guide Specifications and Quality Certification Program" (Fifth Edition) of the Architectural Woodwork Institute (AWI) except as otherwise specified herein. References to "Premium", "Custom" and "Economy" Grades herein, shall be as defined in that Standard.
- B. Lumber Standard: AWI Section 100.
- B. Lumber Standard; American Softwood Lumber Standard: U.S. Dept. of Commerce Product Standard PS-20.
- C. Panel Products: AWI Section 200.
- D. Preservative Treatment Standard: American Wood Protection Association Standard (AWPA) U1-02

1.3 SUBMITTALS

- A. Shop Drawings: Show fabrication details and connections to adjacent Work.
- B. Samples:
 - 1. Plastic Laminate: 12 inch square section; each type.
 - a. Color Samples: Manufacturer's standard colors, textures, patterns, and finish.
- C. Quality Control Submittals:
 - 1. Dip Treatment Certificates: Certification by treating plant stating chemical solutions used, submersion period, and conformance with specified standards.
 - 2. Pressure Treatment Certificates: Certification by treating plant stating chemicals and process used, net amount of salts retained, and conformance with specified standards.

1.4 QUALITY ASSURANCE

- A. Mill and Producer's Label: Each lumber and panel item shall bear label indicating type, grade, mill, and grading agency on unfinished surface, or on end of material with finished surfaces.
 - 1. Panels shall bear APA or equivalent grade-mark; each panel.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials and completed fabricated wood items in a dry, well-ventilated area completely protected from the weather. Comply with temperature and humidity requirements for storage and installation as specified in the applicable quality standards.
- B. Protect sanded and prefinished surfaces during handling and installation. Keep such surfaces covered with polyethylene film or other suitable protective covering.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements: Maintain constant minimum temperature of 60 degrees F and maximum relative humidity of 55 percent in spaces to receive the Work of this Section.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Lumber: Kiln-dried to 12 percent average moisture content for exterior Work; 8 percent for interior Work.
- B. Fasteners:
 - 1. Nails, Spikes, and Staples: Size and type to suit application; non-ferrous metal or galvanized steel for exterior locations, high humidity locations, treated wood, and wood to receive transparent finishes; plain finish for other interior locations.
 - 2. Bolts, Nuts, Washers, Lags, and Screws: Medium carbon steel; size and type to suit application; galvanized for exterior locations, high humidity locations, and treated wood; plain finish for other interior locations.
 - 3. Anchors: Toggle bolt type for anchorage to hollow masonry; expansion shield and lag bolt type for anchorage to solid masonry or concrete; galvanized steel or stainless steel.

2.2 STANDING AND RUNNING TRIM

- A. Comply with AWI Sections 300, 700, or 900 as applicable, and as otherwise specified herein.

2.3 PRESERVATIVE TREATMENT

- A. Dip Treatment: Comply with AWI Section 100 and as otherwise specified.
 - 1. Inspect wood items after treatment. Discard warped or twisted items.
 - 2. Treat interior wood items where indicated.
- B. Pressures Treatment: AWWPA U1 Standards; kiln-dried to required moisture content after treatment. Inspect wood items after treatment, discard warped or twisted items. Treat the following items:

2.4 FABRICATION

- A. Machine and sand wood surfaces to comply with the requirements of the AWI Quality Grade specified.
- B. Mill assemble items to largest sizes practicable, to minimize field cutting and jointing. Allow for cutting and fitting where necessary to fit at the Site.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine substrate conditions and surfaces upon which finish Work is to be installed. Do not proceed with finish Work until unsatisfactory substrate conditions are corrected.

3.2 PREPARATION

- A. Condition the Work of this Section to average prevailing humidity conditions in installation areas prior to installing.

3.3 INSTALLATION

- A. Comply with workmanship and finishing standard requirements of the AWI Quality Grade specified herein.
- B. Install the Work plumb, level, and free of distortion. Shim where required, with concealed shims.
- C. Cut wood items to fit unless specified to be shop-fabricated, or shop-cut to exact size. Scribe and cut for accurate fit where Work abuts other finish Work. Drill pilot holes at corners before making cutouts.
- D. Distribute defects to the greatest appearance advantage possible.
- E. Trim and Moulding: Install in single, unjointed lengths at openings and for runs less than the maximum lumber length available. For long runs, use only 1 piece

less than the maximum length available in any straight run. Stagger joints in adjacent members. Cope moulding at returns. Miter at corners.

- F. Attach the Work securely in place.
 - 1. Nailing: Blind nail where possible. Use finishing nails where exposed. Set nail heads for filling, except for exterior wood scheduled to receive natural finish (if any).
 - 2. Anchoring: Secure the Work to anchors or to blocking which is built-into or directly attached to substrates.

- G. Treated Wood: Coat exposed surfaces of treated field-cut wood items with a heavy brush coating of the same preservative.

- H. Casework: Install Work in a manner consistent with the AWI Quality Grade specified.
 - 1. Secure casework to grounds, stripping, or blocking with countersunk concealed fasteners and blind nailing, as required to provide a rigid installation. Scribe and cut for accurate fit to other finish Work.
 - 2. Adjust and lubricate casework hardware for proper operation.

- I. Plastic Laminated Finish Work: Comply with finish requirements of AWI Quality Grade specified herein.
 - 1. Coordinate and verify sizes and locations of openings for fixtures with actual fixture sizes. Form inside corners to a radius of not less than 1/8 inch. Rout cutouts, and file cut edges to smooth surfaces free of cracks.

3.4 CLEANING

- A. Clean exposed surfaces of prefinished Work.

3.5 PROTECTION

- A. Protect installed Work from damage by Work of other trades. Maintain temperature and humidity requirements during the construction period in interior installation areas.

END OF SECTION

SECTION 06 40 00 - ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions shall apply to the work of this section.

1.2 DESCRIPTION OF WORK

- A. Provide woodwork as indicated on the Drawings and as specified herein, including, but not limited to the following:
 - 1. Wood trim to be painted.
 - 2. Plywood
 - 3. Countertops.
 - 4. Millwork

1.3 RELATED SECTIONS

- | | |
|---------------------------|------------------|
| A. Rough Carpentry | Section 06 10 00 |
| B. Finish Carpentry | Section 06 20 00 |
| C. Architectural Woodwork | Section 06 40 00 |
| D. Painting | Section 09 91 00 |

1.4 REFERENCES

- A. Architectural Woodwork Institute (AWI)
- B. American Society for Testing and Materials (ASTM)
- C. American National Standards Institute (ANSI).

1.5 SUBMITTALS

- A. Drawings shall be prepared indicating location and fastening.
- B. Product Data: Submit manufacturer's product data for each product and process specified as work of this Section.
- C. Quality Certifications: Submit Manufacturer's (Fabricator's) certification, stating that fabricated woodwork complies with AWI quality grades and other requirements indicated herein.
- D. Wood Treatment Data: Submit chemical treatment manufacturer's instruction for handling, storing, installation, and finish of treated material.
- E. Fire-Retardant Treatment: Include certification by treating plant that treated materials comply with requirements.
- F. Regulatory Certification: For each manufactured item.
- G. Shop Drawings: Submit Shop Drawings showing location of each item,

dimensioned plans and elevations, large scale details and profiles, attachment devices and other components.

1. Identify woodwork using same identification system shown on Architectural Drawings.
 2. Coordinate details and cut-outs to accommodate accessories specified under other Sections.
 3. Provide field sample.
- H. Samples: Submit the following samples representative of quality to be provided in finished work:
- I. Catalogue cuts for all hardware.

1.6 QUALITY ASSURANCE

- A. AWI Quality Standard: Comply with applicable requirements of the AWI "Architectural Woodwork Quality Standards", except where indicated otherwise.
- B. Fabrication and Installation Qualifications: firm which can demonstrate a minimum of 5 years of successful experience in fabricating and installing woodwork items similar in type and quality to those required for this project.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soiling and deterioration.
- B. Do not deliver woodwork, until operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If woodwork must be stored, store only in areas meeting requirements specified for installation areas.

PART 2 - PRODUCTS

2.1 FABRICATION, GENERAL

- A. Wood Moisture Content: Comply with requirements of referenced quality standard for moisture content of lumber and plywood at time of fabrication and for relative humidity in installation areas.
- B. Fabricate wood work to dimensions, profiles, and details indicated with openings and mortises precut, where possible, to receive hardware and other items and work.
- C. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary, provide ample allowances for scribing, trimming, and fitting.
- D. Pre-Cut Openings: Provide wood work with pre-cut openings, where possible, for hardware, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams for proper size and shape. Smooth edges of cutouts and, where located in countertops, seal edges of cutouts with a water-resistant coating.

- E. Measurements: Before fabrication of wood work to be fitted to other construction, obtain field measurements and verify dimensions and shop drawing details as required for accurate fit.
- F. Wood work construction shall comply with the requirements of AWI Architectural Cabinets and Paneling, Custom Grade, except where indicated herein and on the Drawings for more stringent requirements.

2.2 WOOD SPECIES AND GRADES

- A. Solid Wood:
 - 1. Plywood not exposed to view: AWI Grade II.
- B. All plywood products and laminating adhesives used shall contain no added urea-formaldehyde.

2.3 MEDIUM DENSITY FIBER BOARD FOR CABINETS

- A. Manufacturers
 - 1. Sierra Pine or equal.
- B. Thickness as shown on drawings.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine all areas to receive Work of this Section and correct conditions as required to accommodate the Work.
- B. Do not deliver and install Work of this Section until wet work such as plastering, painting and other finishes is completed; the HVAC system shall be operating and maintaining proper temperature and humidity conditions.
- C. Condition woodwork to the average ambient humidity conditions prior to installation.
- D. Verify the location and condition of built-in anchoring.

3.2 INSTALLATION

- A. Install plumb, true, level and without distortion. Shim as needed with concealed wood or hard plastic shims.
- B. Install the Work of this Section in strict accordance with the manufacturer's printed instructions and approved shop drawings.
- C. All cut edges of MDF shall be sanded smooth.
- D. Fit joints neatly and accurately with adjoining surfaces in same plane. Maintain field joint tolerances equal to those specified in AWI Standards.
- E. Tolerances: 1/8" in 8'-0" for plumb and level (including tops); allow no variation in flushness of adjoining surfaces.
- F. Scribe and cut paneling to fit adjoining Work. Refinish cut surfaces to match

adjacent surfaces; repair damaged finishes.

- G. Provide filler strips; trim strips to irregularities of adjacent surfaces.
- H. Fastening:
 - 1. Use concealed fasteners for all MDF Board installation.
 - 2. Fasten assembled items together securely.
 - 3. Fasten items securely to supporting surfaces.
 - 4. Anchor tops with brackets and concealed fasteners.

3.3 CLEANING AND PROTECTION

- A. Clean woodwork on both exterior and interior surfaces.
- B. Protect woodwork as required. Repair and/or replace damaged items and/or finishes to the architect's satisfaction.

END OF SECTION 06 40 00

SECTION 06 41 00 - CUSTOM CASEWORK

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Provide wood casework, cabinets and shelving as indicated on the Drawings and as specified herein, including, but not limited to the following:
 - 1. Wood cabinets, doors and wood shelving.
 - 2. Hardware and accessories.
 - 3. Installation Materials

1.02 SUSTAINABILITY REQUIREMENTS

- A. The Contractor shall implement practices and procedures to meet the Project's sustainable requirements as specified in this Section, are implemented to the fullest extent. Substitutions or other changes to the work shall not be proposed by the Contractor or their sub-contractors if such changes compromise the stated Sustainable Design Performance Criteria.
- B. Sustainability requirements included in the Section are as follows:
 - 1. Restrictions on the use of urea-formaldehyde containing materials.

1.03 REFERENCES

- A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.
 - 1. Architectural Woodwork Institute (AWI):
Architectural Woodwork Quality Standards
 - 2. American Society for Testing and Materials (ASTM)
 - 3. American National Standards Institute (ANSI):
ANSI 156.9 B43161
 - 4. National Electrical Manufacturers Association (NEMA):
NEMA LD3 High-Pressure Decorative Laminates
 - 5. American Wood Preservers' Association (AWPA).
Standard C2 (Lumber and Timber)
Standard C9 (Plywood)

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each product and process specified as work of this Section and incorporated into items of the casework.

- B. Manufacturer's AWI Certifications: Submit casework manufacturer's (fabricator's) certification, stating that fabricated casework complies with AWI quality grades and other requirements indicated herein.
- C. Wood Treatment Data: Submit chemical treatment manufacturer's instruction for handling, storing, installation, and finish of treated material.
- D. Fire-Retardant Treatment: Certification by treating plant stating treated material complies with specified standards and treatment will not bleed through specified finishes. Submit BS/A and MEA approval certification.
- E. MEA/BSA Certification: For each manufactured item. Submit certification of approval by NYC Board of Standards and Appeals (BS/A) or Materials and Equipment Acceptance (MEA).
- F. Hardware (for each type): Name, manufacturer, type, style, size, function, finish, and information about fastenings.
- G. Shop Drawings: Submit Shop Drawings showing location of each item, dimensioned plans and elevations, large scale details and profiles, attachment devices, hardware and other components.
 - 1. Identify casework using same identification system shown on Architectural Drawings.
 - 2. Coordinate details and cut-outs to accommodate accessories specified under other Sections.
- I. Samples: Submit the following samples representative of quality to be provided in finished work:
 - 1. Hardwood veneer plywood.
 - 2. Hardware, one of each type and finish of each item to be used.
 - 3. Counter tops.
- K. Low Emitting Materials Compliance Submittals
 - 1. Provide documentation for each adhesive to be used on site, indicating that the adhesives comply with low V.O.C. requirements.
- L. Sustainable Submittals:
 - 1. Submit manufacturer's documentation that composite wood products, including plywood, that are used are manufactured without the use of any added urea-formaldehyde. This requirement includes binders, and laminating adhesives used in the field or shop. Submit manufacturer's documentation of the resin used in lieu of urea-formaldehyde in binders and laminating adhesives.

1.05 QUALITY ASSURANCE

- A. AWI Quality Standard: Comply with applicable requirements of the AWI "Architectural Woodwork Quality Standards", except where indicated otherwise.
- B. Fabrication and Installation Qualifications: firm which can demonstrate a minimum of 5 years of successful experience in fabricating and installing casework items similar in type and quality to those required for this project.
- C. Obtain each type of hardware from a single manufacturer.

- D. Fire-Retardant Treated Material: Accredited testing agency mark on each piece of wood indicating compliance with the fire hazard classification.
- E. Regulatory Agencies:
 - 1. NYC Board of Standards and Appeals (BS/A).
 - 2. NYC Materials and Equipment Acceptance (MEA).

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect casework during transit, delivery, storage and handling to prevent damage, soiling and deterioration.
- B. Do not deliver casework, until operations which could damage, soil or deteriorate casework have been completed in installation areas. If casework must be stored, store only in areas meeting requirements specified for installation areas.

1.07 PROJECT CONDITIONS

- A. Maintain temperature and humidity in installation area as required to maintain moisture content of installed woodwork within 1.0 percent of optimum moisture content as follows:
 - 1. Optimum Moisture Content of Wood: 5-10%
 - 2. Relative humidity required to be maintained in installation and storage areas: 25-55%

1.08 COLOR SELECTIONS

- A. As selected by Architect and indicated on the Drawings.

PART 2 – PRODUCTS

2.01 FABRICATION, GENERAL

- A. Wood Moisture Content: Comply with requirements of referenced quality standard for moisture content of lumber and plywood at time of fabrication and for relative humidity in installation areas.
- B. Fabricate casework to dimensions, profiles, and details indicated with openings and mortises precut, where possible, to receive hardware and other items and work.
- C. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary, provide ample allowances for scribing, trimming, and fitting.
- D. Pre-Cut Openings: Provide casework with pre-cut openings, where possible, for hardware, appliances, plumbing fixtures, electrical work and similar items. Locate openings accurately and use templates or roughing-in diagrams for proper size and shape. Smooth edges of cutouts and, where located in countertops, seal edges of cutouts with a water-resistant coating.

- E. Measurements: Before fabrication of casework to be fitted to other construction, obtain field measurements and verify dimensions and shop drawing details as required for accurate fit.
- F. Cabinet work and paneling construction shall comply with the requirements of AWI Architectural Cabinets and Paneling, Premium Grade, except where indicated herein and on the Drawings for more stringent requirements.

2.02 WOOD SPECIES AND GRADES

- A. Solid Wood and Hardwood Plywood Veneer:
 - 1. Plywood not exposed to view (tops and backs): AWI Grade II.
 - 2. Shelving in Cabinets (exposed): Plain Sawn Red Oak, AWI Grade I for Oak Units; White Birch, AWI Grade I for Birch units. Solid wood shelving edge (Oak).
 - 3. Shelving in Cabinets: White or Red Birch, AWI Grade II, with solid wood edge to be painted.

2.03 TYPES OF PANELS

- A. Particleboard and Fiberboard: medium density (37 to 50 pounds per cubic foot) shall not be permitted for shelving.
- B. Veneer Core Plywood: core of odd number of veneer plies, with face and back veneers. Use veneer core plywood for all casework, except that other panel types are permitted for certain components where covered by plastic laminate. Use veneer core plywood, marine grade, for all cabinet tops with sinks.
- C. All plywood, composite wood products and laminating adhesives used shall contain no added urea-formaldehyde.

2.05 HIGH PRESSURE DECORATIVE PLASTIC LAMINATES

- A. Manufacturers:
 - 1. Formica Corp.
 - 2. Wilsonart
 - 3. Nevamar Corp.
- B. Adhesives: as recommended by plastic laminate Manufacturer.

2.06 GENERAL NOTES

2.07 ARCHITECTURAL CABINETS - WOOD

- A. Comply with AWI requirements for Section 400A Wood Cabinets, Premium Grade, for transparent finish, except provide more stringent requirements, where indicated.

2.08 ARCHITECTURAL CABINETS - LAMINATE CLAD

- A. Comply with AWI requirements for Section 400B- Laminate Clad Cabinets, Premium Grade.
- B. Laminate Cladding: High pressure decorative laminate complying with the requirements of NEMA LD3:
 - 1. Colors, Finishes, Patterns: as selected by the Project Architect and indicated on the Drawings.
 - 2. Surfaces, Grades and Thicknesses:
 - a. Horizontal surfaces other than tops: GP-50, nominal thickness 0.050".
 - b. Tops: GP-50, nominal thickness 0.050".
 - c. Post-formed Surfaces: PF-42, nominal thickness, 0.042".
 - d. Vertical Surfaces: GP-28, nominal thickness 0.028".
 - e. Edges: GP-50, nominal thickness 0.050".
- C. Surface Material of Panels:
 - 1. Exposed surfaces (other than edges): Grade II.
 - 2. Semi-Exposed surfaces (other than edges): Grade III.
 - 3. Edges: Grade II.
- D. Materials and Minimum Thickness for Cabinet Components
 - 1. Body members: Panel 3/4"
 - 2. Shelves: Veneer Core Plywood Panel 3/4"
for spans to 39"
1" for spans 39" to 48"
 - 3. Backs: Panel 1/2"
- E. Edge Treatment of Exposed and Semi-exposed Components
 - 1. Body Members and Shelves: Match face laminate
 - 2. Doors: Match face laminate.
 - 3. All edges: banded; pressure-glued.
- F. Construction: Comply with the following AWI requirements:
 - 1. Joinery and Case Body Member Fastening: 400B-S-8; 400B-S-9; 400B-T-1; 400B-T-2; 400B-T-3; 400B-T-4. Comply with Standards for Premium Grade.
- L. All laminating adhesives used as part of the cabinet construction shall contain no added urea-formaldehyde.

2.09 CABINET TOPS

- A. Comply with the requirements of AWI Section 400C, for Premium Grade.
- B. High Pressure Decorative Laminate Tops:
Width: if exceeds 60", shop assembled.
Length in one Piece: 12'
Thickness of Top: 3/4" minimum.
Balancing Sheet Requirements: Standard 0.02" backup sheet wherever unsupported area exceeds 4 sq. ft. and core is 3/4" thick; 6 sq. ft. and core is 1" thick; 8 sq. ft. and core is 1 1/8" thick or thicker.
- C. All laminating adhesives used for cabinet tops shall contain no added urea-formaldehyde.

2.10 FIRE-RETARDANT TREATMENT

- A. Where lumber is indicated or required to be fire-retardant treated, provide "FR-S" lumber, complying with AWPA Standards for pressure impregnation with fire-retardant chemicals to achieve a flamespread rating of 25 or less, when tested in accordance with UL Test 723, ASTM E84 or NFPA Test 255.
 - 1. Where treated items are indicated to receive a transparent or paint finish, use a fire-retardant treatment which will not bleed through or adversely affect bond of finish.
 - 2. Provide UL label or identifying mark on each piece of fire-retardant lumber.
 - 3. Redry treated items to maximum moisture content of 19 percent after treatment.
- B. Fire-retardant Treated Plywood
Comply with APA requirements.

2.12 HARDWARE

- A. Low Cabinets
 - 1. Pulls – Rockwood RM750 US32D 3” Long
 - 2. Cam Locks – Rockler 1 3/16” Long, Keyed alike, #98998
 - 3. Cabinet Hinges: SOSS Model 203
 - 4. Shelf Brackets and Supports – Pilaster Strips #255 with Shelf Supports #256
- B. Tall Closets
 - 1. Pulls- Rockwood RM750 US32D, 3” Long
 - 2. Magnetic Catches - IVES 327
 - 3. Hinges – Rixson – 117 & 119
 - 4. Floor Stops – Omnia #7001 US32D
 - 5. Overhead stops – Glynn-Johnson 79 Series US26D
- C. Screws

1. Secure hardware with suitable screws and bolts of same material and finish as hardware items unless otherwise specified. Provide Phillips head screws unless otherwise indicated.
 2. Manufacturer of each hardware item shall provide the fastenings required for the installation of that item.
- D. Grommet
1. At built-in computer desk and security guard desk.
 2. 2" @ Counter Grommet.
 - Doug Mockett & Company, Inc. [www. Mocket.com](http://www.Mocket.com)
 - Brava Grommet, small.
 - Color to be approved by architect.
- E. Hardware Finish:
Hardware finishes shall comply with requirements of U.S. Bureau of Standards for the following:
U.S. - DESCRIPTION
US1D - Dull Black
US2C - Zinc Plated, Commercial
US32D - Satin Stainless Steel

2.13 INSTALLATION MATERIALS

- A. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine all areas to receive Work of this Section and correct conditions as required to accommodate the Work.
- B. Do not deliver and install Work of this Section until wet work such as plastering, painting and other finishes is completed; the HVAC system shall be operating and maintaining proper temperature and humidity conditions.
- C. Condition cabinetwork and paneling to the average ambient humidity conditions prior to installation.
- D. Verify the location and condition of inserts, and other built-in anchoring devices.

3.02 INSTALLATION

- A. Install cabinetwork and paneling plumb, true, level and without distortion. Shim as needed with concealed wood or hard plastic shims.
Tolerances: 1/8" in 8'-0" for plumb and level (including tops); allow no variation in flushness of adjoining surfaces.

- B. Scribe and cut cabinets and paneling to fit adjoining Work. Refinish cut surfaces to match adjacent surfaces; repair damaged finishes.
- C. Provide filler strips; trim strips to irregularities of adjacent surfaces.
- D. Secure and anchor fixed cabinetwork to substrates with concealed devices and fasteners of sufficient sizes and strengths to support fully-loaded cabinets.
- E. Anchor tops to cabinets with concealed fasteners.
- F. Secure paneling to substrates or supports with concealed fasteners, where possible; where nails are required, use countersunk finishing nails.

3.03 HARDWARE INSTALLATION

- A. Secure hardware with screws, bolts and fasteners of the proper sizes, with finish to match hardware.

3.04 ADJUSTMENT, CLEANING, FINISHING, AND PROTECTION

- A. Adjust cabinetwork units as required for proper and uniform appearance.
- B. Clean and lubricate hardware; adjust hardware for proper operation.
- C. Clean all exposed surfaces.
- D. Touch-up shop-applied finishes where damaged or soiled, to obtain a finished appearance to match that of adjacent surfaces. If not possible to obtain a suitable finish, provide a new surface or component.

3.05 CLEANING AND ADJUSTING

- A. Clean hardware items thoroughly and adjust for proper operation.

END OF SECTION 06 41 00

SECTION 06 65 10 - SOLID SURFACE FABRICATIONS

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Architectural Woodwork: Section 06 40 00
- B. Joint Sealants: Section 07 92 00

1.02 SUMMARY

- A. This Section includes the following horizontal and trim solid surface product types:
 - 1. Lavatory Countertops with sinks
 - 2. Backsplashes

1.03 DEFINITION

- A. Solid surface is defined as nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

1.04 SUBMITTALS

- A. Product data:
 - 1. For each type of product indicated.
 - 2. Product data for the following:
 - a. Chemical-resistant tops
- B. Shop drawings:
 - 1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.
 - a. Show full-size details, edge details, thermoforming requirements, attachments, etc.
 - b. Show locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.
 - c. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacle and other items installed in solid surface.
- C. Samples:
 - 1. For each type of product indicated.
 - a. Submit minimum of two, 2-inch by 2-inch samples in specified color.
 - 2. Approved samples will be retained as a standard for work.

- D. Product data:
 - 1. Indicate product description, fabrication information and compliance with specified performance requirements.
- E. Product certificates:
 - 1. For each type of product, signed by product manufacturer.
- F. Fabricator/installer qualifications:
 - 1. Provide copy of certification number.
- G. Maintenance data:
 - 1. Submit manufacturer's care and maintenance data, including repair and cleaning instructions.
 - a. Maintenance kit for finishes shall be submitted.
 - 2. Include in project closeout documents.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.
- B. Fabricator/installer qualifications:
 - 1. Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.
- C. Applicable standards:
 - 1. Standards of the following, as referenced herein:
 - a. American National Standards Institute (ANSI)
 - b. American Society for Testing and Materials (ASTM)
 - c. National Electrical Manufacturers Association (NEMA)
 - d. NSF International
 - 2. Fire test response characteristics:
 - a. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1) Flame Spread Index: 25 or less.
 - 2) Smoke Developed Index: 450 or less.
- D.
 - 1. Coordination Drawings.
 - a. Project-specific information, drawn accurately to scale.
 - b. Do not base coordination drawings on reproductions of the contract documents or standard printed data.
 - c. Indicate dimensions shown on the contract drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements.

- d. Provide alternate sketches to designer for resolution of such conflicts.
 - 1) Minor dimension changes and difficult installations will not be considered changes to the contract.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver no components to project site until areas are ready for installation.
- B. Store components indoors prior to installation.
- C. Handle materials to prevent damage to finished surfaces.
 - 1. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.07 WARRANTY

- A. Provide manufacturer's warranty against defects in materials.
 - 1. Warranty shall provide material and labor to repair or replace defective materials.
 - 2. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.

1.08 MAINTENANCE

- A. Provide maintenance requirements as specified by the manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers:
 - 1. Subject to compliance with requirements, provide products by:
 - a. Corian® surfaces from the DuPont company (basis of design).

2.02 MATERIALS

- A. Solid polymer components
 - 1. Cast, nonporous, filled polymer, not coated, laminated or of composite construction with through body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified.
 - 2. Superficial damage to a depth of 0.010 inch (.25 mm) shall be repairable by sanding and/or polishing.
- B. Thickness:
 - 2. 1/2 inch
- C. Edge treatment:
 - 1. Square
- D. Color:
 - 1. Aqualite
- E. Backsplash:
 - 1. Applied

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- F. Sidesplash:
1. Applied
- G. Performance characteristics:

Property	Typical Result	Test
Tensile Strength	6,000 psi	ASTM D 638
Tensile Modulus	1.5×10^{-6} psi	ASTM D 638
Tensile Elongation	0.4% min.	ASTM D 638
Flexural Strength	10,000 psi	ASTM D 790
Flexural Modulus	1.2×10^{-6} psi	ASTM D 790
Hardness	>85	Rockwell "M" Scale
	56	ASTM D 785
	Impressor	Barcol
		ASTM D 2583
Thermal Expansion	3.02×10^{-5} in./in./°C (1.80×10^{-5} in./in./°F)	ASTM D 696
Gloss (60° Gardner)	5–75 (matte—highly polished)	ANSI Z124
Light Resistance 2000	(Xenon Arc) No effect	NEMA LD 3- Method 3.3
Wear and Cleanability	Passes	ANSI Z124.3 & Z124.6
Stain Resistance: Sheets	Passes	ANSI Z124.3 & Z124.6
Fungus and Bacteria Resistance	Does not support microbial growth	ASTM G21&G22
Boiling Water Resistance 2000	No visible change	NEMA LD 3- Method 3.5
High Temperature Resistance 2000	No change	NEMA LD 3- Method 3.6
Izod Impact (Notched Specimen)	0.28 ft.-lbs./in. of notch	ASTM D 256 (Method A)
Ball Impact 2000	No fracture—1/2 lb. ball:	NEMA LD 3- Method 3.8
Resistance: Sheets	1/4" slab—36" drop 1/2" slab—144" drop	
Weatherability	$\Delta E^*_{94} < 5$ in 1,000 hrs.	ASTM G 155
Specific Gravity †	1.7	
Water Absorption	Long-term 0.4% (3/4") 0.6% (1/2") 0.8% (1/4")	ASTM D 570
Toxicity Protocol	99 (solid colors) 66 (patterned colors) ("LC50"Test)	Pittsburgh Test

Flammability	All colors (Class I and Class A)	ASTM E 84, NFPA 255 & UL 723
Flame Spread Index	<25	
Smoke Developed Index	<25	

† Approximate weight per square foot: 1/4" (6 mm) 2.2 lbs., 1/2" (12.3 mm) 4.4 lbs.
Shapes meet or exceed the ANSI Z124.3 and ANSI Z124.6 standards for plastic sinks and lavatories.

NEMA results based on the NEMA LD 3-2000

2.03 ACCESSORIES

- A. Joint adhesive:
 - 1. Manufacturer's standard one- or two-part adhesive kit to create inconspicuous, nonporous joints.
- B. Sealant:
 - 1. Manufacturer's standard mildew-resistant, NSF 51-compliant, UL-listed silicone sealant in colors matching components.
- C. Sink/lavatory mounting hardware:
 - 1. Manufacturer's standard bowl clips, panel inserts and fasteners for attachment of undermount sinks/lavatories.
- D. Conductive tape:
 - 1. Manufacturer's standard aluminum foil tape, with required thickness, for use with cutouts near heat sources.
- E. Insulating felt tape:
 - 1. Manufacturer's standard for use with conductive tape in insulating solid surface material from adjacent heat source.

2.04 FACTORY FABRICATION

- A. Shop assembly
 - 1. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.
 - 2. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints.
 - 3. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.
 - 4. Rout and finish component edges with clean, sharp returns.
 - a. Rout cutouts, radii and contours to template.
 - b. Smooth edges.
 - c. Repair or reject defective and inaccurate work.

2.05 FINISHES

- A. Select from the manufacturer's standard color chart.
 - 1. Color:
 - a. Aqualite

- B. Finish:
 - 1. Provide surfaces with a uniform finish.
 - a. Matte; gloss range of 5–20.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
 - 1. Provide product in the largest pieces available.
 - 2. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.
 - a. Exposed joints/seams shall not be allowed.
 - 3. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.
 - 4. Cut and finish component edges with clean, sharp returns.
 - 5. Rout radii and contours to template.
 - 6. Anchor securely to base cabinets or other supports.
 - 7. Align adjacent countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop.
 - 8. Carefully dress joints smooth, remove surface scratches and clean entire surface.
 - 9. Install countertops with no more than 1/8-inch (3 mm) sag, bow or other variation from a straight line.
- B. Straight backsplashes and applied straight sidesplashes:
 - 1. Install applied sidesplashes using manufacturer's standard color-matched silicone sealant.

2. Adhere applied sidesplashes to countertops using manufacturer's standard color-matched silicone sealant.

3.03 REPAIR

- A. Repair or replace damaged work which cannot be repaired to architect's satisfaction.

3.04 CLEANING AND PROTECTION

- A. Keep components clean during installation.
- B. Remove adhesives, sealants and other stains.

END OF SECTION

SECTION 07 21 00 - BUILDING INSULATION

PART 1 - GENERAL

1.01 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, and installation instructions for each type of insulation specified.
 - 1. Include data substantiating that the materials comply with the specified thermal resistance and vapor resistance qualities.
- B. Samples:
 - 1. Blanket, Batt or Roll: 12 inch sq.
- C. LEED Design Submittals:
 - 1. MR Credit 4.1 and MR Credit 4.2: Identify manufacturer's name, the percentage of post-consumer recycled content by weight, the pre-consumer recycled content by weight, and the cost of the product.
 - 2. MR Credit 5.1 and MR Credit 5.2: Identify source, cost, and the fraction by weight that is considered regional.
 - 3. MR Credit 6: Identify the manufacturer's name, the rapidly renewable content of the product submitted, and the cost of the product.
- D. Quality Control Submittal:
 - 1. Certificate: Affidavit required under Quality Assurance Article.

1.02 QUALITY ASSURANCE

- A. Allowable Thickness Variations: Manufacturer's standard units which vary slightly from the thickness indicated may be acceptable, subject to the approval of the Director.
- B. Thermal Resistance: The thicknesses shown are for the thermal resistance (R-Value in accordance with ASTM C 177 or ASTM C 518) specified for each material. The R-Values specified are minimum acceptable. Provide adjusted thicknesses as directed for the use of material having a different thermal resistance.
- C. Certification: Affidavit by the polystyrene thermal insulation manufacturer, certifying that the insulation was manufactured with CFC and HCFC-free blowing agents.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Do not allow insulation materials to become wet or soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage, and protection during installation.

- B. Do not deliver flammable insulation materials to the project site more than 2 days ahead of the time of installation. Protect at all times against ignition.
- C. Protect insulation materials subject to deterioration by sunlight from exposure to sunlight.
- D. Complete the installation and concealment of insulation materials as rapidly as possible.

1.05 PROJECT CONDITIONS

- A. Do not proceed with the installation of insulation on walls or under slabs until the Work which follows (and which conceals the insulation) is ready to be performed.
- B. Examination of Substrate: Examine the substrate and the conditions under which the insulation Work is to be performed. Do not proceed with the insulation Work until unsatisfactory conditions have been corrected.

PART 2 - PRODUCTS

2.01 MATERIALS

- E. Mineral Fiber Insulation: Glass or other inorganic fibers and resinous binders formed into flexible blankets, batts or rolls; ASTM C 665.
 - 1. R-Value:
 - a. 2-1/2 Inches Nominal Thickness: R = 7.0.
 - b. 3-1/2 or 3-5/8 Inches Nominal Thickness: R = 11.0.
 - c. 6-1/4 or 6-1/2 Inches Nominal Thickness: R = 19.0.
 - d. 7-1/2 Inches Nominal Thickness: R = 22.0.
 - e. 9-1/2 Inches Nominal Thickness: R = 30.0.
 - f. 12 Inches Nominal Thickness: R = 38.0.
 - 2. Type I - Blankets with no membrane covering.
 - 3. Type II, Class C - Blankets with a nonreflective barrier membrane covering one principal face.
 - 4. Type III, Class A - With a reflective barrier membrane covering one principal face. Membrane flame spread rating of 25 or less.
 - 5. Type III, Class B or C - With a reflective barrier membrane covering one principal face. Membrane flame spread rating greater than 25.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify that adjacent materials are dry and ready to receive insulation.

- B. Close off openings in areas to receive loose insulation to permanently prevent escape of insulation.

3.02 INSTALLATION

- A. Comply with manufacturer's printed instructions for the particular conditions of installation in each case. If printed instructions are not available or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work.
- B. Extend insulation full thickness over entire surface to be insulated. Apply a single layer of insulation of the required thickness, unless otherwise indicated or required to make up the total thickness. Cut and fit tightly around obstructions, and fill voids with insulation.
 - 1. Do not place insulation over, or within 3 inches of recessed lighting fixtures.
- C. Install insulation with factory applied barrier membrane facing the warm side of building spaces. Tape ruptures in barrier membrane.
 - 1. Install reflective barrier membrane insulation with 3/4 inch air space in front of reflective barrier membrane wherever possible.
- D. Place loose fiber insulation into spaces and onto surfaces, either by pouring or by machine-blowing. Level horizontal applications to uniform thickness as indicated, firmly settled to uniform density, but not excessively compressed.

END OF SECTION 07 21 00

SECTION 07 81 00 - APPLIED FIREPROOFING

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Statement of Special Inspections: BDC 406.

1.02 DEFINITIONS

- A. Fireproofing Manufacturer: Manufacturer of primary fire resistive materials.
- B. Fire Resistance Rating: Time rating (in hours) in accordance with Underwriters Laboratories Fire Resistance Directory listings.

1.03 PERFORMANCE REQUIREMENTS

- A. Fire Resistance Rating: Fireproofing shall meet the indicated hourly rating when applied to the construction assembly shown on the Drawings.
- B. Fire Hazard Classification: Fireproofing shall be listed in the Underwriters Laboratories Building Materials Directory with the following performance properties:
 - 1. Flame Spread: 10 or less.
 - 2. Smoke Developed: 5 or less.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's product descriptions for each required material.
 - 1. Fireproofing: Include fireproofing manufacturer's application instructions, including primer/adhesive requirements and recommended minimum thickness and density for each required hourly rating.
- B. Quality Control Submittals:
 - 1. Certificates:
 - a. UL fire resistance rating certificate.
 - b. UL fire hazard classification certificate.
 - c. Fireproofing manufacturer's certification (or confirming independent test reports) that fireproofing meets the performance requirements and physical properties.
 - 2. Applicators Qualifications Data: Information confirming that the firm, supervisor, and workers have the specified qualifications.

1.05 QUALITY ASSURANCE

- A. Applicators Qualifications:
 - 1. Firm: Approved by fireproofing manufacturer.
 - 2. Supervisor: Not less than 5 years of experience in the application of sprayed fire resistive material.

3. Workers: Not less than one year of experience in the application of sprayed fire resistive material.
- B. Fireproofing: Fire resistive materials free of all forms of asbestos, formulated for sprayed-on application, factory packaged, and complying with specified performance requirements and physical properties.
 1. Source Limitations: Obtain fireproofing materials through one source from a single manufacturer.
- C. Equipment: Use mixing and application equipment recommended by the fireproofing manufacturer.
- D. Fireproofing Certifications:
 1. UL fire resistance rating certificate.
 2. UL fire hazard classification certificate.
 3. Affidavit by fireproofing manufacturer (or confirming independent test reports) certifying that fireproofing meets the performance requirements and physical properties.
- E. Field Examples
 1. Do not proceed with the fireproofing in other areas until a field example has been approved by the Director's Representative.
 2. Approved field example shall serve as the standard of quality for the remainder of the Work. Completely remove disapproved field examples.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fireproofing materials in factory packaged and sealed containers, clearly labeled, bearing manufacturer's name, product name, product type, batch number, date, and UL labels for classifications.
- B. Store materials in an enclosed area protected from the elements, and maintain within the manufacturer's recommended temperature limits.
- C. Handle materials in accordance with manufacturer's printed instructions.

1.07 PROJECT CONDITIONS

- A. Apply fireproofing prior to installation of ductwork, piping, conduits, and other suspended items. However, hangers, clips and other supports for these items shall be installed before application of fireproofing.

PART 2 - PRODUCTS

2.01 TYPE 1 FIREPROOFING

- A. Use: Interior.
- B. Physical Properties:

1. Dry Field Density (ASTM E 605): 15 lb/cu ft minimum average.
2. Cohesion/Adhesion (Bond Strength) (ASTM E 736): Minimum average 200 lb/sq ft.
3. Compressive Strength (ASTM E 761): Minimum 1000 lb/sq ft.
4. Impact (Bond Impact) Resistance (ASTM E 760): Shall not crack or delaminate.
5. Effect of Deflection (ASTM E 759): Shall not crack or delaminate.
6. Corrosion Resistance (ASTM E 937): No evidence of corrosion.
7. Air Erosion (ASTM E 859): Maximum 0.025 g/sq ft weight loss.

2.05 ACCESSORIES

- A. Primer/Adhesive: Primer or adhesive recommended by the fireproofing manufacturer to obtain required bond strength for the specific fireproofing and substrate.
- B. Sealer/Topcoat: Surface sealer and/or protective topcoat, as specified; materials as recommended by the fireproofing manufacturer for the intended use and conditions unless otherwise indicated.
 1. Color of Exposed Material: Manufacturer's standard.
- C. Water: Potable, cool, fresh, and free from such amounts of organic and mineral substances which would be harmful to the fireproofing.
- D. Sealant: Sealant recommended by the fireproofing manufacturer for the specific fireproofing use/application and substrate.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine the substrate and conditions under which fireproofing is to be applied. Do not proceed with the fireproofing Work until unsatisfactory conditions have been corrected.
 1. Verify that hangers, clips, sleeves, and other items that will penetrate the fireproofing are in place.
 2. Check paint on substrate for compatibility with primer/fireproofing and adequacy of bond strength in accordance with fireproofing manufacturer's instructions.

3.02 PREPARATION

- A. Protection:
 1. Protect surfaces that are not to receive fireproofing with suitable covers.
 2. Cover openings in the work areas with suitable temporary closures.

- B. Surface Preparation:
 - 1. Remove dirt, dust, oil, grease, loose paint and rust, mill scale, and other foreign matter that may impair the bonding of the fireproofing to the substrate. Clean substrate free of contamination from chemicals and solvents.

3.03 APPLICATION

- A. Apply the fireproofing in accordance with UL fire test report and the manufacturer's application instructions.
 - 1. Application Method: Apply the fireproofing material by spraying.
- B. Thickness and density of fireproofing shall be in accordance with the approved product data and as required to produce the hourly fire resistance rating shown on the Drawings.
- C. Apply the fireproofing in a monolithic covering of uniform density and texture, free of seams, staging breaks, holes, voids, and other defects that might impair the fire resistance. Install the fireproofing to the full required thickness over entire area of each surface to be covered.
 - 1. Stop-off application operation at natural stopping points, such as inside corners, wherever possible.
 - 2. Edge of fireproofing adjoining other materials shall be sharp and clean, without overlapping.
- D. Finish of Fireproofing: Unless otherwise indicated, finish shall be a uniform surface texture as applied, without noticeable icicles or sagging.
- E. Sealer or Topcoat: Apply sealer or topcoat on surfaces of fireproofing in accordance with the fireproofing manufacturer's application instructions.
- F. Sealer and Topcoat: Apply sealer and topcoat on surfaces of fireproofing in accordance with the fireproofing manufacturer's application instructions.

3.04 FIELD QUALITY CONTROL

- A. Special Inspections and Testing Agency: The College will engage a qualified special inspections and testing agency to perform special inspections, tests, and prepare reports. The special inspections and testing agency will interpret the tests and indicate in each report whether the tested work complies with or deviates from project requirements. The special inspections and testing agency will perform tests in accordance with the New York State Uniform Fire Prevention and Building Code (BCNYS).

3.05 ADJUSTING

- A. Correct fireproofing in damaged areas, and areas with less than the required thickness or standard of quality.

3.06 CLEANING

- A. After completion of the fireproofing in each containable area of the project, remove protective covers and temporary closures, and clean surfaces that have been soiled performing the Work.

END OF SECTION 07 81 00

SECTION 07 84 00 - FIRESTOPPING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Provide firestop systems consisting of a material, or combination of materials installed to retain the integrity of fire resistance rated construction by maintaining an effective barrier against the spread of flame, smoke and/or hot gases through penetrations, fire resistive joints, and perimeter openings in accordance with the requirements of the Building Code for this project.
- B. Firestop systems shall be used in locations including, but not limited to, the following:
 - 1. Penetrations through fire resistance rated floor and roof assemblies including both empty openings and openings containing penetrants.
 - 2. Penetrations through fire resistance rated wall assemblies including both empty openings and openings containing penetrants.
 - 3. Membrane penetrations in fire resistance rated wall assemblies where items penetrate one side of the barrier.
 - 4. Joints between fire resistance rated assemblies.
 - 5. Perimeter gaps between rated floors/roofs and an exterior wall assembly.
- C. Related Sections include, but are not limited to, the following:
 - 1. Division 07 – Thermal and Moisture Protection
 - 2. Division 21 – Fire Suppression
 - 3. Division 22 – Plumbing
 - 4. Division 23 – Heating, Ventilating and Air Conditioning
 - 5. Division 26 – Electrical
 - 6. Division 28 – Electrical Safety and Security

1.03 REFERENCES

- A. *New York City Building Code Editing Note: change according to location and code authority for project.*
- B. National Fire Protection Association (NFPA)
 - 1. NFPA 101 (Life Safety Code)

C. American Society For Testing and Materials Standards (ASTM):

1. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E814: Standard Test Method for Fire Tests of Through-Penetration Firestops.
3. ASTM E1966: Test Method for Resistance of Building Joint Systems.
4. ASTM E1399: Test Method for Cyclic Movement and Measuring Minimum and Maximum Joint Width.
5. ASTM E119: Methods of Fire Tests of Building Construction and Materials.
6. ASTM E2174: Standard Practice for On-Site Inspection of Installed Fire Stops
7. ASTM E2307: Standard Test Method for Determining the Fire Endurance of Perimeter Fire Barrier Systems Using the Intermediate-Scale, Multi Story Test Apparatus (ISMA)
8. ASTM E2393-04 Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers

D. Underwriters Laboratories Inc. (UL):

1. UL Qualified Firestop Contractor Program.
2. UL 263: Fire Tests of Building Construction and Materials.
3. UL 723: Surface Burning Characteristics of Building Materials.
4. UL 1479: Fire Tests of Through-Penetration Fire Stops.
5. UL 2079: Tests for Fire Resistance of Building Joint Systems.

E. UL Fire Resistance Directory -Volume 2:

1. Through-Penetration Firestop Devices (XHJI)
2. Fire Resistive Ratings (BXUV)
3. Through-Penetration Firestop Systems (XHEZ)
4. Fill, Void, or Cavity Material (XHHW)

F. Omega Point Laboratories (OPL)

1. Building Products, Materials & Assemblies – Volume II

G. Factory Mutual Research (FM):

1. FM 4991: FM Approval Standard of Firestop Contractors – Class 4991

1.04 DEFINITIONS

- A. Firestopping: The use of a material or combination of materials in a fire-rated structure (wall or floor) where it has been breached, so as to restore the integrity of the fire rating on that wall or floor.
- B. System: The use of a specific firestop material or combination of materials in conjunction with a specific wall or floor construction type and a specific penetrant(s).
- C. Barrier: Any bearing or non-bearing wall or floor that has an hourly fire and smoke rating.
- D. Through-penetration: Any penetration of a fire-rated wall or floor that completely breaches the barrier.
- E. Membrane-penetration: Any penetration in a fire-rated wall or floor/roof-ceiling assembly that breaches only one side of the barrier.
- F. Fire Resistive/Construction Joint: Any gap, joint, or opening, whether static or dynamic, between two fire rated barriers including where the top of a wall meets a floor; wall edge to wall edge applications; floor edge to floor edge configurations; floor edge to wall.
- G. Perimeter Barrier: Any gap, joint, or opening, whether static or dynamic, between a fire rated floor assembly and an exterior wall assembly.
- H. Approved Testing Agencies: Not limited to: Underwriters Laboratory (UL), Factory Mutual (FM), Warnock Hersey, and Omega Point Laboratory (OPL).

1.05 PERFORMANCE REQUIREMENTS

- A. Penetrations: Provide through-penetration and membrane-penetration firestop systems that are produced and installed to resist the spread of fire, passage of smoke and other hot gases according to requirements indicated, to restore the original fire-resistance rating of assembly penetrated.
 - 1. Provide and install complete penetration firestopping systems that have been tested and approved by nationally accepted testing agencies per ASTM E814 or UL 1479 fire tests in a configuration that is representative of field conditions.
 - 2. F-Rated Systems: Provide firestop systems with F-ratings indicated, as determined per ASTM E814 or UL 1479, but not less than one (1) hour or the fire resistance rating of the assembly being penetrated.
 - 3. T-Rated Systems: Provide firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E814 or UL 1479, and where required by the Building Code for floor penetrations which are not located within the cavity of a wall.
 - 4. L- Rated Systems: Provide firestop systems with L- ratings less than 5cfm/sf.
 - 5. W-Rated systems: Provide firestop systems that are resistant to water. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.

6. For penetrations involving non-metallic, CPVC, PVC, or plastic piping, tubing or conduit, provide firestop systems that are chemically compatible in accordance with Manufacturer requirements.
 7. For penetrations involving insulated piping, provide firestop systems not requiring removal of insulation.
 8. For penetrations involving fire or fire/smoke dampers, only firestop products approved by the damper manufacturer shall be installed in accordance with the damper installation instructions.
- B. Fire Resistive Joints: Provide joint systems with fire resistance assembly ratings indicated, as determined by UL 2079 (ASTM E1399 and E1966), but not less than the fire resistance assembly rating of the construction in which the joint occurs. Firestopping assemblies must be capable of withstanding anticipated movements for the installed field conditions.
1. For firestopping assemblies exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
 2. For floor penetrations exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means, as specified by the Architect.
 3. L- Rated Systems: Provide firestop systems with L- ratings less than 5cfm/sf.
- C. Firestopping products shall have flame spread ratings less than 25 and smoke-developed ratings less than 450, as determined per ASTM E 84. Note: Firestop products installed in plenum spaces shall have a smoke developed rating less than 50.
- D. Engineering Judgment (EJ): Where there is no specific third party tested and classified firestop system available for an installed condition, the Contractor shall obtain from the firestopping material manufacturer an Engineering Judgment (EJ) to be submitted to the Design Professional and where required the Authority Having Jurisdiction for approval prior to installation. The EJ shall follow International Firestop Council (IFC) guidelines. Note: Tested and Listed firestop systems are to be used before an Engineering Judgment (EJ). Engineering Judgments (EJ) shall not be utilized as an alternative to proper construction or coordination.

1.06 SUBMITTALS

- A. Product Data: For each type of firestopping product selected. Manufacturers certification must verify that firestopping materials are free of asbestos, lead and contain volatile organic compounds (VOCs) within limits of the local jurisdiction.
- B. Design Listings: Submit system design listings, including illustrations, from a qualified testing and inspecting agency that is applicable to each firestop configuration.
- C. Installation Instructions: Submit the manufacturer's installation instruction for each firestop assembly.

- D. Where there is no specific third party tested and classified firestop system available for a particular configuration, the Contractor shall obtain from the firestopping material manufacturer an Engineering Judgment (EJ) for submittal.
- E. Material Safety Data Sheet (MSDS): Submit for each type of firestopping product selected.
- F. Qualification Data: For firms and persons specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Submit documents as per 1.7.
- G. A quality control manual approved by FM or UL (if applicable).
- H. Firestop Schedule: Submit schedule (see appendix A) itemizing the following:
 - 1. Manufacturer’s product reference numbers and/or drawing numbers.
 - 2. Listing agency’s design number.
 - 3. Penetrating Item Description/Limits: Material, size, insulated or uninsulated, and combustibility.
 - 4. Maximum allowable annular space or maximum size opening.
 - 5. Wall type construction.
 - 6. Floor type construction.
 - 7. Hourly Fire resistance rating of wall or floor.
 - 8. F rating.
 - 9. T rating for floor penetrations not in a cavity of a wall. The F and T ratings shall be equal.
 - 10. L and W rating, if applicable.
- I. Firestop Application Log: A separate binder shall be prepared and kept on site for use by the Inspection Agency and the Authority Having Jurisdiction. The binder shall contain the following:
 - 1. The binder shall be a three (3) ring binder.
 - 2. Firestop Schedule (see appendix A)
 - 3. All approved firestopping assemblies including engineering judgments shall be provided and organized by trade.
 - 4. Copy of manufacturer’s installation instruction for each firestop assembly.
 - 5. A matrix or table of contents listing each assembly shall be provided.
 - 6. The binder shall be updated as new firestop assemblies or EJ’s are added.
 - 7. The binder shall be kept on-site at a location approved by the Owner.
 - 8. Qualifications or Certification of each Installer

1.07 QUALITY ASSURANCE

- A. Provide firestopping system design listings from UL, FM, Warnock Hersey or OPL in accordance with the appropriate ASTM Standard(s) per article 1.5.
- B. Contractor Qualifications: An acceptable Firestop Contractor shall be:
 - 1. Licensed by State or Local Authority where applicable, or
 - 2. FM Research approved in accordance with FM Standard 4991, or
 - 3. UL Qualified Firestop Contractor, or
 - 4. Meet the following requirements
 - i. Installation personnel shall be trained by the approved firestop manufacturer.
 - ii. The installation firm shall be experienced in installing firestop systems and fire resistive joint systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance.
 - iii. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified tested and listed system requirements.
 - iv. Minimum of three (3) years experience and shown to have successfully completed not less than 5 comparable scale projects and provide references.
- C. Single Source Limitations: Obtain firestop systems for all conditions from a single manufacturer. The only exception is where a listed firestop system is available for a specific opening from another manufacturer, it shall be utilized before an Engineering Judgment.
- D. Materials from different firestop manufacturers shall not be installed in the same firestop system or opening.
- E. Firestopping material shall be asbestos and lead free and shall not incorporate nor require the use of hazardous solvents.
- F. Firestopping sealants must be flexible, allowing for normal movement.
- G. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces such that a void is created.
- H. Firestopping materials shall be moisture resistant, and may not dissolve in water after curing.
- I. Materials used shall be in accordance with the manufacturer's written installation instructions.
- J. Identify installed firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. In addition, for perimeter or joint firestop systems attach labels at locations every 20 feet or at least each section where separated. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and provide a label

material that will result in partial destruction of label if removal is attempted. Include the following information on labels:

1. The words "Warning - Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Firestop system designation of applicable testing and listing agency.
 4. Date of installation.
 5. Firestop system manufacturer's name.
 6. Installer's name.
 7. Inspector's name (if applicable)
- K. Inspection of penetrations through fire rated floor and wall assemblies shall be in accordance with ASTM E2174, Standard Practice for On-Site Inspection of Installed Fire Stops and ASTM E2393-04 Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers. The Owner may engage a qualified, independent inspection agency, or material testing agency to perform these inspections.
- L. In high-rise buildings or in buildings assigned to Risk Category III or IV, Special inspection for through-penetrations, membrane penetration firestops, fire-resistant joint systems and perimeter fire barrier systems shall be conducted by an approved agency.
- M. Field Mock-up Installations: Prior to installing firestopping, erect mock-up installations for each type firestop system indicated in the Firestop Schedule to verify selections made and to establish standard of quality and performance by which the firestopping work will be judged by the Owner or Owner's Representative. Obtain acceptance of mock-up installations by the Owner or Owner's Representative before start of firestopping installation. Provide at least 72 hours notice to Owner or Owner's Representative prior to inspection.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturer's labels identifying product and manufacturer, date of manufacture/expiration, lot number, listing agency's classification marking, and mixing instructions for multi-component materials.
- B. Store and handle materials per manufacturer's instructions to prevent deterioration or damage due to moisture, temperature changes, contaminants, or other causes.
- C. All firestop materials shall be installed prior to expiration date.

1.09 PROJECT CONDITIONS

- A. Environmental Limitations: Install firestopping when ambient or substrate temperatures are within limits permitted by the manufacturer's written instructions. Do not install firestopping when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate per the manufacturers written instructions on the product's Material Safety Data Sheet.
- C. Verify the condition of the substrates before starting work.
- D. Care should be taken to ensure that firestopping materials are installed so as not to contaminate adjacent surfaces.

1.10 COORDINATION

- A. Coordinate areas prior to firestopping installation with the Owner, Construction Manager and/or all other Contractors.
- B. Coordinate construction of openings and penetrating items to ensure that firestopping assemblies are installed according to specified requirements. Opening shall not exceed maximum restrictions allowable for annular spacing per listing or acceptable Engineering Judgments.
- C. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- D. Do not conceal firestopping installations until the Owner's inspection agency or Authorities Having Jurisdiction have examined each installation.
- E. Schedule firestopping after installation of penetrants and joints but prior to concealing or obstructing access to areas requiring firestopping.
- F. Preinstallation Conference: This conference should be a joint meeting attended by the Owner's Representative and all prime contractors, respective firestopping sub-contractors and firestopping company field advisor to review project requirements. The agenda for the conference should include the following topics:
 - 1. Review scope of work.
 - 2. Review shop drawings and firestop application log.
 - 3. Review mock-up requirements.
 - 4. Discuss identification labels and locations.
 - 5. Review schedule, coordination and sequencing with all trades.
 - 6. Review any engineering judgments or other special requirements.
 - 7. Function and frequency of inspections and testing labs.
- G. Destructive testing shall be performed at mock up and at pre determined intervals according to ASTM E 2174 and ASTM E 2393-04 by the inspector and with the installing Contractor present. Inspector to test for in place installation conformance to tested and listed system or engineering judgment details. Non conformances will result in additional destructive testing, at the cost of the installer.

2.01 FIRESTOPPING, GENERAL

- A. Firestopping products specified in system design listings by approved testing agencies may be used providing they conform to the construction type, penetrant type, annular space requirements and fire rating involved in each separate assembly.
- B. Manufacturer of firestopping products shall have been successfully producing and supplying these products for a period of not less than three years and be able to show evidence of at least ten projects where similar products have been installed and accepted.
- C. Accessories: Provide components for each firestop system that is needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by the firestopping manufacturer and by the approved testing agencies for the firestop systems indicated. Accessories include, but are not limited to the following items:
 - 1. Permanent forming/damming/backing materials, including the following:
 - i. Slag wool fiber insulation.
 - ii. Foams or sealants used to prevent leakage of fill materials in liquid state.
 - iii. Fire-rated form board.
 - iv. Polyethylene/polyurethane backer rod.
 - v. Rigid polystyrene board.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Steel sleeves
- D. All firestopping products and systems shall be designed and installed so that the basic sealing system will allow the full restoration of the thermal and fire resistance properties of the barrier being penetrated with minimal repair if penetrants are subsequently removed.

2.02 MIXING

- A. For those products requiring mixing before application, comply with firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

2.03 MANUFACTURERS

- A. Subject to compliance with the requirements, provide products by one of the following or equivalent manufacturers:
 - 1. Grace Construction Products.

2. Nelson Firestop Products.
3. Hilti Firestop Products.
4. A/D Fire Protection Systems Inc.
5. RectorSeal Corporation (The).
6. Specified Technologies Inc.
7. 3M; Fire Protection Products Division.
8. Tremco; Sealant/Weatherproofing Division.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Verify that all pipes, conduits, cables, and/or other items which penetrate fire-rated construction have been permanently installed prior to installation of firestops.

3.02 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing firestop systems to comply with written recommendations of firestopping manufacturer and the following requirements:
 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of firestop systems.
 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestop systems. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form-release agents from concrete.

3.03 FIRESTOP SYSTEMS INSTALLATION

- A. General: Install firestop systems to comply with "Performance Requirements" article in Part 1 and firestopping manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Installation of firestopping shall be performed by an applicator/installer qualified as described in article 1.7.
- C. Apply firestopping in accordance with approved testing agencies listed system designs or manufacturer's EJ per the manufacturer's installation instructions.
- D. Verify that environmental conditions are safe and suitable for installation of firestop products.

- E. Install forming/damming/backing materials and other accessories required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire resistance ratings required.
- F. Install joint forming/damming materials and other accessories required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths of installed firestopping material relative to joint widths that allow optimum movement capability and achieve fire resistance ratings required.
- G. Install metal framing, curtain wall insulation, mechanical attachments, safing materials and firestop materials as applicable within the system design.
- H. Install fill materials for firestop systems by proven techniques to produce the following results:
 - 1. Fill voids, joints and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they fully contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
 - 4. Tool non-sag firestop materials after their application and prior to the time skinning begins. Use tooling agents approved by the firestopping manufacturer.
- I. On vertical pipe penetrations, lift riser clamps to permit the installation of firestopping around the entire pipe penetration. For penetrations involving fire or fire/smoke dampers, only firestop products approved by the damper manufacturer shall be installed in accordance with the damper installation instructions.

3.04 FIELD QUALITY CONTROL

- A. Inspecting Agency: Authorities Having Jurisdiction, the Owner, or Owner's Representative shall be allowed to perform random destructive testing during inspection of firestop systems to verify compliance per listings or manufacturer's installation instructions. All areas of work must be accessible until inspection by the applicable Authorities Having Jurisdiction and inspection agencies. The contractor shall be responsible to repair all tested assemblies with no cost to the owner.
- B. Proceed with enclosing firestop systems with other construction only after inspections are complete.
- C. Where deficiencies are found, repair or replace firestop systems so they comply with requirements.

3.05 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings, as Work progresses by methods and with cleaning materials that are approved in writing by firestopping manufacturer(s) and

that do not damage materials in which openings occur. Leave finished work in neat, clean condition with no evidence of spillovers or damage to adjacent surfaces.

- B. Provide final protection and maintain conditions during and after installation that ensure firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestop systems immediately and install new materials to produce firestop systems complying with specified requirements.

**FASHION INSTITUTE OF TECHNOLOGY
 ADMISSIONS OFFICE RELOCATION
 COED RESIDENCE HALL**

PROJECT #C1536

FIRESTOP SCHEDULE

Project No:	Contractor Name and Address:	Date Submitted:
Project Title:	Supplier/Installer Name and Address:	Company Field Advisor Name and Address:
	Manufacturer Name and Address:	

Manufacturer's Product Reference Numbers and/or Drawing Numbers	U.L., FM, Warnock Hersey or Omega Point Lab Penetration Design Nos.	Penetrating Item: Material, Size, Insulated, Combustible, Joint, Perimeter, etc. Description:	Maximum Allowable Annular Space or Maximum Size Opening	Wall type Construction		Floor Type Construction	Fire Resistance Rating of Wall or Floor (Hourly)	F Rating	T Rating (floors Only)	L Rating (if available)	W Rating (if available)
				DE S.	CONS T.						
Example No. 1 DCFSS-130	UL #130	Maximum 4" Steel Pipe Non-Insulated		P4	6" CMU	N.A.	1 Hour	1 Hour	N.A.	.	
Example No. 2 5300-ICF88.01	UL #591	Maximum 4" PVC Pipe		N.A.	N.A.	UL # D916	3 Hour	1 Hour	2 Hour		

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 COED RESIDENCE HALL**

PROJECT #C1536

Manufacturer's Product Reference Numbers and/or Drawing Numbers	U.L., FM, Warnock Hersey or Omega Point Lab Penetration Design Nos.	Penetrating Item: Material, Size, Insulated, Combustible, Joint, Perimeter, etc. Description:	Maximum Allowable Annular Space or Maximum Size Opening	Wall type Construction		Floor Type Construction	Fire Resistance Rating of Wall or Floor (Hourly)	F Rating	T Rating (floors Only)	L Rating (if available)	W Rating (if available)
				DE S.	CONS T.						
Exmple No. 3	CW-S-2006	Curtain Wall/Perimeter	6" to 12"	NA	NA	4 1/2" Reinforced LW concrete	2 Hour	2 Hour	NA	1 CFM/ Lin Ft.	

SECTION 07 92 00 – JOINT SEALANTS

PART 1 – GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 08 11 13 - Hollow Metal Doors and Frames
- B. Section 09 29 00 - Gypsum Board Assemblies

1.2 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, and installation instructions for each product specified except miscellaneous materials.
- B. Samples:
 - 1. Sealants: One pint or standard tube.
 - 2. Joint Fillers: 12 inch long section
 - 3. Joint Primer/Sealer/Conditioners: One pint.
 - 4. Backer Rods: 12 inch long section.
 - 5. Bond Breaker Tape: 12 inch long section.

1.3 QUALITY ASSURANCE

- A. Container Labels: Include manufacturer's name, trade name of product, kind of material, federal specification number (if applicable), expiration date (if applicable), and packaging date or batch number.

1.4 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Temperature: Follow manufacturer's directions.
 - 2. Ventilation: Provide sufficient ventilation wherever sealants, primers, And other similar materials are installed in enclosed spaces. Follow manufacturer's recommendations.
- B. Protection:
 - 1. Protect all surfaces adjacent to sealants with non-staining removable tape or other approved covering to prevent soiling or staining.
 - 2. Protect all other surfaces in the Work area with tarps, plastic sheets, or other approved coverings to prevent defacement from droppings.

PART 2 – PRODUCTS

2.1 SEALANTS

- A. GE Silicone II paintable sealant for sound penetrations or approved equal.
- B. USG Acoustical sealant or approved equal

- C. Sealant for exterior glazing, GE Silicone based.
- D. Sealant Colors: For exposed materials provide color as indicated or, if not indicated, as selected by the Architect from manufacturer's standard colors. For concealed materials, provide the natural color which has the best overall performance characteristics.

2.2 JOINT FILLERS

- A. Expanded Polyethylene Joint Filler: Flexible, compressible, closed-cell polyethylene of not less than 10 psi compression deflection (25 percent).

2.4 MISCELLANEOUS MATERIALS

- A. Joint Primer/Sealer/Conditioner: As recommended by the sealant manufacturer for the particular joint surface materials and conditions.
- B. Backer Rod: Compressible rod stock of expanded, extruded polyethylene.
- C. Bond Breaker Tape: Polyethylene or other plastic tape as recommended by the sealant manufacturer; non-bonding to sealant; self adhesive where applicable.
- D. Cleaning Solvents: Oil free solvents as recommended by the sealant manufacturer. Do not use re-claimed solvents.
- E. Masking Tape: Removable paper or fiber tape, self-adhesive, non-staining.
- F. Provide setting blocks and spacing material at exteriors windows.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine all joint surfaces for conditions that may be detrimental to the performance of the completed Work. Do not proceed until satisfactory corrections have been made.

3.2 PREPARATION

- A. Clean joint surfaces immediately before installation of sealant and other materials specified in this Section.
 - 1. Remove all loose materials, dirt, dust, rust, oils and other foreign matter that will impair the performance of materials installed under this Section.
 - 2. Remove protective coatings and similar materials from joint faces with manufacturer's recommended solvents.
 - 3. Do not limit cleaning of joint surfaces to solvent wiping. Use methods such as grinding, acid etching or other approved and manufacturer's recommended means, if required, to clean the joint surfaces, assuring that the sealant materials will obtain positive and permanent adhesion.

- B. Set joint fillers at proper depth and position as required for installation of bond breakers, backer rods, and sealants. Do not leave voids or gaps between the ends of joint filler units.
- C. Priming Joint Surfaces:
 - 1. Prime joints if recommended by the manufacturer's printed instructions.
 - 2. Do not allow the primer/sealer to spill or migrate onto adjoining surfaces.

3.3 JOINT BACKING INSTALLATION

- A. Install bond breaker tape in relaxed condition as it comes off the roll. Do not stretch the tape. Lap individual lengths.
- B. Install backer rod of sufficient size to fill the joint width at all points in a compressed state. Compress backer rod at the widest part of the joint by a minimum of 25 percent. Do not cut or puncture the surface skin of the rod.

3.4 SEALANT INSTALLATION

- A. Except as shown or specified otherwise, install sealants in accordance with the manufacturer's printed instructions.
- B. Install sealants with ratchet hand gun or other approved mechanical gun. Where gun application is impractical, install sealant by knife.
- C. If low temperature makes application difficult, preheat sealants using manufacturer's recommended heating equipment.
- C. Finishing: Tool all vertical, non-sag sealants so as to compress the sealant, eliminating all air voids and providing a neat smoothly finished joint. Provide slightly concave joint surface, unless otherwise indicated or recommended by the manufacturer.
 - 1. Use tool wetting agents as recommended by the sealant manufacturer.

3.5 CLEANING

- A. Immediately remove misapplied sealant and droppings from metal surfaces with solvents and wiping cloths. On other materials, remove misapplied sealant and droppings by methods and materials recommended in writing by the manufacturer of the sealant material.
- B. After sealants are applied and before skin begins to form on sealant, remove all masking and other protection and clean up remaining defacement caused by the Work.

END OF SECTION 07 92 00

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Standard and custom hollow metal doors and frames.
2. Louvers installed in hollow metal doors.
3. Light frames and glazing installed in hollow metal doors.

B. Related Sections:

1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
2. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
3. Division 08 Section "Door Hardware".
4. Division 09 Section "Interior Painting" for field painting hollow metal doors and frames.
5. Division 09 Section "Gypsum Board Assemblies".

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
8. ASTM E 413 - Classification for Rating Sound Insulation.
9. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
10. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
11. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.

12. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
13. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
14. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
15. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
 1. Elevations of each door design.
 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 4. Locations of reinforcement and preparations for hardware.
 5. Details of anchorages, joints, field splices, and connections.
 6. Details of accessories.
 7. Details of moldings, removable stops, and glazing.
 8. Details of conduit and preparations for power, signal, and control systems.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 (neutral pressure at 40" above sill) or UL 10C. With Label on door when delivered.
 1. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
- D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.
 - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. CECO Door Products
 - 2. Curries Company
 - 3. Steelcraft
 - 4. Or Equal

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.3 STANDARD HOLLOW METAL DOORS

- A. General: Provide 1-3/4" and 2 1/4" doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
- B. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Design: Flush panel.
 - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.
 - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 - 3. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.
 - 4. Manufacturers Basis of Design:
 - 1. CECO Door Products Legion Series
 - 2. Curries Company 707 Series
 - 3. Or Equal

2.4 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
 - 3. Fabricate frames with mitered or coped corners.
 - 4. Fabricate frames, with the exception of slip-on drywall types, with "closed and tight" miter seams continuously welded on face, finished smooth with no visible seam unless otherwise indicated.
 - 5. Frames for Steel Doors: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
 - 6. Frames for Borrowed Lights: Minimum 16 gauge (0.053-inch-1.3-mm-) thick steel sheet.

7. Manufacturers Basis of Design:

- a. CECO Door Products BQ/BU/DQ/DU/BR/DR Series (Drywall Profile)
- b. CECO Door Products SQ/SU/SR Series (Masonry Profile)
- c. Curries Company C/CM/CG Series (Drywall Profile)
- d. Curries Company M/G Series (Masonry Profile)

- C. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

2.6 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.

- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.

- C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.7 LOUVERS

- A. Metal Louvers: Door manufacturer's standard metal louvers unless otherwise indicated.

1. Blade Type: Vision proof inverted V or inverted Y.

2.8 LIGHT OPENINGS AND GLAZING

- A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator's shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.

- B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.

- C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames

- D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.
- D. Glazing: Comply with requirements in Division 08 Section "Glazing" and with the hollow metal door manufacturer's written instructions.
 - 1. Factory Glazing: Factory install glazing in doors as indicated. Doors with factory installed glass to include all of the required glazing material.

2.9 ACCESSORIES

- A. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.10 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.
- C. Hollow Metal Doors:
 - 1. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
 - 2. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
- D. Hollow Metal Frames:
 - 1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.

3. Sidelight and Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 4. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
 5. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
 6. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 7. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
 8. Door Silencers: Except on gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
- E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.11 STEEL FINISHES

- A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
 - 9. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
 - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured,

remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
 4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
 - a. Jamb and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

END OF SECTION 08 11 13

SECTION 08 31 13 – CEILING ACCESS PANELS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to work of this section.

1.02 DESCRIPTION OF WORK

- A. Provide glass reinforced gypsum (GRG) access panels in gypsum drywall ceilings, complete with accessories, as specified herein.
- B. Install access panels or doors as required for operation, maintenance and/or inspection of dampers, smoke/heat detectors, equipment, valves, controls, or other devices concealed behind finished surfaces, non-removable ceiling construction, and in pipe shafts.”

1.03 RELATED SECTIONS

- A. Gypsum Board AssembliesSection 09 29 00
- B. PaintingSection 09 91 00

1.04 REFERENCES

- A. Underwriters Laboratories, Inc. (UL)
- B. National Fire Protection Association (NFPA)
- C. Warnock Hersey (WHI)

1.05 SUBMITTALS

- A. Product Data: Submit manufacturer’s technical data and installation instruction for each type of access panel assembly, including setting drawings, templates, instructions and direction for installation of anchorage devices.
- B. Verification: Obtain specific locations and sizes for required access panels from trades requiring access to concealed equipment and indicate on submittal schedule.
- C. Special Size Access Panels: Use where required or as indicated.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle access doors and frames as recommended by the Manufacturer, to protect the units from damage.

1.07 QUALILTY ASSURANCE

- A. Coordination: Furnish inserts and anchoring devices which must be built into other work for installation of access doors. Coordinate delivery with other work to avoid delay.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Hollow Metal Access Doors, For Walls (if required)
 - 1. Karp Associates, Inc. Maspeth, NY 11378
 - 2. Nystrom Building Products, Minneapolis, MI 55413
 - 3. Acudor Products Inc., Cedar Grove, NJ 07009
- B. Glass Reinforced Gypsum (GRG) Access Doors, For GWB Ceiling
 - 1. Chicago Metallic Company

2.02 ACCESS DOORS: WALL (if required)

- A. Frames
 - Minimum 16 gauge steel.
 - 1. Gypsum Board Applications: Trim shall be galvanized drywall bead.
- B. Flush Type Door Panel
 - Minimum 14 gauge steel.
 - 1. Hinges: Concealed spring type set to open to approximately 175 degrees; sufficient number to support the door size, or continuous type hinge.
 - 2. Finish: Factory-applied rust inhibitive baked enamel primer over phosphate treated steel.
- C. Cam Locks

Flush Screwdriver or key operated; sufficient number to hold in door panel in flush, smooth plane when closed.

1. One lock on each door panel shall be key operated, pin tumbler type. The remaining locks, if any, shall be screwdriver operated type.

2.03 ACCESS DOOR: DRYWALL CEILING

- A. General: Furnish each access door assembly manufactured as an integral unit, complete with all parts and ready for installation.
- B. The access door panel is made from glass reinforced gypsum and installs and finishes in the same manner as drywall. The Access Door comes in 2 pieces – the frame is attached with drywall screws, then taped and finished using conventional drywall finishing techniques.

2.04 FABRICATION AND MANUFACTURE

- A. Manufacture access door assemblies as integral units complete with all parts and ready for installation. Fabricate units of continuous welded steel construction unless otherwise indicated or specified. Grind welds smooth and flush with adjacent surfaces where applicable. Attachment devices shall be of size and type suitable to secure access doors to types of walls and ceilings being installed into.
 1. Access doors or panels shall be as required for the device being serviced by the access door/panel.”

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install the access doors in accordance with the manufacturer’s printed installation instructions, except as shown or specified otherwise.
- B. Coordinate access door installation with installation of supporting construction.
- C. Set units accurately in position and securely attach to support with face panel plumb or level in relation to adjoining finish surface.

3.02 ADJUSTMENT

- A. Adjust hardware and doors for proper operation.

- B. Remove and replace panels and/or frames which are warped, bowed or otherwise damaged.

END OF SECTION

SECTION 08 41 01 - ALUMINUM ENTRANCES

PART 1 - GENERAL

1.01 SUMMARY

- A. Related Documents: Conditions of the Contract, Division 1 - General Requirements, and Drawings apply to Work of this Section.
- B. Section Includes:
 - 1. Aluminum doors complete with hardware for entrance doors.
- C. Products Furnished but Not Installed Under This Section:
 - 1. Anchoring devices that are built into masonry.
 - 2. Anchoring devices that are cast in concrete.
- D. Related Sections:
 - 1. Section 05 50 00 - Metal Fabrications
 - 2. Section 06 10 00 - Rough Carpentry
 - 3. Section 07 92 00 - Joint Sealers
 - 4. Section 08 71 00 - Door Hardware
 - 5. Section 08 80 00 - Glazing

1.02 SYSTEM REQUIREMENTS

- A. Design Requirements:
 - 1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage, or moisture disposal.
 - 2. Requirements shown by details are intended to establish basic dimension of units, sight lines and profiles of members.
 - 3. Provide concealed fastening.
 - 4. Provide entrance and storefront systems, including necessary modifications, to meet specified requirements and maintaining visual design concepts.
 - 5. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
 - 6. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.
- B. Thermal Requirements:
 - 1. Framing systems shall accommodate expansion and contraction movement due to

surface temperature differentials of 180F without causing buckling, stress on glass, failure of joint seals, excessive stress on structural elements, reduction of performance, or other detrimental effects.

2. Ensure doors function normally within limits of specified temperature range.

3. Thermal Performance:

a. Thermal Transmittance Coefficient (U-factor): When tested to ASTM C236 and AAMA Specification 1503.1-98,

1" (25.4mm) clear insulating glazing: The conductive thermal transmittance (U-factor) shall not be more than 0.56 BTU/hr/sf/°F (3.17 W/m²-K)

1" (25.4mm) low-E (with Low-e glass, e=0.21) insulating glazing = The conductive thermal transmittance (U-factor) shall not be more than .42 BTU/hr/sf/°F (2.38 W/m²-K) using Low-E glazing)

1-9/16" (39.67mm) [1/4" (6.35mm) clear - 7/16" (11.1mm) airspace - 3/6" (4.77mm) clear - 7/16" (11.1mm) airspace - 1/4" (6.35mm) clear] triple pane clear insulating glazing: The conductive thermal transmittance (U-factor) shall not be more than 0.45 BTU/hr/sf/°F (2.55 W/m²-K)

1-9/16" (39.67mm) [1/4" (6.35mm) - Sunglass #2 - 7/16" (11.1mm) airspace - 3/6" (4.77mm) clear - 7/16" (11.1mm) airspace - Sunglass#4 - 1/4" (6.35mm)] triple pane low-E (with Low-e glass, e=0.21) = The conductive thermal transmittance (U-factor) shall not be more than .32 BTU/hr/sf/°F (1.81 W/m²-K) using Low-E glazing.

b. Condensation Resistance Factor (CRF): When tested to AAMA Specification 1503.1-98, the condensation resistance factor shall not be less than 63 for 1" (25.4mm) glazing or 68 for 1 9/16" (39.67mm) glazing.

Pairs of Doors

1. Air infiltration @ 1.57 (75 PA) psf: Air leakage for pairs of doors shall not exceed .50 CFM/FT² when tested in accordance with ASTM E283.

Air infiltration @ 6.24 (75 PA) psf: Air leakage for pairs of doors shall not exceed 1.00 CFM/FT² when tested in accordance with ASTM E283.

2. Water infiltration: No uncontrollable leakage when tested in accordance with ASTM E331 at a test pressure of 0 psf (0 PA) on pair of doors per AAMA101-08 for LW rating.

3. Wind loads: Provide framing system capable of withstanding wind load design pressures of 40 psf (1920 PA) acting inward and 40 (1920 PA) psf acting outward. The design pressures are to be tested per ASTM E-330.

4. Forced Entry testing per AAMA1304

1.03 SUBMITTALS

A. General: Submit in accordance with Section 01 33 00.

- B. Product Data:
 - 1. Submit manufacturer's descriptive literature and product specifications.
 - 2. Include information for factory finishes, hardware, accessories, and other required components.
 - 3. Include color charts for finish indicating manufacturer's standard colors available for selection.

- C. Shop Drawings:
 - 1. Submit shop drawings covering fabrication, installation and finish of specified systems. Shop drawings to include calculations for all stress and loads including wind loads. Drawings to be signed and sealed by a licensed Structural Engineer.
 - 2. Include following:
 - a. Fully dimensioned plans and elevations with detail coordination keys
 - b. Locations of exposed fasteners and joints
 - 3. Provide detailed drawings of:
 - a. Composite members
 - b. Joint connections for framing systems and for entrance doors
 - c. Anchorage
 - d. System reinforcements
 - e. System expansion and contraction provisions
 - f. Glazing methods and accessories
 - g. Internal sealant requirements and recommended types
 - 4. Schedule of finishes.

- D. Samples:
 - 1. Submit manufacturers standard samples indicating quality of finish.
 - 2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.
 - 3. Submit samples for each type of glass, 12 x 12 inch size

- E. Qualification Data:
 - 1. Submit installer qualifications verifying years of experience.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Certified in writing by system manufacturer as qualified for installation of specified systems.
- B. Perform Work in accordance with AAMA SFM-1 and manufacturer's written instructions.
- C. Conform to requirements of ANSI A117.1 and local amendments.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect finished surfaces as necessary to prevent damage.
- B. Do not use adhesive papers or sprayed coatings that become firmly bonded when exposed to sun.
- C. Do not leave coating residue on any surfaces.
- D. Replace damaged units.

1.06 WARRANTY

- A. Provide warranties in accordance with the manufacturer.
- B. Provide written warranty in form acceptable to Owner jointly signed by manufacturer, installer and Contractor warranting work to be watertight, free from deflective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components which fail within 1 year from date of Substantial Completion.
- C. Warranty shall cover following:
 - 1. Complete watertight and airtight system installation within specified tolerances.
 - 2. System is structurally sound and free from distortion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS AND PRODUCTS

- A. Subject to compliance with requirements indicated, provide products by one of the following:
 - 1. Oldcastle BuildingEnvelope®, Terrell, TX.
- B. Substitutions: Submit under provisions of Section 013300, a minimum of 10 days prior to bid date.
- C. Or equal Acceptable Entrance Systems:

Standard duty systems (0.125" (3.17mm) wall thickness; 2-5/8" (66.67mm) deep)
Model AD-375 - medium stile thermal (6" (152.4mm)(10" (254mm)) bottom rail, 2-1/2" (63.5mm) top rail, 3-3/4" (95.25mm) verticals)

2.02 FRAMING MATERIALS AND ACCESSORIES

- A. Aluminum:
 - 1. ASTM B221, alloy 6063-T6 for extrusions; ASTM B209, alloy 5005-H16 for sheets; or other alloys and temper recommended by manufacturer appropriate for specified finish.
- B. Fasteners:

1. Aluminum, non-magnetic stainless steel or other non-corrosive materials compatible with items being fastened.
 2. Provide concealed fasteners wherever possible.
 3. For exposed locations, provide Phillips flathead screws with finish matching item fastened.
 4. For concealed locations, provide manufacturer's standard fasteners.
- C. Expansion Anchor Devices: Lead-shield or toothed-steel, drilled-in, expansion bolt anchors.
- D. Protective Coatings: Cold-applied asphalt mastic complying with SSPC-Paint 12, compounded for 30 mil thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645.
- E. Touch-Up Primer for Galvanized Components: Zinc oxide conforming to FS TT-P-641.
- F. Glazing Gaskets:
1. Compression type design, replaceable, molded or extruded, silicone, or ethylene propylene diene monomer (EPDM).
 2. Profile and hardness as required, to maintain uniform pressure for watertight seal.
- G. Thermal separation consisting of extruded glass reinforced Polyamide.
- H. Dual Weather-stripping:
1. Provide Bulb gasket full perimeter of frame
 2. Provide EPDM or silicone gasket weather-stripping in bottom & top door rail, for contact with threshold and door header.
 3. Provide EPDM extruded gasket at jambs and door header.
 4. Provide pile weather exterior and dual bulb weathering at interior of adjustable astragals on pairs of doors.

2.03 GLAZING ACCESSORIES

- A. Refer to Section 08 80 00.

2.05 FABRICATION

- A. Coordination of Fabrication:
1. Check actual frame or door openings required in construction work by accurate field measurements before fabrication.
 2. Fabricate units to withstand loads that will be applied when system is in place.
- B. General
1. Conceal fasteners wherever possible.
 2. Reinforce work as necessary for performance requirements, and for support to structure.
 3. Separate dissimilar metals and aluminum in contact with concrete utilizing protective coating or preformed separators, which will prevent contact and

- corrosion.
- 4. Comply with Section 08 81 00 for glazing requirements.
- C. Entrance Doors:
 - 1. Fabricate with mechanical joints using internal [steel] reinforcing plates and shear blocks attached with fasteners and by welding.
 - 2. Provide extruded aluminum glazing stops of square design.
 - 3. Extruded rigid fiberglass reinforced polyamide struts are used as a thermal separator between interior and exterior of door.
 - 4. Pairs of doors shall have twin pile seals at the exterior with an adjustable astragal on active stile and twin adjustable co-extruded astragals at the interior.
- D. Hardware:
 - 1. Receive hardware indicated on hardware schedule and install in accordance with requirements of this Section.
 - 2. Cut, reinforce, drill and tap frames and doors as required to receive hardware.
 - 3. Comply with hardware manufacturer's templates and instructions.
 - 4. Use concealed fasteners wherever possible.
- E. Welding:
 - 1. Comply with recommendations of the American Welding Society.
 - 2. Use recommended electrodes and methods to avoid distortion and discoloration.
 - 3. Grind exposed welds smooth and flush with adjacent surfaces; restore mechanical finish.
- F. Flashing: Form from sheet aluminum with same finish as extruded sections. Material thickness shall be as required, suitable to condition, without deflection or "oil-canning".

2.06 FINISHES

- A. Clear Anodized:
 - 1. Conforming to AA-M12C22A31 and AAMA 611.
 - 2. Architectural Class II, etched, medium matte, clear anodic coating, 0.4 mil minimum thickness.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine conditions and proceed with Work in accordance with general conditions.

3.02 INSTALLATION

- A. Erection Tolerances:
 - 1. Limit variations from plumb and level:
 - a. 1/8 inch in 10'-0" vertically.

- b. 1/8 inch in 20'-0" horizontally.
- 2. Limit variations from theoretical locations: 1/4 inch for any member at any location.
- 3. Limit offsets in theoretical end-to-end and edge-to-edge alignment: 1/16 inch from flush surfaces not more than 2 inches apart or out-of-flush by more than 1/4 inch.
- B. Install doors and hardware in accordance with manufacturer's printed instructions.
- C. Set units plumb, level and true to line, without warp or rack of frame.
- D. Anchor securely in place, allowing for required movement, including expansion and contraction.
- E. Separate dissimilar materials at contact points, including metal in contact with masonry or concrete surfaces, with bituminous paint or preformed separators to prevent contact and corrosion.
- F. Set sill members in bed of sealant. Set other members with internal sealants and baffles to provide weather-tight construction.
- G. Coordinate installation of perimeter sealant and backing materials between assemblies and adjacent construction in accordance with requirements of Section 07 92 00.
- H. Glazing: Refer to requirements of Section 08 81 00.

3.03 ADJUSTING

- A. Test door operating functions. Adjust closing and latching speeds and other hardware in accordance with manufacturer's instructions to ensure smooth operation.

3.04 CLEANING

- A. Clean surfaces in compliance with manufacturer's recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.
- B. Clean metal surfaces exercising care to avoid damage.

END OF SECTION

SECTION 08 41 10 - ALUMINUM STOREFRONTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Related Documents: Conditions of the Contract, Division 1 - General Requirements, and Drawings apply to Work of this Section.
- B. Section Includes:
 - 1. Storefront system, complete with reinforcing, fasteners, anchors, and attachment devices.
 - 2. Accessories necessary to complete work.
- C. Products Furnished But Not Installed Under This Section:
 - 1. Anchoring devices that are built into masonry.
 - 2. Anchoring devices that are cast in concrete.
- D. Related Sections:
 - 1. Section 05 50 00 - Metal Fabrications
 - 2. Section 06 10 00 - Rough Carpentry
 - 3. Section 07 92 00 - Joint Sealers
 - 4. Section 08 41 01 - Aluminum Entrances
 - 5. Section 08 80 00 - Glazing

1.02 REFERENCES

- A. Aluminum Association (AA):
 - 1. DAF-45 Designation System for Aluminum Finishes.
- B. American Architectural Manufacturers Association (AAMA):
 - 1. 501 Methods of Test for Exterior Walls.
 - 2. 501.2 Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
 - 3. 2605 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
 - 4. 611 Voluntary Specification for Anodized Architectural Aluminum.
 - 5. 701 Voluntary Specifications for Pile Weatherstripping and Replaceable Fenestration Weatherseals.
 - 6. 1503 Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections.
 - 7. 1801 Voluntary Specification for the Acoustical Rating of Windows, Doors, and Glazed Wall Sections.
 - 8. CW-10 Care and Handling of Architectural Aluminum From Shop to

- Site.
9. SFM1 Aluminum Storefront and Entrance Manual.
- C. American Society for Testing and Materials (ASTM):
1. A36 Structural Steel.
 2. A123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 3. B209 Aluminum and Aluminum - Alloy Sheet and Plate.
 4. B221 Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
 5. E283 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors.
 6. E330 Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
 7. E331 Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
- D. Glass Association of North America (GANA):
1. Glazing Manual
- E. Federal Specifications (FS):
1. TT-P-641G(1) Primer Coating, Zinc Dust-Zinc Oxide (For Galvanized Surfaces).
 2. TT-P-645A Primer, Paint, Zinc Chromate, Alkyd Type.
- F. Steel Structures Painting Council (SSPC):
1. Cold-Applied Asphalt Mastic (Extra Thick Film).

1.03 SYSTEM REQUIREMENTS

- A. Design Requirements:
1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage, or moisture disposal.
 2. Requirements shown by details are intended to establish basic dimension of units, sight lines and profiles of members.
 3. Provide concealed fastening.
 4. Provide entrance and storefront systems, including necessary modifications, to meet specified requirements and maintaining visual design concepts.
 5. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
 6. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.
 7. Framing systems shall accommodate expansion and contraction movement due to surface temperature differentials of 180 degrees F without causing buckling,

stress on glass, failure of joint seals, excessive stress on structural elements, reduction of performance, or other detrimental effects.

8. Stresses placed on structural silicone sealants shall be kept within sealant manufacturer's recommended maximum.

B. Performance Requirements:

Coordinate wind loads with applicable building code.

1. Wind loads: Provide framing system capable of withstanding wind load design pressures of 45 psf acting inward and 45 psf acting outward. The design pressures are based on the 2014 Building Code.
2. Air infiltration: Air leakage through fixed light areas of storefront shall not exceed 0.06 cfm per square foot of surface area when tested in accordance with ASTM E283 at differential static pressure of 6.24 psf.
3. Water infiltration: No uncontrolled leakage when tested in accordance with ASTM E331 at test pressure of 10 psf as defined in AAMA 501.
4. Deflection:
Maximum calculated deflection of any framing member in direction normal to plane of wall when subjected to specified design pressures for spans up to and including 13'-6" shall be limited to $[1/175]$ of its clear span and for spans greater than 13'-6" deflection shall be limited to $[1/240]$ of its clear span + 1/4", except that maximum deflection of members supporting plaster surfaces shall not exceed 1/360 of its span.
5. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than:
 - a. Glass to Exterior – 0.54 (clear)
 - b. Glass to Center – 0.63 (clear)
 - c. Glass to Interior – 0.51 (clear)
6. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:
 - a. Glass to Exterior – 69frame and 60glass (clear)
 - b. Glass to Center – 58frame and 61glass (clear)
 - c. Glass to Interior – 57frame and 57glass (clear)
7. Sound Transmission Class (STC): When tested to AAMA Specification 1801, the STC Rating shall not be less than:
 - a. Glass to Exterior – 38 (laminated)
 - b. Glass to Center – 37 (laminated)
 - c. Glass to Interior – 38 (laminated)

- C. Testing Requirements:** Provide components that have been previously tested by an independent testing laboratory.

1.04 SUBMITTALS

- A. General: Submit in accordance with Section 01 33 00.
- B. Product Data:

1. Submit manufacturer's descriptive literature and product specifications.
 2. Include information for factory finishes, hardware, accessories, and other required components.
 3. Include color charts for finish indicating manufacturer's standard colors available for selection.
- C. Shop Drawings:
1. Submit shop drawings covering fabrication, installation and finish of specified systems. Shop drawings to include calculations for all stress and loads including wind loads. Drawings to be signed and sealed by a licensed Structural Engineer.
 2. Include following:
 - a. Fully dimensioned plans and elevations with detail coordination keys.
 - b. Locations of exposed fasteners and joints.
 3. Provide detailed drawings of:
 - a. Composite members.
 - b. Joint connections for framing systems and for entrance doors.
 - c. Anchorage.
 - d. System reinforcements.
 - e. System expansion and contraction provisions.
 - f. Glazing methods and accessories.
 - g. Internal sealant requirements.
 - h. Thermal improvements.
 4. Schedule of finishes.
- D. Samples:
1. Submit manufacturers standard samples indicating quality of finish.
 2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.
 3. Submit samples for each type of glass, 12 x 12 inch size.
 4. Submit samples for each extrusion type, 12 x 12 inch size.
- E. Test Reports:
1. Standard Systems: Submit certified copies of previous test reports dated within the last three years substantiating performance of system in lieu of retesting. Include other supportive data as necessary.
- F. Qualification Data:
1. Submit installer qualifications verifying years of experience.
Manufacturer's Instructions: Submit manufacturer's printed installation instructions.
- 1.05 QUALITY ASSURANCE**
- A. Installer Qualifications: Certified in writing by system manufacturer as qualified for installation of specified systems.

- B. Perform Work in accordance with AAMA SFM1 and manufacturer's written instructions.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect finished surfaces as necessary to prevent damage.
- B. Do not use adhesive papers or sprayed coatings that become firmly bonded when exposed to sun.
- C. Do not leave coating residue on any surfaces.
- D. Replace damaged units.

1.07 WARRANTY

- A. Provide written warranty in form acceptable to Owner jointly signed by manufacturer, installer and Contractor warranting work to be watertight, free from defective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components which fail within 1 year from date of Substantial Completion.
- B. Warranty shall cover following:
 - 1. Complete watertight and airtight system installation within specified tolerances.
 - 2. System is structurally sound and free from distortion.
- C. Provide written warranty stating organic coating finish will be free from fading more than 10%, chalking, yellowing, peeling, cracking, pitting, corroding or non-uniformity of color, or gloss deterioration beyond manufacturer's descriptive standards for 1 year from date of Substantial Completion and agreeing to promptly correct defects.

PART 2 - PRODUCTS

2.01 MANUFACTURERS AND PRODUCTS

- A. Subject to compliance with requirements indicated, provide products by one of the following:
 - 1. **Oldcastle BuildingEnvelope®**, Terrell, TX.
- B. Substitutions: Submit under provisions of Section 01 33 00, a minimum of 10 days prior to bid date.
- C. Or equal Acceptable Storefront Framing System:
Series 6000 Thermal MultiPlane, glass set to the front, thermally broken, exterior loaded.
2" x 6" mullion profile. This system uses a poured-in-place polyurethane thermal pocket to create its thermal break. This system accommodates 1" glass thickness, with 1/4" as an option.

2.02 FRAMING MATERIALS AND ACCESSORIES

- A. Aluminum:
 - 1. ASTM B221, alloy 6063-T5 for extrusions; ASTM B209, alloy 5005-H16 for sheets; or other alloys and temper recommended by manufacturer appropriate for

- specified finish.
- B. Internal Reinforcing:
 - 1. ASTM A36 for carbon steel.
 - 2. Shapes and sizes to suit installation.
 - 3. Steel components factory coated with alkyd type zinc chromate primer complying with FS TT-P-645.
 - C. Anchorage Devices:
 - 1. Manufacturer's standard formed or fabricated steel or aluminum assemblies of shapes, plates, bars or tubes.
 - 2. Hot-dip galvanize steel assemblies after fabrication; comply with ASTM A123, 2.0 ounce minimum coating.
 - D. Fasteners:
 - 1. Aluminum, non-magnetic stainless steel or other non-corrosive materials compatible with items being fastened.
 - 2. Provide concealed fasteners wherever possible.
 - 3. For exposed locations, provide Phillips flathead screws with finish matching item fastened.
 - 4. For concealed locations, provide manufacturer's standard fasteners.
 - E. Expansion Anchor Devices: Lead-shield or toothed-steel, drilled-in, expansion bolt anchors.
 - F. Protective Coatings: Cold-applied asphalt mastic complying with SSPC, compounded for 30 mil thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645.
 - G. Touch-Up Primer for Galvanized Components: Zinc oxide conforming with FS TT-P-641.
 - H. Glazing Gaskets:
 - 1. Compression type design, replaceable, molded or extruded, of neoprene, polyvinyl chloride (PVC), or ethylene propylene diene monomer (EPDM).
 - 2. Profile and hardness as required to maintain uniform pressure for watertight seal.
 - I. Weatherstripping:
 - 1. Wool pile conforming to AAMA 701.2.
 - 2. Provide EPDM or vinylblade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.
 - J. Internal Sealants and Baffles.

2.03 GLASS AND GLAZING ACCESSORIES

- A. Refer to Section 08 80 00.

2.04 FABRICATION

- A. Coordination of Fabrication:
 - 1. Check actual frame or door openings required in construction work by accurate field measurements before fabrication.
 - 2. Fabricate units to withstand loads that will be applied when system is in place.
- B. General
 - 1. Conceal fasteners wherever possible.
 - 2. Reinforce work as necessary for performance requirements, and for support to

- structure.
- 3. Separate dissimilar metals and aluminum in contact with concrete utilizing protective coating or preformed separators, which will prevent contact and corrosion.
- 4. Comply with Section 08 80 00 for glazing requirements.
- C. Aluminum Framing:
 - 1. Provide members of size, shape and profile indicated, designed to provide for glazing from [exterior] [interior].
 - 2. Provide manufacturer's standard thermal break between exterior and interior aluminum surfaces.
 - 3. Fabricate frame assemblies with joints straight and tight fitting.
 - 4. Reinforce internally with structural members as necessary to support design loads.
 - 5. Maintain accurate relation of planes and angles, with hairline fit of contacting members.
 - 6. Seal horizontals and direct moisture accumulation to exterior.
 - 7. Provide flashings and other materials used internally or externally that are corrosive resistant, non-staining, non-bleeding and compatible with adjoining materials.
 - 8. Provide manufacturer's extrusions and accessories to accommodate expansion and contraction due to temperature changes without detrimental to appearance or performance.
- D. Welding:
 - 1. Comply with recommendations of the American Welding Society.
 - 2. Use recommended electrodes and methods to avoid distortion and discoloration.
 - 3. Grind exposed welds smooth and flush with adjacent surfaces; restore mechanical finish.
- E. Flashing: Form from sheet aluminum with same finish as extruded sections. Apply finish after fabrication. Material thickness as required to suit condition without deflection or "oil-canning".

2.05 FINISHES

- A. Clear Anodized:
 - 1. Conforming to AA-M12C22A31 and AAMA 611.
 - 2. Architectural Class II, etched, medium matte, clear anodic coating, 0.4 mil minimum thickness.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine conditions and proceed with Work in accordance with Section 01400.

3.02 INSTALLATION

- A. Erection Tolerances:
 - 1. Limit variations from plumb and level:

- a. 1/8 inch in 10'-0" vertically.
 - b. 1/8 inch in 20'-0" horizontally.
 2. Limit variations from theoretical locations: 1/4 inch for any member at any location.
 3. Limit offsets in theoretical end-to-end and edge-to-edge alignment: 1/16 inch from flush surfaces not more than 2 inches apart or out-of-flush by more than 1/4 inch.
- B. Install doors and hardware in accordance with manufacturer's printed instructions.
 - C. Set units plumb, level and true to line, without warp or rack of frame.
 - D. Anchor securely in place, allowing for required movement, including expansion and contraction.
 - E. Separate dissimilar materials at contact points, including metal in contact with masonry or concrete surfaces, with bituminous paint or preformed separators to prevent contact and corrosion.
 - F. Set sill members in bed of sealant. Set other members with internal sealants and baffles to provide weather-tight construction.
 - G. Coordinate installation of perimeter sealant and backing materials between assemblies and adjacent construction.
 - H. Glazing: Refer to requirements of Section 08 80 00.

3.03 ADJUSTING

- A. Test door operating functions. Adjust closing and latching speeds and other hardware in accordance with manufacturer's instructions to ensure smooth operation.

3.04 CLEANING

- A. Clean surfaces in compliance with manufacturer's recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.
- B. Clean metal surfaces exercising care to avoid damage.

END OF SECTION

SECTION 08 41 26 – ALL-GLASS ENTRANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes swinging, single-acting exterior and vestibule door assemblies with concealed closers, rail fittings, and top and bottom pivots.

1.2 REFERENCE STANDARDS

- A. American Architectural Manufacturers Association (AAMA): www.aama.org:
 - 1. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum
- B. ASTM International (ASTM): www.astm.org:
 - 1. ASTM C1048 Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass
- C. Builders Hardware Manufacturers Association (BHMA): www.buildershardware.com:
 - 1. ANSI/BHMA A156 Series
- D. Code of Federal Regulations
 - 1. 16 CFR 1201 Safety Standard for Architectural Glazing Materials
- E. International Code Council (ICC): www.iccsafe.org:
 - 1. ICC A117.1 Accessible and Usable Buildings and Facilities (ANSI)
- F. U.S. Architectural & Transportation Barriers Compliance Board: www.access-board.gov:
 - 1. Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate installation of all-glass door assemblies with installation of floor and wall opening construction to comply with tolerance requirements of recessed components.
 - 2. Coordinate installation of anchors and blocking indicated on all-glass entrance shop drawings.

1.4 ACTION SUBMITTALS

- A. Product Data: For each all-glass entrance component, including:
 - 1. Glass panels.
 - 2. Rail fittings.
 - 3. Closer and pivots.
 - 4. Auxiliary door hardware and accessories.

- B. Shop Drawings: For glass door assemblies.
 - 1. Include plans, elevations, sections, details and calculations signed and sealed by a licensed Structural Engineer. Use glass panel type designations used in this Section and on Drawings.
 - 2. Locations and requirements for recesses and attachments to other work.
 - 3. Door hardware locations, mounting heights, and installation requirements.

- C. Samples for Verification: For each exposed component including hardware, for each color and finish selected, of size indicated below:
 - 1. Glass: 6 inches (150 mm) square, showing exposed-edge finish[and tint].
 - 2. Hardware: One of each type of exposed door hardware items.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified installer.

- B. Warranty: Sample of unexecuted manufacturer warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For all-glass door assemblies, to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Experienced Installer equipped and trained for installation of glass door assemblies required for this Project with record of successful completion of not less than five projects of similar scope.

1.8 WARRANTY

- A. Special Manufacturer's Warranty: Standard form in which manufacturer agrees to repair or replace components of glass door assemblies that demonstrate deterioration or faulty operation due to defects in materials or workmanship under normal use within warranty period specified.
 - 1. Warranty Period: Two years date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Provide **PURE Frameless** glass panel partitions with swinging or sliding glass doors, manufactured by DORMA USA, Inc.; (800) 523-8483; email: specification@dorma-usa.com; website: www.dorma.com, Or approved equal.
- B. Source Limitations: Provide all-glass entrance assemblies, fittings and hardware, and accessories (excluding glass panels) through one source from a single manufacturer.

2.2 ALL-GLASS ENTRANCE ASSEMBLIES

- A. Accessibility Standard: Comply with applicable provisions in ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 or local authorities having jurisdiction.
- B. All-Glass Entrance Assembly Configurations: Exterior tempered-glass frameless entrance assembly, with perimeter fittings, rail fitting mountings and supports, door pivots, closers, locks and accessories.
 - 1. Manual-Swinging, All-Glass Entrance Doors (Three of four leaves, one leaf is automatic operation for ADA purposes):
 - a. Rail fittings at sill
 - b. Patch fittings at head
 - c. Double Door: Size as scheduled , single-action
 - d. Door Supports: Adjacent glass panels
 - e. Building structure indicated on Drawings. Metal frame specified in another section.
 - 2. All-Glass Partition: Glass panels of material and thickness specified, of size indicated on Drawings, held within DORMA Dri Fit glazing channel.

2.3 RAIL FITTINGS

- A. Rail Fittings, General: All-glass clamping fittings in types, sizes, quantities, and mounting locations recommended by manufacturer for glass door types, sizes, and operation and glass panel configurations.
 - 1. Basis of Design, **DORMA DRS Rails**.
 - 2. Material and Finish:
 - a. Stainless steel, satin polished.
 - 3. Rail Configurations:
 - a. Bottom Rail: 3-5/8 inches by length required for door size indicated.

- 1) Profile: Square
 - 2) With manufacturer's standard pivot
4. End Caps: Manufacturer's standard precision-fit end caps for rail fittings.

2.4 PATCH FITTINGS

- A. Patch Fittings, General: All-glass clamping fittings [and safety clamping fittings] in types, sizes, quantities, and mounting locations recommended by manufacturer for glass door types, sizes, and operation and glass panel configurations.
- B. Patch Fittings:
1. Basis of Design, **DORMA GLAS Universal Center Hung Patch Fittings**.
 2. PT10 Top patch fitting
 3. Clip-on Cover Material and Finish:
 - a. Stainless steel, satin polished.
- C. Materials:
1. Stainless-Steel Cladding: ASTM A 666, Type 304.

2.5 DOOR HARDWARE

- A. General: Heavy-duty entrance door hardware units in sizes, quantities, and types recommended by manufacturer for all-glass entrance systems indicated. For exposed parts, match metal and finish of rail fittings.
- B. Concealed Overhead Closers and Bottom Pivots: Center hung; BHMA A156.4, Grade 1. Provide housings, bottom arms, top walking beam pivots, mounting plates, auxiliary stop, and accessories.
1. Basis of Design: **DORMA, See 08 71 00 "Door Hardware"**
 2. Swing: Single acting with positive dead stop.
 3. Hold Open: 105 degrees
 4. Opening Force: Comply with interior door operating force of authorities having jurisdiction for accessibility requirements and egress doors.
- C. Mechanical Locks and Latches:
1. Single-Door and Active-Leaf Locksets: Manufacturer's standard patch dead-bolt locksets.
 - a. All Glass Exit Device

- 1) Basis of Design: **DORMA, See 08 71 00 "Door Hardware"**
 - 2) Finish: Satin polished stainless steel
- D. Lock Cylinders: As specified in Section 08 71 00 "Door Hardware."
- E. Weather Stripping: Pile Brush type; replaceable without removing all-glass entrance doors from pivots.
- F. Automatic Door Operators: Compact electromechanical swing door operator with solid-state controller; BHMA A156.19, power assist, low energy, with opening force required of not more than 5 lbf (22 N); single door, one-way two-way operation, surface-mounted; size recommended by door operator manufacturer for weight of door.
1. Basis of Design Product: **DORMA, See 08 71 00 Door Hardware.**
 2. Activation Device: Push-plate switch & Push-button switch on each side of door.
 3. Cover: Standard width
 4. Finish: Match exit device finish.

2.6 GLASS PANELS

- A. Glass Panels, General:
1. Provide glass panels that comply with 16 CFR 1201, Category II requirements for safety glazing. Permanently mark glazing with certification label of the SGCC.
 2. Provide glass panels with exposed edges machine ground and flat polished.
 3. Provide holes and cutouts in glass to receive hardware, fittings, and accessories prior to tempering glass. Do not cut, drill, or make other alterations to glass after tempering.
 4. Fully temper glass using horizontal (roller-hearth) process, and fabricate so that when glass is installed, roll-wave distortion is parallel with bottom edge of door or lite.
- B. Fully Tempered Ultraclear (Low-Iron) Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality-Q3, with visible light transmission of not less than 91 percent; thickness 3/4 inch (12.7 mm)

2.7 FABRICATION

- A. General: Fabricate all-glass door assemblies in sizes, profiles, and configurations shown on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine door opening to determine if work is within all-glass entrance manufacturer's required tolerances and ready to receive work. Proceed with installation once conditions affecting installation and performance meet manufacturer's requirements.

3.2 DOOR INSTALLATION

- A. General: Comply with all-glass entrance manufacturer's written installation instructions and approved shop drawings.
- B. Install all-glass door assemblies after other finishing operations have been completed. Coordinate installation of recesses housings with installation of adjacent finishes.
- C. Set units level, plumb, and true to line, with uniform joints.
- D. Maintain uniform clearances between adjacent components.
- E. Secure housings and components to building structure using manufacturer's recommended fasteners suitable for application.

3.3 ADJUSTING

- A. Adjust doors and hardware to produce smooth operation and uniform fit.
- B. Adjust door closers to required timing and force.
- C. Adjust hardware for smooth operation.
- D. Replace damaged glass panels and accessories.

3.4 CLEANING

- A. Clean glass panels in accordance with glass manufacturer's written instructions. Do not use cleaning agents or methods not approved by glass manufacturer.
- B. Clean exposed metal surfaces to factory new appearance.

END OF SECTION 08 41 26

SECTION 08 71 00 – DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
- C. Related Sections:
 - 1. Division 06 Section “Rough Carpentry”.
 - 2. Division 08 Section “Hollow Metal Doors and Frames”.
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. NFPA 80 - Fire Doors and Windows.
 - 4. NFPA 101 - Life Safety Code.
 - 5. NFPA 105 - Installation of Smoke Door Assemblies.
 - 6. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards:
 - 1. ANSI/BHMA Certified Product Standards - A156 Series
 - 2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions, and finishes.

- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Keying Schedule: Prepared under the supervision of the Owner's Representative, and Architect, prepare schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.
- D. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required, by Owner and Architect. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.
- E. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.

1.4 QUALITY ASSURANCE

- A. **Manufacturers Qualifications:** Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. **Installer Qualifications:** Installers, trained by the primary product manufacturers, with a minimum 3 years documented experience installing both standard and electrified builders' hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- C. **Door Hardware Supplier Qualifications:** Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor in good standing by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
 - 1. **Scheduling Responsibility:** Preparation of door hardware and keying schedules.
- D. **Source Limitations:** Obtain each type and variety of Door Hardware specified in this Section from a single source, qualified supplier unless otherwise indicated.
 - 1. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated (if required).
- E. **Regulatory Requirements:** Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the model building code including, but not limited to, the following:
 - 1. NFPA 70 "National Electrical Code", including electrical components, devices, and accessories listed and labeled as defined in Article 100 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - 2. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1 as follows:
 - a. **Handles, Pulls, Latches, Locks, and other Operating Devices:** Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
 - b. **Door Closers:** Comply with the following maximum opening-force requirements indicated:
 - 1) Interior Hinged Doors: 5 lbf applied perpendicular to door.
 - 2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

- c. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.
 3. NFPA 101: Comply with the following for means of egress doors:
 - a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
 - b. Thresholds: Not more than 1/2 inch high.
 4. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252 (neutral pressure at 40" above sill) or UL-10C.
 - a. Test Pressure: Positive pressure labeling.
- F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- G. Keying Conference: Conduct keying conference with Owner's Representative, and Architect to incorporate the following criteria into the final keying schedule document:
 1. Function of building, purpose of each area and degree of security required.
 2. Plans for existing and future key system expansion.
 3. Requirements for key control storage and software.
 4. Installation of permanent keys, cylinder cores and software.
 5. Address and requirements for delivery of keys.
- H. Pre-Submittal Conference: Conduct coordination conference with attendance by representatives of Supplier(s), Installer(s), Contractor(s), Owner's Representative and Architect to review proper methods and the procedures for receiving, handling, and installing door hardware.
 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for hollow metal doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades (if required).
 3. Review sequence of operation narratives for each unique access-controlled opening.
 4. Review and finalize construction schedule and verify availability of materials.
 5. Review the required inspecting, testing, commissioning, and demonstration procedures.
- I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software, or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software, and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- C. Door and Frame Preparation: Related Division 08 Sections: Steel doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.

- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
 - 1. Ten years for mortise locks and latches.
 - 2. Twenty-five years for concealed closure.

1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Continuing Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
 - 1. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
 - a. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
 - B. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity, unless otherwise indicated:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
4. Acceptable Manufacturers:
 - a. Bommer Industries (BO).
 - b. Hager Companies (HA).
 - c. McKinney Products (MK).

2.3 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified automatic, self-latching, and manual flush bolts and surface bolts. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor. Furnish dust proof strikes for bottom bolts. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
 1. Acceptable Manufacturers:
 - a. Door Controls International (DC).
 - b. Rockwood Manufacturing (RO).
 - c. Trimco (TC).

2.4 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years of experience designing secured master key systems and have on record a published security keying system policy.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
- C. Cylinders: Original manufacturer cylinders complying with the following:

1. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
 2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
 4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 5. Keyway: Manufacturer's Standard.
- D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified cylinders employing a utility patented and restricted keyway requiring the use of patented controlled keys. Provide bump resistant, fixed core cylinders as standard with solid recessed cylinder collars. Cylinders are to be factory keyed where permanent keying records will be established and maintained.
1. Provide a 6 pin multi-level master key system comprised of patented controlled keys and security and high security cylinders operated by one (1) key of the highest level. Geographical exclusivity to be provided for all security and high security cylinders and UL437 certification where specified.
 - a. Level 1 Cylinders: Provide utility patented controlled keyway cylinders that are furnished with patented keys available only from authorized distribution.
 2. Acceptable Manufacturer:
 - a. Sargent Manufacturing (SA) - Degree Series.
 - b. Corbin Russwin (RU) – Access 3 Series.
- E. Keying System: Each type of lock and cylinders to be factory keyed. Conduct specified "Keying Conference" to define and document keying system instructions and requirements. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner. Incorporate decisions made in keying conference, and as follows:
1. Master Key System: Cylinders are operated by a change key and a master key.
 2. Grand Master Key System: Cylinders are operated by a change key, a master key, and a grand master key.
 3. Great-Grand Master Key System: Cylinders are operated by a change key, a master key, a grand master key, and a great-grand master key.
 4. Existing System: Master key or grand master key locks to Owner's existing system.
 5. Keyed Alike: Key all cylinders to same change key.
- F. Key Quantity: Provide the following minimum number of keys:
1. Top Master Key: One (1)
 2. Change Keys per Cylinder: Two (2)
 3. Master Keys (per Master Key Group): Two (2)
 4. Grand Master Keys (per Grand Master Key Group): Two (2)
 5. Construction Keys (where required): Ten (10)
 6. Construction Control Keys (where required): Two (2)
 7. Permanent Control Keys (where required): Two (2)

- G. Construction Keying: Provide construction master keyed cylinders or temporary keyed construction cores where specified. Provide construction master keys in quantity as required by project Contractor. Replace construction cores with permanent cores. Furnish permanent cores for installation as directed under specified "Keying Conference".

2.5 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified mortise locksets furnished in the functions as specified in the Hardware Sets. Locksets to be manufactured with a corrosion resistant, stamped 12-gauge minimum formed steel case and be field-reversible for handing without disassembly of the lock body. Lockset trim (including knobs, levers, escutcheons, roses) to be the product of a single manufacturer. Furnish with standard 2 3/4" backset, 3/4" throw anti-friction stainless steel latchbolt, and a full 1" throw stainless steel bolt for deadbolt functions.
1. Acceptable Manufacturers:
 - a. Corbin Russwin Hardware (RU) – ML2000 Series.
 - b. Sargent Manufacturing (SA) – 8200 Series.
 - c. Schlage (SC) – L9000 Series.
 - B. Lock Trim Design: As specified in Hardware Sets.

2.6 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
- B. Standards: Comply with the following:
1. Strikes for Mortise Locks and Latches: BHMA A156.13.
 2. Strikes for Bored Locks and Latches: BHMA A156.2.
 3. Strikes for Auxiliary Deadlocks: BHMA A156.5.
 4. Dustproof Strikes: BHMA A156.16.

2.7 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type of door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
 2. Standards: Closers to comply with UL-10C and UBC 7-2 for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
 4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 - a. Where closers are indicated to have mechanical dead-stop, provide heavy duty arms and brackets with an integral positive stop.
 - b. Where closers are indicated to have mechanical hold open, provide heavy duty units with an additional built-in mechanical holder assembly designed to hold open against normal wind and traffic conditions. Holder to be manually selectable to on-off position.
 - c. Where closers are indicated to have a cushion-type stop, provide heavy duty arms and brackets with spring stop mechanism to cushion door when opened to maximum degree.
 - d. Closers shall be concealed.
 5. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt or security type fasteners as specified in the door Hardware Sets.
- B. Door Closers, Overhead Concealed (Heavy Duty): ANSI/BHMA 156.4 certified Grade 1 heavy duty door closers. Closers to have fully concealed body in the door and track assembly in the frame, with separate and independent valves for closing speed, latch speed, and backcheck adjustments.
1. Acceptable Manufacturers:
 - a. LCN Closers (LC).
 - b. Norton Door Controls (NO).

2.8 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor

stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders (if applicable).

1. Acceptable Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Hiawatha, Inc. (HI).
 - c. Rockwood Manufacturing (RO).

- C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Acceptable Manufacturers:
 - a. Rixson Door Controls (RF).
 - b. Rockwood Manufacturing (RO).
 - c. Sargent Manufacturing (SA).

2.9 ARCHITECTURAL SEALS

- A. General: Thresholds, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous sound gasketing on interior doors where indicated.
- B. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.
- C. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.
- D. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- E. Acceptable Manufacturers:
 1. Pemko Manufacturing (PE).
 2. Reese Enterprises, Inc. (RS).
 3. Zero International (ZE).

2.10 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.11 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings, and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 2. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 3. Provide blocking in drywall partitions where wall stops, or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for acoustical doors in full bed of sealant.
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating, and adjusted.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. and provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SCHEDULE

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
- B. Manufacturer's Abbreviations:

1. DORMA – Dormakaba
2. WIKK – Wikk Industries
3. NGP – National Guard Products
4. MK – McKinney
5. SG – Sargent
6. LC – LCN Closers
7. RO – Rockwood
8. NO – Norton Door Controls
9. RX – Rixson
10. VD – Von Duprin

Hardware Schedule

Set: 1

Door: 1

Each Pair to receive:

1	6" Double Header x 1/8062 top Top pivot & 1/RTS88	233.062 x panic strike prep ES2 x RTS closer on RHR Leaf	700	DORMA
2	Top DRS Rails	234.120 x 2-1/2" x Tapered	700	DORMA
2	Bottom DRS Rails	234.171 x -2-1/2" x Tapered	700	DORMA
2	Exit Devices DG1000 DB-TB-S2	970.210 X Top Latch Function	700	DORMA
2	Pull Handles – JS	970.410	700	DORMA
2	Keyed Cylinders	match existing x SFIC (small format Interchangeable cores)	626	
1	Electric Strike	ES2 x Fail Safe	630	DORMA
1	Automatic Operator x deep reveal if required	ED250 x 24VDC x extended spindle	689	DORMA
1	Bollard Post	B4SSM x IG (Inground mount) Prep for 630		WIKK
1	Bollard Post	Actuator. Use at Exterior (location as per plan) B4SSM x Surface mount x Prep for 630	630	WIKK
1	Bollard Actuator	Actuator. Use at Interior (location as per plan) SFA-3 2-3/4" x 4-1/2"	630	WIKK
2	Wall Actuators	SFA-3 2-3/4" x 4-1/2" x wall mounted At Vestibule & Lobby	630	WIKK
1	Key switch	KS5-L2 Confirm location of key switch With architect	630	DORMA
2	Header Stops	233.988	700	DORMA
2	Floor Stops	926.870	700	DORMA
1	Threshold	426	AL	NGP
*	Top & Bottom U-Channels	Frameless PURE System at vertical Glass wall panels		DORMA
1	Power Supply	PS610RF	600	DORMA

*Provide quantity and length as required for all fixed glass panels.

Notes:

1. Doors & vestibule glass to be 3/4" Tempered safety glass.
2. All part numbers based on 3/4" tempered glass.
3. Header to span across top of doors. Can be recessed or flush mounted.
4. Dri-Fit U-Channels to span full width of glass wall fixed panels at top and Bottom. Recessed or Flush mounted.
5. Between all fixed glass panels (at vertical butt joints) provide UV stable polycarbonate with high bond tape on surfaces adjacent to glass.
6. Provide cylinders as required to match existing BLDG. Provide interchangeable core.

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Additional Description

Door #1

- Doors are normally closed and latched. Doors are unlocked during business hours.
- Latch retracted and automatic operator is activated by pushbuttons located on bollards. Manual entry from outside is permitted by pulling the doors when they are unlocked.
- Actuator push buttons will open both LHR door leaves at doors #1 and #2 simultaneously.
- Key switch will disable the actuator pads during non-business hours. Green light indicates Power on, Red indicates power off. The key switch can be eliminated if the security software can perform this function.
- Free Egress from inside at all times.

Set: 2

Door: 2

Each Pair to receive:

1	6" Double Header x 1/8062 top Top pivot & 1/RTS88	233.062 x RTS closer on RHR Leaf	700	DORMA
2	Top DRS Rails	234.120 x 2-1/2" x Tapered	700	DORMA
2	Bottom DRS Rails	234.171 x -2-1/2" x Tapered	700	DORMA
2	Dummy Exit Devices DG1000 DM	970.210 X Dummy Bars x no latching	700	DORMA
2	Pull Handles – JS	970.410	700	DORMA
1	Automatic Operator x deep reveal if required	ED250 x 24VDC x extended spindle	689	DORMA
2	Header Stops	233.989	700	DORMA
2	Floor Stops	926.870	700	DORMA
*	Top & Bottom U-Channels	Frameless PURE System at vertical Glass wall panels		DORMA
1	Power Supply	PS610RF	600	DORMA

*Provide quantity and length as required for all fixed glass panels.

Additional Description

Door #2

- Doors are normally closed. No latching.
- Automatic operator is activated by pushbuttons located on wall & bollard. Manual entry is permitted by pulling the doors.
- Actuator push buttons will open both LHR door leaves at doors #1 and #2 simultaneously.
- Key switch will disable the actuator pads during non-business hours. Green light indicates Power on, Red indicates power off. The key switch can be eliminated if the security software can perform this function.
- Free Egress from inside at all times.

Set: 3

Door: 3, 4, 9, 10, 11, 12, 15, 16, 17, 18, 19 ,20 ,21 ,22, 23, 24, 25

Notes:

1. All hardware for Steelcase doors to be supplied and installed by FIT's furniture vendor.

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Set: 4

Door: 5, 6, 28

3	Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1	Privacy Mort. Lock	49-8265-LNMD with Indicator	US32D	SG
1	Concealed Closer	3133 BUMPER	AL	LC
1	Door Stop	400	US26D	RO
3	Silencer	608		RO
2	Kickplates	K1050	US26D	RO

Notes:

1. Cylinder to be 6-pin interchangeable core.

Set: 5

Doors: 13, 14, 26

3	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	DG1 8204 LNMD	US32D	SG
1	Concave Wall Stop	409	630	RO
3	Silencer	608		RO
2	Kickplates	K1050	US26D	RO

Notes:

1. Cylinder to be 6-pin interchangeable core.

Set: 6

Doors: 27

3	Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom Lock	DG1 8204 LNMD	US32D	SG
1	Door Closer	7500	689	NO
3	Silencer	608		RO
1	Concave Wall Stop	409	630	RO
2	Kickplates	K1050	US26D	RO
1	Louver w/ Fusible Link			

Notes:

1. Cylinder to be 6-pin interchangeable core.

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Set: 7

Doors: 30

3 Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1 Storeroom Lock	DG1 8204 LNMD	US32D	SG
1 Concealed Overhead Stop	1-X36	630	RX
1 Door Closer	7500	689	NO
3 Silencer	608		RO
2 Kickplates	K1050	US26D	RO

Notes:

1. Cylinder to be 6-pin interchangeable core.

Set: 8

Doors: 8

3 Hinge	TA2714	US26D	MK
1 Exit Device	9813 x ETB	US32D	SG
1 Concealed Closer	3133 Bumper	AL	LC
1 Door Stop	400 / 441CU	US26D	RO
3 Silencer	608		RO
2 Kickplates	K1050	US26D	RO

Notes:

1. Cylinder to be 6-pin interchangeable core.

Set: 9

Doors: 29

3 Hinge	TA2714	US26D	MK
1 Exit Device	9813 x ETB	US32D	SG
1 Concealed Closer	3133 Bumper	AL	LC
1 Electric Strike	6211	US26D	VD
1 Door Stop	400 / 441CU	US26D	RO
3 Silencer	608		RO
1 Card Reader	by security system supplier		
2 Kickplates	K1050	US26D	RO

Notes:

1. Cylinder to be 6-pin interchangeable core.

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Set: 10

Doors: 31

3 Hinge	TA2714	US26D	MK
1 Exit Device	9813 x ETB	US32D	SG
1 Concealed Closer	3133 Bumper	AL	LC
1 Magnetic Door Hold – Open	EM 5004 MAT HT RM2	12	DORMA
1 Electric Strike	ES2 x Fail Safe	630	DORMA
1 Automatic Operator x deep reveal if required	ED250 x 24VDC x extended spindle	689	DORMA
2 Wall Actuators	SFA-3 2-3/4" x 4-1/2" x wall mounted	630	WIKK
1 Power Supply	PS610RF	600	DORMA
1 Door Stop	400 / 441CU	US26D	RO
3 Silencer	608		RO
1 Card Reader	by security system supplier		
2 Kickplates	K1050	US26D	RO

Notes:

1. Cylinder to be 6-pin interchangeable core.

Set: 11

Doors: 7, 32

6 Hinge	TA2714 NRP 4-1/2" x 4-1/2"	US26D	MK
1 Storeroom Lock	DG1 8204 LNMD	US32D	SG
2 Concealed Overhead Stop	1-X36	630	RX
6 Silencer	608		RO
1 Flush Bolt	2849	US26D	RO
1 Dust Proof Strike	570	US26D	RO
1 Kickplates	K1050	US26D	RO

Notes:

1. Cylinder to be 6-pin interchangeable core.

END OF SECTION 08 71 00

DOOR HARDWARE 08 71 00 - 19

SECTION 08 73 00 - THRESHOLDS, WEATHERSTRIPPING AND SEALS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Provide thresholds, saddles, weatherstripping, seals and astragals as shown on Drawings and as specified herein.

1.2 REFERENCES

- A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.

1. American National Standards Institute (ANSI).
2. American Society for Testing and Materials (ASTM).
3. National Fire Protection Association (NFPA).
4. Builders Hardware Manufacturers Association (BHMA).
5. Underwriters Laboratories, Inc., (UL).
6. American Architectural Manufacturers Association (AAMA).

1.3 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, installation and maintenance instructions for each item and type.
- B. Samples:
 1. Color Samples:
 - a. Color brushed Aluminum: Provide manufacturer's standard colors for Architect's selection.

1.4 QUALITY ASSURANCE

- A. Fire Rated Products: Comply with Underwriter's Laboratories, Inc. (UL); Warnock Hersey International, Inc., (WHI); or Factory Mutual System (FM) Standards, and time ratings in hours listed in each directory list.
- B. Use resilient or flexible stripping and seals that are easily replaceable and available during anticipated life of building.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products of this Section as recommended by manufacturer to protect from damage.

- B. Inventory products immediately upon delivery.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Zero International, Inc., Bronx, NY.
- B. Accurate Metal Weatherstripping Co., Mt. Vernon, NY.
- C. Pemco, Ventura, CA
- D. Reese Enterprises, Inc., Huntington Beach, CA.
- E. Safe-T-Metal Co., Inc., Garden City Park, NY.
- F. National Guard Products, Memphis, TN.

2.2 MATERIALS

- A. Metals:
 - 1. Extruded Aluminum: Alloy 6063, hardness T5 or T6.
 - 2. Stainless Steel: Rolled, non-magnetic, Type 300.
- B. Neoprene : Minimum chlorine content 12 percent.
 - 1. Solid Neoprene: Mil R-6855E, Class II, Grade 40.
 - 2. Closed Cell Neoprene: ASTM D6576, Type II, Grade A, B, C.
- C. Polypropylene: American Architectural Manufacturer's Association (AAMA), 701.1 Standards.
- D. Fasteners: Builders Hardware Manufacturers Association (BHMA), Standard 1001, unless otherwise specified.

2.3 EXTRUDED THRESHOLDS

- A. Types:
 - 1. Type 1: Single piece saddle.
 - 2. Type 2: Adjustable width saddle.
 - a. Adjustable Construction: 3 piece interlocking. Width: Minimum 5" and less than 7".
 - b. Adjustable Construction: 5 pieces interlocking. Width: Minimum 7" or greater.

Provide adjustable width saddles generally at building entrance doors, doors opening off Auditorium platform or stage, Gymnasium doors, Dance Classroom doors.

3. Type 3: Rabbeted with stop strip.
 - a. Thermal Barrier: Hollow neoprene bulb.
 - b. Thermal Barrier: Closed cell sponge neoprene.
 - c. Thermal Barrier: Pile insert.

B. Surface Pattern:

1. Abrasive tread for single piece saddle.
2. Grooved tread for adjustable width saddle.

2.4 SPECIAL ACCESSORIES

- A. Disabled Ramps: Metal and finish to match threshold type.
- B. Cover Plates for Door closers: Construction and finish to match threshold type. Openings and cutouts for hardware unit spindles. Coordinate fabrication with final approved hardware schedule and necessary templates.

2.5 CAST METAL THRESHOLDS

Provide at roof bulkhead door and other locations as indicated on drawings.

- A. Metals: Cast bronze (Provide white bronze at aluminum doors).
- B. Surface Pattern: Grooved tread.
- C. Finish: Minimum two (2) ounces per square foot of abrasive granules embedded a minimum of 1/16" deep in top metal surface.
- D. Fasteners: Manufacturer's standard or recommended fasteners in compatible material and matching finish, unless otherwise specified.

2.6 THRESHOLD FABRICATION

- A. Fabricate thresholds of length required for tight fit against doorframes. Cope to provide fitting around obstructions. Leave edges free from burrs.
- B. Factory miter corners and fit with end returns to close exposed ends of thresholds not covered by the doorframe.
- C. Drill holes 3" from each end of threshold and intermediate holes 12" maximum on center for required fasteners. Prepare holes for countersunk fasteners.

2.7 DRIP CAPS

- A. Provide drip caps for exterior doors not protected from precipitation.
- B. Types:
 - 1. Sill Protection.
 - 2. Top Protection: Extended rain drip cap.
- C. Metal: Extruded aluminum.
- D. Finish: Anodized to match door finish.
- E. Fasteners: Manufacturer's standard or recommended fasteners in compatible material and matching finish, unless otherwise specified.

2.8 HEAD AND JAMB WEATHERSTRIPPING AND SEALS

- A. Resilient Insert Type
 - 1. Mounting: Surface.
 - 2. Housing:
 - a. Extruded aluminum: Main walls and flanges, minimum 0.06" thick.
 - 1. Security Housing: Minimum 0.080" thick.
 - 3. Finish:
 - a. Aluminum: Clear anodized, or Bronze color anodized. Color as selected by Project Architect.
 - 4. Seals: Solid neoprene.
 - 5. Fasteners: Manufacturer's standard or recommended fasteners in compatible material and matching finish, unless otherwise specified.
- B. Interlocking Metal Type
 - 1. Mounting: Surface.
 - 2. Metal: Extruded aluminum, minimum 0.052" thick.
 - 3. Finish:
 - a. Mill, or
 - b. Color selected by Project Architect.
 - 4. Fasteners: Manufacturer's standard or recommended fasteners in compatible material and matching finish, unless otherwise specified.
- C. Spring Metal Type

1. Mounting: Surface.
 2. Metal:
 - a. Spring bronze, minimum 0.006" thick.
 - b. Spring stainless steel, minimum 0.005" thick.
 3. Finish: Mill.
 4. Fasteners: Manufacturer's standard or recommended fasteners in compatible material and matching finish, unless otherwise specified.
- D. Special Purpose Ratings for Jambs and Head. Meet requirements of Paragraph A., and the following
1. Special Purpose Rating for Door(s) Indicated:
 - a. Fire Rated/Labeled.
 - b. Smoke/Air.
 - c. Sound Tested.
 - d. Light Proof.
 2. Mounting: Three sides of frame.
 - a. Light Proof Rating: Continuous extruded elliptical solid neoprene seal, with no light leaks.
 - b. Sound Tested: Adjustable bumper-type stripping with resilient insert, retained in adjustable metal strip by captive adjustment screws, forming a combination door stop and seal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install Work in accordance with manufacturer's printed instructions, except as shown or specified otherwise.

NOTE: Refer to Section 07 92 00: "Joint Sealers" for sealant types.

- B. Level and align thresholds with frames and doors. Where required, use non-corrosive shims.

1. Exterior Doors: Set threshold in a solid bed of "Type 3" sealant.
2. Secure thresholds to substrate with countersunk fasteners.

- C. Weatherstripping and Seals

1. Starting at head, install continuous stripping at each opening without unnecessary interruptions at door corners and hardware.
2. Secure fasteners for stripping and seals so they will not work loose during door operation. Exposed heads of fasteners shall be free of sharp edges.

3. Coordinate meeting seals with hardware before installation.
4. Install units plumb and level at optimum location to maintain a permanent effective seal.

3.2 ADJUSTING AND CLEANING

- A. Adjust stripping and seals, if necessary, to achieve an effective seal for proper operation of doors and hardware.
- B. Clean exposed surfaces by methods recommended by manufacturer.

END OF SECTION

**FASHION INSTITUTE OF TECHNOLOGY
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COED RESIDENCE HALL
LIST OF SUBMITTALS**

PROJECT #C1536

SUBMITTAL	DATE SUBMITTED	DATE APPROVED
Product Data:	_____	_____
Catalog sheets, specifications, installation and maintenance instructions for each item		
Samples:	_____	_____
1. Color sample of anodized aluminum and bronze		

* * *

SECTION 08 80 00 MISCELLANEOUS GLAZING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the miscellaneous glass and glazing as shown on the drawings and/or specified herein, including but not limited to glazing for aluminum entrances and railing inserts:
1. Laminated safety glass for Aluminum Entrance Doors.
 2. Insulated Glass in aluminum curtain wall.
 3. Tempered glass railing inserts.

1.02 REFERENCES

- A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.
1. Flat Glass Marketing Association (FGMA).
 2. Underwriters Laboratories, Inc. (UL).
 3. American National Standards Institute (ANSI).

1.03 SUBMITTALS

A. Product Data

Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used.

B. Samples

Glass: 12" x 12" pieces for each type of glass specified herein. All samples shall bear a label stating the name of the manufacturer, the product's brand name and thickness.

C. Quality Assurance

Provide certifications that materials and systems comply with specified requirements

D. Warranties

Provide written warranties as specified herein.

1.04 QUALITY ASSURANCE

A. Compatibility of Materials

Components of glazing system shall be manufactured or recommended by one manufacturer to assure compatibility of materials.

B. Installer: A firm with a minimum of five years experience in type of work required by this Section and which is acceptable to manufacturers of primary materials; and with a successful record of in-service installations similar in size and scope to this Project.

C. Comply with recommendations in "Glazing Manual" and "Glazing Sealing Systems Manual" of Flat Glass Marketing Association except as shown or specified otherwise and specifically recommended otherwise by manufacturers of glass and glazing materials.

D. Safety Glazing Material (General)

Type indicated, meeting requirements of the Consumer Products Safety Commission and of ANSI Z97.1 with label on each piece.

E. Glass Thickness and Strength

Determine and provide size, thickness and strength (by heat treatment) of glass products that are certified to meet or exceed performance requirements specified in this Section. Provide units with proper thickness, edge clearance and tolerance to comply with recommendations of glass manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials and products in unopened, factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and standards of good practice.

1. Protect materials from moisture, sunlight, excess heat, sparks and flame.

2. Sequence deliveries to avoid delays, but minimize on-site storage.
3. Protect glass from edge damage during handling, storage, and installation.

1.06 PROJECT CONDITIONS

A. Environmental Requirements

1. Comply with glazing materials manufacturer's written recommendations regarding environmental conditions under which glazing materials shall be installed.
2. Perform work of this Section only when existing or forecasted weather conditions are within limits established by manufacturers of materials and products used.
3. Install sealants only when temperatures are within limits recommended by sealant manufacturer, except, never install sealants when temperatures are below 40°F.

1.07 WARRANTY

- ##### **A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by laminated-glass manufacturer agreeing to replace laminated-glass units that deteriorate f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.**
1. Warranty Period: five years from date of substantial Completion
 2. Deterioration of Laminated Glass: Defects developed from normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

PART 2 –PRODUCTS

2.01 GLASS

- ##### **A. For Railings – Float glass meeting requirements of ASTM C1036 Type 1, Quality q3 fully tempered in accordance with ASTM C1048 Type FT**
1. Color Clean, Class 1
 2. Polish edges exposed to a bright flat polish

3. Install with clips shown on drawings
4. Thickness 3/8"

B. For Aluminum Doors

Laminated Safety Glass, two sheets of double-strength clear sheet glass; ASTM C 1036 or ASTM C1048, Type I, Class 1, quality q3; permanently laminated together with minimum 0.060" thick sheet of clear plasticized polyvinyl butyral produced specifically for laminating glass.

C. For Aluminum Curtain Wall

1" insulating glass (1/4", 1/2", 1/4")

PART 3 - EXECUTION

3.01 PREPARATION

- A. Inspect each piece of glass immediately before installation, and eliminate pieces with damage or face imperfections.

3.02 INSTALLATION (GENERAL)

- A. Install glass in accordance with standards detailed in "Glazing Manual" and "Glazing Sealing Systems Manual" of Flat Glass Marketing Association except as shown and specified otherwise, and where specifically recommended otherwise by manufacturers of glass and glazing materials.
- B. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- C. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

END OF SECTION 08 80 00

SECTION 08 81 00 - GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Provide all glass glazing Work as indicated on the Drawings and as specified herein, including, but not limited to the following:

1. Float Glass (tempered)

1.2 REFERENCES

- A. Glass Association of North America (GANA).
- B. Underwriters Laboratories, Inc. (UL).
- C. American National Standards Institute (ANSI).
 1. A58.1: Building Code Requirements for Minimum Design Loads in Buildings and Other Structures.
 2. Z97.1 American National Standard Performance Specifications and Methods of Test for Safety Glazing Materials Used in Buildings.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's specifications and installation and maintenance instructions for each type of glass specified herein:
- B. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements. Separate certification will not be required for glazing materials bearing manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.
- C. Samples: Submit, for verification purposes, 12" square sample for each type of glass indicated.
- D. Compatibility and Adhesion Test Report: Submit statement from sealant manufacturer that glass and glazing materials have been tested for this job for compatibility and adhesion with glazing sealants and interpreting test results of material performance, including recommendations for primers and substrate preparation needed to obtain adhesion.

1.4 QUALITY ASSURANCE

- A. Special Experience Requirements:
 - 1. Manufacturer's Qualifications: Provide glass and glazing produced by a manufacturer with not less than (5) five years successful experience in the fabrication of glazing of the type and quality required.
 - 2. Installer's Qualifications: Engage an Installer and craftsmen who have successfully completed (3) three glass and glazing projects similar in scope, materials and design to this project within the last (5) five years.
- B. Glazing Standards: Comply with recommendations of Glass Association of North America (GANA) "Glazing Manual" and "Laminated Glass Design Guide," except where more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined.
- C. Single Source for Glass: To ensure consistent quality of appearance and performance, provide materials produced by a single manufacturer or fabricator for each kind and condition of glass.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect glass and glazing materials during delivery, storage and handling to comply with manufacturer's directions and to prevent damage to glass and glazing materials from moisture, temperature changes, direct exposure to sun, and from other causes.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements
 - 1. Comply with glazing materials manufacturer's written recommendations regarding environmental conditions under which glazing materials can be installed.
- B. Glazing channel dimensions shown are intended to provide for necessary minimum bite on the glass, minimum edge clearance and adequate glazing material thickness, with reasonable tolerances. Provide correct glass size for each opening, within the tolerances and necessary dimensions required.

1.7 WARRANTY

- A. Warranties shall be in addition to, and not a limitation of other rights the Owner may have under the contract document.
- B. In addition to the Contractor's guarantee provided in the Agreement, the manufacturer shall furnish warranties to repair or replace defective glass and glazing materials or workmanship for a period of five (5) years after date of Substantial Completion, and longer where specified. Defects include, but are not limited to the following:
 - 1. Glass breakage due to pressures up to specified values, thermal stress, manufacturing defects and damage to glass.
 - 2. Spontaneous breakage of heat treated glass.
 - 3. Loss of effective glass bite due to shifting of glass.
 - 4. Loss of effective glass bearing on setting blocks due to shifting of glass and blocks.
- C. The warranties shall include a provision that the period of such warranties shall commence with the College's final acceptance of all work covered under the Contract.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include but are not limited to the following:
 - 1. PPG Industries, Inc.
 - 2. Spectrum Glass Products, Inc
 - 3. Guardian Industries Corp.

2.2 GLASS

- A. GLASS
 - 1. General: All Glass shall be Clear Soda-Lime Float Glass. Glass for glazing shall comply with the provisions of ASTM C1036 Standard Specification for Flat Glass. Unless otherwise stated, glazing materials and installation shall comply with the provisions and recommendations

of the Glass and Glazing Federation "Glazing Manual" or with the American FGMA Glazing Manual.

2. Quality Control: All glass shall be manufactured and processed in a factory where the quality control procedures comply with ISO 9002 and are independently maintained.
3. Defects: The glass shall be cut clean, without edge faults such as feathered edges, shells or other imperfections. In all point-supported glass and with all toughened glass, all edges shall be ground to eliminate edge defects.
4. Manufacturing Tolerances - In general as set out by ASTM C1036 - Minimum Actual Glass Thickness for Nominal Specified Glass Thickness: Not less than those specified in ASTM E 1300 Table A4.1
5. Fabrication Tolerances:

Thickness:	<1/4"	5/16 & 3/8"	1/2" & 5/8"
Warp:	±0.196" per yard measured along straight edge		
Any dim. < 3'-3"	±0.04"	±0.08"	±0.08"
Any dim. > 3'-3"	±0.04"	±0.08"	±0.11"

Squareness shall be measured by a comparison of diagonals.

Diagonals up to 78.74":	±0.15"
Diagonals over 78.74":	±0.19"
Edge straightness:	±0.036" per foot

All glass shall be prefabricated and delivered in the required sizes. No on-site cutting, nipping or drilling will be allowed.

B. Heat Strengthened and Fully Tempered Glass:

1. All heat strengthened and fully tempered glass shall be tempered on a roller hearth furnace eliminating tong marks and shall conform to ASTM 1048 and/or ANSI Z97.1 or BS 6206 Class A.
2. For fully tempered glass the surface compressive stress shall be demonstrated by differential surface refractometer (DSR) measurement to be controlled at works at greater than 14,500 psi (100 MPa). For heat strengthened glass the surface compressive stress shall be demonstrated to be between 5800-7250 psi (40-50 MPa). 100% heat soak testing shall be required for all fully tempered glass per DN 18516, Part 4.
3. Tempering periods and temperatures shall be in accordance with manufacturer's guidelines, which shall be verified with trial test plates to assess:

- a. Specific heating times for different glass thickness,
 - b. Distortion levels,
 - c. Compressive stress levels.
4. The glass shall conform to the following requirements in the horizontal tempering process:
- a. Maximum Bow: for glass thickness less than 1/4" $\pm 0.5\%$ and for glass thickness greater than 1/4" $\pm 0.15\%$
 - b. Roller Wave: ± 0.0059 " maximum depth
 - c. Edge dip: \pm maximum 0.0098"
5. Tempered glass shall have edges flat ground with a small arris and shall be polished. Small shells and/or chips shall be ground out prior to tempering. Maximum chip/shell diameter shall not exceed 1/16". Do not cut, drill, work, or permanently mark after tempering.

C. Glazing Accessories

1. General: Provide approved glazing accessories required for a complete installation, in accordance with ASTM C864. Submit details, including compatibility with adjacent components and sealants. Indicate sizes and locations on shop drawings. Glazing accessories, including spacers, setting blocks, wedges, and the like, shall comply with AS 1288, and the recommendations of the glass manufacturer or glazing system. Extruded profiles shall be smooth, of uniform dimensions, correctly selected for the conditions of use, and free from components likely to bleed, stain or detrimentally affect performance of the glazing. All products shall be of ultra-violet resistant grade. Products may be manufactured from EPDM (ethylene-propylene-diene monomer), DuPont "Neoprene", or approved equivalent.

2.3 GLAZING MATERIALS

A. For Channel glazing and for small lights:

1. Products: W.R. Meadows Solaply; Pecora's 60+ Unicrylic Acrylic; Tremco's Mono.
2. Type 1 Glazing Material: Acrylic Glazing Sealant; solvent-based, acrylic terpolymer, thermoplastic sealant; FS TT-S-00230, Type II,

Class B, 95 percent of solids acrylic; compounded specifically for glazing.

- B. Setting Blocks: Neoprene, 70-90 durometer hardness, with proven compatibility with sealants used.
- C. Spacers: Neoprene, 40-50 durometer hardness, with proven compatibility with glazing materials used.
- D. Compressible Filler Rod: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, proven to be compatible with glazing materials used, flexible and resilient, with 5-10 psi compression strength for 25 percent deflection.
- E. Cleaners, Primers and Sealers: Type recommended by glazing material manufacturer.

2.4 FABRICATION

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance required.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean the glazing channel, or other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to the substrate. Remove lacquer from metal surfaces wherever elastomeric sealants are used.
- B. Inspect each piece of glass immediately before installation, and eliminate pieces which have observable damage or face imperfections.
- C. Apply primer or sealer to joint surfaces wherever recommended by sealant manufacturer.

3.2 INSTALLATION

- A. Each installation shall withstand normal temperature changes and impact loading (for operating doors) without failure of any kind including loss or

breakage of glass, failure of sealants or gaskets to remain airtight, deterioration of glazing materials and other defects in the Work.

- B. Install glass in accordance with the standards detailed in the "Glazing Manual" and the "Glazing Sealing Systems Manual" of the Flat Glass Marketing Association except as shown and specified otherwise, and except as specifically recommended otherwise by the manufacturers of the glass and glazing materials.
- C. Unify appearance of each series of lights by setting each piece to match others as nearly as possible. Inspect each piece and set with pattern, draw and bow oriented in the same direction as other process.
- D. Install glazing materials in accordance with the manufacturer's printed instructions.

3.3 GLAZING

- A. Install setting blocks of proper size at quarter points of sill rabbet. If required to keep in place, set blocks in thin course of the heel-bead compound.
- B. Provide spacers inside and out, and of proper size and spacing, for all glass sizes larger than 50 unites inches, except where gaskets are used for glazing. Provide 1/8" minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.
- C. Voids and Filler Rods: Prevent exudation of sealant or compound by forming voids or installing filler rods in the channel at the heel of jambs and head (do not leave voids in the sill channels) except as otherwise indicated, depending on light sizes, thickness and type of glass, and complying with manufacturer's recommendations.
- D. Do not cut, seam, nip, or abrade glass which is tempered, heat strengthened, or coated.
- E. Force glazing materials into channel to eliminate voids and to ensure complete "wetting" or bond of glazing material to glass and channel surfaces.
- F. Tool exposed surfaces of glazing sealants and compounds to provide a substantial "wash" away from the glass. Install pressurized tapes and gaskets

to protrude slightly out of the channel, so as to eliminate dirt and moisture pockets.

- G. All butt joints shall be sealed with clear silicone, unless otherwise indicated on the drawings.

3.4 CURE, PROTECTION AND CLEANING

- A. Cure glazing materials in accordance with manufacturer's printed instructions and recommendations, to obtain high early bond strength, internal cohesive strength, and surface durability.
- B. Mark glazed openings immediately upon installation of glass by attaching crossed streamers to framing. Do not apply markers of any type to surfaces of glass.
- C. Replace glass included in the Work which is broken, or otherwise damaged, from the time Work is started at the site until the date of physical completion.
- D. Maintain glass in a reasonably clean condition until date of physical completion.
- E. Clean and trim excess glazing material from the glass and stops or frames promptly after installation.
- F. When directed, or just before the project is turned over to the Owner, remove dirt and other foreign material and wash and polish glass included in the Work on both sides.

3.5 GLAZING SCHEDULE

- A. Non-Rated Glass Doors and Side Lites: Fully Tempered Laminated Safety Glass.

END OF SECTION 08 81 00

GLAZING 08 81 00-8

SECTION 08 88 10 - FIRE RATED GLASS & FRAMING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Fire rated framing system.
1. Fire resistive, temperature rise, framing system with decorative cladding for 60 minute interior applications.
 2. Applications of fire rated framing includes:
 - a. Vision lites in fire rated doors, full vision fire rated doors, sidelites, borrowed lites, windows, transoms and transparent walls with fire rating requirement as specified.
- B. Related Sections:
1. Section 08 71 00: Finish Hardware.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM):
1. ASTM E119 Methods for Fire Tests of Building Construction and Materials.
 2. ASTM E152 Methods of Fire Tests of Door Assemblies.
 3. ASTM E2074: Standard Test Method for Fire Tests of Door Assemblies, including Positive Pressure Testing of Side-hinged and Pivoted Swinging Door Assemblies.
 4. ASTM E2110-1: Standard Test for Positive Pressure of Fire Tests of Window Assemblies.
- B. National Fire Protection Association (NFPA):
1. NFPA 80: Fire Doors and Windows.
 2. NFPA 251: Fire Tests of Building Construction and Materials.
 3. NFPA 252: Fire Tests of Door Assemblies.
- C. Underwriters Laboratories, Inc. (UL):
1. UL 9: Standard for Safety of Fire Tests of Window Assemblies.
 2. UL 10B: Standard for Safety of Fire Tests of Door Assemblies.
 3. UL 10C: Standard for Safety of Positive Pressure Fire Tests of Door Assemblies.
 4. UL 263: Fire Tests of Building Construction and Materials.
- D. Consumer Product Safety Commission (CPSC):
1. CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials.

E. Glass Association of North America (GANA)

1. GANA – Glazing Manual.
2. FGMA – Sealant Manual.

1.03 SYSTEM DESCRIPTION

A. Performance Requirements:

1. Fire Rating: 60 minutes as specified.
2. Fire Resistive Wall Assembly Certifications: 60 minute fire resistive wall assemblies tested in accordance with ASTM E119, NFPA 251, and UL 263.
3. Fire Resistive Door Assembly Certifications: 60 minute fire resistive door assemblies tested in accordance with ASTM E119, NFPA 251, and UL 263.
4. Testing Laboratory: Fire test shall be conducted by a nationally recognized independent testing laboratory.

B. Listings and Labels:

1. Fire rated framing system shall be under current follow-up service by a nationally recognized independent laboratory approved by OSHA and maintain a current listing or certification. Assemblies shall be labeled in accordance with limits of listings.

C. Appearance:

1. Fire rated wall/door assembly shall have a neat finished appearance with minimum joints at decorative cover intersections.

1.04 SUBMITTALS

A. Submit listed submittals in accordance with Conditions of the Contract.

1. Shop Drawings: Submit shop drawings showing layout, profiles and product components.
2. Samples: Submit samples for finishes, colors and textures.
3. Technical Information: Submit latest edition of manufacturer's product data providing product descriptions, technical data and installation instructions.

1.05 DELIVERY, STORAGE AND HANDLING

A. General: Comply with Division 1 Product Requirements Sections.

B. Ordering: Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

- C. Delivery: Deliver materials to specified destinations in manufacturer's or distributor's packaging undamaged, complete with installation instructions.
- D. Storage and Protection: Store off ground, under cover, protected from weather and construction activities and at temperature conditions recommended by manufacturer.

1.06 FABRICATION DIMENSIONS

- A. Field Measurements: Verify actual measurements for openings by field measurements before fabrication. Show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.07 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document. Manufacturer's warranty is not intended to limit other rights that the Owner may have under the Contract Documents.
 - A. Warranty Period: 5 years from date of substantial completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS – FIRE RATED DOOR and WALL ASSEMBLY

- A. Manufacturer of Framing System:
 - 1. SAFTI*fire*[™] GPX Framing as manufactured and distributed by SAFTI *FIRST*[™] Fire Rated Glazing Solutions (**Basis of Design**). Contact: 325 Newhall Street, San Francisco, CA 94124-2693; Telephone 888/653-3333; Fax 415/824-5900; email info@safte.com; Web site www.safte.com
 - 2. Technical Glass Products.
 - 3. Approved Equal.
- B. Manufacturer of Glazing Material:
 - 1. SuperLite[™] II-XL as manufactured and distributed by SAFTI *FIRST*[™] Fire Rated Glazing Solutions(**Basis of Design**).
 - 2. Pyrostop as manufactured by Technical Glass Products.
 - 3. Approved Equal.

2.02 MATERIALS – FRAMING

- A. Fire resistive, temperature rise framing system rated for 60 minutes.

1. Frame thickness: 4"
2. Internal framing: Internal tube steel framing shall conform to ASTM A501. Formed steel retainers shall be galvanized conforming to ASTM A527.
3. Insulation: The framing system shall insulate against the effects of fire, smoke and heat transfer from either side. The perimeter of the framing system to the rough opening shall be firmly packed with mineral wool fire stop insulation or appropriately rated intumescent sealant.
4. Fasteners: Type recommended by manufacturer.
5. Framing covers: Powder coated extruded aluminum alloy 6063-T5 standard.
6. Glazing accessories: The glazing material perimeter shall be separated from the perimeter framing system with approved flame retardant glazing tape. The SuperLite™ glazing panel shall be caulked continuously around the edge to the tube steel frame utilizing neutral cure silicone.

2.03 MATERIALS – GLASS

- A. Assemblies shall be glazed with SuperLite™ II-XL meeting ASTM E 119.
- B. Properties:
 1. Individual Lites shall be permanently identified with a listing mark.
 2. Glazing material installed in “Hazardous Locations” (subject to human impact) shall be certified to meet the applicable requirements for fire rated assemblies referenced in ANSI Z97.1 Standard for Safety Glazing Materials Used In Buildings and/or CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials.
 3. Temperature rise on the unexposed side of glazing material shall be limited to 250 degrees Fahrenheit when required.
- C. Logo: Each piece of fire rated glazing shall be labeled with a permanent logo.

2.03 FABRICATION

- A. Assemblies shall be furnished knocked down for field assembly and will be glazed in the field unless specified otherwise.
- B. Door assemblies shall be factory prepared for field mounting of hardware.
- C. Fabrication Dimensions: Fabricate to approved dimensions. The general contractor shall guarantee dimensions within required tolerance. Obtain approved shop drawings prior to fabrication.

2.04 FINISHES

- A. Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designing finishes.

- B. Covers shall be chemically cleaned and pretreated; then, finished with:
 - 1. Powder coated paint finish equal to Cardinal Industrial Finishes. Colors as selected by the Architect from manufacturer's standard colors.
- C. Protect finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping.
- D. Variations in appearance of abutting or adjacent pieces are acceptable. Noticeable variations in the same piece are not acceptable.

PART 3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data including product technical bulletins and installation instructions.

3.02 EXAMINATION

- A. Site Verification of Conditions: Verify substrate conditions, have been previously installed under other sections, and are acceptable for product installation in accordance with manufacturer's instructions. Openings shall be plumb, square and within allowable tolerances. The Architect/Engineer shall be notified of any conditions that jeopardize the integrity of the proposed fire wall/door framing system. Do not proceed until such conditions are corrected.

3.03 INSTALLATION

- A. Fire wall/door installation shall be by a licensed contractor and in strict accordance with the approved shop drawings.

3.04 CLEANING AND PROTECTION

- A. Protect glass from contact with contaminating substances resulting from construction operations. Remove such substances by method approved by manufacturer.
- B. Wash glass on both faces not more than four days prior to date schedule for inspections intended to establish date of Substantial Completion. Wash glass by method recommended by glass manufacturer.
- C. Remove temporary coverings and protection of adjacent work areas.
- D. Remove construction debris from project site and legally dispose of debris.

END OF SECTION

SECTION 08 88 13 – FIRE-RESISTANT GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire-rated glazing materials installed as wall applications and lites.

1.02 RELATED REQUIREMENTS

- A. Section 08 11 13 – Hollow Metal Doors and Frames
- B. Section 09 29 00 - Gypsum Board Assemblies

1.03 RELATED REQUIREMENTS

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2011
 - 2. ASTM E2074 - Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side Hinged and Pivoted Swinging Door Assemblies; 2000
- B. American National Standards Institute (ANSI):
 - 1. ANSI Z97.1 - For Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2009
- C. Consumer Product Safety Commission (CPSC):
 - 1. CPSC 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; 2009
- D. Glass Association of North America (GANA):
 - 1. GANA - Glazing Manual; 2008
 - 2. GANA - Sealant Manual; 2008
- E. National Fire Protection Association (NFPA):
 - 1. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2010
 - 2. NFPA 251 - Standard Methods of Tests of Fire Endurance of Building Construction and Materials; 2006
 - 3. NFPA 252 – Standard Methods of Fire Tests of Door Assemblies; 2012
 - 4. NFPA 257 – Standard on Fire Tests for Window and Glass Block Assemblies; 2012
- F. Underwriters Laboratories, Inc. (UL):
 - 1. UL 9 – Standard for Fire Tests of Window Assemblies; 2009
 - 2. UL 10B – Standard for Fire Tests of Door Assemblies; 2008

3. UL10C – Standard for Positive Pressure Fire Tests of Door Assemblies; 2009
4. UL 263 – Standard for Fire tests of Building Construction and Materials; 2003

1.04 DEFINITIONS

- A. Fire Protection: As defined by the International Building Code (IBC), fire protection glass has fire rating of 45 or 90 minutes and is in compliance with NFPA 252, NFPA 257, UL 9, UL 10B, and UL 10C testing standards.
- B. Fire Resistance: As defined by the International Building Code (IBC), fire resistant glass has fire rating of 60 or 120 minutes and is in compliance with ASTM E119, NFPA 251, NFPA 252, NFPA 257, UL 9, UL 10B, UL 263, and CAN/ULC-S101 testing standards.

1.05 SUBMITTALS

- A. See Submittals section for submittal procedures.
- B. Product Data: Submit manufacturer's technical data for each glazing material indicated, including installation and maintenance instructions.
- C. Certificates: Submit from glass and glazing materials manufacturer verifying that glass and glazing materials furnished for project comply with requirements.
 1. Certification submittals are not required for glazing materials bearing manufacturer's permanent label that designate type and thickness of glass, and labels represent a quality control program from recognized certification agency or independent testing laboratory acceptable to authorities having jurisdiction.
- D. Product Test Listings: Submit UL listing, indicating that fire-resistant glass complies with requirements based on comprehensive testing of products indicated.
- E. Samples: Submit, for verification purposes, 8 inch by 8 inch size samples for each type of glass indicated.
- F. Warranty: Submit sample of manufacturer's warranty.

1.06 QUALITY ASSURANCE

- A. Glazing Standards: GANA Glazing and Sealant Manuals
- B. Fire Resistance Rated Glass: Each lite shall bear permanent, non-removable UL label certifying it for use in tested and rated fire resistive assemblies.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver material to designated location on project site in manufacturer's original

- packaging, undamaged, and complete with installation instructions.
- B. Do not expose fire-resistant glazing to temperatures greater than 120 degrees F or less than minus 40 degrees F during storage and transportation, as well as installation.
 - C. Store in dry conditions, evenly supported along full length of edge, off ground, under cover, and protected from weather and construction activities.
 - D. Do not expose non-polyvinyl butyral (PVB) side of glass to ultra violet light.
 - E. Do not leave glass temporarily held in frames without fixing of glazing beads and completion of capping silicone sealant.
 - F. Store sheets of glass vertically, do not lean glass against surfaces for support, ensure maximum of 6 degree declination from vertical.

1.08 WARRANTY

- A. Provide manufacturer's limited warranty subject to requirements of proper handling and installation requirements, and if properly installed in fire rated support system, approved by independent testing laboratory as follows:
 - 1. Manufacturer will meet published fire-resistant glass requirements.
 - 2. Manufacturer's insulating glass units will not develop material obstruction of vision between interior glass surfaces due to manufacturing defects.
 - 3. Fire ratings indicated will not be degraded due to manufacturing defects.
- B. Warranty Period: For period of five years commencing the date of original factory shipment of glazing materials to project site by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Pilkington Fire Protection Glass North America; Product Pyrostop:
www.pilkington.com/fire
 - 1. Pilkington North America, Inc.
 - 2. Location: Toledo, Ohio.
 - 3. Phone: (419) 478-0165.
 - 4. Fax: (419) 478-0165.
 - 5. Contact: Bret Penrod, General Manager
 - a. Email: bret.penrod@nsg.com
- B. Distributed by Technical Glass Products, Snoqualmie, Washington:
www.fireglass.com
 - 1. Phone: (800) 426-0279.
 - 2. Fax: (800) 451-9857.
 - 3. Email: sales@fireglass.com.
- C. Or Approved equal.

2.02 PERFORMANCE REQUIREMENTS

- A. Clear, laminated, fully insulating fire-resistant safety glass for use in impact safety-rated locations such as doors, sidelites, transoms, borrowed lites, and wall applications with fire rating requirements ranging from 45 to 120 minutes and passing hose stream test; for use in interior and exterior applications.
- B. Fire-resistant glazing provides protection by effectively blocking radiant and conductive heat, and maximizing natural light and visibility.
- C. Passes positive pressure test standard; UL 10C.

2.03 GLAZING MATERIALS

- A. Composition: For fire ratings equal to or greater than 45 minutes, glazing is composed of multiple sheets of high visibility light transmitting glass laminated together using intumescent type interlayers.
- B. Permanently label each piece of fire-resistant glazing with UL control number, product and manufacturer's name, hourly fire rating, and human impact safety rating.
- C. Impact Safety Resistance: ANSI Z97.1 and CPSC 16 CFR 1201 (Categories I and II).
- D. Glazing assemblies for 45 minute and above fire rated assemblies are composed of the following glass:
 - 1. Product; Optiwhite™ low iron glass as manufactured by Pilkington
- E. Interior Use Fire Resistant Glazing Properties
 - 1. Glazing Type:45-200
 - a. Fire Rating: 45 minutes
 - b. Glass Thickness: 3/4 inch (19 mm)
 - c. Daylight Transmission: 86 percent
 - d. Weight: 9.2 lbs per sq ft
 - e. STC: 40 dB
 - f. Assembly: Doors
 - 1) Maximum Exposed Area: 3,724 sq in
 - 2) Maximum Exposed Width: 41 5/8 inch
 - 3) Maximum Exposed Height: 89 3/4 inch
 - g. Building Code Marking: DOH-N-45
 - 2. Glazing Type 60-101
 - a. Fire Rating: 60 minutes
 - b. Glass Thickness: 7/8 inch
 - c. Daylight Transmission: 87 Percent
 - d. Weight: 10.6 lbs per sq ft
 - e. STC: 41 dB
 - f. Assemblies: Sidelites
 - 1) Maximum Exposed Area: 5,605 sq in

- 2) Maximum Exposed Width: 96 inch
- 3) Maximum Exposed Height 95 inch
- g. Building code marking W-60

2.04 GLAZING COMPOUNDS

- A. Glazing Tape: Provide closed cell polyvinyl chloride foam that is coiled on release paper over adhesive on two sides with maximum water absorption of 2 percent by volume and compression of 25 percent to ensure air and vapor seal, and also non-combustible and flexible.
- B. Silicone Sealant: Non-combustible, one-part neutral curing silicone, medium modulus sealant, in accordance with ASTM C920; Type S, Grade NS, Class 25 with additional movement capability of 50 percent in both extension and compression for total of 100 percent, Exposure NT, Substrates G, A, and O as applicable.
 - 1. Acceptable Manufacturers:
 - a. Product; Dow Corning 795 Silicone Building Sealant manufactured by Dow Corning Corp.: www.dowcorning.com
 - b. Product; SilGlaze II SCS2800 manufactured by Momentive Performance Materials: www.momentive.com
 - c. Product; Spectrem 2 manufactured by Tremco Inc.: www.tremcosealants.com
 - d. Substitutions: Not permitted.
- C. Setting Blocks: Hardwood that is suitably treated against humidity or calcium silicate; sized to width of glass by 4 inches by 3/16 to 1/4 inches thick
- D. Spacers: Neoprene or other resilient blocks of 40 to 50 Shore A durometer hardness, adhesive-backed on one face only, tested for compatibility with specified glazing compound.
- E. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

2.05 FABRICATION

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with manufacturer recommendations and referenced glazing standard as required to comply with system performance requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine glass framing, with glazier present, for compliance with the following:

1. Verify manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 2. Verify for minimum required face or edge clearances.
 3. Examine for edge damage or face imperfections.
- B. Clean glazing channels and other framing members receiving glass immediately before glazing, and remove coatings that are not firmly bonded to substrates.
- C. Do not proceed with glazing until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Comply with referenced GANA standards and manufacturer's handling and installation instructions for glass, glazing sealants, and glazing compounds.
- B. Protect glass edges and glazing tapes from damage during handling and installation.
- C. Inspect glass during installation and report damaged glazing tape that could be detrimental to performance to manufacturer's product representative.
- D. Cut glazing tape to length and set against permanent stops, flush with sight lines and fitting openings exactly, and with allowance for stretch during installation.
- E. Install setting blocks with edge block, located at quarter points of glass, no more than 6 inches from corners.
- F. Install glazing vertically into fire-rated metal frames or partition walls with same fire rating as glass, and push against tape for full contact at perimeter of pane or unit.
- G. Install glazing tape on free perimeter of glazing as indicated above.
- H. Do not remove or tamper with special edge protection tape.
- I. Do not allow direct contact between glass and framing material.
- J. Install removable stop and secure without displacement of tape.
- K. Do not put heavy pressure on glass through glazing beads, sealing profiles or glazing tapes.
- L. Carefully trim protruding tape with sharp knife.
- M. Apply cap bead of silicone sealant along void between the stop and the glazing, to uniform line, with bevel to form watershed away from glass, tool or wipe sealant surface smooth.
- N. Provide at least 3/16 inch of edge clearance.
- O. Install glazing in vision panels of fire-rated doors in compliance with NFPA 80.
- P. Install glazing so that UL and manufacturer's labels remain visible and oriented properly per instructions after installation.

3.03 TOLERANCES

- A. Deflection: Designed deflection of insulating glass units in their frame under the maximum potential design load should be less than the span of glass unit in

millimeters divided by 300, or 8 mm, whichever of these two numbers is least.

- B. Glazing pressure on glass edges shall be low and uniform, less than 20 N per cm edge length at border of pane.
 - 1. Point loading of glass edges is not permitted.

3.04 PROTECTION AND CLEANING

- A. Protect glass from contact with contaminating substances resulting from construction operations.
 - 1. Remove any such substances by method approved by glass manufacturer.
- B. Wash glass on both faces not more than four days prior to date scheduled for inspections intended to establish date of Substantial Completion.
 - 1. Wash glass by method recommended by glass manufacturer.

END OF SECTION 08 88 13

SECTION 09 22 13 – NON-LOAD BEARING FRAMING AND FURRING

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 09 29 00 Gypsum Board Assemblies

1.2 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, and installation instructions for the following:
 - 1. Studs, Tracks, and Furring.
 - 2. Fasteners.
- B. Samples:
 - 1. Steel Framing and Furring: 12 inches long, each component.
 - 2. Fasteners: 10 each type.

1.3 QUALITY ASSURANCE

- A. Fire Resistance Rated Applications: Provide UL listed or ASTM E 119 tested materials, accessories, and application procedures to comply with the rating indicated.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Studs, Tracks, and Furring: ASTM C 645; 25 gage galvanized steel, with additional framing members, reinforcing, accessories, and anchors necessary for the complete framing system.
- B. Fasteners: Except where shown or specified, select fasteners of type, size, style, grade, and class required for secure installation of framing and furring. Galvanize all fasteners and accessories.
 - 1. Standard Bolts and Nuts: ASTM A 307, Grade A, regular hexagon head.
 - 2. Lag Bolts: FS FF-B-561, square head.
 - 3. Machine Bolts: FS FF-B-584 head; FS FF-N-836 nuts.
 - 4. Machine Screws: FS FF-S-92, cadmium plated steel.
 - 5. Plain Washers: FS FF-W-92, round, general assembly grade, carbon steel.
 - 6. Lock Washers: FS FF-W-84, helical spring type, carbon steel.
 - 7. Toggle Bolts: Tumble-wing type; FSS FF-B-588, type, class and style as

- required to sustain load.
8. Self-Drilling Fasteners: No. 12-14 x 3/4 inch, hex washer head, self-drilling fastener with pilot point.
- C. Anchors: Steel framing manufacturer's recommended types and sizes for substrates involved.

PART 3 EXECUTION

3.1 STEEL FRAMING AND FURRING INSTALLATION

- A. Install steel framing, furring and accessories in accordance with manufacturer's printed instructions, unless otherwise shown or specified.
- B. Framing Installation:
1. Align tracks accurately at floor and ceiling. Secure tracks as recommended by the framing manufacturer for the upper and lower construction involved, except do not exceed 24 inches O.C. spacing for nail or powder-driven fasteners, or 16 inches O.C. for other types of attachments. Provide fasteners approximately 2 inches from corners and ends of tracks.
 2. Position studs vertically and engage both upper and lower tracks. Space studs 16 inches on center, unless otherwise indicated on the Drawings. Fasten studs to track flanges with screws or by crimping.
 - a. Use full length studs between tracks wherever possible. If necessary, splice studs with a minimum 8 inch nested lap and fasten with two screws per stud flange.
 3. Install additional studs to support inside corners at intersections and corners, and to support outside corners, terminations of partitions, and both sides of control joints (if any).
 4. Terminate partitions at finish ceiling line unless otherwise indicated on the Drawings.
 5. Brace chase wall framing horizontally to opposite studs with 12 inch wide gypsum board gussets or metal framing braces, spaced vertically not more than 4 feet on center.
 - a. Attach gypsum board gussets with a minimum 3 screws per stud flange.
 - b. Attach metal framing braces with a minimum 2 screws per stud flange.
 6. Install rough framing at openings consisting of full-length studs adjacent to jambs and horizontal header and sill tracks. Cut horizontal tracks to length and split flanges and bend webs at ends for flange overlap and screw to jamb studs. Install intermediate studs between jamb studs at head

- and sill sections, at same spacing as full-length studs.
7. At door frames, install rough framing as specified above. Install jamb studs to comply with framing manufacturer's recommendations for the types of frames and weights of doors required. Fasten jamb studs to metal frames with anchor clips using 2 self-tapping screws or bolts per clip. Where wood frames are shown, fasten jamb studs to rough framing with screws.
 8. Where double doors, or doors weighing more than 50 lb are shown or scheduled, install two studs at each jamb and one additional stud not more than 6 inches from jamb studs.
 9. Where vertical control joints are shown at jamb lines, install additional vertical studs located on opening side of jambs and not less than 1/2 inch from jamb studs. Do not fasten the additional studs to tracks or jamb studs.
- C. Steel Furring Installation: Install steel furring at 16 inches O.C. maximum spacing and provide additional furring at openings, cutouts, and corners. Securely anchor with fasteners spaced 24 inches O.C. maximum and stagger on opposite flanges of hat-shaped channels.
- D. Tolerances: Do not exceed 1/8 inch in 8 feet variation from plumb or level in any exposed line or surface, except at joints between boards do not exceed 1/16 inch variation between planes or abutting edges or ends. Shim as required to comply with specified tolerances.

END OF SECTION 09 22 13

SECTION 09 28 13 - TILE BACKER BOARD

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Gypsum Board Systems: Section 09 29 00.
- B. Ceramic Tile: Section 09 30 10.

1.02 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, and installation instructions for tile backer board.
- B. Samples:
 - 1. Tile Backer Board: 12 inches square.
 - 2. Joint Reinforcement Tape: 12 inches long.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Tile Backer Board: Cement mortar building board specifically for use as backer for ceramic tile, either of the following:
 - 1. Durock Tile Backer Board by United States Gypsum, 101 South Wacker Drive, Chicago, IL 60606, (800) 874-4968.
 - 2. Wonder-Board by Gold Bond Building Products National Gypsum Company, 2001 Rexford Rd., Charlotte, NC 28211, (800) 628-4662.
- B. Joint Reinforcement: Tile backer board manufacturer's recommended adhesives, fillers, and tapes.
- C. Fasteners: Tile backer board manufacturer's recommended nails or screws.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install the Work of this Section in accordance with the manufacturer's printed instructions.

END OF SECTION 09 28 13

SECTION 09 29 00- GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work under this section shall be governed by the Contract Documents. Provide materials, labor, equipment and services necessary to furnish, deliver and install all work of this section as shown on the drawings, as specified herein, and/or as specified by job conditions.

1.2 DESCRIPTION OF WORK

- A. Provide materials, labor, equipment and services to complete all gypsum board installation including metal studs, regular, fire resistant, moisture resistant gypsum board, and all accessories as specified herein and as indicated on the Drawings.
- B. This section includes gypsum wallboard assemblies which meet specified criteria for:
 - 1. Post-consumer recycled paper content in the gypsum wallboard paper facing; and
 - 2. Post-industrial recycled content (synthetic gypsum) in the gypsum wallboard cores (optional).

1.3 RELATED SECTIONS

- A. Section 05 17 00 – Support System for Suspended Ceiling
- B. Section 06 10 00 – Rough Carpentry
- C. Section 08 11 13 – Hollow Metal Doors & Frames
- D. Section 09 91 00 – Painting

1.4 QUALITY ASSURANCES

- A. Codes and Regulations
 - 1. Work specified herein shall conform to all applicable State and Local codes and regulations having jurisdiction.
 - 2. Where fire resistant ratings are required for work of this section, the gypsum drywall assemblies shall be installed in strict accordance with the Underwriters Laboratory requirements.
- B. Environmental Criteria for gypsum wallboard:
 - 1. Recycled Content:
Gypsum wallboard shall contain recycled content material as follows:
 - a. Paper facings: a minimum of 100% post-consumer recycled paper content.

- b. Gypsum cores: Where feasible, a minimum of 75% post-industrial recycled gypsum content (also called “synthetic” gypsum – from coal-fired power plants).
The percentage of recycled content is based on the weight of the component materials.
- C. Environmental Criteria for Glass Fiber:
(for recycled content and other High Performance building criteria)
 - 1. Recycled content:
 - a. EPA Comprehensive Procurement Guidelines, www.epa.gov/cpg
 - b. ASTM D5359, “Glass Cullet Recovered from Waste for Use in Manufacture of Glass Fiber”
 - c. Fiberglass insulation shall contain a minimum of 20% (combined) post-industrial/post-consumer recycled content. The percentage of recycled content is based on the weight of the component materials.
 - 2. Emissions:
 - a. Where feasible, provide fiberglass insulation that does not contain formaldehyde binders.
 - b. Fiberglass insulation in exposed locations and in ceiling plenums (used for HVAC return) shall be encapsulated with a continuous wrap of polyethylene or similar material.

1.5 SUBMITTALS

- A. Product Literature
 - 1. Submit manufacturers' products literature, catalog cuts and data sheets for all products.
- B. Gypsum wallboard:
 - 1. Manufacturer’s certification of recycled content per paragraph 1.04.
 - 2. Material Safety Data Sheets.
 - 3. Manufacturer’s maintenance instructions.
 - 4. Manufacturer’s policy statement on gypsum wallboard recycling programs.
 - 5. Samples of accessories, studs, attachments

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site, ready for use in the manufacturer's original and unopened containers and packaging, bearing labels as to type of material, brand name and manufacturer's name. Delivered materials shall be identical to approved samples.
- B. Store materials under cover in a dry and clean location, off the ground. Remove materials which are damaged or otherwise not suitable for installation from the job site and replace with acceptable materials.
- C. Gypsum wallboard to be stored per manufacturer’s recommendations for allowable temperature and humidity range. Panels shall not be allowed to become damp.

- D. Where feasible, gypsum wallboard shall not be stored with materials which have high emissions of VOCs or other contaminants (see paragraph 3.03 below).

1.7 ENVIRONMENTAL REQUIREMENTS

- A. During joint finishing, maintain within the work area a uniform temperature between 55 and 70 degrees F.

1.8 REGULATORY REQUIREMENTS.

- A. New York City Building Code

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering gypsum board systems which may be incorporated in the Work include but are not limited to the following:
 - 1. Steel Framing and Furring:
 - a. Bostwick Steel Framing Co.
 - b. Gold Bond Building Products Division
 - c. Marino Industries Corp.
 - d. United States Gypsum Co.
 - 2. Grid Suspension Systems:
 - a. Chicago Metallic Corp.
 - b. National Rolling Mills Co.
 - c. United States Gypsum Co.
 - 3. Gypsum Boards and Related Products:
 - a. Georgia-Pacific Corp.
 - b. National Gypsum Company
 - c. United States Gypsum Co.

2.2 GYPSUM BOARD

- A. See drawings
- B. Provide double layer 5/8" fire rated gypsum board at all rated walls to underside of slab.
- C. Shaft wall where shown on drawings (if required).

2.3 FURRED AND STUD WALL FRAMING MEMBERS

- A. General: Select size and gauge of framing members and establish spacing to comply with requirements of ASTM C 754 unless otherwise specifically indicated.
 - 1. Maximum deflection: $L/240$ at 5 lbf per square foot, except limit deflection to $L/360$ where gypsum board partitions are substrates for ceramic tile.
- B. Metal studs: as indicated on the drawings, non-load bearing channel or C-H type, formed from 20 gauge electro-galvanized steel, as per ASTM C-645 designed for screw attachment and provided with knockouts to accommodate pipe and/or conduit installations. Width and height of studs shall conform to partition types noted on the drawings. See drawing for additional gauges of studs.
- C. Ceiling and floor runners: channel type formed of 20 gauge electro-galvanized steel, designed to receive partition types and studs as required. Stud, runners and furring shall conform to ASTM C-645.

2.4 CEILING SUPPORTS (See Section 05 17 00 for additional information)

- A. Ceiling suspension system shall be in accordance with NYC latest building code.
- B. General: Size ceiling support components to comply with State of New York Building Code and with ASTM C 754.
- C. Steel Angle and Plate
ASTM A-36. Provide angle 3"x3"x3"/16"x1" wide, clip angles with slot for 3/8" bolts. Provide 1" x3/16" steel plate hangers with 3/8" bolt holes or 1/4" diameter rods, or approved equal. Test for pull out into concrete.
- D. Bolts
ASTM A307, 3/8" diameter, with lock washers and nuts. Provide shop coat of asphaltum paint.
- E. Running Channels
1 1/2" deep x 7/16" wide flanges, 475 lbs. per 1000' painted, 508 lbs. per 1000', galvanized. $S(\text{in.}^3) = .0538$, $I(\text{in.}^4) = .0404$. Provide shop coat of asphaltum paint for paint channels. Use painted channels unless indicated otherwise.
- F. Sleeve Anchors (Angle to Deck)- Installed after Deck in Place:
 - 1. Manufacturers
 - a. Hilti Fastening Systems.
 - b. Illinois Tool Works, Inc.
 - 2. Stainless Steel
 - 3. Bolts: Minimum diameter of 3/8", with hex head.
 - 4. Safe working loads: for pullout: 400 lbs. (min.); for shear: 400 lbs. (min.) in 3,000 p.s.i lightweight concrete.
- G. Hanger Anchorage Devices: Devices whose suitability for use has been proven by standard construction practices or by certified test data. Size devices for 3x load, as determined by ASTM E 488.

- H. Furring Members: ASTM C 645; 0.0179 inch minimum thickness (25 gage), hat-shaped; "C"-shaped studs for spans of more than 4 feet.
- I. Painting: all steel members and accessories of the support system unless galvanized or of stainless steel, shall be dipped or painted with one coat approved asphaltum paint.
- J. Hanging System shall meet requirements of the New York City building code.

2.5 INSULATION

- A. See drawings for wall assembly insulation.
- B. Insulation within partitions: sound attenuation blankets consisting of a paperless, semi-rigid mineral fiber mat, or glass fiber having a density of not less than 3 pounds per cu. ft., except where indicated otherwise.
- C. Insulation shall conform to ASTM C665, Type 1, Class A and have a fire hazard classification in accordance with ASTM E-84 as follows: flame spread-25; fuel contributed-20; smoke developed-0.
- D. See details for insulation in corridor walls. To be thermafiber SAFB or approved equal.

2.6 RESILIENT CLIPS

- A. Genie clip type RST by PLITEQ INC or equal.

2.7 FURRING CHANNELS

- A. Min. gauge 25 with hemmed edges

2.8 JOINT TREATMENT

- A. General: Provide products by manufacturer of gypsum boards. Comply with ASTM C 475 and with manufacturer's recommendations for specific project conditions.
- B. Joint Tape: Manufacturer's standard paper reinforcing tape.
- C. Drying Type Joint Compound: Vinyl-based ready-mixed type for interior use, and as follows:
 - 1. All-purpose type, for both embedding tape and as topping.
- D. Joint Compound: At joints and fasteners in water-resistant gypsum backing board intended for tile surfacing, provide compound specifically recommended or permitted by manufacturer of gypsum board.
- E. Provide adhesive to laminate GWB in new restroom or install furring strips if wall is not plumb.

2.9 MISCELLANEOUS ACCESSORIES

- A. Metal accessories shall consist of corner beads, stops, edge trim, casing beads and control joints and other accessories as required, conforming to proper profiles and sizes to accommodate drywall partition components encountered. Accessories: formed of 26 galvanized or cadmium plated steel after manufacture. Hot dip galvanized as per ASTM A-525.
 - 1. For terminations as indicated, provide USG Series 200 casing beads (J-molding not acceptable).
- B. Screws for securing drywall and accessories in place: self-drilling, self-tapping, Phillips head steel screws as recommended by the manufacturer of the partition system and by conditions encountered in the field. The use of nails for application will not be permitted. Screws shall conform to ASTM C-646.
- C. Joint and recess fastener treatment: a three (3) coat application as recommended by the approved gypsum drywall manufacturer. Materials shall conform to ASTM C-475.
- D. For supports to hang equipment on wall: provide metal strip secured to vertical studs.
- E. Reglets and Reveals: see drawings for types.

2.10 ISOLATION CLIPS

- A. Genie Clip
- B. Furring Channels
 - 1. Minimum gauge 25ga with hemmed edges
 - 2. Width at base 2.5"
 - 3. Max at base 2.75"
 - 4. Width at top 1.25"
 - 5. Height 7/8"
- C. Fasteners
 - 1. 3/16 or 1/4" x 2 1/4" long anchor screws.
 - 2. Fasteners shall have a maximum pull out of 120 lb., pull out to shear.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Study the contract drawings and specifications with regard to the work as shown and required under this section so as to ensure its completeness.
- B. Examine the surfaces and conditions to which this work is to be attached or applied, and notify the Architect if conditions or surfaces exist which are detrimental to the proper and expeditious installation of the work. Starting on the work shall imply acceptance of the surfaces and conditions to perform corrective measures before the start of installation.
- C. Verify dimension taken at the job site, affecting the work. Bring field dimensions which are at variance to the attention of the Architect. Obtain decision regarding

corrective measures before the start of installation.

- D. Cooperate in the coordination and scheduling of the work of this section with the work of other sections so as not to delay job progress.

3.2 WORKMANSHIP

- A. Install materials and partition systems specified herein and as indicated on the drawings in strict accordance with the printed directions and/or specifications of the approved manufacturer to attain fire ratings noted on the drawings.
- B. Apply drywall with the reverse side against the framing members, and with the separate panels in moderate contact. In no case shall the panels be forced into place. At interior and exterior corners, conceal the cut edges of the panels so that the corners of any four panels will not meet at the same point. Vertical joints shall not occur on the same stud on both sides of a partition. Apply panels in such lengths as will result in a minimum of joints.
- C. Build into drywall partitions reinforcing plates on not less than 3/16" thick to accommodate items which will be secured on and/or hung from the drywall partitions such as: wall mounted equipment. (see drawings for location of accessories). Coordinate with other trade contractors as required.
- D. Unless otherwise indicated, provide continuous faces of gypsum drywall partitions, with control joints, spaced not over 30 feet o.c. Verify control joint locations with the Architect prior to installation.

3.3 ENVIRONMENTAL CONSIDERATIONS

- A. Where feasible, one or both of the following procedures shall be used to minimize the exposure of gypsum wallboard to materials or finishes which have high short-term emissions of VOC's, formaldehyde, particulates, or other air-borne compounds:
 - 1. The gypsum wall board shall be taped, spackled and primed *before* the installation of the highly-emitting materials.
 - 2. The gypsum wallboard shall be installed *after* the installation of the highly-emitting materials.Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paint, wood preservatives, and finishes; control and/or expansion joint fillers; hard finishes requiring adhesive installation; gypsum board (with associated finish processes and products); and composite or engineered wood products with formaldehyde binders.

3.4 FRAMING FOR PARTITIONS AND FURRING

- A. Floor and ceiling runners: accurately locate and align and install continuously at locations noted, and securely attach to adjacent construction using power driven

- anchors spaced 16" o.c. Anchor floor runners not over one (1) inch from runner ends.
- B. Two continuous beads of sealant, one along either edge shall be placed at the bottom of floor runner channels prior to anchoring to floor.
 - C. Position and anchor all studs vertically in the runners, spaced as recommended by the manufacturer but not more than 16" on center. Anchor studs which are located adjacent to door frames, partition intersections, furred wall, and at corners to floor and ceiling runner flanges with required screws.
 - D. Install studs in all cases in one piece from noted floor location to underside of the encountered structure or to horizontal termination runner.
 - E. When drywall panels are not scheduled to go on the underside of the structure, provide an additional horizontal stud member at the point above the ceiling line where the drywall panels are terminated. Brace to underside of slab above with every other stud - plus diagonal bracing at same spacing (if required).
 - F. Locate double studs not more than 2" from all door frame jambs, abutting partitions, partition corners and other construction, and as indicated on the drawings.
 - G. Provide double studs at jambs of door and window frames and head and sill runners as required to completely frame out these openings. Screw to runners at top and bottom and both sides. In addition, provide two (2) braces to slab above head runners.
 - H. Over metal doors and borrowed lights, place a section of runner track horizontally with a web-flange bent at each end. Fasten with one positive attachment per flange.
 - I. Provide additional studs and runners to conform to details noted and/or required by conditions encountered in the field.

3.5 HUNG CEILING FRAMING (See Section 05 17 00 for additional information)

- A. Coordinate this Work with the various trades who may have ducts, pipes, conduits, or other Work in the spaces above the suspended ceilings, in order that anchors, hangers and running channels may be properly placed to avoid such ducts, pipes, conduits, and other obstructions. Any changes required to be made in the locations of anchors, hangers, and running channels by reason of the Contractor's failure to observe this requirement shall be made by the Contractor without additional cost to the Owner.
- B. Coordinate Work with Gypsum Board.
- C. Secure 3"x3" steel angle to structural deck with inserts; install anchors as recommended by the manufacturer. Space at 48" O.C. (max.) in each direction to accommodate the running channel layout.
- D. Attach steel plate hangers to angle with 3/8" diameter bolt, lock washer, and nut.
- E. Attach running channels to plate hangers with 3/8" diameter bolt, lock washer and nut.
- F. Install channels level, true to grid layout, at proper height, ready to receive the ceiling system: furring channels for gypsum board; or for drop clips for acoustical ceiling tees.

- G. Ceiling Openings
 - 1. Provision shall be made for the installation of lighting fixtures, ventilating or air conditioning equipment, access openings, and other ceiling openings.
 - 2. Rigid frames of furring channels or angles shall be provided around openings, Adequately braces and reinforced.
- H. Grillage for hung ceilings: composed of hangers placed not over 4'-0" o.c. along the main runner direction and not over 4'-0" o.c. in the opposite direction and 6" from boundary walls.
- I. Hangers: of sufficient length to provide proper anchorage to the main runners and shall be hung plumb. Install main runners level with a tolerance of 1/8" in 12'-0" at designated heights with hangers secured to runners not over 4'-0". Splice channel ends not less than 12" with double strand of the wire near end of each splice.
- J. In addition, below metal deck slabs, use hook and bridge components as required and adjust and modify the existing hook and bridge framing components as required.
- K. Furring Channels (if required): Saddle tie furring channels at right angles to main runners 24" o.c. and 1" from parallel walls with double strand of 16 gauge tie wire. Lap furring channel ends 8" by nesting one channel into the other and wire tie at center of splice.
- L. Screw attach drywall panels to the furring channels as specified herein. At the Contractor's option, furring channels may be secured to carrying channels using furring channel clips as recommended by the approved manufacturer.
- M. Provide additional framing members as required to accommodate conditions encountered in the field at no additional cost to the Owner.
- N. Access doors: Receive, store, and install access doors and frames furnished by other trade contractors in a secure, plumb and rigid manner.
- O. Light fixtures: Coordinate location and frame (if required).

3.6 GYPSUM DRYWALL

- A. Apply drywall with long dimension (parallel) to framing members, with abutting ends and edges occurring over stud flanges. Use panels of the maximum practical length to minimize joints. Arrange joints on opposite sides of the partition to occur on different studs. Cut panels to fit outlets, switch boxes and all other items encountered which penetrate the drywall surfaces.
- B. For vertical single-layer drywall application, space 1" screws a maximum of 12" o.c. in the field of the panel and 8" o.c. staggered along the vertical abutting edges.
- C. For horizontal single-layer drywall application, space 1" screws a minimum of 12" o.c. in the field of the panel and 12" o.c. along the abutting edges.
- D. Stagger drywall joints above door openings and not opposite each other on the same stud at door heads. At door jambs, secure drywall panels to each stud of the double stud arrangement with screws spaced 8" on center into each stud.
- E. Horizontal drywall joints not permitted.
- F. If drywall panels are not scheduled to extend to underside of structure, then extend panels a minimum of 6 inches above the finished suspended ceilings as shown.

3.7 ACCESSORIES

- A. Install corner beads on all exterior corners in one length without joints and secure with fasteners spaced 9" O.C. on both sides. Corner beads: formed to an angle of 90 degrees with 1-1/4" fine mesh flanges.
- B. Wherever an end of drywall will remain exposed or cannot be taped, provide continuous casing beads over face layer and secure in place with fasteners spaced 9" O.C. "J" molding is not acceptable.
- C. Provide control joints in the face layer at continuous walls exceeding 30'-0" and where indicated on the drawings and staple in place in a secure and rigid manner. (See plans for location of control joints in ceiling).
- D. Drywall abutting dissimilar materials shall terminate in casing beads fastened to terminal stud only. "J" molding is not acceptable.
- E. See details for additional reveals and trim.

3.8 INSULATION

- A. Install continuous, full height insulation blankets between channel studs. Secure insulation to the back to the drywall on one side leaving no voids.

3.9 SOUND ISOLATION CLIPS (GENIE CLIP TYPE RST)

- A. Do not exceed 48" O.C.
- B. Furring strips shall not exceed 24".
- C. Fasten clips to substrate (concrete) for a minimum pull out and shear of 120 lbs.
- D. Tighten fasteners to come in solid contact with the top washer in the clip. Do not over tighten.
- E. Locate first row of channels to be within 3" to 6" of the wall edge. Last furring channel within 6" from edge of wall or beam.
- F. All other rows should have maximum spacing not to exceed 24".
- G. Furring channels (24ga) shall not be more than 6" beyond last sound clip.
- H. Snap furring channel into clip and make joints between clips with a 6" overlap. Secure with (2), 7/16" framing screws.
- I. Stagger layers of gypsum board.
- J. Caulk around perimeter of GWB.
- K. Tape and finish GWB.
- L. Seal any penetrations, or air leaks with non hardening acoustic caulking.
- M. Any penetration, (hanger) shall have a rubber gasket.

3.10 TREATMENT FOR JOINTS AND FASTENERS

- A. Completely fill all joints formed by the drywall panels and/or adjoining materials with a three (3) coat application of joint cement and tape. Joint treatment compound shall be mixed according to the approved manufacturer's directions.

- B. Drive fasteners in slightly below the surface of the board, with heads forming a slight depression below the surface of the drywall. Fasteners shall not be driven closer than 3/8" from edges and ends of boards. Drywall adjacent to the joint of fastening shall be held tightly against the framing members while driving fasteners. Dependence on fasteners to draw drywall against the framing will not be acceptable.
- C. All boards shall fit tightly against the supporting frame work before applying joint treatment and concealing screw depressions.
- D. Joint Compound and Taping:
 - 1. Mix joint compound in strict accordance with manufacturer's recommendations.
 - 2. Apply taping or embedding compound in a thin uniform layer of all joints and angles to be reinforced. Immediately apply reinforcing tape centered over joint and seated into compound. Sufficient compound - approximately 1/64" to 1/32" - must remain under the tape to provide proper bond. Follow immediately with a thin skim coat to embed tape, but not to function as a second coat. Fold and embed tape properly in all interior angles to provide a true angle. The tape or embedding coat must be thoroughly dry prior to application of second coat.
 - 3. Apply second coat of joint compound over embedding coat, filling panel taper flush with surface; cover tape and feather out slightly beyond first coat. On joints with no taper, cover the tape and feather out at least 4" on either side of tape. Allow second coat to dry thoroughly prior to application of finish coat.
 - 4. Spread finish coat evenly over and extend slightly beyond second coat on all joints and feather to a smooth, uniform finish. Over tapered edges, do not allow finished joint to protrude beyond plane of the surface. Apply a finish coat to cover tape and taping compound at all tapered angles and provide a true angle. Where necessary, sand between coats and following the final application of compound to provide a smooth surface ready for decoration.
- E. Finishing Fasteners
 - 1. Apply a taping or all-purpose type compound to fasten depressions as the first coat. Follow with a minimum of two additional coats of topping or all-purpose compound, leaving all depressions level with the plane of the surface.
- F. Finishing Beads and Trims
 - 1. Apply first coat to all bead and trim and properly feather out from ground to plane of surface. Compound must thoroughly dry prior to application of second coat.
 - 2. Apply second coat in same manner as first coat, extending compound slightly beyond onto face of panel. Compound must be thoroughly dry prior to application of finish.
 - 3. Apply finish coat to all bead and trim, extending compound slightly beyond the second coat and properly feathering from ground to plane or surface. Sand finish as necessary to provide a flat, smooth surface ready for

decoration.

3.11 PREPARATION FOR FINISHES

- A. All exposed surfaces of gypsum drywall which have depressions, gouges, cuts and dimples shall be spackled and sanded to present a smooth level surface acceptable for painting and wall covering by other trades.
- B. Spackle openings around pipes, switches and all other framed openings.

3.12 CLEANING

- A. Promptly remove joint compound from doors, door frames, windows, floors and all other surfaces which are not scheduled to receive the joint compound.
- B. At the completion of installation, remove all rubbish, excess material, scaffolding, tools, and other equipment from the building and job site and leave surfaces clean and whole.

END OF SECTION 09 29 00

SECTION 09 30 10 - CERAMIC TILE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Provide all ceramic tile work indicated on the Drawings and as specified herein.

1.2 REFERENCES

- A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.
- B. ANSI A137.1 "American National Standard Specifications for Ceramic Tile".
- C. Tile Council of America (TCA) Handbook for Ceramic Tile Installation. This includes ANSI A108/A118/A136 "Standard Specifications for the Installation of Ceramic Tile".

1.3 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.4 SUMMARY

- A. Work Included: The Work of this Section shall include, but not be limited to the following:
 - 1. Wall tile in the restroom.
 - 2. Marble threshold saddles at the restroom.
 - 3. Setting and grouting materials and other installation accessories.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each type of product specified.
- B. Shop Drawings: Submit shop drawings indicating tile patterns and locations and widths of control joints in tile surfaces.
- C. Samples for Initial Selection: Submit actual tiles showing full range of colors, textures, and patterns available. Include samples of grout.
- D. Samples for Verification: Submit the following:

1. Samples for each type of tile and for each color and texture required.
 2. Full-size units of each type of trim and accessory material for each color required.
 3. Stone threshold saddle in 6-inch lengths.
- E. Certificates: Submit master grade certificates for each shipment and type of tile, signed by tile manufacturer and Installer.
- F. Reports: Submit material test reports from qualified independent testing laboratory to show compliance of tile and tile setting and grouting products with requirements indicated.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for Project, for at least 5 years.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.
- B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.
- B. Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.
- C. Maintain temperatures at 50 deg F or more in ceramic tiled areas during installation and for 7 days after completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Ceramic/Porcelain Tile:
1. Daltile

49 E 21st St
New York, NY 10010
www.daltile.com
T: 212-471-0256

2. Or approved Equal

2.2 MATERIALS

- A. Wall tile
 1. Manufacturer: Daltile
Style: Glazed Color Wheel Linear
Color: Bullnose Top Trim Color: Arctic White no. 0190
Size: 4"x12"
 2. Or approved Equal
- B. Wall Accent Tile
 1. Manufacturer: Daltile
Style: Wheel Linear
Color: Glass Tile whisper Green No. CW12, Matte Finish
Size: 4"x12"
 2. Or approved Equal
- C. Floor tile T-3
 1. Manufacturer: Daltile
Style: Collection Haut Monde, Empire Black, No. HM06
Color: Elite Grey HM05, Unpolished
Size: 24"x24"
 2. Or approved Equal

2.3 PRODUCTS, GENERAL

- A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for "Standard Grade" requirements unless otherwise indicated.
- B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with materials for setting and grouting.
- C. Colors, Textures, and Patterns: Provide tile, grout, and other products of colors, surface textures and other appearance characteristics as selected by the Architect from manufacturer's standard range.

2.4 TILE PRODUCTS

- A. Tile: Provide flat tile complying with the following requirements:

1. Nominal Facial Dimensions: As scheduled.
2. Nominal Thickness: As scheduled.
3. Edges: As scheduled.
4. Patterns: As Indicated.
5. Products: As scheduled sizes, patterns and colors.

- B. Trim Units: Provide trim units to match adjoining flat tile, coordinated with sizes and coursing of adjoining flat tile where applicable, and of standard shapes to suit conditions of installation. Provide coved units at junction of floor and wall and bullnose tile where indicated.

2.5 MARBLE THRESHOLDS

- A. Marble Thresholds: Unless otherwise noted to the contrary, provide white Carrera marble thresholds with honed finish complying with ASTM C 503 requirements for exterior use and for abrasion resistance.

2.6 WATERPROOFING FOR THINSET TILE

- A. Latex Rubber Waterproofing: Manufacturer's standard factory- prepackaged, job-mixed, proprietary two-part formulation consisting of liquid latex rubber and powder for trowel application and glass fiber fabric reinforcing.
1. Products: Subject to compliance with requirements, provide Laticrete 9235 Waterproof Membrane by Laticrete International Inc., and PRP 315 Anti-Fracture and Waterproof Membrane by Mapei Corporation.

2.7 CRACK-SUPPRESSION MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
1. Chlorinated Polyethylene Sheet: Non-plasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; 0.030-inch nominal thickness.
 - a. Products: "Nobleseal TS" as manufactured by The Noble Company, or Architect approved equal.

2.8 SETTING MATERIALS

- A. Latex/Polymer Modified Portland Cement Mortar Installation Materials: Provide materials complying with ANSI A108.5 and as specified below.
- B. Latex Additive: Laticrete 4237 by Laticrete International, Inc. for use with job-mixed portland cement and aggregate mortar bed.

- C. Latex-Portland Cement Mortar: ANSI A118.4, with Laticrete 3701 by Laticrete International, Inc. combined at job site with prepackaged dry mortar mix supplied or specified by latex additive manufacturer.

2.9 GROUTING MATERIALS

- A. Latex-Portland Cement Grout: ANSI A118.6 for materials described in Section H-2.4, composed as follows:
 - 1. Mixture of Dry-Grout Mix and Latex Additive: Mixture of factory-prepared, dry-grout mix and latex additive complying with the following requirements:
 - a. Unsanded Dry-Grout Mix: Dry-set grout complying with ANSI A118.6 for materials described in Section H-2.3, for joints 1/8 inch and narrower.
 - b. Sanded Dry-Grout Mix: Commercial portland cement grout complying with ANSI A118.6 for materials described in Section H-2.1, for joints 1/8 inch and wider.
 - c. Latex Additive: Styrene butadiene rubber.
 - 2. Products:
 - a. Unsanded Grout: Provide Laticrete 600 Series unsanded grout modified with 1776 grout admixture; as manufactured by Laticrete International.
 - b. Sanded Grout: Provide Laticrete 500 Series sanded grout modified with 1776 grout admixture; as manufactured by Laticrete International.
 - 3. Colors and Types: Refer to Finish Schedule for grout colors and types, or, if not scheduled, as selected by the Architect.

2.10 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Ceramic Tile Cleaner: Product specifically acceptable to tile and grout manufacturer, as recommended by National Tile Promotion Federation, 112 North Alfred St., Alexandria, VA 22134 or Ceramic Tile Institute, 700 N. Virgil Ave., Los Angeles, CA 90029.
- C. Sealer: As recommended by Manufacturer.

2.11 MORTAR AND GROUT MIXTURES

- A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers for accurate proportioning of materials and mixing

procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics.

1. Provide grout colors as scheduled and selected by Architect.

PART 3 -EXECUTION

3.1 EXAMINATION

- A. Examine substrates and areas where tile will be installed, for compliance with requirements for proper installation. Proceed with installation after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Blending: For tile with color variations, verify that tile has been blended in factory and packaged accordingly. If not factory blended, return to manufacturer.
- B. Prior to installation of tiles, check tiles for flatness. If any tiles are found to be warped, tiles shall be rejected and provided with new tiles.

3.3 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standard: Comply with applicable parts of ANSI A108 series of standards included under “American National Standard Specifications for the Installation of Ceramic Tile.”
- B. TCA Installation Guidelines: TCA “Handbook for Ceramic Tile Installation”; comply with TCA installation methods indicated.
- C. Extent: Extend tile into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Fitting: Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind exposed cut edges of tile for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.
 1. Refer to Architectural Drawings for starting points. Prior to commencement of work review all installation conditions with Architect.
- E. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area.

Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.

1. Make joints between mounted tile sheets same width as joints within tile sheets so that extent of each sheet is not apparent.

F. Grout tile to comply with the requirements of the following tile installation standards:

1. For ceramic tile grouts (sand-portland cement, dry-set, commercial portland cement, and latex-portland cement grouts), comply with ANSI A108.10.

3.4 WATERPROOFING INSTALLATION

- A. Install waterproofing in compliance with waterproofing manufacturer's instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate.
- B. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.5 CRACK ISOLATION MEMBRANE INSTALLATION

- A. Install crack-suppression membrane to comply with manufacturer's written Instructions to produce membrane of uniform thickness bonded securely to substrate.

3.6 FLOOR INSTALLATION METHODS

- A. Marble Thresholds: Install thresholds at locations indicated; set in same type of setting bed as abutting field tile.
 1. Set thresholds in latex-portland cement mortar where mortar bed would otherwise be exposed above adjacent non-tile floor finish.

3.7 WALL TILE INSTALLATION METHODS

- A. Install types of wall tile designated to comply with requirements indicated below for setting-bed methods, and TCA installation methods related to subsurface and grout.
- B. Latex-Portland cement Mortar: ANSI A108.5.
 1. Gypsum Board, Latex Portland cement Mortar, Interior: TCA W243.
 2. Cementitious Backer Units, Interior: TCA W244.
 3. Grout: Sanded and unsanded Latex-Portland cement grout, ANSI A108.10, as specified.
 4. Cement Backer Board/ wet areas, Interior TCA W412 at stud and

cement backer board locations as directed by the Architect.

3.8 CLEANING AND PROTECTION

- A. Cleaning: Upon completion of placement and grouting, clean all tile surfaces so they are free of foreign matter.
 - 1. Remove latex-Portland cement grout residue from tile as soon as possible.
 - 2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal, wood and plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.

- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile.

- C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensure that tile is without damage or deterioration at time of Substantial Completion.
 - 1. When recommended by tile manufacturer, apply a protective coat of neutral cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
 - 2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.

- D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION 09 30 13

SECTION 09 50 00 – WOOD PANEL CEILINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section

1.02 SUMMARY

A. Section Includes

1. Solid Wood and Wood veneer ceiling panels
2. Exposed grid suspension system
3. Wire hangers, fasteners, main runners, wall angle moldings and accessories.

B. Related Sections:

1. Section 09 29 00 - Plaster and Gypsum Board
2. Division 23 - HVAC
3. Division 26 - Electrical

C. Alternates

1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and approved products will be set forth by the Addenda. If included in a Bid are substitute products that have not been approved by Addenda, the specified products shall be provided without additional compensation.

2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Underwriters' Laboratories Classified Acoustical performance; Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM):

- 1) ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
- 2) ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
- 3) ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
- 4) ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
- 5) ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
- 6) ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
- 7) ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
- 8) ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
- 9) ASTM E 1264 Classification for Acoustical Ceiling Products

B. Hardwood Plywood & Veneer Association (HPVA)

C. International Building Code

D. ASHRAE Standard 62.1-2004 Ventilation for Acceptable Indoor Air Quality

E. NFPA 70 National Electrical Code

F. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures

G. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components

H. International Code Council-Evaluation Services Report - Seismic Engineer Report

1. ESR 1308 - Armstrong T-Bar or Dimensional Suspension

I. California Air Resources Board (CARB) compliant

J. LEED - Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each type of ceiling unit and suspension system required.
- B. Installation Instructions: Submit manufacturer's installation instructions as referenced in Part 3, Installation.
- C. Samples: Minimum 3-1/2 inch or 5-1/2 inch samples of specified panel; 8 inch long samples of exposed wall molding and suspension system, including main runner.
- D. Shop Drawings: Illustrating the layout and details of the ceilings. Show locations of items that are to be coordinated with, or supported by the ceilings.
- E. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.
- F. All products not conforming to manufacturer's current published values must be removed and dispose. Replace with complying product at the expense of the Contractor performing the work.

1.05 QUALITY ASSURANCE

- A. Single-Source Responsibility: Provide ceiling panel units and grid components by a single manufacturer.
- B. Fire Performance Characteristics: Identify ceiling components with appropriate markings of applicable testing and inspecting organization.
 - a. Surface Burning Characteristics: As follows, tested by HPVA (Hardwood Plywood and Veneer Association) under the test standard ASTM E-84 tunnel test and complying with ASTM E 1264 for Class A products.
 - i. Flame Spread: 25 or less
 - ii. Smoke Developed: 50 or less
- C. Woodworking Standards: Manufacturer must comply with specified provisions of Architectural Woodworking Institute quality standards.
- A. Woodworkds Panels: As with other architectural features located at the ceiling, may obstruct or skew the planned fire sprinkler water distribution pattern through possibly delay or accelerate the activation of the sprinkler or fire detection systems by

channeling heat from a fire either toward or away from the device. Designers and installers are advised to consult a fire protection engineer, NFPA 13, or their local codes for guidance where automatic fire detection and suppression systems are present.

- B. Coordination of Work: Coordinate ceiling work with installers of related work including, but not limited to building insulation, wet work i.e. gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store the wood veneer ceiling panels in a dry interior location in their cartons prior to installation to avoid damage. Store the ceiling panel cartons in a flat, horizontal position. Do not remove the protectors between the panels until installation.
- B. Do not store in unconditioned spaces with humidity greater than 55 percent or lower than 25 percent relative humidity and temperatures lower than 50 degrees F or greater than 86 degrees F. Do not expose the wood veneer ceiling panels to extreme temperatures, for example, close to a heating source or near a window with direct sunlight.
- C. Handle ceiling units carefully to avoid chipped edges or damage to units in any way.

1.07 PROJECT CONDITIONS

- A. Prior to installation, the wood veneer ceiling materials are required to reach room temperature and have stabilized moisture content for a minimum of 72 hours.
- B. Do not install the wood veneer panels in spaces where the temperature or humidity conditions vary greatly from the temperatures and conditions that will be normal in the occupied space.
- C. As interior finish products, the wood veneer panels are designed for installation in temperature conditions between 50 degrees F and 86 degrees F, in spaces where the building is enclosed and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.

1.08 WARRANTY

- A. Wood Veneer Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to:
 - a. Ceiling Panels: Defects in materials or factory workmanship
 - b. Grid System: Rusting and manufacturing defects
- B. Warranty Period:
 - a. Wood veneer panels: One (1) year from date of installation
 - b. Grid: One (1) year from date of installation
- C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.9 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Ceiling Units: Furnish quantity of full-size units equal to 5.0 percent of amount installed.

2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Ceiling Panels:

- 1. Armstrong World Industries, Inc.

B. Suspension Systems:

- 1. Armstrong World Industries, Inc.

2.2.1 WOOD VENEER CEILING UNITS

A. Ceiling Panels Type AP:

1. Surface Texture: Smooth
2. Composition: Wood
3. Species/Finish: White
4. Size: 12" x 96"
5. Reveal: Backer
6. Profile:
7. Sabin:N/A
8. Edge Banding and Trim: To match face veneer
9. Noise Reduction Coefficient (NRC):
10. Flame Spread: ASTM E84 HPVA Fire Classification (Fire Class)
11. Dimensional Stability:
12. Acceptable Product: WOODWORKS Grille - Classics for Walls, Item # 7094BO as manufactured by Armstrong World Industries

B. Ceiling Accessories (Ceilings) WoodWorks:

1. 5457GAL1 - WW Touch-Up Stain 1 Gallon - please specify color
2. 5671 - Ledger
3. 5672 - Junction - 1-3/8"
4. 5675 - End Cap - 2-1/4"
5. 5687 - Backer Clip
6. 7146 - Solid Wood Trim
7. 7239 - Adjustable Trim Clip
8. 7891 - 12 Gauge Hanger Wire
9. 8171WGBOC02 - 2-1/4" Integrated Light Connection Clip

2.3.1 METAL SUSPENSION SYSTEMS

A. Components:

Main beams and cross tees, base metal and end detail, fabricated from commercial quality hot dipped galvanized steel complying with ASTM A 653. Main beams and cross tees are double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.

- a. Structural Classification: ASTM C 635 Heavy Duty duty
- b. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.
- c. Acceptable Product: PRELUDE XL 15/16" Exposed Tee as manufactured by Armstrong World Industries

B. Attachment Devices:

Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

C. Wire for Hangers and Ties:

ASTM A 641, Class 1 zinc coating, soft annealed, with a yield stress load of at least time three design load, but not less than 12 gauge.

D. Wood Works Edge Moldings and Trim:

- 1. 7835 - 10ft Channel Molding

E. WoodWorks Suspension Accessories:

- 1. 7126 - Spreader Hold Down
- 2. 7127 - Snap-in Access Tool
- 3. 7425 - Stabilizer Bar
- 4. 414 - Retention Clip
- 5. 435 - Stabilizer Clip
- 6. 522 - Mid-point Clip
- 7. 5596 - Security Screws
- 8. 5944 - Suspension Kit

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out.
- B. Proper designs for both supply air and return air, maintenance of the HVAC filters and building interior space are essential to minimize soiling. Before starting the

HVAC system, make sure supply air is properly filtered and the building interior is free of construction dust.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

3.3 INSTALLATION

- A. Install suspension system and panels in compliance with ASTM C636; CISCA Seismic Guidelines; approved construction drawings; with the authorities having jurisdiction; and in accordance with the manufacturer's installation instructions.
- B. Install wall moldings at intersection of suspended ceiling and vertical surfaces.

3.4 ADJUSTING AND CLEANING

- A. Replace damaged and broken panels.
- B. Clean exposed surfaces of ceilings panels, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 50 00

SECTION 09 51 13 ACOUSTICAL CEILING PANELS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Provide acoustical ceiling Work as indicated on Drawings and as specified herein, including the following:
 - 1. Acoustical Mineral Fiber Tile and Panel Ceilings.
 - a. Lay-in panel installation - exposed grid

1.02 SUSTAINABILITY REQUIREMENTS

- A. The Contractor shall implement practices and procedures to meet the Project's sustainable requirements. The Contractor shall ensure that the Sustainability Requirements, and as specified in this Section, are implemented to the fullest extent. Substitutions or other changes to the work shall not be proposed by the Contractor or their sub-contractors if such changes compromise the stated Sustainable Design Performance Criteria.
- B. Sustainability requirements included in the Section are as follows:
 - 1. Meet established minimum post and pre-consumer percent content for specified mineral based acoustical tiles and panels.
 - 2. Documentation of Recycled materials.

1.03 REFERENCES

- A. References and industry standards listed in this Section are applicable to the Work. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations, suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.
- B. American Society for Testing and Materials (ASTM), latest edition.
 - 1. C423 Test Method for Sound Absorption and Sound Absorption Coefficient by the Reverberation Room Method.
 - 2. C635 Metal Suspension System for Acoustical Tile and Lay-In Panel Ceilings.
 - 3. C636 Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
 - 4. E84 Surface Burning Characteristics of Building Materials.
 - 5. E90 Standard Test Method for Laboratory Sound Transmission Class
 - 6. E119 Method for Fire Tests of Building Construction and Materials.
 - 7. E413 Determination of Sound Transmission Class
 - 8. E1264 Standard Classification for Acoustical Ceiling Products.
- D. Underwriters Laboratories Inc. (UL)

Fire Resistance Directory

- E. New York City Board of Standards and Appeals (BSA) approvals, or New York City Materials Equipment Acceptance (MEA) approvals.

1.04 DEFINITIONS

- A. Indirect Suspension System
Installed as part of the Work of this Section, as furnished by ceiling system manufacturer to be attached to direct suspension system.

1.05 SUBMITTALS

- A. Product Data
Submit manufacturer's product specifications and installation instructions for ceiling materials, indicating compliance with applicable requirements. Include information pertaining to fire performance, flame spread, and smoke development.
- B. Shop Drawings
Submit shop drawing details indicating the relationship to mechanical and electrical Work and other items penetrating or connected to the ceiling. Indicate framing and support details for the ceiling Work.
 - a. Submit ceiling plans for coordination with mechanical trades.
- C. Samples
 - 1. Submit samples of the following materials, prior to installation;
 - a. Acoustical panels: 6"x6" samples of each type, pattern and color.
 - b. Exposed runners and moldings: 8" long samples of each color and system type required.
 - c. Concealed suspension members: 1 set of each assembly specified.
- D. Quality Assurance Submittals
 - 1. Affidavit certifying experience of installation company.
 - 2. New York City MEA or BSA approval reports, as applicable.
- E. Project Closeout Submittals
 - 1. Guarantee
 - 2. Extra Materials (Attic Stock) 10%
- F. Sustainable Submittals:
 - 1. Submit Contractor's Sustainable Materials Form with complete information on recycled content for ceiling tile materials provided under the work of this section. Include cost of materials and percentage, by weight, of materials that have post-consumer or pre-consumer recycled content for the following:
 - a. Mineral based tiles.
 - b. Mineral based panels.

2. Submit documentation of recycled content in ceiling tile materials – product data, mix design information, or manufacturer’s statement.

1.06 QUALITY ASSURANCE

- A. Qualifications
Installer is to be a firm with not less than five years of successful experience in the installation of specified materials.
- B. Regulatory Requirements
 1. Building Code: Work of this Section shall conform to all requirements of the N.Y.C. Building Code and all applicable regulations of other governmental authorities.
 2. New York City Board of Standards and Appeals (BSA) approvals, or New York City Materials Equipment Acceptance (MEA) approvals when applicable.
 3. Acoustical and Insulating Materials Association
- C. Fire Performance Characteristics
Provide ceiling components that are identical to those tested for the following fire performance characteristics, according to ASTM test method, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction. Identify ceiling components with appropriate marking of applicable testing and inspecting agency.
 1. Surface Burning Characteristics: Tested per ASTM E84. Tested surfaces shall be the surfaces facing the occupied space.
 - a. Flame Spread: 25 or less.
 - b. Smoke Developed: 25 or less.
 2. All materials exposed to the airflow in ceiling cavity plenums used for supply, return, or exhaust air shall be non-combustible or limited-combustible and have a maximum smoke developed index/rating of 50, as defined by and in accordance with NYC Building Code Reference Standard RS13-1. **Flame spread index shall not exceed 25.** Tested surfaces shall be the surfaces facing the plenum.
- E. Coordination of Work
Coordinate layout and installation of ceiling units and suspension system components with other work above, supported by, or penetrating through ceilings, including light fixtures, HVAC equipment, fire-suppression systems and partitions. Resolve all discrepancies and conflicts prior to start of Work.
- F. Pre-installation Meeting
Prior to start of Work, installer of ceiling system and representatives of trades involved are to have a conference at the job site, in the presence of the Architect and Owner’s representative, to discuss coordination of ceiling system installation and resolve all discrepancies.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery

Deliver all acoustical units in manufacturer's original, unopened packages fully identified with type, finish, performance data and compliance labeling.

- B. Storage
 - 1. Store materials where they will be protected against damage from moisture, direct sunlight, surface contamination or other causes.
 - 2. Store tile containers in space where they will be installed for at least 24 hours prior to installation to stabilize moisture content and temperature.
- C. Handling

Handle ceiling units carefully to avoid chipping edges or damaging units in any way.

1.08 GUARANTEE

- A. Work showing defects in workmanship or materials within the one year guarantee period specified in the Contract shall be corrected as directed by the Architect. Defects include but are not limited to:
 - 1. Tiles **or suspension system** loose or improperly secured.
 - 2. Tiles **or suspension members** showing discoloration or cracking.
 - 3. Tiles **or suspension members** warping, sagging, or deforming.

PART 2 - PRODUCTS

2.01 MANUFACTURERS, MODELS

- A. Acoustical Panels
 - 1. Mineral Composition Panels (24" x 24 x 1")
 - a. Armstrong World Industries
Product name: Calla Square Lay-in-Tegular Tile
 - b. approved equal
- B. Indirect Metal Suspension Systems
 - 1. Chicago Metallic Corporation
 - 2. Donn Corporation / USG Interiors, Inc.
 - 3. Armstrong World Industries, Inc.
 - 4. Suspension members shall be by the manufacturer of the ceiling panels or by a company recommended by the panel manufacturer.

2.02 MATERIALS - ACOUSTICAL TILES AND PANELS

- A. Mineral Fiber Tile and Panels
 - 1. Provide units per ASTM E1264; of designation, style, finish, color, acoustical range, edge detail and size as indicated below:

a. Suspended (Exposed grid, lay-in) Installation

Style:	Item No: 61001Hrc
Size:	24" x 24" x 1"
Edge Profile:	Reveal tegular
Weight:	1.30-1.55 lbs./sq.ft.
NRC:	Min. .70
CAC:	Min. 35
Light Reflectance	Min. .84 Average
Color:	Blizzard White
Finish:	Hot Dipped Galvanized

2. Mineral products shall be manufactured with a minimum of 60% of post and pre-consumer content materials.

2.03 MATERIALS - METAL SUSPENSION SYSTEMS - INDIRECT HUNG

A. Exposed Grid Suspension System

Interlude XL 9/16" Dimensional Tee Suspension System.

1. Structural Classification: Regular-duty system in accordance with ASTM C 635.
2. Face width: 9/16" face .
3. Main runners: Connect to direct suspension system. Conform to ASTM C 635 for regular-duty classification.
4. Provide runners suitable for attachment of hold-down clips and impact clips as applicable.

2.04 MISCELLANEOUS MATERIALS

A. Edge Moldings and Trim Pieces

Provide manufacturer's standard molding for edges and penetrations of ceiling units which fit with type of edge detail and suspension system indicated.

B. Tile Fasteners

Cadmium plated, type recommended by tile manufacturer, but for not less than 1/2" penetration of substrate.

C. Drop Clips

18 gage galvanized steel with key hole slot, or other configuration approved by New York City Dept. of Buildings for connection of ceiling suspension members to carrying channels.

Drop clips shall be of length required for indicated ceiling height, and to provide clearances for lighting fixtures, mechanical equipment, and other items above the ceiling. Where necessary because of limited clearance, provide clips that connect runners tight to the bottom of carrying channels.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine conditions before beginning Work to determine it is in proper condition to receive acoustical materials and suspension system. Area shall be broom cleaned and uninterrupted for free movement of rolling scaffold. Do not proceed until satisfactory conditions prevail.
- B. Verify that direct suspension system has been installed properly, that main runners are spaced evenly and have been leveled to a tolerance of 1/8" in 12' measured both lengthwise on each runner and transversely between parallel runners so that indirect suspension system installation may proceed accurately.
- C. Start of Work constitutes acceptance of existing conditions, therefore, contractor is advised to bring any discrepancies to the attention of the Architect prior to start of Work.

3.02 PREPARATION

- A. Coordination
 - 1. Provide and coordinate the locations of inserts, clips, or other supports for support of acoustical ceilings.
 - 2. Determine the length of drop clips required to maintain indicated ceiling height and to provide necessary clearance for electrical, mechanical and other equipment. Where necessary for clearance, clips that connect tight to the bottom of carrying channels shall be used.
- B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans.

3.03 INSTALLATION - GENERAL

- A. Install materials in accordance with manufacturer's printed instructions and in compliance with ASTM C636, governing regulations, fire resistance rating requirements, as indicated.
 - 1. Coordinate requirements for Work of other trades to be built into ceiling system. Provide supplementary framing as required.
- B. Arrange directionally-patterned units (if any) in manner shown by reflected ceiling plans, or as approved by the Project Architect. Install in patterns indicated, (balanced borders all sided) symmetrical or centered about center line of corridors, panels, fixtures, beam haunches, rooms, spaces.
- C. Cut as required for installation of electric fixtures, air diffusers, grilles, sprinkler heads, security devices, access doors, etc., provided under other contracts. Verify sizes and locations with other trades.

- D. On completion, the acoustic ceilings shall present a uniform horizontal plane surface, unless otherwise indicated, free from blemishes and imperfections.
- E. Install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.
 - 1. Sealant Bed: Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before installing moldings.
 - 2. Screw-attach moldings to substrate at intervals not over 16" o.c. and not more than 3" from ends, leveling with ceiling suspension system to tolerance of 1/8" in 12'-0". Miter corners accurately and connect securely.
- F. Install panels in coordination with suspension system with suspension members concealed by support of tile units. Scribe and cut panels to fit accurately at borders and penetrations.

3.04 ADJUSTING AND CLEANING

- A. Clean exposed surfaces of ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage.
- B. Remove and replace Work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.
- C. Remove and replace Work that is damaged or soiled by other trades as directed by Authority's Representative.

3.05 ATTIC STOCK

- A. Provide 10% of tile wrapped and labeled.

END OF SECTION 09 51 13

SECTION 09 65 19 - RESILIENT FLOORING AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION OF WORK

- A. Provide all materials, labor, tools and equipment required to install luxury vinyl tile, vinyl base and vinyl transition trips at doorways.
- B. Contractor shall coordinate with the subfloor installer and review the installation prior to installing the new floor tile. Contractor shall provide written acceptance for the underlayment prior to installing the floor tile.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM), latest editions.
 - 1. E 84 Test Method for Surface Burning Characteristics of Building Materials.
 - 2. E 648 Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
 - 3. E 662 Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
- B. Federal Specifications (FS)
 - 1. SS-W040 Wall Base: Vinyl Plastic.
- C. National Fire Protection Association (NFPA)
 - 1. Standard 253 Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

1.4 SUBMITTALS

- A. Product data for all material including MSDS sheets
- B. Floor Plan showing layout of each type of floor tile.
- C. Samples
 - 1. For Verification, prior to installation, submit 2 samples of each of the specified materials including floor tiles, bases, and transition strips.

1.5 QUALITY ASSURANCE

- A. Qualifications
Manufacturer: Provide each type of resilient flooring and accessories as produced by a single manufacturer, including recommended primers, adhesives, sealants, and leveling compounds.
Installer: A firm with not less than 5 years of successful experience in the installation of specified materials.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Storage
Store materials (flooring, base and adhesives) in location having a minimum temperature of 68 degrees Fahrenheit for at least 24 hours prior to start of laying of flooring.

1.7 PROJECT CONDITIONS

- A. Environmental Requirements
Continuously heat spaces to receive base to a temperature of 68 degrees Fahrenheit for at least 48 hours prior to flooring installation, and for 48 hours after installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Vinyl Wall Base:
1. Allstate Flooring
1099 Wall Street West
Suite 169
Lyndhurst New Jersey, 07071
T: 718-526-7890
 2. Johsonite
16910 Munn Road Chagrin Falls, OH 44023
T: 440-5438916
Tarkett
440 Park Ave S 2nd floor, New York, NY 10016
T: 646-653-7982
 3. Or Approved Equal
- B. Luxury Vinyl Floor Tile:
1. American Olean
49 E 21st St, New York, NY 10010

- T: 212-471-0256
2. Or Approved Equal

2.2 MATERIALS

- A. Floor tile LVT-1
1. Manufacturer: American Olean
Model: Montesano
Color: MN&! Greige
Size: 18"x36"
 2. Or Approved Equal
- B. Vinyl Base B-1
1. Manufacturer: Allstate
Material: Vinyl.
Color: A46
 2. Or Approved Equal
- C. Adhesive
1. As recommended by manufacturer of resilient products for specific

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect subfloor surfaces to determine that they are smooth and free from cracks, holes, ridges, coatings preventing adhesive bond, and other defects impairing performance or appearance.

3.2 PREPARATION

- A. Apply primer, if recommended by flooring manufacturer, in compliance with Manufacturers' directions.

3.3 INSTALLATION OF FLOOR TILE

- A. Follow manufacturers' recommendation for installation
1. Install floor tile with manufacturers approved adhesive over all areas to be covered.
 2. Lay out tile so that the tile is centered in each room, or as layout shown on drawings.
 3. Inspect floor surface for defects.
 4. Cut tiles at walls.
 5. Leave a 3/8" gap at walls.

3.4 INSTALLATION OF RESILIENT BASE

- A. Apply base securely in locations indicated, using maximum lengths available to minimize joints. Adhere to substrate with full spread of adhesive, assuring continuous contact with vertical and horizontal surfaces. Site-fabricate corners, coping or mitering inside corners and heat-forming outside corners using manufacturer-approved device.
 - 1. At irregular vertical surfaces where top edge of resilient base does not make continuous contact, fill voids with manufacturer's recommended adhesive compound.

3.5 INSTALLATION OF MISCELLANEOUS ACCESSORIES

- A. Vinyl floor base as approved by manufacturer.

3.6 CLEANING

- A. Initial Cleaning: Remove excess and waste materials promptly.
- B. Final Cleaning: Remove scuff marks, excess adhesive, and other foreign substances, using only cleaning products and techniques recommended by manufacturer of resilient products.

3.7 PROTECTION

- A. Construction Period: Cover traffic routes across completed resilient flooring with plywood, hardboard, or other durable material to protect against damage from loaded dollies and other construction traffic.
- B. Final Protection: Cover resilient floor surface with non-staining building paper until substantial completion in each area.

3.8 ATTIC STOCK

- A. Each type of tile and base.
 - 1. Floor Tile 10%
 - 2. Base 10%

END OF SECTION 09 65 19

SECTION 09 69 00 - CARPET TILE

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes carpet tile and installation.
- B. This section includes Nylon face-fiber carpet tiles which meet specified criteria for:
 - 1. Post-consumer and/or post-industrial recycled content;
 - 2. Product coding labels (to promote future recycling of used products);
 - 3. Emissions testing for improved indoor air quality; and
 - 4. Reduced-emission, reduced-toxicity installation adhesives.
- C. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 09 65 19 for resilient wall base and accessories.

1.02 SUBMITTALS

- A. Product Data for each type of carpet tile material and installation accessory specified. Submit manufacturer's printed data on physical characteristics, durability, fade resistance, and fire-test-response characteristics. Submit methods of installation for each type of substrate.
- B. Manufacturer's certification of recycled content per paragraph 1.03.
- C. Manufacturer's certification of product compliance with adhesive standards per paragraph 1.03.
- D. Manufacturer's certification of product compliance with emissions testing standards per paragraph 1.03.
- E. Manufacturer's certification of product labeling per paragraph 1.03.
- F. Material Safety Data Sheets.
- G. Manufacturer's maintenance and cleaning instructions.
- H. Manufacturer's policy statement on carpet recycling/carpet recycling programs.

- I. Shop Drawings showing columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tile. Indicate the following:
 - 1. Seam locations, types, and methods.
 - 2. Type of subfloor.
 - 3. Type of installation.
 - 4. Pattern type, location, and direction.
 - 5. Pile direction.
 - 6. Type, color, and location of insets.
 - 7. Type, color, and location of edge, transition, and other accessory strips.
 - 8. Transition details to other flooring materials.

- J. Samples for verification of the following products, in manufacturer's standard sizes, showing the full range of color, texture, and pattern variations expected. Prepare Samples from the same material to be used for the Work. Label each sample with the manufacturer's name, material type, color, pattern, and designation indicated on Drawings and carpet tile schedule. Submit the following:
 - 1. Full-size sample of each type of carpet tile required.
 - 2. 12-inch Samples of each type of exposed edge stripping and accessory item.

- K. Schedule of carpet tile using same room designations indicated on Drawings.

- L. Maintenance data for carpet tile to include in the operation and maintenance manual specified in Division 1. Include the following:
 - 1. Methods for maintaining carpet tile, including manufacturer's recommended frequency for maintaining carpet tile.
 - 2. Precautions for cleaning materials and methods that could be detrimental to finishes and performance. Include cleaning and stain-removal products and procedures.

1.03 QUALITY ASSURANCE

- A. **Installer Qualifications:** Engage an experienced Installer who is certified by the Floor Covering Installation Board (FCIB) or who can demonstrate compliance with FCIB certification program requirements.

- B. **Single-Source Responsibility:** Obtain each type of carpet tile from one source and by a single manufacturer, in a single mill run.

- C. **Fire-Test-Response Characteristics:** Provide carpet tile with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to

authorities having jurisdiction. Identify carpet tile with appropriate markings of applicable testing and inspecting agency.

1. Surface Flammability: Passes ASTM D2859.
2. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E 648.
3. Flame Spread: 25 or less per ASTM E 84.
4. Smoke Developed: 450 or less per ASTM E 84.

D. References/Quality assurance (*for recycled content and other High Performance building criteria*)

1. Recycled Content:

“Recycling Activities in the Carpet Industry”(reference only), Carpet and Rug Institute, Dalton, GA, <http://www.carpet-rug.com>

2. Adhesives:

“Green Seal Environmental Standard for Certification of Commercial Adhesives” (GS-36), Green Seal, Inc., Washington, DC, <http://www.greenseal.org>

3. Emissions testing:

“Green Label” program for emissions testing and emission standards for carpet, carpet adhesives, and carpet cushion. Carpet and Rug Institute, Dalton, GA

4. Installation:

“Standard for Installation of Commercial Carpet”, CRI 104, Carpet and Rug Institute, Dalton, GA

E. Environmental Criteria:

1. Recycled Content:

Carpet tiles shall have face fibers and/or backings containing a minimum of 15% (combined) post-industrial/post-consumer recycled content. The percentage of recycled content is based on the weight of the component materials.

2. Adhesives:

Carpet tile adhesives shall meet the VOC limits and prohibited chemical limitations of the “Green Seal Environmental Standard for Certification of Commercial Adhesives” (GS-36), of Green Seal, Inc., Washington, DC.

3. Emissions Testing:

Carpet tiles and adhesives shall meet or surpass all criteria of the “Green Label” Indoor Air Quality Test Program established by the Carpet and Rug Institute (CRI) of Dalton, Georgia.

4. Product Labeling (for future recycling):

Carpet tiles shall have Carpet Component Identification Codes as established by the Carpet and Rug Institute (CRI) of Dalton, Georgia. The labels shall be permanently printed or attached to the carpet backing. The codes shall identify, at minimum, the carpet’s face fiber, primary backing, and secondary backing.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 5: "Storage and Handling"
- B. Deliver materials to Project site in original factory wrappings and containers, labeled with identification of manufacturer, brand name, and lot number.
- C. Store materials on-site in original undamaged packages, inside well-ventilated area protected from weather, moisture, soilage, extreme temperatures, and humidity. Lay flat, with continuous blocking off ground.
- D. Where feasible, remove carpet tiles from packaging and store in unoccupied, ventilated areas (100% outside air supply, minimum of 1.5 air changes per hour, no recirculation) for 24-72 hours prior to installation. Carpet tiles shall not be stored with materials which have high emissions of VOCs or other contaminants (see section 3.01 below).
- E. Carpet tiles to be stored per manufacturer’s recommendations for allowable temperature and humidity range. Tiles shall not be allowed to become damp.

1.05 PROJECT CONDITIONS

- A. General: Comply with CRI 104, Section 6: "Site Conditions; Temperature and Humidity."
- B. Space Enclosure and Environmental Limitations: Do not install carpet tile until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.
- C. Subfloor Moisture Conditions: Moisture emission rate of not more than 3 lb/1000 sq. ft./24 hours when tested by calcium chloride moisture test in compliance with CRI 104, 6.2.1, with subfloor temperatures not less than 55 deg F.
- D. Subfloor Alkalinity Conditions: A pH range of 5 to 9 when subfloor is wetted with potable water and pHydriion paper is applied.

1.06 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Carpet Tile Warranty: Submit a written warranty executed by carpet tile manufacturer and Installer agreeing to repair or replace carpet tile that does not meet requirements or that fails in materials or workmanship within the specified warranty period. Failures include, but are not limited to, more than 10 percent loss of face fiber, tile curling, snags, runs, and delamination.
- C. Warranty Period: 10 years from date of Substantial Completion.

1.07 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.
 - 1. Carpet Tile: Before installation begins, furnish quantity of full-size units equal to 10 percent of amount installed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

- A. Available Manufacturer: Subject to compliance with requirements, provide products as manufactured by one of the following:
1. Bentley Commercial Carpeting
 2. Mannington
 3. Interface FLOR Commercial

2.02 CARPET TILE

- A. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the products specified in each carpet tile Product Data sheet at end of this Section.

2.03 INSTALLATION ACCESSORIES

- A. Concrete-Slab Primer: Nonstaining type as recommended by carpet tile manufacturer.
- B. Trowelable Underlayments and Patching Compounds: As recommended by carpet tile manufacturer.
- C. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated and to comply with flammability requirements for installed carpet tile as recommended by carpet tile manufacturer.

PART 3 - EXECUTION

3.01 ENVIRONMENTAL CONSIDERATIONS

- A. Comply with CRI 104 recommendations for space ventilation during and after carpet tile installation.
- B. Where feasible, carpet tiles shall be installed *after* the installation of materials or finishes which have high short-term emissions of VOC's, formaldehyde, particulates, or other air-borne compounds which may be adsorbed by or settle on the carpet tiles. Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paint, wood preservatives, and finishes; control and/or expansion joint fillers; hard finishes requiring adhesive installation; gypsum board (with associated finish processes and products); and composite or engineered wood products with formaldehyde binders.

- C. When installed over concrete slabs, verify compatibility of carpet tile and adhesives with curing compounds, leveling agents, or sealing agents used for slab preparation.

3.02 WASTE MANAGEMENT

- A. Identify carpet tile manufacturer's policy for collection or return of construction scrap, unused material, demolition scrap, and/or packaging material. Where feasible, institute demolition and construction waste separation and recycling to take advantage of manufacturer's programs.

3.01 EXAMINATION

- A. Examine subfloors and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting performance of carpet tile. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Verify that subfloors and conditions are satisfactory for carpet tile installation and comply with requirements specified in this Section and those of carpet tile manufacturer.

3.02 PREPARATION

- A. General: Comply with carpet tile manufacturer's installation recommendations to prepare substrates indicated to receive carpet tile installation.
- B. Level subfloor within 1/4 inch in 10 feet, noncumulative, in all directions. Sand or grind protrusions, bumps, and ridges. Patch and repair cracks and rough areas. Fill depressions.
 - 1. Use leveling and patching compounds to fill cracks, holes, and depressions in subfloor as recommended by carpet tile manufacturer.
- C. Remove subfloor coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone.
- D. Broom or vacuum clean subfloors to be covered with carpet tile. Following cleaning, examine subfloors for moisture, alkaline salts, carbonation, or dust.
- E. Concrete-Subfloor Preparation: Apply concrete-slab primer, according to manufacturer's directions, where recommended by carpet tile manufacturer.

3.03 INSTALLATION

- A. General: Comply with CRI 104, Section 13: "Carpet Modules (Tiles)."
- B. Where demountable partitions or other items are indicated for installation on top of finished carpet tile floor, install carpet tile before installation of these items.
- C. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings.
- D. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings. Unless otherwise indicated on the drawings.

3.04 CLEANING

- A. Perform the following operations immediately after completing installation:
 - 1. Remove visible adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove protruding yarns from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.

3.05 PROTECTION

- A. General: Comply with CRI 104, Section 15: "Protection of Indoor Installation."
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure carpet tile is without damage or deterioration at the time of Substantial Completion.

3.06 CARPET SCHEDULE

- A. The following product is the **Basis of Design**:

- 1. Carpet Designation: **CP-1**

Manufacturer:	Bentley
Product Number:	801521
Style:	
Color:	Narrative
Product Construction:	Tufted Textured Loop
Yarn System:	Post-Consumer Content Type 6 Nylon
Recycled Content:	
Post Industrial Range:	44% - 44%
Post Consumer:	1%
Total Recycled Content:	45% - 45%

**FASHION INSTITUTE OF TECHNOLOGY
ADMISSIONS OFFICE RELOCATION
COED RESIDENCE HALL**

PROJECT #C1536

Antimicrobial:	(AATCC 138 Washed) (AATCC 174 Parts 2&3) Intersept®
Tufted Yarn Weight:	20-29 oz/yd ²
Machine Gauge:	1/10 in
Pile Height:	0.16 in
Pile/Face Weight:	
Size:	18" x 36"
Indoor Air Quality:	Green Label Plus Certified # <u>GLP0820</u>
Sustainable Carpet	
Smoke Density:	(ASTM E - 662)
Standard Backing:	AFFIX Hardback

END OF SECTION

SECTION 09 84 11 – ACOUSTICAL CEILING MATERIAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes bonded acoustical cotton used as ceiling panels with adhesive.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product data and installation instructions.
- B. Samples: Submit 2 samples of 6" x 6", showing full range of exposed texture to be execute in adhesive work.
- C. Adhesive.
- D. Test Reports: Submit certified test reports from recognized test laboratories.
- E. Certificates: Submit manufacturer's certificate that products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Installer shall review existing ceiling conditions prior to installation and accept the ceiling conditions in writing prior to installation.
- B. Installer Qualifications: Utilize an installer having demonstrated experience on projects of similar size and complexity.

1.5 DELIVERY, STORAGE & HANDLING

- A. Delivery: Deliver material in the manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Provide labels indicating brand name, source of procurement, style, size and thickness.
- C. Storage and protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

1.6 MAINTENANCE

- A. Extra Materials: Provide 5% for use by owner in building maintenance and repair.
- B. Provide new unopened cartons of extra materials, packaged with protective covering for storage and identified with appropriate labels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Bonded Acoustical Cotton:
 - 1. Echo Eliminator by Acoustical Surfaces Inc. (Basis of Design)
123 Columbia Court North, Suite 210
Chaska, MN 55318
Tel.: (800) 448-0121
Website: www.AcousticalSurfaces.com
 - 2. Or approved equal.

2.2 BONDED ACOUSTICAL COTTON

- A. Material: Manufactured from recycled cotton fiber, which shall be capable of being recycled upon completion of its useful life.
- B. Acoustical panels shall be impact resistant.
- C. Thickness: 2" Thick panels, 3lb density.
- D. Color: White
- E. Edge, Square.
- F. Sizes: Nominal (As indicated on Drawings)
- G. Density: 3 pounds/cubic foot.
- H. Provide manufacturer recommended adhesives for complete single source installation.
- I. Accessories: Adhesives as recommended by manufacturer, AGS 12 – Spray applied, PSA29 - Brush applied.
- J. Flammability:
 - 1. ASTM E84, Class A. Flame Spread 5.
 - 2. Smoke Developed: 35.
- K. Noise Reduction Coefficient (NRC) Rating:
 - 1. For Direct adhesive NCR 1.05

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site Verification of Conditions:
 - 1. Examine surfaces scheduled to receive directly attached acoustical units for unevenness, irregularities and dampness that would affect quality and execution of work.
 - 2. Do not proceed with installation of acoustical panels until unacceptable conditions are corrected.

3.2 INSTALLATION

- A. General: Do not begin installation until materials sufficient to complete an entire room are received and are ready for installation.
 - 1. Field cut acoustical panels as required, in accordance with manufacturers recommended procedure and equipment.
 - 2. Acoustical wall panels shall be adhesively mounted in accordance with manufacturer's recommendations and/or as detailed on the drawings.
 - 3. Review spacing to match spacing as shown on drawings. Evenly space panels.
- B. Manufacturer's Instructions:
 - 1. Comply with the instructions and recommendations of the acoustical panel manufacturer.
 - 2. Install materials in accordance with governing regulations, fire resistance rating requirements and industry standards applicable to work.

3.3 CLEANING

- A. Clean exposed surfaces of acoustical panel to comply with manufacturer's instructions for cleaning.
- B. Remove and replace tiles, which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.4 PROTECTION

- A. Protect installed work from damage due to subsequent construction activity. Including temperature and humidity limitations and dust control, so that the work will be without damage and deterioration at the time of acceptance by the owner.

SECTION 09 91 00 - PAINTING

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section includes requirements for reduced emission, reduced toxicity interior paints (primers & top coats) and anti-corrosive paints for metal in interior applications.
- B. Work Included: Provide painting in accordance with the Contract Documents. The Work of this Section shall include but not be limited to the following:
1. Gypsum board walls, ceilings, wood railings, metal railings, stringers, stair risers, hollow metal doors
 2. Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color is not designated, the Owner will select these from standard colors.
- C. Work Not Included:
1. Concealed Surfaces: Painting is not required on surfaces in concealed and generally inaccessible areas such as pipe spaces, duct shafts and elevator shafts.
 2. Finished Metal Surfaces: Anodized aluminum factory-finished aluminum, bronze, stainless steel, and similar finished metals will not require painting. Exposed no-hub piping will not require painting.
 3. Do not paint hinges, locks or joints of access covers, plates and doors.
 4. Do not paint glass, concrete.
 5. Do not paint joint of wall surfaces and any applied plates such as light switches, receptacles and escutcheons. Allow paint to completely dry prior to reattachment of such devices to prevent binding.
 6. Do not paint any artwork, signs, room numbers
- D. Labels: Do not paint over any code-required labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

A. Federal Specifications TT

1. Primers, Sealers, Undercoats

- a. Metal Primer (Zinc Dust, Zinc Oxide) for Galvanized surfaces:
FS TT-P-641
- b. Metal Primer (Zinc Chromate) Aluminum or Steel surfaces:
FS TT-P-645
- c. Primer Sealer (Latex Emulsion): FS TT-P-650
- d. Enamel Undercoat (Alkyd Resin): FS TT-E-545
- e. Alkyd Primer (Corrosion Inhibiting): FS TT-P-664
Lead and Chromate Free, VOC Complying
- f. Wood Primer: FS TT-P-25

2. Finish Paints

- a. Alkyd Enamel, Gloss: FS TT-E-489
- b. Interior Latex, Flat: FS TT-P-29
- c. Interior Alkyd, Gloss: FS TT-E-506
- d. Latex Semi-Gloss Enamel: FS TT-P-1511
- e. Alkyd Semi-Gloss Enamel: FS TT-E-509
for white tints;
FS TT-E-529
Class A for deep colors.

3. Miscellaneous Materials:

- a. Turpentine: ASTM D 13.
- b. Mineral Spirits (Petroleum Paint Thinner): FS TT-T-291
- c. Color Pigments: Pure, non-fading, finely ground pigments, at least 99 percent passing a 325 mesh sieve. Color pigments that are to be used on masonry, concrete and plaster shall be lime proof - FS-TT-P-381.
- d. Spackling: FS SS-P-00450.
- e. Putty: Linseed-Oil type for Wood Sash Glazing -FS-TT-P-791B.
- g. Paste Wood Filler: FS TT-F-336
- h. Plastic Wood Filler: FS TT-F-340C.
- i. Surface Sealer: Pigmented Oil for Plaster & Wallboard - FS-TT-S-179.
- j. Linseed Oil: Boiled CID-A-A-371
- k. Linseed Oil: Raw CID-A-A-379A

1.03 SUBMITTALS

A. Product Data

Provide manufacturers' product literature for all materials specified. In addition to actual material data, submit material manufacturer's printed directions and recommendations for environmental conditions, surface preparation, priming, mixing, reduction, spreading rate, application, and storage, as applicable for each of the materials specified that will be used.

B. Manufacturer's certification of product compliance with paint standards (VOC content and prohibited compounds) per paragraph 1.05.

C. Material Safety Data Sheets.

D. Manufacturer's maintenance and cleaning instructions.

E. Samples

1. Initial Selection

Submit manufacturer's color charts for each type of finish for approval by the Architect. Verify colors specified with manufacturers' color charts for availability and notify the Architect if any discrepancies should occur.

2. Verification prior to installation

- a. Submit three samples of each color and material on 12" x 12" hard-board.
- b. Submit three samples of finish metal surfaces as required until acceptable color, sheen and texture are achieved.

1.04 QUALITY ASSURANCE

A. General

1. All painting materials shall arrive at the job ready-mixed.
2. Remove all rejected materials from the premises immediately.
3. All thinning and tinting materials shall be as recommended by the manufacturer. Generally, all paints shall not require additional thinning and/or tinting.
4. Check other Sections of this Specification that the specified shop prime

paint is compatible with the total coating system. Report discrepancies to the Architect before commencing painting Work.

5. Materials selected for each system type shall be products of a single manufacturer.

B. Qualifications

Work of this Section shall be performed by personnel with a minimum of three years experience in performing this type of Work.

C. Regulatory Requirements

1. New York State Building Code, latest edition.
2. U.S. Department of Labor, Occupational Safety and Health Administration, latest regulations.

D. Certifications

Federal Specifications: When materials are specified to comply with Federal Specifications, products will be accepted which meet or exceed the performance requirements of such Federal Specifications and comply with all regulations currently in effect.

1. Indicate that material complies with Federal Specifications by including the Federal Specification number on the container label or on the product literature, or submit a statement with the Product Data stating that material meets or exceeds the performance requirements of the Federal Specification.

E. Field Samples

1. Provide samples of each color and finish, under natural lighting conditions, in a location where each finish is to be applied.

F. References/Quality Assurance (*for indoor air quality and toxicity criteria*)

1. "Green Seal Environmental Standard for Paints" (GS-11), Green Seal, Washington, DC, www.greenseal.org.
2. "Green Seal Environmental Standard for Anti-Corrosive Paints (GC-03), Green Seal, Washington, DC, www.greenseal.org.

G. Environmentally-Preferable Product Criteria:

1. VOC Content of Paints:

The volatile organic compound (VOC) content of interior paints, interior primers, and anti-corrosive paints used in interior applications shall not exceed the limits defined in the Green Seal Environmental Standards for Paints (GS-11, dated 5/20/93) and Anti-Corrosive Paints (GC-03, dated 1/7/97), of Green Seal, Washington, DC. The VOC limits defined in the referenced Green Seal standards are as follows. All VOC limits are defined in grams per liter, and exclude water and tinting color added at the point of sale (as determined by U.S. EPA Reference Test Method 24).

<u>Interior Paints & Primers</u>	<u>Anti-Corrosive Paints</u>
Non-flat: 150	Gloss: 250
Flat: 50	Semi-gloss: 250
	Flat: 250

2. Additional Chemical Component Restrictions in Paints:

To the extent feasible, interior paints, interior primers, and anti-corrosive paints used in interior applications shall comply with the following chemical component restrictions of the Green Seal Environmental Standards for Paints (GS-11, dated 5/20/93) and Anti-Corrosive Paints (GC-03, dated 1/7/97), of Green Seal, Washington, DC.

- a) Aromatic Compounds: the product must contain no more than 1.0% by weight of the sum total of aromatic compounds. Testing for the concentration of these compounds will be performed if they are determined to be present in the product during a materials audit.
- b) Other Chemicals: the manufacturer shall demonstrate that the following chemical compounds are not used as ingredients in the manufacture of the product.
 - Halomethanes: methylene chloride
 - Chlorinated ethanes: 1,1,1-trichloroethane
 - Aromatic solvents: benzene, toluene (methylbenzene), ethylbenzene
 - Chlorinated ethylenes: vinyl chloride
 - Polynuclear aromatics: naphthalene
 - Chlorobenzenes: 1,2-dichlorobenzene
 - Phthalate esters: di (2-ethylhexyl) phthalate, butyl benzyl phthalate, di-n-butyl phthalate, di-n-octyl phthalate, diethyl phthalate, dimethyl phthalate

- Miscellaneous semi-volatile organics: isophorone
- Metals and their compounds: antimony, cadmium, hexavalent chromium, lead, mercury
- Preservatives (antifouling agents): formaldehyde
- Ketones: methyl ethyl ketone, methyl isobutyl ketone
- Miscellaneous volatile organics: acrolein, acrylonitrile

1.05 DELIVERY, STORAGE, AND HANDLING

A. Delivery

Deliver materials to the site in original, unopened containers bearing manufacturers name and label containing the following information:

1. Product name or title of material
2. Manufacturer's stock number and date of manufacture
3. Manufacturer's name
4. Federal Specification number, if applicable.
5. Federal regulations for amount of lead in paint (less the 0.06% lead in non-volatile ingredients)
6. Contents by volume for major pigment and vehicle constitutions
7. Thinning instructions
8. Application instructions
9. Color name and number

B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage of paint in a clean condition, free of foreign materials and residue.

1. Protect materials from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from use of paints.

C. To the extent feasible, do not store paint products with materials that have a high capacity to adsorb VOC emissions (i.e., materials which are woven, fibrous or porous in nature, such as acoustical ceilings, carpet, textiles, etc.). Do not store

paint products in occupied spaces.

1.06 PROJECT CONDITIONS

- A. Apply water-base paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50 deg. F and 90 deg. F, unless otherwise permitted by paint manufacturer's instructions.
- B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45 deg. F and 95 deg. F, unless otherwise permitted by paint manufacturer's instructions.
- C. Do not apply paint when relative humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by paint manufacturer.

1.07 GUARANTEES

- A. Adherence of workmanship and materials to Specification requirements shall be maintained for the one year contract guarantee period. These requirements shall include the following:
 - 1. There shall be no evidence of blistering, peeling, crazing, alligating, streaking, staining, or chalking.
 - 2. Dirt shall be removed without blemishing the finish by washing with mild soap and water.
 - 3. Colors of surfaces shall remain free from serious fading; the variation, if any, shall be uniform.
- B. Correct all defects, appearing within the guarantee period, by removal of the defective work and replacement as directed.
- C. All corrective measures shall be the Contractor's responsibility, and will be made at no extra cost to the owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide products of one of the following manufacturers: Colors selected are Benjamin Moore and Co. If an other manufacturer is used, colors must match Benjamin Moore.
 - 1. Benjamin Moore and Co.

2. PPG Industries, Pittsburgh Paints.
3. The Sherwin-Williams Company.

2.02 MATERIALS

- A. Provide products which meet all New York State VOC requirements for applications outlined herein.
- B. Provide products which meet all Federal regulations for amount of lead in paint (less than 0.06% lead in non-volatile ingredients).
- C. Provide best quality grade of various types of coatings as regularly manufactured by the paint materials manufacturers. Materials not displaying manufacturers' identification as a standard, best-grade product will not be acceptable.
- D. Use only thinners approved by paint manufacturers for applications intended and use only within recommended limits.
- E. PRIMER

Primer coat product shall meet or exceed the following:

1. Volume Solids: 40% ± 2%
2. Weight Solids: 51% ± 2%
3. VOC (EPA Method 24): 90 g/L; 0.75 lb/gal
4. Provides performance which is comparable to the products that are formulated in accordance with federal specification:
 - a. A-A-2340
 - b. A-A-2994, Type II
 - c. TT-P-650D, Type I
5. Spreading Rate per coat: @ 4 mils wet; 1.6 mils dry
- F. INTERMEDIATE AND FINISH COATS

Intermediate and finish coat products shall meet or exceed the following:

1. Volume Solids: 39% ± 2%

2. Weight Solids: 53% ± 2%
3. VOC (EPA Method 24): 0 g/L; 0.0 lb/gal
4. Spreading Rate per coat: @ 4 mils wet; 1.6 mils dry

2.03 COLORS

A. Selection

1. Paint colors are as indicated on Paint Schedule.

B. Colors:

1. For multicoat systems, apply each coat using a successively darker tint or shade, unless approved otherwise.
2. Top coat colors: As indicated in finish schedule, by reference to nomenclature of manufacturer listed on schedule. This reference is for color matching only.

2.04 PAINTING SCHEDULE

A. Interior

- | | |
|--|---|
| 1. Gypsum wall board surface in all area spaces:
Enamel | Eggshell |
| 2. Gypsum wall board surfaces in stairwells: | Semi-Gloss |
| 3. Hollow metal and miscellaneous metal trim: | Semi-Gloss |
| 4. Laquered Wood: | Color base
with Pre-catalyzed Lacquer (4)
Clear Glass Top Coats |

2.05 INTERIOR PAINT SYSTEMS

A. Gypsum Drywall and Plaster

- | | |
|---|-----------------|
| 1. Eggshell Finish (for ceilings only): | |
| 1st Coat - Latex primer sealer | -- 1.0 Mils DFT |
| 2nd Coat - Eggshell latex enamel | -- 1.3 Mils DFT |
| 3rd Coat - Eggshell latex enamel | -- 1.3 Mils DFT |

2. Semi-Gloss Finish (for vertical surfaces):

1st Coat - Latex primer sealer	--	1.0 Mils DFT
2nd Coat - Alkyd enamel	--	1.3 Mils DFT
3rd Coat - Alkyd enamel	--	1.3 Mils DFT

B. Ferrous Metal

* 1st Coat (New) - Alkyd Modified Latex Primer	--	1.2 Mils DFT
** 1st Coat (Repaint) - Alkyd Modified Rust Preventive Latex Primer	--	1.6 Mils DFT
2nd & 3rd Coats Semi-Gloss Latex Enamel	--	1.3 Mils DFT each coat
* Touch-up required on shop primed items.		
** Spot prime as needed.		

C. Painted Woodwork and Hardboard

1st Coat - Vinyl Acrylic Latex Enamel Underbody	--	1.1 Mils DFT
2nd & 3rd Coats - Semi-Gloss Latex Enamel	--	1.3 Mils DFT each coat

PART 3 - EXECUTION

3.01 ENVIRONMENTAL CONSIDERATIONS

- A. Comply, at minimum, with paint manufacturer recommendations for space ventilation during and after installation. Where feasible, the following ventilation conditions shall be maintained during the paint curing period, or for 72 hours after application: 1) supply 100% outside air 24 hours a day; 2) supply airflow at a rate of 6 air changes per hour, when outside temperatures are between 55 degrees F and 85 degrees F and humidity is between 30% and 60%; and 3) supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated in item 2 above.
- B. To the extent practical, allow paint installations to cure *prior to* the reinstallation of materials that adsorb VOCs. Materials that adsorb VOCs include carpets, textiles, and acoustical ceiling panels.

3.02 PREPARATION

A. Protection

1. Cover or otherwise protect all finished surfaces on the walls to be painted. Protection includes taping, masking, and draping all items on or near the

walls to be painted.

2. Contractor to contact Facilities Department to coordinate the removal and reinstallation of such items as art, posters, trophy display cases and lockers from the walls and/or doors.
3. All built-in display cases to remain and be covered
4. All signage and hardware on doors to be taped
5. Floors to be protected from paint

B. Surface Preparation

1. Perform preparation and cleaning procedures in accordance with the paint manufacturer's instructions and as specified.
 - a. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease with clean cloths and cleaning solvents prior to other cleaning procedures. Program the cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
2. Ferrous Metals
 - a. Remove dirt and grease with cleaning solvents which will not affect shop prime coat. Wipe off with clean cloths.
 - b. Remove rust, mill scale and defective paint down to bare metal, using scraper, sandpaper, or wire brush. Grind if necessary to remove shoulders at edge of sound paint to prevent flaws from photographing finish coats.
3. Steel Doors, Frames/or Wall Access Panels
 - a. Fill small dents, pits, and other minor imperfections flush and smooth with polyester filler.
 - b. Apply and finish filler in accordance with manufacturer's instructions.
4. Wood
 - a. Remove scratches, dirt, stains, raised grain and other surface defects.
 - b. Fine sand wood surfaces to remove rough spots, dirt and markings.
 - c. Putty nails, holes and other indentations flush with adjacent surfaces. Color putty to match finish of wood.
 - d. Touch-up raw surfaces and edges of primed woodwork resulting

from cutting and fitting at the job before the wood is installed. Use same kind of material used for shop priming or use type of primer specified for the painting system.

5. Gypsum Board: Fill cracks and other blemishes with spackling or patching compound and sand smooth.
 - a. Latex-fill minor defects.
 - b. Spot-prime defects after repair.

6. Plaster:
 - a. Fill hairline cracks, small holes, and imperfections with latex patching plaster.
 - b. Make smooth and flush with adjacent surfaces.
 - c. Wash and neutralize high-alkali surfaces.

7. Mildew:
 - a. Remove mildew by scrubbing with solution of trisodium phosphate and bleach.
 - b. Rinse with clean water and allow surface to dry.

3.03 APPLICATION

A. General

1. No Work shall be performed in spaces which are not broom clean and free of dust and waste.
2. Apply paint materials to produce smooth finished surfaces, free of brush or roller marks, drops, runs, or sags.
3. Paint materials shall be kept at a proper and uniform consistency.
4. Thin only when necessary to achieve best results.
5. Thinners shall be turpentine, mineral spirits or material recommended by manufacturer of paint, and in quantity as recommended.
6. Excessive use of thinner as indicated by variation in absorption, lack of "hide", thickness of dry film, mottled or streaky coat, shall be cause for rejection. Correct as directed.
7. Apply all coats with brush, roller or spray, varying slightly the color of succeeding coats to achieve approved color
8. Brush out or roll on first or prime coat; work well into surface.
9. Allow at least 48 hrs. for enamels to dry.
10. The surfaces of interior woods and metals shall be sanded or rubbed between

coats to assure smooth finish and proper adhesion of subsequent coats.

11. Finish doors on tops, bottoms and side edges same as exterior faces.

3.04 CLEANING

A. General

Contractor is required to clean-up behind each paint crew such that painting and clean-up will be a continuous uninterrupted operation. The practice of one general clean-up after completion of all painting will be strictly prohibited. This clean-up will include, but not be limited to the following:

1. Remove spots or defacement resulting from Work of this Section.
2. Retouch all damaged surfaces to leave Work in perfect finished condition.
3. If spots or defacement cannot be satisfactorily removed and retouched, re-finish the surfaces as directed.
4. Free all operating units of painted materials and leave them clean and in proper working order.
5. Remove from premises all surplus paint materials, debris and any other rubbish resulting from the Work.
6. Leave storage space clean and in condition required for equivalent spaces in project.

3.05 PROTECTION

- A. Provide "Wet Paint" signs to protect newly-painted finishes. Remove temporary protective after completion of painting operations.
- B. At the completion of Work touch-up and restore all damaged or defaced painted surfaces as directed by the FIT Project Manager.

END OF SECTION

SECTION 10 14 00 – SIGNAGE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawing and general provisions of Contract, including General and Supplementary Conditions and Division –1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK

- A. Provide all identifying device Work as indicated on the Drawings and as specified herein, including, but not limited to, the following:
 - 1. Interior Aluminum Lettering
 - 2. Interior Vinyl Decal
- B. Refer to the Drawings for locations of identifying devices.

1.03 RELATED SECTIONS

- A. Section 08 11 13 - Hollow Metal Doors and Frames
- B. Section 09 29 00 - Gypsum Board Assemblies
- C. Section 06 06 70 – Plastic Surfacing Materials

1.04 REFERENCES

- A. American National Standards Institute (ANSI)
- B. Copper Development Association (CDA)
- C. National Association of Architectural Metal Manufacturers (NAAMM)
- D. American National Standards Institute (ANSI)

1.05 SUBMITTALS

- A. Schedule indicating sign type, material, location, text, letter style, color, and other pertinent information.
- B. Shop Drawing of the sign at scale of 3" = 1'-0"; indicate letter style, sizes, spacing and method of securing.

C. Samples

1. Aluminum Lettering: submit (2) samples indicating color, letter style, size and other pertinent information.
2. Vinyl Decal: submit (2) samples indicating color, letter style, size and other pertinent information.

1.06 QUALITY ASSURANCE

- A. Work of this Section shall be performed by firms experienced in signage manufacture and the installation of these items.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle products of this Section as recommended by manufacturer or fabricator, to protect from damage.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- . Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be submitted for incorporation in the Work include but are not limited to the following:
1. Big Apple Visual Group
247 W. 35th Street
New York, NY 10001
212-629-3650
Contact: Petal Bacchus, petal@bigapplegroup.com
 2. Or Approved Equal

2.02 SIGNAGE

- A. Aluminum Lettering
1. Thickness: ¼”
 2. Material: Brushed Aluminum
 3. Finish: Satin
 4. Font: Neuropol
 5. Size: 2” high lettering
 6. Name: STUDENT LOUNGE (capital letters)
 7. Attached to new gypsum wall.

B. Vinyl Decal

1. Material: Vinyl
2. Font: Neuropol
3. Size: 6" high lettering
4. Name: vending (lowercase letters)
5. Color: Color match to Benjamin Moore Old Navy 2063-10. Color sample to be submitted to Architect for approval.
6. Applied to 3Form Resin Panel

2.03 TYPEFACE STANDARDS

- A. Typefaces shall be Neuropol. Type layouts will not be provided by the Architect. Provide proper fonts and layouts per accepted professional typesetting Standards.

2.04 COLORS

- A. Colors: Provide colors/finishes of lettering as stated in this specification by the Architect for each material.

2.05 MATERIALS

- A. Product shall be flat, smooth, and free from blemishes.

2.06 ANCHORS AND FASTENERS

- A. Anchors and fasteners shall be compatible with materials to which they are to be applied and protected against galvanic action with them. Fasteners exposed to view shall not be used.

2.07 FINISHES

- A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by the Architect from the manufacturer's standards.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Install no Work until surfaces on which signage, and other Work of this Section are to be placed and attached are free of defects and are in a completed condition.

3.02 PREPARATION

- A. All surfaces to receive placement of Work of this Section shall be clean and dry.

3.03 INSTALLATION

- A. Install all signage, and other Work of this Section level and plumb; secure to substrate in manner as detailed on the Drawings and as recommended by the Manufacturer.

3.04 CLEAN-UP AND PROTECTION

- A. Clean all surfaces of Work of this Section.
- B. Remove all debris resulting from the Work of this Section from Work area.
- C. Remove protection covers; protect Work until Project Completion.

END OF SECTION 10 14 00

SECTION 10 28 13 - TOILET ACCESSORIES

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Gypsum board Assemblies: Section 09 29 00
- B. Ceramic Tile: Section 09 30 10

1.02 SUBMITTALS

- A. Product Data: Specifications or data sheets and installation instructions for each product required.
- B. Samples: As specified herewith
- C. Contract Closeout Submittals: Furnish the following, as applicable, for each product required:
 - 1. Operation and maintenance data.

1.03 QUALITY ASSURANCE

- A. Provide products from more than one manufacturer if necessary to meet the requirements of this Section.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's original protective packaging.
 - 1. Furnish items with protective wrappings or covers as required to protect finishes. Do not remove protective coverings until completion of other Work liable to damage accessory finish.
- B. Pack products with required trim, mounting devices, fasteners, service tools or keys, and complete installation instructions.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Stainless Steel: AISI Type 302/304 with No. 4 satin finish, unless otherwise indicated.
- B. Mounting Devices and Fasteners: Stainless steel, unless otherwise indicated.
- C. Chromium Plating: Nickel and chromium electro-deposited on metal; ASTM B 456, Type SC 2, satin finish unless otherwise indicated.

2.02 FABRICATION

- A. Mounting Devices: If not indicated, furnish type and size compatible with accessory unit specified which will securely mount accessory to wall or partition construction indicated.
 - 1. Grab Bars: Furnish anchoring devices which will withstand minimum downward pull of 500 pounds.
- B. Exposed Mounting Devices and Fasteners:
 - 1. Type: Theft-resistant.
 - 2. Finish: Match accessory finish, unless otherwise indicated.
 - 3. Masonry Construction: Furnish stainless steel machine screws in nonferrous expansion anchors except furnish stainless steel toggle bolts where anchorage occurs in masonry cavities.

2.03 MIRROR

- A. See Drawings for information.

2.04 SINGLE ROLL TOILET TISSUE DISPENSERS - SURFACE MOUNTED (SRTTD-SM)

- A. Single Jumbo-roll toilet tissue dispenser; 22 gauge stainless steel satin finish, model B-2890, Bobrick Washroom Equipment; Door shall be equipped with a lock. Overall size 10 5/8" x 4 1/2". Provide key with unit.

2.05 TOILET PAPER DISPENSER

- A. Bobrick Model #B-2890
- B. Approved Equal

2.06 WASTE RECEPTACLES (WR)

Bobrick Surface Mounted Waster Receptacle Model B275 type 304, 22 gauge stainless steel. With exposed satin finish. Furnished with heavy duty vinyl liner.

2.07 SOAP DISPENSERS (SD)

Hillyard Co. Affinity Dispenser, Order No. HIL22280; Color White; Dimensions 10.75" T x 6.25" W x 3.75" D

Hillyard
P.O. Box 909
St. Joseph, MO 64502
1-800-365-1555

2.08 LAVATORIES (L)

Kohler Model K-2084 Wall-Mount Bathroom Sink with single faucet hole. Color White.

2.09 LAVATORY FAUCET (LF)

Toto Model TEL115-D10EM#CP Helix EcoPower micro sensor activated gooseneck spout faucet. Anti-scald, thermal mixing chamber, automatic sensor adjustment on installation.

2.10 WATER CLOSET WITH FLUSHOMETER VALVE (WC)

Toto CT708EV Wall Mounted Flushometer Elongated Bowl with 1.28 gallon flushing system. TET 2LN Series, High Efficiency Toilet, EcoPower Flushometer Valve. Model: TET2LA31#SS (1 ½" Vacuum Breaker), Color: White

2.11 PAPER TOWEL DISPENSER

Georgia Pacific. EnMotion. Hardwound, 8 in Paper Towel Wd, 1 ½ in, Stainless Steel. Mfr. Model #: 59466A.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Unless otherwise indicated, install Work of this Section in strict accordance with the manufacturer's instructions.
 - 1. Install all attachments, anchorage devices, and fasteners as required to securely mount accessory units to types of wall or partition construction indicated.
- B. Toilet Tissue Dispensers - Surface Mounted: Install units back-to-back where possible when indicated for 2 or more compartments with dividing stall partitions. Fasten dispensers through backs with stainless steel through bolts and bonnet nuts.

3.02 CLEANING AND POLISHING

- A. Remove protective wrappings from installed accessories after completion of other Work liable to damage accessory finish. Remove residue, if any, and polish exposed surfaces.

END OF SECTION

SECTION 10 52 00 - FIRE EXTINGUISHERS & CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawing and general provisions of Contract, including General and Supplementary Conditions and Division –1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Provide Fire Extinguisher and cabinet as indicated on the Drawings and as specified herein.

1.3 REFERENCES

- A. Underwriter’s Laboratories, Inc. (UL)

1.4 SUBMITTALS

- A. Product Data
- B. Brochure of product, accessories and installation details.

1.5 QUALITY ASSURANCE

- A. Products
By a single manufacturer.
- B. Fire Extinguisher
Bear UL “Listing Mark” for type, rating, and classification of extinguisher indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle products of this Section as recommended by manufacturer to protect items from damage.

1.7 WARRANTY

- A. Manufacturer’s standard form agreeing to repair or replace units that fail in material or workmanship within the specified warranty period.
- B. Warranty Period: 5 years after the date of substantial completion.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers
 - 1. Potter Roemer Fire Protection Equipment
1119 Morris Avenue
Union, NJ 07083
908.964.5775
 - 2. Larsen's Manufacturing Company (Basis of design)
7421 Commerce Lane N.E.
Minneapolis, MN 55432
763.571.1181
 - 3. J.L. Industries, Inc.
4450 West 78th Street Circle
Bloomington, MN 55435
952.835.6850

2.2 MATERIALS - FIRE EXTINGUISHERS

- A. Model: 7210 - Cold Rolled Steel with recoatable white polyester finish.
- B. UL Rating: Classified -7N43
- C. Nominal Capacity: 10 lbs.
- D. Units by other listed manufacturers can be used if they meet the UL Rating and nominal capacity listed above.

2.3 MATERIALS – CABINET

- A. Model: 7210, Steel fire protection box, Fire-rated insulation material inner box with 5/8" trim, ADA accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install Fire Extinguisher and cabinet as indicated on drawings.
- B. Check extinguisher for proper charge and operation.

3.2 CLEANING

- A. Clean all surfaces of Work of this Section.

END OF SECTION 10 52 00

SECTION 10 80 00 – CONCRETE MASONRY UNITS

PART 1 GENERAL

1.01 SCOPE

- A. The work shall consist of removing existing, salvaging, placing, and finishing concrete masonry units (CMU's) as required to complete the façade restoration in kind to the existing.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Masonry Units shall have been removed from the existing building, stacked, and kept dried for not less than 28 days prior to being placed on the structure. Wetting of the block units shall not be permitted.
- B. Mortar shall conform to the requirements of ASTM C270-89 or shall be proportioned based on laboratory or field experience to provide the required strength and workability.
- C. Grout shall be mixed in the ratio, by volume, of one part Portland cement, up to 1/10-part lime, 2-1/4 parts minimum to 3 parts maximum damp loose sand and up to 2 parts coarse aggregate. The grout shall be of a fluid consistency suitable for placing without segregation.
- D. Cement shall conform to ASTM C150-86 Type I, IA, II, or IIA.
- E. Hydrated Lime shall conform to ASTM C150-86 Type II.
- F. Admixtures such as fly ash or other flowability improving and water retention agents, may be used in the grout mix.
- G. Water used in mixing and curing concrete shall be clean and free from injurious amounts of oil, salt, acid, alkali, organic matter, or other deleterious substances.

PART 3 EXECUTION

3.01 WORMANSHIP

- A. All masonry shall be laid in the same bond, direction as the exiting building and kept, true, level, plumb and neatly finished in accordance with the dimensions shown on the drawings.
- B. There shall be no visible grout or mortar stain on the finished interior or exterior wall surfaces.

3.02 INSPECTION

- A. The Architect shall inspect the masonry units after removed from the building and prior to reinstallation.

3.03 HANDLING OF CONCRETE MASONRY UNITS

- A. Materials shall be stockpiled and batched by methods that will prevent cracking, chipping, and breaking of the concrete masonry units. CMU's are to be stacked to a height of eight block layers maximum. CMU's shall not be stored on the ground and shall be protected from mud, dirt, and other contaminants.

3.04 MIXING OF MORTAR AND GROUT

- A. After all ingredients are in the batch mixer, they shall be mechanically mixed for not less than three minutes. Hand mixing may be used when approved by the Engineer.

3.05 MORTAR

- A. The starting joint on foundations shall be laid with full mortar coverage on the bed joint, except that the area where grout occurs shall be kept free from significant accumulations of mortar so that the grout will contact the foundation.
- B. Allow mortar joints to stiffen to "thumbprint hardness" before tooling. All tooling shall be done with a tool that compacts the mortar, pressing the excess mortar out of the joint rather than dragging it out. Remove mortar protrusions or droppings from the face of the masonry. Allow mortar to achieve an initial set prior to removal to avoid smearing mortar into masonry, but do not leave mortar droppings on masonry for an extended time.

- C. Exterior wall surfaces shall have joints tooled with a round or V-shaped bar to produce a dense, slightly concave surface well bonded to the block at the edges.
- D. The horizontal and vertical mortar joints shall be 3/8" thick with full mortar coverage on the face shells and on the webs.
- E. Mortar may be retempered with water as required to maintain proper plasticity. Retempering on mortar boards shall be done only by adding water within a basin formed within the mortar and the mortar reworked into the water. Any mortar, which is unused after 1-1/2 hours from the initial mixing time, shall be discarded.

3.06 GROUT

- A. The coarse aggregate used in grout shall comply with the following:

Size of Smallest Space to be Grouted	Maximum Coarse Aggregate Size
3/4-inch wide	none
3-inches wide	1/2 inch
4-inches wide	3/4 inch

Reinforcing steel shall be secured in place and inspected before grouting starts.

- B. There shall be no bridging or honeycombing of the grout. Slump of the grout shall be no greater than 11 inches. The grout is to be placed in lifts not to exceed 5 feet.
- C. Grout shall be placed within 1.5 hours after water is first added to the batch. Grout not used within the allotted time is to be discarded.
- D. Significant accumulations of detrimental mortar droppings shall be removed from the grout space. No grout shall be placed until the Engineer or Architect has inspected the grout space and approved it for grouting.
- E. All grouts shall be rodded or vibrated into place. Vertical cells to be filled shall have accurate alignment to maintain a continuous unobstructed cell area not less than 2" by 3".
- F. Grout of beams over openings shall be done in one continuous operation.
- G. Anchor bolts cast in walls shall be solidly grouted in place.

3.07 PREPARATION OF SUBGRADE

- A. Prior to placement of concrete masonry units, subgrade shall be free of chips, sawdust, debris, water, extraneous oil, mortar, or other harmful substances. Earth surfaces shall be firm and damp. Placement of concrete masonry units on mud, dried earth or un-compacted fill will not be permitted.
- B. Items to be embedded in or placed on the concrete shall be positioned accurately and anchored firmly. The top surface of the concrete foundation shall be clean, free of laitance and the aggregate shall be exposed, but not undercut, before the initial masonry course is placed.

3.08 PLACING

- A. Concrete masonry units shall not be placed until the subgrade, forms, steel reinforcement, and embedded items have been inspected and approved. The Contractor shall give reasonable notice to the Engineer each time he intends to place concrete masonry units. Such notice shall provide sufficient time for the Engineer to inspect the subgrade, steel reinforcement and other preparations for compliance with the specifications. Other preparations include but are not limited to the finishing, schedule of work, or workforce. Deficiencies are to be corrected before concrete masonry units are to be placed.

3.09 CONSTRUCTION

- A. Excessive mortar smears and dropping shall be avoided.
- B. Prevent rain from entering wall by covering the tops of walls at the end of each working day. Withing a day or two of that a smear occurs, use a stiff fiber brush and water (with or without sand) to scrub mortar smears off the masonry surface.
- C. All walls over 8 feet shall be braced. If conditions are or expected to be excessively windy, the contractor is responsible for adequate bracing, irrespective of wall height.

3.10 FINISHING

- A. Cleaning of the CMU's shall only be by scrubbing or as suggested by the manufacturer. Scrubbing efforts shall be focused on the unit surfaces, not the mortar joints. Pressure water spraying and acid cleaning are not acceptable.
- B. Masonry walls shall be protected from saturation or other factors that may cause efflorescence during construction and until they are weather

proofed. If efflorescence occurs prior to weather proofing, it shall be removed.

- C. Over cleaning of masonry shall always be avoided.

3.11 REMOVAL AND REPLACEMENT OR REPAIR

- A. When concrete masonry units are damaged or otherwise defective, the Contractor shall remove and replace the structure or structural member containing the defective concrete masonry units or, where feasible, correct or repair the defective parts. The Engineer will determine the required extent of removal, replacement, or repair. Prior to starting repair work the Contractor shall obtain the Engineer's approval of his plan for effecting the repair. The Contractor shall perform all repair work in the presence of the Engineer.

PART 4 ITEMS OF WORK AND CONSTRUCTION DETAILS

- A. Items of work to be performed with this specification and the construction details therefore are:
 - 1. Concrete Masonry Units (CMU's):
 - a. This item shall consist of the masonry work required to construct the walls and columns as shown on the drawings.
 - b. All CMU's shall be laid with a 3/8" thick mortar bed between block layers.
 - c. All cells of the CMU'S shall be filled with 3000-psi concrete gout.

END OF SECTION 10 80 00

SECTION 12 15 00 - ART HANGING AND DISPLAY SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes materials required for the Click Rail System to provide a complete system by AS Hanging Display Systems for hanging informational, directional, art, panels and regulatory notices, with rigid track that does not bend. Review the wall segment that is to receive the track and confirm that the wall is linear.
- B. The Click Rail System hangs functional or decorative signs, including: artwork, photos, and employee notices, and safety signage that are permanent, or are frequently rotated, removed or replaced.
- C. The wall track facilitates the regrouping of wall displays in owner-occupied and tenant space where furnishings are frequently rearranged. The Click Rail System eliminates ongoing wall patching and painting or reapplication of high value wall surface coverings and treatments in the areas designated for wall hangings.
- D. The durability of the track allows for reuse after the useful lifespan of a building. The Click Rail System can be removed for reuse and installed in another building, especially projects seeking the LEED certification of a new or existing structure.
- E. The track may be mounted to gyp-board, lath & plaster, brick, CMU and a variety of other wall surfaces.
- F. The wall track may be mounted behind finish carpentry, moldings, trim, etc. so it becomes unseen.
- G. The wall track may be mounted within a soffit so it becomes unnoticed.
- H. The wall track may be integrated behind grid ceiling L-molding in such a way as to become nearly invisible in a space.
- I. The Click Rail Wall System may deploy flexible stainless cables, or transparent Nylon cords as vertical members.
- J. The system may be used with a single overhead track and suspended cables, or in conjunction with a matched lower track to hold the cables in tension.

1.02 SUBMITTALS

- A. Product Data: Indicate system, material type, color, composition, thickness, and installation procedure.

- B. Samples: Provide one (1) sample of each of the components for the system to be installed to the Architect or Owner's Representative for verification. The physical sample is required at the job site to determine if the components of the system meet the intent of the specification.

1.03 QUALITY ASSURANCE

- A. Conduct a Pre-Installation Conference on site with the Architect, Contractor and Installer prior to commencing installation. Determine the weight of the objects to be displayed. The components of AS Hanging Display Systems have various weight tolerances. Once the weight is known, the components needed to carry the weight can be identified. A Weight Guide is available at www.ASHanging.com for further details.
- B. Click Rail Track; Rated Strength: 78 lbs.
- C. Stainless Steel Cables are 0.071-inches (1.8mm); Rated Strength: 45lbs.
- D. Nylon Cords are 0.078-inches (2.0mm); Rated Strength: 15lbs.

1.04 WARRANTY

- A. Materials and Workmanship for Tracks: One (1) year (the "Limited Warranty Period") from the date of purchase.
- B. Materials and Workmanship for Cables: One (1) year (the "Limited Warranty Period") from the date of purchase.
- C. Materials and Workmanship for Hooks/Fittings: One (1) year (the "Limited Warranty Period") from the date of purchase.

PART 2 – PRODUCTS

- A. AS Hanging Display Systems, www.ASHanging.com, US Distribution Center, 8396 State Route 9, West Chazy, NY 12992. Canadian Distribution Center, 3600 Matte Blvd., Unit L, Brossard QC J4Y 2Z2 Canada. Toll free: 866-935-6949, Phone: 450-619-7999, info@ashanging.com. All track, cables and fittings are to be single sourced to avoid incompatibilities. Click Rail is the basis of design.
- B. Or equal
- C. Where indicated on drawings, Click Rail Track, as manufactured by AS Hanging Display Systems, shall be installed. Aluminum shall be extruded alloy 6063-T5, with anodized or powder coat finish. Finish is to be complete, including cable-interface chamber. Tracks are 78.75 inches in length (2m), and will include all mounting hardware. Hardware is to include 8 sets of mounting clips, screws and screw anchors. Anchors are to be compatible

with gypsum, plaster, cement, brick and ceramic surfaces. Mounting clips are also to serve as unions for continuously mounted tracks. Track rated strength is to be 78 lbs. per length, minimum, with non-structural fastening. Compatible cables are to be of convenient “Twist-End” design that allows cable to be inserted anywhere along the track and where track may be mounted shy of finished ceiling surface. Cable end-fittings are to be factory assembled onto cables and not reliant upon a top “gripper”. Stainless steel cables are 7 x 7 strand and 1.8 mm diameter construction with a minimum strength of 45 lbs. Nylon cords are single strand and 2.0 mm diameter construction with a minimum strength of 15 lbs. End-Caps and Corner Connectors must be available for the track, to complete any exposed ends, and if needed during installation.

- A. Click Rail Track: Aluminum [Warm White semi-gloss powder]
- B. Click Rail Track Accessories: End Cap: Plastic [White]
Corner Connectors: Plastic [White]
- C. Cable Configuration will be [suspended from an upper track]
- D. Cable & Cord: Twist-End [Stainless Steel Cable]
 - 1. Cable Length: [48in (120cm)]
- E. Hooks:
 - 1. Manual Hooks: [Multi-Purpose]
 - 2. Self-Gripping Hooks: [Secure Self-Gripping]
 - 3. Panel Display Hooks: [Panel Hook], [Panel Hook, Wide]
- F. Cable Fittings and Accessories:
 - 1. Cable Clamp (use only with stainless cables): [Single-Sided], [Double-Sided].
 - 2. Cable Stop
 - 3. Frame Stabilizer: [6.75" (17 cm)], [12.5" (32 cm)].
 - 4. Counter-Weight Stabilizer, Cable
- G. Cable Tensioners:
 - 1. [Twist-End Cable Tensioner]

PART 3 – EXECUTION

- 3.01** INSTALLATION shall be as required for each system in strict accordance with As Hanging Display Systems latest edition of the Click Rail Installation Guide. A minimum of two (2) complete copies of the Installation Guide shall be on the project site at all times. Installation Guides are available for download at www.ASHanging.com.
- 3.02** The wall surface and its substrate determine the type of fasteners used for the particular application. The manufacturer supplies wood screws and plastic screw anchors that are suitable for mounting the track to common gyp-board, lath & plaster and structural lumber.

It is the responsibility of the installer to select the correct fastener for the particular installation. Failure to do so may cause property damage or personal injury.

END OF SECTION 12 15 00

SECTION 12 24 94 - WINDOW TREATMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Manually operated room-darkening shades.

1.2 REFERENCES

- A. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- B. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.

1.3 SUBMITTALS

- A. Submit under provisions of submittals section.
- B. Submit Environmental Certification and Third Party Evaluation.
- C. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
 - 3. Storage and handling requirements and recommendations.
 - 4. Mounting details and installation methods.
- D. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, and relationship to adjacent work.
- E. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.
- F. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.
- G. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.
- H. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.
- B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.
- C. Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
- D. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.
- E. Environmental Certification: Submit written certification from the manufacturer, including third party evaluation, recycling characteristics, and perpetual use certification as specified below. Initial submittals, which do not include the Environmental Certification, below will be rejected. Materials that are simply 'PVC free' without identifying their inputs shall not qualify as meeting the intent of this specification and shall be rejected.
- F. Recycling Characteristics: Provide documentation that the shade cloth can and is part of a closed loop of perpetual use and not be required to be down cycled, incinerated or otherwise thrown away. Scrap material can be sent back to the mill for reprocessing and recycling into the same quality yarn and woven into new material, without down cycling. Certify that this process is currently underway and will be utilized for this project.
- G. Perpetual Use Certification: Certify that at the end of the useful life of the shade cloth, that the material can be sent back to the manufacturer for recapture as part of a closed loop of perpetual use and that the material can and will be reconstituted into new yarn, for weaving into new shade cloth. Provide information on each shade band indicating that the shade band can be sent back to the manufacturer for this purpose.
- H. Mock-Up: Provide a mock-up (manual shades only) of one roller shade assembly for evaluation of mounting, appearance and accessories.
 - 1. Locate mock-up in window designated by Architect.
 - 2. Do not proceed with remaining work until, mock-up is accepted by Architect.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 WARRANTY

- A. Roller Shade Hardware, Chain and Shadecloth: Manufacturer's standard non-depreciating twenty-five year limited warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. MechoShade Systems, Inc. (Basis of Design)
42-03 35th Street
Long Island City, NY 11101
Tel: (718) 729-2020
Fax: (718) 729-2941
Email: info@mechoshade.com
Website: www.mechoshade.com
- B. DFB Sales
21-07 Borden Avenue
Long Island City, NY 11101
Website: dfbsales.com
- C. Or approved Equal.

2.2 APPLICATIONS/SCOPE

- A. Roller Shade: to be provided for all windows on 4th floor.
 - 1. Shade Type 1: Manual operating interior, chain drive room in all exterior windows of rooms and spaces shown on Drawings, and related mounting systems and accessories.

2.3 SHADE CLOTH

- A. MechoShade Systems, Inc.,
 - 1. "Euroveil Basketweave 5300 Series", .008 inches thick (.19 mm) blackout material and weighing .94 lbs. per square yard, comprising of 85% PVC (coating) and 15% polyester (yarn).

2. Color: 5306 Silver Birch 5% Open

B. 1. Or approved Equal

2.4 SHADE BAND

A. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem pocket, shade roller tube, and the attachment of the shade band to the roller tube.

Sewn hems and open hem pockets are not acceptable.

1. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.
2. Shade band and Shade Roller Attachment:
 - a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less 12494-6 than 1.55 inch (39.37 mm) in diameter for manual shades, and less than 2.55 inches (64.77 mm) for motorize shades are not acceptable.
 - b. Provide for positive mechanical engagement with drive / brake mechanism.
 - c. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" snap-off" spline mounting, without having to remove shade roller from shade brackets.
 - d. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
 - e. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets are not acceptable.

2.5 SHADE FABRICATION

- A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.
- B. Fabricate shade cloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shade cloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design. Fabricate hem as follows:
 1. Bottom hem weights.
 2. Concealed hemtube.
 3. Exposed hemtube.
 4. Exposed blackout hembar with light seal.
 5. Exposed blackout hembar with polybond seal.

- C. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.
- D. For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadebands.
- E. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shadebands.

2.6 COMPONENTS

- A. Access and Material Requirements:
 - 1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
 - 2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
 - 3. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.
- B. Manual Operated Chain Drive Hardware and Brackets:
 - 1. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.
 - 2. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable.
 - 3. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.
- C. Drive Chain: #10 qualified stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Notify architect of unsatisfactory preparation before proceeding with installation.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the method recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.
- B. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- C. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION 12 24 94

SECTION 14 21 00 - MACHINE ROOMLESS ELEVATORS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: The extent of the work is indicated on the drawings.
- B. Work of this Section includes labor, materials, tools, equipment, appliances and services required to manufacture, deliver and install the units complete as shown on the drawings, as specified herein, and/or as required by job conditions.
- C. The work and /or requirements specified in all sections is described in singular with the understanding that identical work shall be performed on all units or associated systems unless otherwise specified herein.
- D. The work shall include, but is not limited to the following:
 - 1. One (1) 2000 lbs. capacity machine room-less traction passenger elevator operating at 150 fpm.
 - 2. Governor access panel to be located in the front of the elevator shaft at 1'-0" AFF at level 2.
- E. Related Sections
 - 1. Division 01: Protecting hoistway during installation of equipment, Construction Waste Management, Indoor Air Quality Management, Volatile Organic Compound Limits.
 - 2. Division 07: Elevator pit waterproofing.
 - 3. Division 23: Ventilation of hoistway and control room, and fire extinguisher in control room.
 - 4. Division 26: Power feeders to starter panels through fused main line switches
 - 5. Division 26: Branch circuits through fused disconnects for car lights.
 - 6. Division 26: Lights and GFI receptacles in control room, overhead, and pit.
 - 7. Division 26: Signal wiring to initiate emergency power operation.
 - 8. Division 26: Signal wiring from smoke detectors to a junction box in the machine room.
 - 9. Division 26: Empty conduit runs for wiring required to monitor elevators from a central location.
 - 10. Division 26: Shunt trip devices to automatically disconnect the main power supply to the elevators prior to the activation of sprinkler system.
 - 11. Division 27: Life safety system speakers and telephone communication wiring to a junction box in the control room for each elevator.
 - 12. Division 27: Card reader and CCTV Systems, device and their interface with the elevator system.

13. Division 27: Telephone communications wiring terminated in a junction box located next to the controller.
14. Division 27: Ethernet port in each elevator machine room, fire command center and building engineer's office.

F. Abbreviations and Symbols

1. The following abbreviations, Associations, Institutions, and Societies may appear in the Project Manual or Contract Documents:

ADA	Americans with Disabilities Act
AHJ	Authority Having Jurisdiction
AIA	American Institute of Architects
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
IBC	International Building Code
IEEE	Institute of Electrical and Electronics Engineers
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Agency
OSHA	Occupational Safety and Health Act

G. Codes and Ordinances / Regulatory Agencies

1. Work specified by the Contract Documents shall be performed in compliance with applicable Federal, State, and municipal codes and ordinances in effect at the time of Contract execution. Regulations of the Authority Having Jurisdiction shall be fulfilled by the Contractor and Subcontractors. The entire installation, when completed, shall conform with all applicable regulations set forth in the latest editions of:
 - a. Local and/or State laws applicable for logistical area of project work.
 - b. Building Code applicable to the AHJ.
 - c. Elevator Code applicable to the AHJ.
 - d. Safety Code for Elevators and Escalators, ASME A17.1 and all supplements as modified and adopted by the AHJ.
 - e. Safety Code for Elevators and Escalators, A17.1S supplement to A17.1 as modified and adopted by the AHJ for Machine Room Less installations (MRL).
 - f. Guide for Inspection of Elevators, Escalators, and Moving Walks, ASME A17.2.
 - g. Safety Code for Existing Elevators and Escalators, ASME A17.3 as modified and adopted by the AHJ.
 - h. Guide for emergency evacuation of passengers from elevators, ASME A17.4.
 - i. National Electrical Code (ANSI/NFPA 70).

- j. American with Disabilities Act - Accessibility Guidelines for Building and Facilities and/or A117.1 Accessibility as may be applicable to the AHJ.
 - k. ASME A17.5/CSA-B44.1 - Elevator and escalator electrical equipment.
 - l. ECC (Energy Conservation Code) as may be applicable to the AHJ.
2. The Contractor shall advise the Owner's Representative of pending code changes that could be applicable to this project and provide quotations for compliance with related costs.

H. Reference Standards

1. AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
2. ANSI/AWS D1.1 - Structural Welding Code, Steel.
3. ANSI/NFPA 80 - Fire Doors and Windows.
4. ANSI/UL 10B - Fire Tests of Door Assemblies.
5. ANSI/IEEE - 519-Latest Edition
6. ANSI/IEEE - Guide for Surge Withstand Capability (SWC) Tests
7. ANSI Z97.1 – Laminated/Safety Tempered Glass

I. Definitions

1. Defective Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
2. Provide: Where used in this document, provide shall mean to install new device, apparatus, system, equipment or feature as specified in this document.
3. Definitions in ASME A17.1 as amended or modified by the AHJ apply to work of this Section.

1.2 PERMITS AND SUBMITTALS

A. Permits

1. Comply with the requirements of Division 01.
2. Prior to commencing work specified by the Contract Documents, the Contractor shall, at its own expense, obtain all permits or variances as may be required by the AHJ and provide satisfactory evidence of having obtained said permits and variances to both the Owner's Representative and Consultant.
3. File necessary drawings for approval of all Authorities Having Jurisdiction.

B. Submittals

1. Comply with the requirements of Division 01.
2. Submit the following

a. Samples

Item No.	Quantity	Size	Description
S1	3	12" x 12"	Exposed finishes as requested by Architect
S2	1	Actual	Each fixture as requested by the Architect
S3	1	Actual	Mitered, corner construction of entrance frame
S4	1	Actual	Entrance Jamb and Car Braille plate

b. The samples shall be:

- 1) Held on site after inspection and used as a standard for acceptance or rejection of subsequent production units.
- 2) Labeled to identify their intended use and relation to the documents, e.g., car finishes, control panel, etc.

Subject to approval, where an item of equipment is a standard item, copies of the manufacturer's catalogue or brochure may be accepted provided that all dimensions and relevant information are shown in the catalogue or brochure.

c. Shop Drawings - Submit computer generated layout drawings for approval. Include the following:

- 1) A listing of all components, devices and sub-systems including:
 - a) Manufacturer and location of plant
 - b) Size and model number
- 2) Control Room Plan indicating:
 - a) Location of equipment and code clearances
 - b) Service connections and disconnect switches
 - c) Passenger rescue and brake release
 - d) CCTV provisions
- 3) Fully dimensioned hoistway plan and section of each unit indicating:
 - a) Platform (with cab), hoistway and entrance dimensions
 - b) All running clearances
 - c) Location of fixtures
 - d) Buffers, service ladders and pit reactions
 - e) Location of inserts
 - f) Rail Reactions

- 4) Entrance details
- 5) Sill support detail
- 6) Fixture details including hall lanterns, hall pushbutton stations, car operating panel, etc.
- 7) Wiring diagrams
- 8) Insert diagrams
- 9) Cab details including wall, ceiling, base, handrail, lighting, fixtures, front return and transom plans and sections
- 10) MRL criteria including:
 - a) Location of machine and governor
 - b) Structural requirements and reactions
 - c) Clearances
 - d) Access requirements

3. Calculations

- a. Rail loads
- b. Pit and machine room reactions
- c. Heat emissions in machine room and hoistway.
- d. Electrical loads including, accelerating and running currents. Include all auxiliary loads.

C. Keys

1. Upon the initial acceptance of work specified by the Contract Documents on each unit, the Contractor shall deliver to the Owner, six (6) keys for each general key-operated device that is provided under these specifications in accordance with ASME A17.1, Part 8 standards as may be adopted and modified by the AHJ.
2. All other keying of access or operation of equipment shall be provided in accordance with ASME A17.1 Part 8 as may be adopted and modified by the AHJ.

D. Diagnostic Tools

1. Prior to seeking final acceptance of the project, the Contractor shall deliver to the Owner any specialized tools required to perform diagnostic evaluations, adjustments, and/or programming changes on any microprocessor-based control equipment installed by the Contractor. All such tools shall become the property of the Owner.
 - a. Owner's diagnostic tools shall be configured to perform all levels of diagnostics, systems adjustment and software program changes which are available to the Contractor.
 - b. Owner's diagnostic tools that require periodic re-calibration and/or re-initiation shall be performed by the Contractor at no additional cost to the Owner for a period equal to the term of the maintenance agreement from the date of final acceptance of the project.

- c. The Contractor shall provide a temporary replacement, at no additional cost to the Owner, during those intervals in which the Owner might find it necessary to surrender a diagnostic tool for re-calibration, re-initiation or repair.
 2. Contractor shall deliver to the Owner, printed instructions, access codes, passwords or other proprietary information necessary to interface with the microprocessor-control equipment.
- E. Wiring Diagrams, Operating Manuals and Maintenance Data
 1. Comply with the requirements of Division 01.
 2. Deliver to the Owner, four (4) identical volumes of printed information organized into neatly bound manuals prior to seeking final acceptance of the project.
 3. The manuals shall also be submitted in electronic format on non-volatile media, incorporating raw 'CAD' and/or Acrobat 'PDF' file formats.
 4. Manuals, as well as electronic copies, shall contain the following:
 - a. Step-by-step adjusting, programming and troubleshooting procedures that pertain to the solid-state microprocessor-control and motor drive equipment.
 - b. Passwords or identification codes required to gain access to each software program in order to perform diagnostics or program changes.
 - c. A composite listing of the individual settings chosen for variable software parameters stored in the software programs of both the motion and dispatch controllers.
 - d. Method of control and operation.
 5. Provide four (4) sets of "AS INSTALLED" straight-line wiring diagrams in both hard and electronic format in accordance with the following requirements:
 - a. Displaying name and symbol of each relay, switch or other electrical component utilized including identification of each wiring terminal.
 - b. Electrical circuits depicted shall include all those which are hard wired in both the machine room and hoistway.
 - c. Supplemental wiring changes performed in the field shall be incorporated into the diagrams in order to accurately replicate the completed installation.
 6. Furnish four (4) bound instructions and recommendations for maintenance, with special reference to lubrication and lubricants.
 7. Manuals or photographs showing controller repair parts with part numbers listed.
- F. Training
 1. Prior to seeking final acceptance of the project, the Contractor shall conduct an eight-hour training program on-site with building personnel selected by the Owner.
 2. The focus of the session shall include:

- a. Instructions on proper safety procedures and who to contact for the purpose of assisting passengers that may become entrapped inside an elevator car.
 - b. Explain each control feature and its correct sequence of operation.
3. Control features covered shall include but, not be limited to:
- a. Independent Service Operation.
 - b. Emergency Fire Recall Operation - Phase I
 - c. Emergency In-car Operation - Phase II.
 - d. Emergency Power Operation.
 - e. Emergency Communications Equipment.
 - f. Emergency Hoistway Access and Rescue Features.

G. Patents

1. Patent licenses which may be required to perform work specified by the Contract Documents shall be obtained by the Contractor at its own expense.
2. The Contractor agrees to defend and save harmless the Owner, Consultant and agents, servants, and employees thereof from any liability resulting from the manufacture or use of any patented invention, process or article of appliance in performing work specified in the Contract Documents.

1.3 QUALITY ASSURANCE

A. Energy Conservation Code

1. The Contractor shall comply with the requirements set forth in the Energy Conservation Code as may be applicable to the AHJ.
2. Except for equipment or systems under the purview of other disciplines, elevator and escalator equipment provided by the Contractor requiring compliance shall include, but not be limited to:
 - a. Energy efficiencies of gearless motors
 - b. Absorption of regenerated power for elevators
 - c. Energy efficiencies of car interior lighting and ventilation
 - d. Automatic operation of car interior lighting and ventilation through the individual car controller

B. Qualifications

1. The work shall be performed by a company specialized in the business of manufacturing, installing and servicing conveying systems of the type and character required by these specifications with a minimum of ten (10) years of experience.
2. Prior written acceptance is required for manufacturers other than those listed, before quoting this project. Requests for acceptance will not be considered unless

they are submitted before bid date and are accompanied by the following information:

- a. List of five (5) similar installations having exact equipment being proposed for this project arranged to show name of project, system description and date of completed installation. The list shall include the names, position and resumes of the construction team and field supervisor of the installations.
- b. Complete literature, performance and technical data describing the proposed equipment. Include the names, position and resumes of the proposed construction team and field supervisor.
- c. List of ten (10) service accounts by building name, building manager or owner, including phone numbers.
- d. Location of closest service office from which conveying system will be maintained.
- e. Location of closest parts inventory for this installation.
- f. List of the names, positions and resumes of the construction teams and field supervisor for the installation.

C. Structural, Mechanical and Electrical Design Parameters

1. The mechanical and electrical systems and the building structure have been designed for the following design loads:
 - a. Structural Loads:
 - 1) The pit, machine room and rail loads are shown on the drawings.
2. Power supply: 208V-3PH-60Hz
3. Electrical Loads: (PE1) 10 HP
 - 37 A. FLR (Full Load Running)
 - 107 A. FLA (Full Load Acceleration)
4. Heat Release: (PE1) 7,000 BTU/HR/UNIT
5. Submit a written statement with the bid that the above design loads and the clearance requirements shown on the Architectural drawings are acceptable for the proposed equipment. If not, specifically state the design variances.
6. After the award, if the type of equipment provided requires structure, mechanical and electrical system changes and/or revisions, the Elevator Contractor shall be responsible for all additional design and construction costs.
7. Electrical equipment, motors, controllers, etc., installed under this contract shall have necessary CSA/US or UL listing as may be required by the AHJ. Equipment shall be labeled or tagged accordingly.

1.4 DELIVERY / STORAGE / HANDLING / COORDINATION

A. Delivery and Storage of Material and Tools

1. Comply with the requirements of Division 01.
2. Delivery, Storage and Handling:
 - a. Deliver materials to the site ready for use in the accepted manufacturer's original and unopened containers and packaging, bearing labels as to type of material, brand name and manufacturer's name. Delivered materials shall be identical to accepted samples.
 - b. Store materials under cover in a dry and clean location, off the ground.
 - c. Remove delivered materials which are damaged or otherwise not suitable for installation from the job site and replace with acceptable materials.
3. The Owner shall bear no responsibility for the materials, equipment or tools of the Contractor and shall not be liable for any loss thereof or damage thereto.
4. The Contractor shall confine storage of materials on the job site to the limits and locations designated by the Owner and shall not unnecessarily encumber the premises or overload any portion with materials to a greater extent than the structural design load of the Facility.

B. Work with Other Trades / Coordination

1. Coordinate installation of sleeves, block outs, equipment with integral anchors, and other items that are embedded in concrete or masonry for the applicable equipment. Furnish templates, sleeves, equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
2. Coordinate sequence of installation with other work to avoid delaying the Work.
3. Coordinate locations and dimensions of other work relating to the equipment scheduled for installation including pit ladders, sumps, and floor drains in pits; entrance subsills; machine beams; and electrical service, electrical outlets, lights, and switches in pits and machine rooms, secondary levels, overhead sheave rooms and hoistways as it relates to the specific equipment.

1.5 WARRANTY / MAINTENANCE SERVICES

A. Contract Close-Out, Guarantee and Warranties

1. Comply with the requirements of Division 01.
2. Guarantee and Warranties:
 - a. Warrant the equipment installed under these specifications against defects in material and quality of installation and correct any defects not due to ordinary wear and tear or improper use of car which may develop within one year from the date each unit is completed and placed in permanent operation and accepted by the Owner.
 - b. This warrantee shall be written and issued at the completion of each unit prior to final payment.

B. Maintenance

1. Interim Maintenance: Provide full protective maintenance on the units that are completed and accepted by the AHJ and that may be put in service prior to the overall project completion. The maintenance service shall be as hereinafter specified under the Full Protective Maintenance Service in "3" below and include all code mandated safety and local law tests and inspections that may come due while on this service.
 - a. The price quoted shall be on a per unit per month basis.
2. Warranty Maintenance: Provide full protective maintenance on the specified equipment for a period of twelve (12) months from the date of final acceptance of the entire installation as specified under the Full Protective Maintenance Service in "3" below.
 - a. The price for this service shall be included in the base price or as otherwise specified in the contract documents.
3. Full Protective Maintenance Service: Submit a separate price for a Full Protective Maintenance Service for the specified units based on a five (5) year contract. The price shall be submitted on the company's own form but shall include all requirements as specified hereinafter. Note: All maintenance shall comply with Part 8 of the ASME A17.1 Code and modified or amended by the Authority Having Jurisdiction.
 - a. Maintenance work shall be performed by certified/qualified personnel directly employed and supervised by the service contractor.
 - b. Perform scheduled maintenance work and repairs during the regular working hours of regular working days of the trade. All work shall be coordinated with the Building Manager.
4. Provide emergency callback service and repair twenty-four (24) hours a day, seven (7) days a week, including holidays, between regular examinations at no extra cost to the Owner. The response time during working hours shall not exceed one (1) hour. Perform emergency repairs within four (4) hours to restore the equipment to operating order. The following conditions will require emergency callback services for elevators:
 - a. Passenger entrapment.
 - b. Failure or malfunction of control system.
 - c. Shutdown of any elevator.
5. Maintenance shall include monthly examination, adjustment, lubrication, repair or replacement of electrical and mechanical parts of all equipment and apparatus.
6. The maintenance services shall also cover relamping of machine room and pit lighting fixtures, signal and operating fixtures, communication system, cab ventilation system, monitoring and control panels. The disconnect means, fuses, car enclosures, car doors and hoistway entrances are excluded. Repair equipment whenever required and use only genuine standard parts produced and manufactured for equipment concerned.

- a. Include a minimum of two (2) hours of monthly labor per unit for the specified scheduled preventive maintenance service.
 - b. The performance of mandated inspections and tests of the equipment, as required by the AHJ, shall be included in this agreement.
 - 1) Where required by the AHJ, witnessing shall be performed by a third party licensed agency hired directly by the Owner.
 - 2) Where testing is required to be performed after normal business hours, Contractor shall invoice the after-hours work at the premium portion of the hourly billing rate only.
 - c. Provide firefighter and emergency power tests and inspections as may be required. There will be two emergency power tests per year which shall be conducted after work hours at no extra cost to the Owner.
 - d. One (1) month prior to the warranty expiration period, perform a Performance and Maintenance survey of all devices covered under the agreement and submit a report listing the recorded performance data, the emergency call-back services rendered during the year, and recommendations to further improve reliability and performance.
 - 1) When requested, provide a recording of each car's acceleration, deceleration and jerk rates along with a 3-day history of average corridor call wait times from 7 a.m. to 6 p.m. as recorded on a specified Tuesday, Wednesday and Thursday.
 - 2) Provide and document all required periodic testing.
 - e. During every scheduled maintenance visit, make sure the machine room and pit areas are clean.
 - 1) Paint the machine room floor and machine room equipment every three (3) years.
 - f. Adjust controls and maintain the equipment to meet the performance requirements as hereinafter specified.
 - g. If overtime repairs and maintenance services are requested and pre-approved by the Owner, the Contractor shall pay for the regular labor portion, and the Owner will cover the premium portion of the labor only.
 - h. Keep permanent record of inspections, maintenance services including lubrication procedures, emergency call-back services, repairs and replacements.
 - i. Maintain a complete set of updated wiring diagrams and schematic control diagrams in the machine room and provide the Owner with an additional record set.
7. Supply all necessary lubricants, cleaning materials and repair parts required to keep the system in good working order during maintenance periods.

8. Maintain an adequate stock of spare parts for maintenance or repair work and minor callback service repairs within the confines of the building in areas designated and assigned by the Owner. Maintain a catalog of spare parts available on site.
9. Additional parts of other equipment required for maintenance and repair of the systems may be stored at the Contractor's facilities with the understanding delivery of same for emergency procedures must be made within two (2) hours to the job site.
10. Other materials and equipment normally not stocked by the Trade Contractor locally must be available within twenty-four (24) hours for delivery to the job site from remote facilities and/or Supplier Contractors responsible to the Contractor for stocking the materials or equipment.
11. If the requirements for stockade of parts as defined herein are not met on any item, immediately notify the Owner in writing as to the circumstances and provide a confirmed delivery date for the required materials and equipment.
12. Should it become necessary to work on the equipment, proper safety barricades shall be erected to protect people from all hazards.
13. If for any reason (such as strike), it is mutually agreed to temporarily reduce the level of maintenance, the monthly amount of the maintenance contract shall be reduced to reflect the reduction in maintenance services.
14. Should the Owner request that the maintenance Contractor perform any work on the equipment of this Contract, but not included in the terms of the Contract, then payment for such work shall be based on the rates included in the Contract for time and material.
15. Thirty (30) days before the annual renewal of this agreement, adjust monthly maintenance price as follows:
 - a. Eighty percent (80%) of the current maintenance price based on current straight-time hourly rate for a mechanic.
 - b. Twenty percent (20%) of the current maintenance price based on the established difference in the "Producer Commodity Prices for Wholesale Metals and Metal Products Index".
 - c. Notwithstanding anything to the contrary, the maximum annual increase shall not be more than three percent (3.0%) of the total contracted payment for the preceding contract year.
16. Cancellation: The Owner has the right to cancel this contract on 30 days' notice.

1.6 ALTERNATES / ALLOWANCES / UNIT PRICES

A. Alternates

1. Value Engineering Alternate
 - a. It is understood that the base specification reflects minimum standards. The above Value Engineering Alternate allows individual contractors to suggest special performance criteria which may be of interest to the Owner and may reflect a degree of quality above the requirements of the base specification.

- b. Voluntary alternate prices may be acceptable as a deviation from, not a substitution for, the basis of bid work of this bid package.
- c. In order to submit a voluntary alternate, the following must be provided at the time of the bid.
 - 1) A complete bid reflecting the requirements of the base specification.
 - 2) All alternates must be accompanied with pertinent data, technical documentation and reference/installation for review.
 - 3) Along with the pricing for voluntary alternates submit the maintenance prices for each.

PART 2 - PRODUCTS

2.1 GENERAL DESCRIPTION

A. Elevator – PE1

1.	Quantity	One (1)
2.	Type	Machine-room-less/Passenger – Class “A”
3.	Capacity (lbs.)	2000
4.	Speed (fpm)	150
5.	Travel in Feet	11’-3”
6.	Number of Landings	Two (2)
7.	Number of Openings	Two (2)
8.	Front Opening	All @ C, 1
9.	Rear Opening	None
10.	Operation	Two Stop Collective Operation
11.	Control	Variable voltage variable frequency
12.	Fireman’s Control	Phase I and II
13.	Number of Push Button Risers	One
14.	Clear Inside Platform Size	5’-8” wide x 4’-4” deep
15.	Guide Rails	Steel tees, provide rail backing as required
16.	Buffers	Spring
17.	Cab	As further specified.
18.	Entrance Size	3’-0” wide x 7’-0” high
19.	Door Operation	Single speed side opening
20.	Machine Type	Gearless traction
21.	Machine Location	Within overhead space
22.	Counterweight Safety	Not Required
23.	Power Supply	208 – 3 - 60

2.2 MANUFACTURERS

A. Pre-Approved Equipment Manufacturers

1. In addition to Original Equipment Manufacturers, the following manufacturer's equipment and materials have been pre-approved for use on this project.
2. Other manufacturers/products not specifically mentioned below shall be considered for approval on an individual basis.
 - a. Controller - GAL (GALaxy), Motion Control Engineering, Elevator Controls Corporation, Elevator Systems, Inc., Smartrise, Schumacher.
 - b. Tracks, Hangers, Interlocks and Door Operators - G.A.L., ECI.
 - c. Fixtures - G.A.L., Adams, EPCO, Monitor, E-Motive USA, C.E. Electronics, Innovation, MAD, National.
 - d. Door Protective Device - Janus, Adams, G.A.L., T.L. Jones, Tri-Tronics.
 - e. Cabs and Entrances - CEC Elevator Cab, EDI/ECI, Elite Elevator Cab, Forms + Surfaces, National Cab & Door, Tyler, Velis, Gunderlin, Eklund, EMCO, Columbia Elevator Products, United Cabs, USC Elevator.
 - f. Machines - Hollister-Whitney, Titan, Imperial, Torin.
 - g. Motors - Imperial Electric, General Electric, Baldor, Reuland Electric.
 - h. VVVF Power Drives - Mitsubishi, MagneTek, Yaskawa, TorqMax.
 - i. VVVF Emergency Power Systems – MCE, Reynolds & Reynolds Electronics.
 - j. Guide Rails - Savera, Monteferro.
 - k. Electrical Traveling Cables – Draka, James Monroe.
 - l. Guide Shoes/Rollers – ELSCO, G.A.L.
 - m. Wire Ropes - Paulsen, Bethlehem, Wayland, Draka.
 - n. Intercommunications/Telephones - Webb Electronics, K-Tec, Ring, Wurtec, Janus, approved equal.
3. Original Equipment Manufacturers may substitute their own branded equipment subject to the following:
 - a. All requirements of the specifications are met regarding performance, appearance, serviceability and support.
 - b. A full stock of all regular and critical replacement parts required for this project are maintained at a facility within fifty (50) miles of the project site.
 - 1) Any parts not stocked at the above referenced facility shall be identified with the location of the nearest source and shall be available for next-day delivery upon demand.
 - c. All parts and software shall be made available for purchase to a qualified elevator maintenance firm within one (1) business day delivery without direct Owner involvement.

- 1) Provide details of parts supply facility and a list of current parts pricing for all major components required for the installation.
- d. All specialized tools, equipment, software, and passwords, required to maintain, repair, adjust the operation, and perform code mandated tests/inspections are provided to the Owner as part of the base installation.
 - 1) Updates to these items shall be available via the parts supply facility referenced above.
- e. Technical support of the product(s) shall be available to the Owner's elevator service provider.

2.3 CONTROL FEATURES / OPERATION

A. Motion Control

1. Smooth stepless acceleration and deceleration of the elevator car shall be provided in either direction of travel during both single and multiple floor runs.
2. Use digital logic to calculate optimum acceleration and deceleration patterns during each run.
3. Acceleration, deceleration, jerk, maximum velocity, leveling accuracy and elapsed flight time, for a typical elevator one floor run, shall not exceed values as further specified.

B. Two Stop Collective Operation

1. A car call or hall call registration will allow the car to proceed to the destination after the hoistway door and car door automatically close and the door and gate circuits are made.
2. Upon arrival at the landing, the doors will open automatically.
3. When the car is traveling away from a registered hall call, the call shall remain registered and the car shall respond on the next trip.
4. Car and hall calls shall cancel automatically as the car stops at the respective call.

C. Independent Service Operation

1. The car operating station shall be equipped with a key-operated switch labeled "IND SER".
2. Locate the switch in the locked service compartment.
3. When placed in the "on" position the following shall occur:
 - a. Group elevator - the elevator shall bypass corridor calls and travel directly to any floor chosen by registration of a car call. Hall calls shall remain registered for service by another elevator in the group.

- b. Simplex elevator - existing hall call registrations shall extinguish and hall buttons shall remain inoperative as an indication to passengers that there is no elevator service.
4. During Independent Service Operation, the elevator doors shall remain open at any landing until the door close or a car call push button is pressed and maintained until the doors are fully closed.
5. If more than one (1) car call is registered, all registered car calls shall extinguish when the elevator stops in response to the first call.
6. Fire Emergency Recall shall automatically override Independent Service Operation and engage Phase I - Fire Emergency Recall Operation following a period of approximately forty-five (45) seconds.

D. Inspection Service Operation

1. Provide a key operated switch in the main car operating panel locked service panel that, when turned to the 'ON' position, shall cause the elevator to be removed from service and placed in Inspection Service Operation.
2. Limited operation of the car shall be provided through pressing the Attendant Service up and down push buttons (if provided) or the highest or lowest car call push buttons (if up and down buttons are not provided) in the main car operating panel only.
3. The car shall move at a speed not to exceed 150 feet per minute (0.75 meters per second) as per code with both the hall and car door panels in the closed and locked position.
4. The Inspection Service switch shall be keyed differently than other typical keys used in the operation of the elevator. Keying shall be in accordance with Security Group Classifications as required by applicable code.
5. The top of the elevator car shall be equipped with a control for limited operation of the car during repairs, maintenance and inspection conducted in the hoistway. The transfer of control to the top of car operating device shall cause that device to be the sole means of control for the elevator.
 - a. Visual and audible indication shall be provided on the top of the car when Firefighters' Emergency Operation is initiated.
6. Power door operating equipment shall be rendered inoperative while the car is being operated in the Inspection Service mode with the exception of power closing of the door. The control system shall maintain closing power on the door while the elevator is moving under Inspection Service Operation.
7. The in-car Inspection Service switch shall be rendered ineffective when the top of car inspection control is activated.
8. Machine Room Inspection Operation and Inspection Operation with open door circuits shall be provided in accordance with A17.1 Safety Code, as modified and adopted, where required or allowed by the AHJ.

E. Hoistway Access Operation

1. Provisions shall be made to allow access to the hoistway through the use of hoistway access switches.
2. Operating the access switch shall permit the car to move at a speed not to exceed 150 feet per minute (0.75 meters per second) as per code with the hall and car doors in the open position to obtain access to the top of the car or climb-in pit.
3. The car shall automatically stop motion when the car top is level with the hoistway door sill for access to top of car.
4. The access key switch(es) shall be keyed differently than other typical keys used in the operation of the elevator. Keying shall be in accordance with Security Group Classifications as required by applicable code.
5. Access operation shall be disabled when top of car inspection operation is in effect.

F. Overload Detection (NYC)

1. For passenger elevators and freight elevators permitted to carry passengers, a positive means shall be provided to detect if the load in the elevator car exceeds the rated capacity of the elevator.
2. When an overload condition is detected:
 - a. The elevator doors shall remain open.
 - b. A voice notification and visual signal shall indicate that the elevator is overloaded.
3. Overload detection shall be overridden by Firefighters' Emergency Operation Phase I and Phase II.

G. Load Weighing Operation

1. A positive means shall be provided to continuously monitor the amount of load being transported by the elevator car.
2. The system shall be used to:
 - a. Preload static motor drives.
 - b. Activate control features that include:
 - 1) anti-nuisance operation.
 - 2) load dispatch operation.
 - 3) load dependent non-stop operation where applicable.
3. The anti-nuisance feature shall operate at loads not exceeding 200 lbs., whereas load dispatch and load non-stop shall be set to function at 65% of the rated loading capacity for the initial set up and adjustment procedure.

H. Anti-Nuisance Operation

1. In the event car loading is not commensurate with the number of car calls registered, all car calls shall be canceled.

- a. The system shall monitor the door protection device to determine if passenger transfer has occurred.
 - b. If after the third (3rd) stop a passenger transfer has not occurred, the system shall cancel all remaining registered car calls and respond to assigned hall call demand.
 - c. The number of calls registered with no passenger transfer that will trigger anti-nuisance shall be adjustable and initially set to three (3) calls.
- I. Firefighters' Emergency Operation / NYC
1. Phase I Emergency Recall Operation shall be provided in accordance with ASME A17.1 code as modified under the New York City Building Code, Appendix "K".
 - a. The fire emergency operation shall include a smoke detector at the top of each hoistway in buildings classified in occupancy group R-2 for automatic recall.
 2. The car operating station shall be provided with an indicator light and audible signal, each of which shall become activated when Phase I Operation is engaged.
 - a. The warning buzzer shall cease to function once the car has completed the recall sequence and is positioned at the designated recall landing.
 - b. The indicator light shall remain illuminated as long as Phase I Operation is activated.
 3. A two-position key-operated switch shall be provided on the designated recall landing per local law to manually activate Phase I operation.
 - a. When activated, Phase I operation shall be arranged so that in order to restore normal service, the car must first be returned to the designated recall landing, after which the Phase I key-switch must be turned to the 'OFF' position.
 - b. All fire recall switches shall be provided with an illuminated visual signal to indicate when Phase I Emergency Recall Operation is in effect.
 4. Phase II Emergency Recall In-Car Operation shall be provided in accordance with applicable ASME A17.1 code as modified under the New York City Building Code, Appendix "K".
 5. The car operating panel shall be equipped with a three-position, key-operated switch to engage Phase II Operation subsequent to completing the Phase I recall sequence and parking at the designated recall landing.
 6. The car operating panel shall be provided with a 'CALL CANCEL' push button that functions only under Phase II Operating mode.
 - a. When operated, the button shall cause any previously registered car calls to cancel.

7. The car operating panel shall be engraved with required fire control identifications per the New York City Building Code, Appendix "K".
8. The "City Wide Standard Key" (Yale #2642) and the "Fire Department Standard Key", shall be used for all Fire Emergency operating devices including car button locked access panels in Destination Dispatch elevators.
9. Firefighters' Emergency Operation, Phase I and Phase II, shall override all car call lockout features as well as special operating features as outlined by the applicable rules defined in Appendix K, Chapter K1 of the NYC Building Code.

J. Firefighters' Emergency Operation

1. Firefighters Service Operation and devices shall meet applicable code requirements of the AHJ.
2. Contractor shall be responsible for compliance in all aspects of Firefighters Service including, but not limited to the mode of operation, initiation of operation, operating control and signaling devices as well as fixture engraving including operating instructions applicable to and where required by the AHJ.

K. Floor Lockout Feature / Keyed Security Control / Car Onlu

1. Provide a car call floor lockout feature for the elevators which will prevent registration of car calls to floors that are "locked out".
 - a. Provide a two (2) position "on-off" key switch located in the car station adjacent to each floor call button except the primary egress floor.
 - b. Turning the key switch to the "off" (locked out) position shall prevent the registration of a call when the corresponding car call button is pressed.
 - c. The key switches shall be individually keyed with a master as directed by the Owner.
2. Activation of a floor lockout key switch shall have no effect on the operation of the hall call station, i.e., the car can be called to a floor from the hall button on the floor that is locked out in the car station.
3. The "floor lockout" key switches shall be in a material and finish to match the car operating panel cover plate.
4. Firefighters' Emergency Operation shall override the car call lockout feature.
5. Provide a label on the door of the individual car controller cabinet identifying that the control system utilizes Floor Lockout Feature.
 - a. Firefighters' Emergency Operation override of Floor Lockout Feature shall be tested in accordance with applicable requirements.

L. Passenger Rescue Feature

1. Provide a device in the control room to move the elevator car to a floor landing in the event of controller or power failure.

- a. This device must be speed controlled to prevent an overspeed condition.
 - b. A line of sight must be provided between the Passenger Rescue Feature device and the elevator car.
 - 1) Coordinate line of sight requirements with the control room requirements.
2. Provide a manual brake release lever attached to the control cabinet for rescue of passengers.
 - a. A visual display shall be provided with the control cabinet, which indicates car position, speed and directions.

M. Door Operation

1. Car and hoistway doors shall be arranged to operate in unison without excessive noise or slamming in either direction of travel.
 - a. Door opening speeds of two (2) feet per second shall be provided in conjunction with closing speeds of 1.0 foot per second in accordance with governing code.
 - b. Door operation shall commence as the car stops level at the floor and the machine brake is applied. Pre-door opening shall not be permitted.
2. Where the hoistway door and the car door are mechanically coupled, the kinetic energy of the closing door system shall be based upon the sum of the hoistway and the car door weights, as well as all parts rigidly connected thereto, including the rotational inertia effects of the door operator and the connecting transmission to the door panels.
3. The force necessary to prevent closing of the car and hoistway door from rest shall not exceed thirty (30) lbf. This force shall be measured on the leading edge of the door with the door at any point between one-third and two-thirds of its travel.
4. Door open and door close time shall be measured between the moment car door operation in either direction begins and the instant at which that cycle is completed.
5. When responding to either a car or corridor call, the amount of time that the elevator door remains stationary in the open position shall be adjustable up to sixty (60) seconds.
 - a. Door open dwell time for a corridor call shall be separate of that for a car call, and in both cases, dwell time shall be canceled whenever the car door protection device is momentarily interrupted by passenger transfers, followed by a reduced door open dwell time of approximately one (1) second (adjustable) after the door protection device is cleared of obstructions.
6. The operation of the door protective device by interruption of one or more infrared light beams (dual or multi-beam non-contact) during the close cycle shall cause the immediate reversing of the doors to the full open position.

7. The door closing cycle shall be arranged so that, in the event the door protective devices become continually obstructed after the normal door open dwell time has expired, and following a time interval of approximately thirty (30) seconds (adjustable), a warning tone shall sound and the door closing cycle shall commence at reduced speed and torque per applicable Code requirements.
8. Each car operating station shall be provided with a “door open” and “door close” push button.
 - a. Pressure on the “door open” button shall cause doors in the full open position to remain so and doors engaged in the close cycle to reverse direction and assume the full open position so long as pressure remains applied to the button.
 - b. The “door open” buttons shall also control the open cycle during Phase II - Emergency In-car Operation.
 - c. The “door close” push button shall function on Independent Service, Attendant Service and Phase II - Emergency In-car Operation as well as during normal automatic operations.
9. Repeated attempts by the power door operator to open or close the door at any landing shall be monitored by the control system.
 - a. In the event the door fails to cycle properly after a preset (adjustable) number of attempts, the car shall either travel to the next stop or remove itself from service, depending upon whether the malfunction is in the open or close cycle.
10. Each hoistway door shall be provided with an automatic self-closing mechanism arranged so that the door shall close and lock if the car should leave the landing while the hoistway door is unlocked.
11. Car doors shall be arranged to prevent their being manually opened from inside the car unless the elevator is positioned within a floor landing zone.

2.4 CONTROL ROOM / MACHINERY SPACE / SECONDARY EQUIPMENT

A. Controller / Dispatcher

1. The elevators shall have generic microprocessor based controller/dispatchers.
2. Digital logic shall calculate optimum acceleration, deceleration and velocity patterns for the car to follow during each run.
3. Closed-loop distance and velocity feedback shall monitor the actual performance of the elevator car with the desired speed profile.
4. System operating software shall be stored in non-volatile memory.
5. Elevator control relays, contactors, switches, capacitors, resistors, fuses, circuit breakers, overload relays, power supplies, electronic circuit boards, microprocessors, static motor drive units, wiring terminal blocks and related components shall be totally enclosed inside a free-standing metal cabinet with hinged access doors.

- a. Provide natural or mechanical ventilation for the controller cabinets.
 - b. Equip the vent openings and exhaust fans with filters.
6. Mount equipment to moisture-resistant, noncombustible panels supported from the steel frame.
 7. Provide "noise filter" between hoistway wiring and controller/dispatchers to eliminate interference.
 8. Optically isolate communication cables between components.
 9. Wiring: Wiring on the units, whether factory or field wiring, shall be done in neat order, and all connections shall be made to studs and/or terminals by means of grommets, solderless lugs or similar connections. All wiring shall be copper.
 10. Terminal Blocks: Provide terminal blocks with identifying studs on units for connection of board wiring and external wiring.
 11. Marking: Identifying symbols or letters shall be permanently marked on or adjacent to each device on the unit, and the marking shall be identical with marking used on the wiring diagrams. In addition to the identifying marks, the ampere rating shall be marked adjacent to all fuse holders.
 12. The manufacturer's standard on-board "LCD" display shall be incorporated on the main processor board and/or otherwise incorporated in the controller cabinet. The "LCD" shall be capable of providing alpha-numeric characters to view the operational status of the elevator and/or group functions depending on the application. The display shall provide the user with necessary information for troubleshooting and reprogramming of the basic system parameters.
 - a. Where the "LCD" is not an integral part of the controller and troubleshooting/reprogramming requires the use of a separate tool, the tool shall be maintained in the machine room and accessible to service personnel. This tool, along with all technical documentation for the correct use of the tool, shall remain the property of the Owner.
 - b. Password protection of critical programming features is required to prevent accidental changes to life-safety and other non-typical control settings.
 - c. Where a separate dispatch or group control panel is provided, a separate "LCD" display shall be provided to view group functions.
 13. In the event diagnostics and monitoring is accomplished via Field Service Tools, provide the required Field Service Tools with related control system appurtenances for diagnostic evaluations, system monitoring and field adjustments.
 - a. Provide instructions for proper use of such diagnostic tools and/or equipment with all coding and other operational requirements.
 - b. Maintain and calibrate the diagnostic tools, and update the associated instructions and other related documents under the service agreement.
 - 1) Should the agreement be cancelled for any reason by either party, maintenance and updating of diagnostic tools shall be provided to the Owner at the Contractor's cost without the need to purchase or lease

additional diagnostic devices, special tools or instructions from the original equipment provider.

- 2) The Owner may request field and technical instructions be provided by the original installation contractor or manufacturer for proper servicing by other qualified elevator company personnel.
- 3) The established cost plus profit, as previously specified, shall be applicable for the life of the system.
 - a) If the equipment for fault diagnosis is not completely self-contained within the controllers but requires a separate detachable device, that device shall be furnished to the Owner as part of this installation.
 - b) Such device shall be in possession of and become property of the Owner.

14. Microprocessor Documentation

- a. Provide and/or obtain complete information on systems' design, component parts, installation and/or modification procedures, adjusting procedures and associated computer conceptual logic circuitry and field connection.
- b. Provide microprocessor upgrading and/or modifications to programs that have been assigned to enhance the operation of the equipment for a period of ten (10) years after project approval.

B. Machine Beams

1. Provide support beams, angles, plates, rails, bearing plates, blocking steel members to support machines, governors, deflector and overhead sheaves. The machinery and deflector sheaves shall be located within the hoistway as shown on the drawings. Coordinate attachments of the machine beams to the building structure with the structural drawings.
2. Mounting of the hoist machine and deflector sheaves shall incorporate isolation to minimize the transmission of noise and/or vibration to the building structure.

C. Gearless Elevator Hoisting Machine [MRL]

1. Provide a permanent magnet synchronous motor (PMSM) gearless traction machine, specially designed and manufactured for elevator service. The machine shall have high starting torque and low starting current, rated for 50⁰ C (90⁰ F) continuous operation, and a minimum of 240 starts per hour.
 - a. Securely mount the machine to overhead steel beams or to the guide rail system.
 - b. The armature shaft shall be supported in ball or roller type bearings.
 - c. The driving sheave shall be cast from the best grade of metal with a Brinell hardness of 215 to 230 and shall be machined with grooves, providing maximum traction with a minimum of rope and sheave wear.

- d. Ensure that adequate ventilation of internal stator windings and rotating element is provided to prevent overheating with thermal overload protection. (Constant velocity fan for constant cooling.)
- e. Equip housing with eyebolt(s) for lifting.
- f. Provide the machine with an electro-mechanical brake.
 - 1) The brake shall be spring applied and electrically released where drum or disk-type brakes are employed.
 - 2) Design the brake electro-magnet for quick release and application of the brake.
 - 3) The brake lining material shall be non-asbestos.
- g. Design the brake for quick release to provide smooth and gradual application of the brake shoes.
 - 1) An emergency brake shall be an integral part of the machine design.
- h. Provide a sheave guard and rope retainer on the machine sheave to prevent hoisting rope from jumping off the grooves.
 - 1) Provide service platforms, grating, handrails, ladders and required accessories to service and maintain the hoisting machines, if required by the local AHJ.
- i. Design and construct the hoisting machine based on passenger elevator cab enclosure weight as specified and as shown on the architectural drawings.

D. Machine Brake

- 1. Provide an electro-mechanical brake.
 - a. Drum or disk-type brakes shall be spring applied and electrically released.
 - b. Design the brake electro-magnet for quick release and application of brake shoes.
 - c. Swivel type brake shoes shall be applied to the braking surface (pulley or disk).
 - d. The brake lining material shall be non-asbestos and shall be attached to two (2) cast iron shoes.
 - e. The brake pulley or disk shall act as the coupling between the drive motor shaft and the worm shaft.
- 2. The brake shall be designed and adjusted to safely hold 125% of rated full load capacity in accordance with applicable code.

E. VVVF AC Drive

- 1. Provide a solid-state, variable voltage, variable frequency (VVVF), 3-phase AC hoist motor drive system as part of the microprocessor-based equipment.

- a. VVVF drive system shall be a low-noise, flux-vector inverter device.
 - b. Include a digital LED readout and touch-key pad to facilitate software parameter adjustments, monitor system operation and display fault codes.
2. The drive shall utilize a 3-phase, full wave rectifier and capacitor bank to provide direct current power for solid-state inversion.
 3. The inverter shall utilize IGBT power semiconductors and duty cycle modulation fundamental frequency of not less than one kilohertz to synthesize 3-phase, variable voltage variable frequency output.
 4. The system shall be designed and configured with the following countermeasures for noise generated by the pulse-width modulated (PWM) inverters.
 - a. Control of radiated noise via inverter and/or motor cables.
 - b. Conducted noise through power lines.
 - c. Induction noise and ground noise.
 5. Inverter shall be encased in metal and independently grounded.
 6. A noise filter for the input power line shall be provided to prevent penetration into radios, wireless equipment and smoke detectors.
 7. A 3% three-phase line reactor shall be provided on the power system rated at the utility voltage input to the drive and sized for the rated drive current.
 8. The drive shall:
 - a. Be configured as a complete digital drive system.
 - b. Be totally software configurable.
 - c. Interface with external equipment/signals via either discrete local I/O connections or high speed Local Area Network (LAN).
 - d. Be located within the limits of the control cabinet (where system size allows) or separately mounted in an appropriate chassis with hinged swing-out doors with clearances equal to the cabinet width dimensions.
 - e. Provide programmable linear or S-curve acceleration.
 - f. Provide free run or programmable linear or S-curve deceleration.
 - g. Have controlled reversing.
 9. Operating and Environmental Conditions:
 - a. Have a service factor of 1.0.
 - b. Rated for continuous duty.
 - c. Humidity - 90% rated humidity non-condensing.
 - d. Cooling - forced air when required.
 - e. Digital display for:
 - 1) Running - output frequency, motor RPM, output current, voltage.
 - 2) Setting - Parameters values for setup and review.
 - 3) Trip - separate message for each trip, last thirty (30) trips to be retained in memory.

10. Protective Features:

- a. Motor overspeed.
- b. Adjustable current limit.
- c. Isolated control circuitry.
- d. Digital display for fault conditions.
- e. Selectable automatic restart at momentary power loss.
- f. Manual restart.
- g. Over/Under Voltage.
- h. Line to line and line to ground faults.
- i. Over-temperature.

F. VVVF AC Drive - Dynamic Braking Module

1. Provide a separate dynamic braking module to control overhauling motor speed, reduce hoist motor deceleration time and dissipate regenerated power. The unit shall consist of:
 - a. A resistor bank to absorb power regenerated by the hoist motor.
 - b. A 3-phase AC contactor rated for proper HP with overload protection to disconnect the inverter from the hoist motor whenever the elevator is stopped.

G. VVVF Emergency Return / Auxiliary Power System

1. Provide a system that will make back-up power available to the elevator when commercial power fails.
2. The unit shall safely move the elevator to a landing and provide power to the door operator to allow passengers to exit.
3. Movement of the car may be load dependent utilizing dynamic braking to control car speed.
4. The unit shall include:
 - a. On board controller.
 - b. UPS status monitor capable of notifying building management system.
 - c. Restart input from the car door open button.
 - d. Test button to simulate power failure.
 - e. UPS bypass control.
 - f. Monitoring of the disconnect switch.
 - g. Lockable shut-off switch.
 - h. Three phase, 208/460 VAC input.
 - i. Battery level LED indicator.
 - j. Necessary fusing for batteries, outputs, logic circuitry and charger.

H. Overspeed Governor

1. Provide a speed governor, located overhead, to operate the car safety.

- a. Maintain the proper tension in the governor rope with a weighted tension sheave located in the pit.
 - 1) Springs used to develop the tension are not acceptable.
- b. Provide rope grip jaws, designed to clamp the governor rope to actuate the car safety upon a predetermined overspeed downward.
 - 1) The centrifugal type governor shall trip and set rope jaws within 60 degrees of governor sheave rotation after reaching rated tripping speed.
- c. Design the governor rope tripping device so that no appreciable damage to or deformation of the governor rope shall result from the stopping action of the device in operating the car safety.
- d. Provide an electrical governor overspeed protective device which shall remove power from the driving machine motor and brake before or at the application of the safety.
 - 1) The setting for the overspeed switch shall be as prescribed in the ASME A17.1 Safety Code.
 - 2) Locate and enclose the switch to ensure that excess lubrication will not enter the switch enclosure.
 - 3) Overspeed switch shall operate in both direction of travel on systems employing a static power drive unit.
- e. Seal and tag the governor with the running speed, tripping speed and date last tested.
- f. Design the governor to prevent false tripping due to conditions caused by rope dynamics.
- g. Governor shall be mounted to the guide rail system or machine beam supports in the hoistway overhead.
 - 1) Coordinate access requirements and testing procedures with the AHJ.
 - 2) Where governor access is not required by the AHJ, governor shall be capable of being manually reset from outside the hoistway.

I. Equipment Isolation

1. Provide effective sound isolation between machines, secondary deflector sheaves, solid state motor drive units and filters, from building structure to reduce noise transmission to occupied spaces and elevators and elevator cabs.
2. When operating per plans and specifications, the elevator equipment shall not generate noise levels in excess of NC-40 in occupied tenant spaces and shall be free of pure tones. For the purposes of this specification, a pure tone shall be defined as a sound level in any one-third octave band which is greater than 5 dB above both adjacent one-third octave bands, in the range 45 to 11,200 Hz.
3. Provide the following as a minimum:

- a. Resiliently isolate the entire elevator/secondary deflector integral unitized base from the elevator machine room floor slab by means of effective neoprene-in-shear isolators having a minimum static deflection of 3/8".
- b. Isolate the transformers and reactance units from the building structure by means of approved neoprene-in-shear isolators having a minimum static deflection of 3/8".
- c. Solid state rectification units shall be mounted on 3/4" thick minimum, neoprene-in-shear pad isolators and an effective electrical filter/reactance limiting electrical noise shall be provided.
- d. Use flexible conduit with ground wire for motor, machine, drive, governor and position/velocity transducer connections.
- e. Isolate the hitch plates and deflector sheave support assembly from the car structure (crosshead) by means of an elastomer pad in compression designed to provide 1/8" deflection under dynamic loading.

J. Overhead and Governor Stop Switches

1. Provide a positive action stop switch at the following locations as required by applicable code:
 - a. Overhead machine space.
 - b. Overhead governor access panel or space as may be mandated by the AHJ.
2. The switch shall be arranged to prevent the application of power to the hoist motor and machine brake when placed in the "OFF" position.
 - a. Clearly identify the switch with permanent marking on the switch cover that indicates "RUN" and "STOP" positions.

K. Emergency Brake

1. Ascending Car Overspeed Protection Device
 - a. Provide a device designed to prevent an ascending elevator from striking the hoistway overhead structure.
 - b. The device shall decelerate the car with any load up to the rated capacity by applying an emergency brake.
 - 1) The device shall detect an ascending car overspeed condition of not greater than 10% higher than the speed that the car governor is set to trip.
 - 2) The device, when activated, shall prevent operation of the car until the device is manually reset.
 - 3) The device shall meet the requirements of the ASME A17.1 Safety Code as may be modified by the AHJ.
2. Unintended Car Movement Protection Device

- a. Provide a device to prevent unintended car movement away from the landing when the car and hoistway doors are not closed and locked.
 - 1) The device shall prevent such movement in the event of failure of:
 - a) The electric driving machine motor.
 - b) The brake.
 - c) The machine shaft or shaft coupling.
 - d) Machine gearing.
 - e) Control system.
 - f) Any component upon which the speed of the car depends.
 - g) Suspension ropes and the drive sheave of the traction machine are excluded.
 - 2) The device shall prevent operation of the car until the device is manually reset.
 - 3) The device shall meet the requirements of the ASME A17.1 Safety Code as may be modified by the AHJ.

2.5 HOISTWAY EQUIPMENT

A. Guide Rails / Inserts / Brackets

1. Provide machined, standard size steel "T" section guide rails with tongue and grooved joints for the car and counterweight. Use not less than 15.0-pound car rails. Size rails to span maximum vertical distance between supports as noted on the drawings.
2. The car guide rails shall be as follows:
 - a. Savera Super Line, Monteferro S or approved equal.
3. Use not less than 3/4" thick machined steel fishplates to form rail joints. Connect rails to fishplate with four (4) bolts.
4. For concrete and concrete block hoistways furnish rail brackets and provide inserts and an insert location drawing to Construction Manager or General Contractor.
5. Brackets shall be used to support the rails from the hoistway framing and/or inserts.
 - a. The rails shall be attached to the brackets by heavy clamps or clips.
 - b. Bolting or welding rails to brackets shall only be allowed in certain instances.
 - c. Do not attach brackets to the top flange of hoistway framing steel.
6. Provide rail backing where the vertical distance between support framing is greater than 14'-0" and no intermediate support framing is shown on the drawing.
7. All guide rails shall be erected plumb and parallel to a maximum deviation of 1/8 inch (plus or minus 1/16 inch).
8. Provide oversized steel members and brackets for the rails where the distances exceed the manufacturer's standard dimensions.

B. Counterweight Assembly / Frame

1. Counterweight shall consist of a steel frame welded or bolted together and necessary steel sub-weights.
 - a. Sub-weights shall be held within the frame by not less than two (2) tie-rods passing through holes in all weights with rods equipped with locknuts, secured by washers and cotter pins at each end.
 - b. The counterweight shall be equal to the weight of the elevator car and approximately 40% of the contract (specified) capacity.
 - c. Provide the required pit counterweight guard where no compensation is used.
 - d. The bottom of the counterweight shall have a buffer striking plate and means to attach knock-off blocks to compensate for varying rope length.

C. Roller Guides

1. Provide roller guide shoes with adjustable mounting base, rigidly bolted to the top and bottom of each side of the car and counterweight frame.
 - a. Roller guides shall consist of a set of sound reducing neoprene wheels in precision bearings held in contact with the three (3) finished rail surfaces by adjustable stabilizing springs.
 - b. The bearings shall be sealed or provided with grease fittings for lubrication.
 - c. Equip roller guides with adjustable stops to control postwise float.
 - d. Fit the top car roller guides with galvanized, painted or powder coated steel guards.
2. Approved applications and manufacturers:
 - a. ELSCO Model B for car roller guides and ELSCO Model D for counterweight guides, or approved equal.

D. Hoist Ropes

1. Pre-formed traction steel wire rope, specifically constructed for elevator applications, shall be provided for suspension of the elevator car and counterweight assembly.
 - a. Fastenings shall be accomplished by use of individual tapered rope sockets (wedge clamp) with adjustable shackles.
 - b. General design requirements for rope shackles and the method of securing wire rope shall conform with ASME A17.1 elevator safety code as modified by, and/or in addition to codes and standards accepted by the AHJ.
 - c. Provide machine-room-less elevators with hoist ropes having steel core.
 - d. Properly select rope for the application and compatibility with the machine drive sheave hardness and groove profile. Design shall provide for a

minimum service life of ten (10) years or one million cycles, whichever occurs first, and shall be substantiated by calculations during the submittal phase.

2. Coated steel belts with steel cords embedded in polyurethane case may be used in lieu of conventional steel hoist ropes subject to approval of the AHJ.
 - a. Belts shall be UL listed and non-combustible.

E. Governor Rope

1. Pre-formed wire rope specifically constructed for elevator applications, shall be provided for governor ropes.
 - a. Rope shall be traction steel or iron in accordance with OEM design requirements.
 - b. Rope diameter and method of fastening shall be in accordance with ASME A17.1 Safety Code as adopted and/or otherwise modified by the AHJ.

F. Electrical Conduit / Wiring / Traveling Cable

1. Electrical wiring shall be provided.
 - a. All wiring shall be stranded copper conductors, manufactured in compliance with ANSI/ASTM B174-71 and UL 62 requirements, and polyvinyl chloride insulation complying with ETT requirements of UL 62 and Article 400 of the National Electric Code.
 - b. Electrical wiring provided for hoistway interlock shall be of a flame retardant type, capable of withstanding temperatures of at least 392 degrees Fahrenheit. Conductors shall be Type SF or equivalent.
 - c. Each run of electrical conduit or duct shall contain no less than 10% spare wires and, in any case, no fewer than two (2) spare wires.
 - d. Crimp-on type wire terminals shall be used where possible.
2. Traveling cable shall be provided.
 - a. Each traveling cable shall be provided with a flame and water resistant polyvinyl chloride jacket.
 - b. Electrical wiring shall consist of stranded copper conductors, manufactured in compliance with ANSI/ASTM B174-71 and UL 62 requirements, and polyvinyl chloride insulation complying with ETT requirements of UL 62 and Article 400 of the National Electric Code.
 - c. Each traveling cable shall contain no less than 10% spare wires.
 - d. Traveling cable exceeding 100' in length shall be provided with a steel wire rope support strand from which the cable shall be suspended.
 - e. Traveling cable must be contained within an approved electrical conduit to within 6' of the final suspension point in the hoistway.

- f. Each traveling cable shall be arranged to provide no fewer than six (6) individually shielded pairs of 20 gauge wire and arranged to contain no less than one (1) coaxial cable for CCTV remote monitoring.
 - g. Traveling cable conductors that terminate at a hoistway center box shall be connected to stud blocks provided for that purpose.
 - 1) Each wiring terminal shall be clearly identified by its nomenclature as shown on the “as built” wiring diagrams and solderless, crimp-on type wire terminals shall be used where possible.
 - h. The attachment of a traveling cable to the underside of the elevator car shall be performed so that a minimum loop diameter of 30x the cable diameter is provided.
 - i. Pre-hang the cables for at least twenty-four (24) hours with ends suitably weighted to eliminate twisting during operation.
3. Rigidly supported EMT conduit, flexible metal conduit and galvanized steel trough shall be utilized throughout the hoistway.
- a. Both EMT and flexible conduit shall be connected on either end by use of compression fittings and secured in place with metal clamps sized in accordance with the diameter of conduit utilized.
 - 1) Wire or plastic wire ty-raps shall not constitute an acceptable means of fastening.
 - b. The use of flexible metal conduit shall be limited to runs not greater than three feet (3') in length.

G. Normal and Final Terminal Stopping Devices

- 1. Provide normal terminal stopping devices to stop the car automatically from any speed obtained under normal operation within the top and bottom overtravel, independent of the operating devices, final terminal stopping device and the buffers.
- 2. Provide final terminal stopping devices to stop the car and counterweight automatically from the speed specified within the top clearance and bottom overtravel.
- 3. The terminal stopping devices shall have rollers with rubber or other approved composition tread to provide silent operation when actuated by the cam fixed to the top of the car.
 - a. Terminal stopping devices that are not mechanically operated (i.e.: magnetic proximity) shall be provided by the manufacturer of the control equipment, intended for use as a terminal limit, and designed for reliable operation in the hoistway environment.

4. Final terminal limits shall be pinned so as to prevent movement after final adjustment where required by the AHJ.

2.6 PIT EQUIPMENT

A. Car and Counterweight Buffers

1. Provide buffer with necessary blocking and horizontal steel braces under the car and counterweight.
2. Provide spring type buffers for elevators with operating speeds of up to and including 200 fpm.
3. Use oil buffers for elevators with operating speeds over 200 fpm.
4. Oil buffer shall bring the car and counterweight to rest from governor tripping speed at an average rate of retardation not exceeding gravity (32 ft/s^2).
5. Oil buffer shall be of the spring return type and shall have means of checking oil supply level.
6. Use reduced stroke buffer with associated terminal slowdown devices where runby is restrictive.
 - a. Buffer and emergency terminal slowdown device shall operate in accordance with applicable codes.
7. The buffer shall be tested and approved by a qualified testing laboratory.
8. Provide a permanent buffer marking plate which indicates the manufacturer's name, identification number, rated impact speed and stroke.
9. Provide a permanent data plate in the vicinity of the counterweight buffer indicating the maximum designed counterweight runby.
10. Support buffers from the pit floor level with all required blocking and bracing steel members.
11. Coordinate the installation of the buffer inspection platform and ladder with the Architect and Construction Manager.

B. Inspection Ladders and Guards

1. Provide the following secondary metal work in the pit, hoistway and in elevator machine room in accordance with bid documents.
 - a. Counterweight shall be guarded by means of a fixed screen from the pit floor to a position of at least 2450 mm (96") above pit floor.
 - b. Pit access ladders.
 - c. Guard around machine and ropes.
2. Submit detailed shop drawings of all miscellaneous metal items for approval.
3. Provide painted sheet steel covers for all dead end hitches.
4. The pit ladder shall have continuous steel flat bar side rails 12 mm (1/2") x 75 mm (3"), with eased edges, spaced a minimum of 400 mm (16") apart. Rungs shall be steel bars 18 mm (3/4") in diameter, spaced 300 mm (12") apart with top to have a

non-slip surface. Rungs shall be located along centerline of side rails, located not less than 180 mm (7") from the nearest permanent object or structure. Plug weld and grind smooth on outer rails faces. Support each ladder at top and bottom and at intermediate points spaced not more than 1500 mm (60"). Extend side rails 1200 mm (48") above top rung.

5. Prime paint and apply two (2) coats of rust inhibiting machinery enamel to metal work specified above.

C. Governor Rope Tension Assembly

1. Provide a governor rope tension assembly.
 - a. Maintain the proper tension in the governor rope with a weighted tension sheave located in the pit.
 - 1) Springs used to develop the tension are not acceptable.
 - b. The sheave shall be of proper diameter and set directly plumb with the governor rope drop to prevent the rope from pulling off of the sheave at an angle.
 - c. Lubrication fittings shall be provided on the assembly.
 - d. The assembly shall have necessary rope guards to prevent accidental contact of the rope/sheave by service personnel and to prevent the governor rope from jumping off of the sheave.

D. Pit Stop Switch

1. Where pit depth does not exceed 67", each elevator pit shall be provided with a push/pull or toggle switch that is conspicuously designated "EMERGENCY STOP" and located so as to be readily accessible from the hoistway entrance on the lowest landing served at a height of approximately 18" above the floor.
 - a. This switch shall be arranged to prevent the application of power to the hoist motor and machine brake when placed in the "OFF" position.

2.7 HOISTWAY ENTRANCES

A. Hoistway Entrance Structure

1. Frames - The frames shall be constructed of 14-gauge sheet steel.
2. Doors - The doors shall be constructed of 16-gauge sheet steel, not less than 1-1/4" thick, reinforced to accept hangers, interlocks or door closers.
3. Equip all hoistway landing doors with one-piece full height non-vision wings of material and finish to match hall side of door panels.
4. Entrances shall bear 1 ½ hour label of Underwriters Laboratories, Inc.

5. Provide each door panel with two removable laminated plastic composition guides, arranged to run in sill grooves with a minimum clearance, replaceable without removing the door from the hangers and incorporating a steel fire stop.
6. Provide rubber bumpers at the top and bottom of the door to stop them at their limit of travel in opening direction.
7. Sills - Provide narrow-type, extruded sills with the nosing approximately one (1) inch deep and running the full length of door travel.
 - a. The sills shall be at least 3/8 inch thick.
 - b. The wearing surface shall be of a non-slip type.
 - c. Rigidly secure the sills to the building construction by means of steel sill support brackets or blocking with necessary metal shimming or adjustments.
 - d. Provide and rigidly secure sill support members to the building structure after blocking and leveling them with necessary metal shimming.
 - 1) Use 4" x 4" x 1/4" angle for single speed entrances and 5" x 5" x 3/8" angle for two speed entrances.
 - 2) If formed sheet steel sill support members are used, the structural properties of these members shall match or exceed the structural properties of 4" x 4" x 1/4" angle for single speed entrances, and 5" x 5" x 3/8" angle for two speed entrances.
8. Struts - Provide 3" x 3" x 1/4" hot rolled steel angle struts.
 - a. If formed sheet steel struts are used, the structural properties of formed struts shall match or exceed the structural properties of 3" x 3" x 1/4" steel angle.
 - b. Extend the struts from top of sill to either the bottom of floor beam or intermediate framing above.
 - c. Bolt struts in place with not less than two (2) bolts at each end.
 - d. Strut clip angles or brackets shall have a thickness not less than the thickness of the supported strut.
9. Track Support - 3/16-inch-thick steel track support plate shall extend between and be bolted to the vertical steel struts with no less than two (2) bolts at each end.
10. Track Covers – 14 gauge steel cover plates shall extend the full travel of the doors.
 - a. Covers shall be made in sections for service access to hangers, sheaves, tracks and interlocks.
 - b. The sections above the door opening shall be movable from within the elevator car.
 - c. Cover fastening devices shall be non-removable from the cover.
11. Fascias – 14 gauge steel fascia plates shall extend at least the full width of the door and be secured at hanger support and sill with oval head machine screws.

- a. Provide fascia plates where the clearance between the edge of the loading side of the platform and the inside face of the hoistway enclosure exceeds the code allowed clearance.
12. Toe Guards - Provide 14 gauge steel toe guards to extend twelve (12) inches below any sill not protected by fascia.
 - a. The toe guards shall extend the full width of the door and shall return to the hoistway wall at a 15-degree angle and be firmly fastened.
 13. Dust Covers - Provide 14 gauge steel dust covers to extend six (6) inches above any header not protected by fascia.
 - a. The dust covers shall extend to a full width of travel of the doors, return to the hoistway wall at a 15-degree angle and be firmly fastened.
 14. The bottom of each horizontally sliding hoistway door panel shall be equipped with guiding members and safety retainers in accordance with A17.1 Safety Code as adopted and/or modified by the AHJ.
 - a. The bottom hoistway door panel safety retainers shall be of stainless steel "Z" bar design, or shall be otherwise designed to prevent displacement of the door panel.
 - b. Elevator Contractor must submit proof to the Department, in the form of a statement certified by a licensed architect or engineer, that the engineering and design of the safety retainers comply with the performance standard defined in Appendix "K".
- B. Tracks / Hangers / Closers / Related Equipment**
1. Formed or extruded steel landing door hanger tracks shall be provided.
 2. Each landing door panel shall be suspended from a pair of door hanger assemblies that are compatible with the hanger tracks.
 - a. Hanger assemblies shall be directly mounted to the door panel using 3/8" diameter or better hardware.
 - b. Solid steel blocks shall be used where job-site conditions dictate the use of spacers between hanger assemblies and the landing door panel.
 - c. Hanger assemblies shall be adjusted or shimmed so that door panels are suspended in a plumb manner with no more than 3/8" vertical clearance to the cab entrance threshold.
 - d. Upthrust rollers shall be adjusted for minimal operating clearance against the bottom edge of the hanger track.
 - e. Means shall be provided to prevent hangers from jumping the track.
 - f. Blocks shall be provided to prevent rollers from overrunning the end of the track.

3. Each set of single speed side slide landing doors shall be provided with a sill-mounted spring closing mechanism.
 - a. Spirator-type spring closers shall be acceptable should prevailing sill depth or runby clearance conditions require their use.

C. Interlocks / Unlocking Devices

1. Each set of landing doors shall be provided with a complete electromechanical interlock assembly.
 - a. Each interlock assembly shall consist of:
 - 1) A switch housing with contacts.
 - 2) Lock keeper.
 - 3) Clutch engagement/release subassembly.
 - 4) Associated linkages.
 - b. Arrange the lock so that individual leading door panels (side slide or center opening) are locked when in the closed position.
2. Non-typical mounting arrangements for interlocks and/or related mechanisms must receive prior approval from the Consultant.
3. Each hoistway door interlock assembly shall be provided with an emergency release mechanism utilizing a drop-leaf type access key at all landings served.
 - a. Each hoistway door shall accommodate manufacturers standard lock release key with escutcheon.
 - 1) The key hole shall be fitted with a metal ferrule that matches the door finish.
 - 2) Drilling key holes in the field will not be accepted.

2.8 CAR EQUIPMENT / FRAME

A. Car Frame and Platform

1. The car frame shall be made of steel members, with the required factor of safety.
2. The car platform shall consist of a steel frame with necessary steel stringers, all securely welded together.
3. The frame and platform shall be so braced and reinforced that no strain will be transmitted to the elevator car.
4. Passenger Elevators
 - a. Provide platform with two (2) layers of 3/4" thick marine grade plywood.
 - b. Cover the underside of the car platform with sheet steel.
 - c. The support frame shall carry rubber pads on which the platform shall rest without any connection to the steel frame for sound and vibration isolation.

- d. Provide extruded stainless steel thresholds having non-slip surface, guide grooves.
- e. Recess the platform to receive finished flooring as selected by the architect and specified under another section of their specification.
- f. The car frame shall be sized for an 8'-0" overall cab height.
- g. Design the elevator frames and platforms for a Class A freight loading.

B. Car Safety

1. Provide a governor actuated mechanical safety device mounted under the car platform and securely bolted to the car sling.
2. The car safety shall be sized for the capacity and speed noted herein.
 - a. When tripped, the safety mechanism shall engage the rails with sufficient force to stop a fully loaded car with an average rate of retardation within the limits given in A17.1 Safety Code as adopted and/or otherwise modified by the AHJ.
3. Install a car safety marking plate of corrosion resistant metal and, in addition to the data required by Code, indicate the manufacturer's name and manufacturer's catalog designation number for safety.
4. Make provisions to release the car safety. In no event shall the safety be released by downward motion of the car. Raising the car to reset the safety shall be allowed.
5. Provide an electrical safety plank switch that will interrupt the power to the hoist machine and apply the machine brakes when the safety is set.

C. Automatic Leveling / Releveling / Positioning Device

1. Equip the elevator with a floor leveling device which shall automatically bring the car to a stop within 1/4" of any floor for which a stop has been initiated regardless of load or direction of travel.
2. This device shall also provide for releveling which shall be arranged to automatically return the elevator to the floor in the event the elevator should move below or above floor level in excess of 1/4".
3. This device shall be operative at all floors served and whether the hoistway or car door is open or closed provided there is no interruption of power to the elevator.
4. A positioning device shall be part of the controller microprocessor systems.
 - a. Position determination in the hoistway may be through fixed tape in the hoistway or by sensors fitted on each driving machine to encode and store car movement.
 - b. Design the mechanical features and electrical circuits to permit accurate control and rapid acceleration and retardation without discomfort.
5. Where there are consecutive floors/stops that are short stops, the system shall be capable of distinguishing between the two landing zones without error.

6. All equipment and logic required for leveling system to properly function with short stops shall be included.

D. Top-of-Car Inspection Operating Station

1. An inspection operating station shall be provided on top of the elevator car.
2. This station shall be installed so that the controls are plainly visible and readily accessible from the hoistway entrance without stepping on the car.
3. When the station is operational, all operating devices in the car shall be inoperative.
4. Provide the following control devices and features:
 - a. A push/pull or toggle switch designated “EMERGENCY STOP” shall be arranged so as to prevent the application of power to the hoist motor or machine brake when in the “off” position.
 - b. A toggle switch designated “INSPECTION” and “NORMAL” to activate the top of car Inspection Service Operation.
 - c. Push button designated “Up”, “Down” and “Enable” to operate the elevator on Inspection Service (the “Enable” button shall be arranged to operate in conjunction with either the “Up” or “Down” button).
 - d. An indicator light and warning buzzer that are subject to activation under Phase I - Fire Emergency Recall Operation.

E. Load Weighing Device

1. Provide means to measure the load in the car within an accuracy of $\pm 4\%$ of the elevator capacity.
2. Provide one of the following types of devices:
 - a. A device consisting of four (4) strain gauge load cells located at each corner of the car platform and supporting a free floating car platform and cab with summing circuits to calculate the actual load under varying conditions of eccentric loading.
 - b. A strain gauge device located on the crosshead, arranged to measure the deflection of the crosshead and thus determine the load in the car.
 - c. A device consisting of four (4) strain gauge load cells, supporting the weight of the elevator machine with summing circuits to calculate the actual load under varying conditions of load.
 - d. A device to measure the tension in the elevator hoist ropes and thus determine the load in the car.
3. Arrange that the output signal from the load weighing device be connected as an input to the signal and motor control systems to pre-torque of the hoisting machine motors where applicable.
4. Provide audible and visual signals in connection with the load weighing device when used as an “overload” device.

F. Car Enclosure Work Light / Receptacle

1. The top and bottom of each car shall be provided with a permanent lighting fixture and 110 volt GFI receptacle.
2. Light control switches shall be located for easy accessibility from the hoistway entrance.
3. Where sufficient overhead clearance exists, the car top lighting fixture shall be extended no less than 24" above the crosshead member of the car frame.
4. Light bulbs shall be guarded so as to prevent breakage or accidental contact.

G. Emergency Exits / Top

1. Ensure they operate as per code and have proper electrical contacts and mechanical locks on the exterior of the cab enclosure.
2. No other key to the building shall unlock the emergency exit lock except access switch keys which may be keyed alike.
 - a. Keys shall be assigned in accordance with ASME A17.1 Group 1 Security requirements.

H. Master Door Power Operator System – VVVF/AC

1. Provide a heavy-duty master door operator on top of the elevator car enclosure for power opening and closing of the cab and hoistway entrance door panels.
2. The operator may be of the pivot/lever or belted linear drive type.
3. Operator shall utilize an alternating current motor, controlled by a variable voltage, variable frequency (VVVF) drive and a closed-loop control with programmable operating parameters.
 - a. System may incorporate an encoder feedback to monitor positions with a separate speed sensing device or an encoderless closed-loop VVVF-AC control to monitor motor parameters and vary power applied to compensate for load changes.
4. The type of system shall be designated as a high speed operator, designed for door panel opening at an average speed of two (2.0) feet per second and closing at approximately one (1.0) foot per second.
 - a. Reduce the closing speed as required to limit kinetic energy of closing doors to within values permitted by ASME A17.1 as may be adopted and/or modified by the AHJ.
5. The door shall operate smoothly without a slam or abrupt motion in both the opening and closing cycle directions.
 - a. Provide controls to automatically compensate for load changes such as:
 - 1) Wind conditions (stack effect).
 - 2) Use of different weight door panels on multiple landings.

- 3) Other unique prevailing conditions that could cause variations in operational speeds.
- b. Provide nudging to limit speed and torque in conjunction with door close signaling/closing and timing devices as permitted by ASME A17.1 as may be adopted and/or modified by the AHJ. Nudging shall be initiated by the signal control system and not from the door protective device.
6. In case of interruption or failure of electric power from any cause, the door operating mechanism shall be so designed that it shall permit emergency manual operation of both the car and corridor doors only when the elevator is located in the floor landing unlocking zone.
 - a. The hoistway door shall continue to be self-locking and self-closing during emergency operation.
 - b. The door operator and/or car door panel shall be equipped with safety switches and electrical controls to prevent operation of the elevator with the door in the open position as per ASME A17.1 Code Standards.
 - c. Provide zone-lock devices as required by ASME A17.1 as may be adopted and/or otherwise modified by the AHJ.
7. Construct all door operating levers of heavy steel or reinforced extruded aluminum members.
8. Belts shall be designed for long life and operate noise free.
9. All components shall be designed for stress and forces imposed on the related parts, linkages and fixed components during normal and emergency operation functions.
 - a. All pivot points, pulleys and motors shall have either ball or roller-type bearings, oilite bronze bushings or other non-metallic bushings of ample size.
10. Provide operating data / data tag permanently attached to the operator as required by applicable code and standards.
- I. Door Reopening Device
 1. Provide an infrared curtain door protection system.
 2. The door shall be prevented from closing and reopen when closing if a person interrupts any one of the light rays.
 3. The door shall start to close when the protection system is free of any obstruction.
 4. The infrared curtain protective system shall provide:
 - a. Protective field not less than 71" above the sill.
 - b. Where a horizontal infrared light beam system is used:
 - 1) A minimum of forty-seven (47) light beams.
 - 2) Accurately positioned infrared lights to conform to the requirements of the applicable handicapped code.

- c. Modular design to permit on board test operation and replacement of all circuit boards without removing the complete unit.
- d. Controls to shut down the elevator when the unit fails to operate properly.

2.9 FINISH / MATERIALS / SIGNAGE

A. Material, Finishes and Painting

1. General

- a. Cold-rolled Sheet Steel Sections: ASTM A366, commercial steel, Type B
- b. Rolled Steel Floor Plate: ASTM A786
- c. Steel Supports and Reinforcement: ASTM A36
- d. Aluminum-alloy Rolled Tread Plate: ASTM B632
- e. Aluminum Plate: ASTM B209
- f. Stainless Steel: ASTM A167 Type 302, 304 or 316
- g. Stainless Steel Bars and Shapes: ASTM A276
- h. Stainless Steel Tubes: ASTM A269
- i. Aluminum Extrusions: ASTM B221
- j. Nickel Silver Extrusions: ASTM B155
- k. Bronze Sheet: ASTM B36(36M) alloy UNS No. C2800 (Muntz Metal)
- l. Structural Tubing: ASTM A500
- m. Bolts, Nuts and Washers: ASTM A325 and A490
- n. Laminated / Safety Tempered Glass: ANSI Z97.1

2. Finishes

- a. Stainless Steel
 - 1) Satin Finish: No. 4 satin, long grain.
 - 2) Mirror Finish: No. 8 non-directional mirror polished.
- b. Sheet Steel:
 - 1) Shop Prime: Factory-applied baked on coat of mineral filler and primer.
 - 2) Finish Paint: Two (2) coats of low sheen baked enamel, color as selected by the Architect.
 - 3) Steel Equipment: Two (2) coats of manufacturer's standard rust-inhibiting paint to exposed ferrous metal surfaces in both the hoistway and pit that do not have galvanized, anodized, baked enamel, or special architectural finishes.

3. Painting

- a. Apply two (2) coats of clear lacquer to bronze or similar non-ferrous materials to prevent tarnishing during a period of not less than twelve (12) months after initial acceptance by the Owner or Agent.

- b. Identify all equipment including buffers, car apron, crosshead, safety plank, machine, controller, drive, governor, disconnect switch, etc., by 4" high numerals which shall contrast with the background to which it is applied. The identification shall be either decalcomania or stencil type.
- c. Paint or provide decal-type floor designation not less than four (4) inches high on hoistway doors (hoistway side), fascias and/or walls as required by A17.1 as may be adopted and/or modified by the AHJ. The color of paint used shall contrast with the color of the surface to which it is applied.

B. Hoistway Entrances Finish and Design

1. Hoistway entrances and door panels shall be finished as specified by the Owner.
2. Where no finish is specified, finishes shall be baked enamel primer gray.
3. Refer to specifications for other design requirements.

C. Hoistway Entrances

1. Entrance Frames:
 - a. Passenger Elevators - Provide stainless steel with No. 4 finish unit frame with welded and mitered corners ground smooth, 2" wide square profile.
2. Door Panels:
 - a. Stainless steel with No. 4 finish.
3. Entrance Sills:
 - 1) Extruded stainless steel.

D. Designation and Data Plates, Labeling and Signage.

1. Provide an elevator identification plate on or adjacent to each entrance frame where required by the AHJ.
2. Provide an elevator identification plate on or adjacent to each entrance frame at the designated landing only as required by code.
3. Elevators shall be identified by "number" only. Where a "letter" is used to identify the elevator, the letter shall indicate the Bank the elevator is in.
 - a. The designation numeral shall be a minimum of 3" in height.
4. For MRL elevators; provide permanent engraved signage indicating the location of the main line disconnect switch(es) for the elevator or bank of elevators.
 - a. The sign shall be located on or adjacent to the Firefighters' Emergency Phase I key switch located at the designated landing.
 - b. Lettering must be a minimum of 6 mm (0.25 in) high in red or a color contrasting with a red background.

5. Provide floor designation cast plates at each elevator entrance, on both sides of the jamb at a height of sixty (60) inches to the baseline of floor indication.
 - a. Floor number designations and Braille shall be 2" high, 0.03" raised and stud mounted.
6. Identify the designated medical emergency services elevator with 3" high international symbol at each elevator entrance on both sides of the jamb.
7. Provide raised designations and Braille markings to the left of the car call and control buttons of the car operating panel(s).
 - a. Designations shall be a minimum of 5/8" high, 0.03" raised and stud mounted.
8. Provide elevators with data and marking plates, labels, signages and refuge space markings complying with A17.1 Elevator Safety Code as may be adopted and/or otherwise modified by the AHJ.
 - a. In addition to information listed on the crosshead data plate as required by A17.1, the plate shall include the weight required to be placed in the elevator to achieve balanced load.
9. Architect shall select the designation and data plates from manufacturer's premium line of plates.

2.10 FIXTURES / SIGNAL EQUIPMENT

A. General - Design and Finish

1. The design and location of the hall and car operating and signaling fixtures shall comply with the ADAAG and local requirements of the AHJ.
2. The operating fixtures shall be selected from the manufacturer's premium line of fixtures.
3. Custom designed operating and signaling fixtures shall be as shown on the drawings or as approved by the Owner / Architect.
4. The layout of the fixtures including all associated signage and engraving shall be as approved by the Owner / Architect.
5. Where no special design is shown on the drawings, the buttons shall be as follows:
 - a. Stainless steel convex type as selected by the Architect from the manufacturer's premium line of push buttons.
 - b. The button shall have a collar with LED call registered light.
6. Where no special design is shown on the drawings, the faceplates shall be as follows:
 - a. 1/8" thick stainless steel with No. 4 finish and tamperproof screws.

7. Mount passenger elevator fixtures with concealed fasteners. The screw/fastener and key switch cylinder finishes shall match faceplate finish.
8. Where key-operated switch and or key operated cylinder locks are furnished in conjunction with any component of the installation, four (4) keys for each individual switch or lock shall be furnished, stamped or permanently tagged to indicate function.
9. All caution signs, pictographs, code mandated instructions and directives shall be engraved and filled with epoxy in code required colors.

B. Main Car Operating Panel

1. Provide a main car operating push button panel on the inside front return panel of the car
2. Car operating panel shall be incorporated in the swing-front return of the elevator cab.
 - a. Coordination with car front manufacturer shall be the responsibility of the Elevator Contractor.
3. The push buttons shall become individually illuminated as they are pressed and shall extinguish as the calls are answered.
4. The operating panel shall include:
 - a. A call button for each floor served, located not more than 48" above the cab floor.
 - b. "Door open" / "Door close" buttons.
 - c. "Alarm" button, interfaced with emergency alarm. The alarm button shall illuminate when pressed.
 - d. "Emergency Stop" switch per local law located at 35" above the cab floor.
 - e. Self-dialing, hands-free emergency communication system actuation button with call acknowledging feature and ASME A17.1. design provisions.
 - f. Three (3) position firefighter key operated switch, call cancel button and illuminated visual/audible signal system with mandated signage engraved per ASME A 17.1 Standards as modified by the AHJ.
 - 1) The "City-Wide Standard Key" (#2642) as well as the "Fire Department Standard Key" (#1620), shall be used for all Fire Emergency operating devices.
5. Provide a locked service cabinet flush mounted and containing the key switches required to operate and maintain the elevator, including, but not limited to:
 - a. Independent service switch.
 - b. Light switch.
 - c. Fan switch.
 - d. G. F. I. duplex receptacle.

- e. Emergency light test button and indicator.
 - f. Inspection Service Operation key switch.
 - g. Port for hand-held service tool where applicable.
 - h. Dimmer for cab interior lighting.
6. Car operating panel shall incorporate:
- a. An integral (no separate faceplate) digital L.E.D. floor position indicator.
 - b. Emergency light fixture (without a separate faceplate) and black-filled engraved unit I.D. number or other nomenclature, as approved by Owner.
 - c. A “No Smoking” advisory.
 - d. The rated passenger load capacity in pounds.
 - e. The number of persons on passenger elevators and freight elevators approved for passenger use based on the capacity divided by one hundred sixty (160) pounds per person.
7. Where posting of an advisory is permitted by the Governing Authority in lieu of the inspection certificate, engrave the following advisory on the hinged cover of the service cabinet, or where otherwise directed by the Owner.
- a. Inspection Certificate is On File in the Building Management Office Located on the (indicate floor).

C. Car Position Indicator

1. The position of the car in the hoistway shall be indicated by the illumination of the position indicator numeral corresponding to the floor at which the car has stopped or is passing.
 - a. Provide 2” high, 10-segment LED type position indicator with direction arrows, integral with the car operating panel.
 - b. Provide Lexan cover lens with hidden support frame behind fixture plate to protect the indicator readout.
 - c. Provide audible floor passing signal per ADA standards where not provided by the elevator signal control.
 - d. Flush mount fixture with cover to match selected car front or car operating panel finish as directed by the Owner.

D. Car Direction Lantern

1. Provide a car riding lantern with visual and audible signal in the edge of the strike and/or return post.
2. The lens shall be digital.
3. Use concealed fasteners for flush faceplate with hairline joint.
4. Car lantern shall indicate the direction of travel when doors are 3/4 open.
5. The unit shall sound once for the “up” direction and twice for the “down” direction.

- a. Provide an electronic chime with adjustable sound volume.

E. Corridor Push Button Stations / Riser

1. A riser of push button signal fixtures shall be provided on all floors.
2. Each signal fixture shall consist of the following:
 - a. A flush-mounted faceplate.
 - b. Illuminating tamper-resistant push buttons measuring 3/4" at their smallest dimension as selected by the Owner.
 - c. A recessed mounting box, electrical conduit and wiring.
3. Intermediate landings shall be provided with fixtures containing two (2) push buttons while terminal landings shall be provided with fixtures containing a single push button.
4. Include firefighter key switch in the main lobby level station or other designated recall landing fixture.
5. Push button signal fixtures shall be installed within ADA reach range above the floor and shall be installed both plumb and flush to the finished wall.
 - a. Standardize the final distance on all floors.
6. Fixture faceplates shall be installed adjacent to the entrance frame on front wall.

F. Hoistway Access Switch

1. Install a cylindrical type keyed switch at top terminal in order to permit the car to be moved at slow speed with the doors open to allow authorized persons to obtain access to the top of the car.
2. Where there is no separate pit access door, a similar switch shall be installed at the lowest landing in order to permit the car to be moved away from the landing with the doors open in order to gain access to the pit.
3. Locate the switch in the terminal floor entrance jambs in a separate fixture with a flush cover plate at a height of 78" above the finished floor. Cover plate shall be of a design and style as approved by the Owner, the Owner's representative or Architect.
4. This switch is to be of the continuous pressure spring-return type and shall be operated by a cylinder type lock having not less than a five (5) pin or five (5) disc combination with the key removable only in the "OFF" position.
 - a. The lock shall not be operable by any key which operates locks or devices used for other purposes in the building and shall be available to and used only by inspectors, maintenance men and repairmen in accordance with A17.1 applicable Security Group.

2.11 CAR ENCLOSURES

A. Elevator Cab / General Design Requirements

1. The design, materials and finishes of the cab enclosures shall be as shown on the Architectural Drawings.
2. Materials:
 - a. Particleboard: Premium grade, AWI, Section 200, fire retardant treated, equal to Duraflake FR
 - b. Plastic Laminate: Comply with NEMA LD3, 0.05" thick, color, texture and finish as selected by the architect
 - c. Wood Panels: AWI Premium Grade, quarter sliced veneer.
 - d. Trims: AWI Premium Grade quarter sawn red oak / cherry / maple / mahogany
3. Steel Shell: 14-gauge furniture steel reinforced and designed to accept finished wall panels. Finish shell panels with one coat of rust inhibitive primer and two (2) coats of enamel paint in accordance with Section 099100. Apply 1/8" thick, rubberized sound deadening material to the hoistway side of the shell.
 - a. All panels shall have minimum radii. Apply sealant beads to panel joints before bolting together with lock washers.
4. Canopy: Canopy construction methods shall match the shell walls. Use 12-gauge furniture sheet steel and adequately support canopy to comply with the loading requirements of the Code.
 - a. Provide necessary cutouts for the installation of fan and top emergency exit. Arrange exit panel to swing up using a heavy duty piano hinge.
 - b. The exit panel shall have dual locks, necessary stops and a handle.
 - c. When in the locked position, the panel shall be flush with the interior face of the canopy with hairline joints.
5. Base: Where finished base provided under another section of these specifications, recess and prepare the shell to accept the base.
 - a. Provide concealed vent slots above side and rear wall base for proper ventilation. Arrange and size vent slots for quiet operation without any whistling. Use 16 gauge baffles to protect the hoistway side of the vent slots.
 - b. The elevator cab shop drawings shall include elevator vent calculations and number, location and size of top and bottom vent holes.
6. Flooring: Where finished flooring is provided under another section of these specifications, recess and prepare sub-flooring to accept the finished flooring.
7. Front Return Panels, Entrance Posts and Transom: Use 14-gauge furniture sheet steel with proper reinforcing to prevent oil canning.

- a. Fixed type return panel shall have required cutouts for car operating and signaling fixtures.
 - b. Swing front return panels shall have required cutouts for the car call buttons, keyed switches, indicators, emergency light fixture, cabinets and the specified special control and signaling devices.
 - 1) Provide concealed full height stainless steel piano hinges of sufficient strength to support the panel, without sagging, in the open position.
 - 2) The concealed locks shall secure the panel at two (2) points with linkage that shall be free of vibration and noise when in the locked position.
 - 3) When locked in the closed position, the front return panel shall be in true alignment with the transom and base.
 - 4) Lock release holes shall be not more than 1/4" diameter and be located at the return side jamb of the panel.
 - 5) Engrave the elevator identification number and capacity, no smoking sign, firefighter instructions, and other code mandated instructions and caution signs directly in the front return panel. Applied panels are unacceptable.
 - c. Transom shall be 14 gauge, and be reinforced and constructed the same as the front return panels.
 - d. Construct entrance posts for the passenger elevators from 12-gauge sheet steel and reinforce to maintain vertical alignment with the adjacent panels.
 - e. Provide channel post entrance jambs for the service elevators. Clad channels with 14-gauge sheet steel and through bolt channels to the floor and to the reinforced header section.
8. Cab Doors: Standard 1" thick, 14-gauge hollow metal flush construction, reinforced for power operation and insulated for sound deadening. Paint hatch side of doors black and face cab side with 16-gauge sheet steel in selected material and finish.
- a. The door panels shall have no binder angles. All welds shall be continuous, ground smooth and invisible.
 - b. Drill and reinforce doors for installation of door operator hardware, door protective device, door gibs, etc.
9. Ceiling: Construction techniques for wall panels shall apply to ceiling panel construction. Locate top emergency exit inconspicuously. Construct and mount the exit panel to prevent light leakage around the perimeter of panel.
10. Ventilation: The ventilation system of the exhaust type shall be provided in each elevator.
- a. The system shall include a blower driven by a direct connected motor and mounted on top of car with isolation to effectively prevent transmission of vibration to the car structure. The blower shall have not less than two (2) operating speeds. The ventilation system shall be sized to provide one (1) air

- change per minute at low speed and one and one-half (1.5) air changes per minute at high speed. The unit design and installation shall be such that the maximum noise level, when operating at high speed, shall not exceed 55 dBA approximately three (3) feet above the car floor. A three (3)-position switch to control the blower shall be provided in the service panel.
- b. The fan or blower shall start upon the pressing of a car or landing call button and shall stop a predetermined time (approximately two [2] minutes) after the car has answered the last registered call.
 - c. The cab ventilation fan shall be designed not to consume more than .33 watts per CFM while operating at maximum speed.
11. Lighting: Arrange lighting fixtures and ceiling assembly to provide even illumination without hot spots and shadows. Overlap fluorescent lamps where cove lighting is specified.
- a. Design and configure lighting system to facilitate maintenance of the fixtures.
 - b. Cab lighting source shall be designed to provide a minimum of 35 lumens per watt.
 - c. When an unoccupied elevator has remained stationary for fifteen (15) minutes, the cab lighting shall become de-energized. The control system shall automatically re-energize the lighting system upon opening of the cab door.
12. Handrails: All attachment hardware shall match the selected handrail and shall permit handrail removal from within the cab.
- a. Provide a minimum of 10-gauge plate at the hatch side of the shell, aligned with the handrail attachment points, to assure secure handrail mounting.
 - b. Design handrail attachment system to support the weight of a person (two hundred fifty [250] pounds) sitting on it without any deflection and damage to the handrail, cab panel and the shell.
13. Protective Pads and Pad Hooks: Provide pad hooks at locations as directed by the Architect. Protective pads shall cover the front return panels, and the side and rear walls. Provide cutouts in pads for access to the cab operating and signaling devices. Pads shall be fire-resistant canvas with two (2) layers of cotton batting padding.
- a. Identify each pad by elevator number and wall location.
14. Accessories: Construct elevator cab to accommodate the door operator, hangers, interlocks and all accessory equipment provided under other sections of these specifications, including firefighter phones, card readers and CCTV.
15. All cab materials shall conform to the code prescribed flame spread rating and smoke development requirements.

B. Cab Fabrication and Installation

1. Maintain accurate relation of planes and angles with hairline fit of contacting panels and/or surfaces.
2. Any shadow gaps (reveals) between panels shall be consistent and uniform.
3. Unless otherwise specified or shown on the drawings, for work exposed to view use concealed fasteners.
4. Maximum exposed edge radius at corner bends shall be 1/16". There shall be no visible grain difference at the bends.
5. Form the work to the required shapes and sizes with smooth and even curves, lines and angles. Provide necessary brackets, spacers and blocking material for assembly of the cab.
6. Interior cab surfaces shall be flat and free of bow or oil canning. The maximum overall deviation between the low and high points of 24" x 24" panel section shall not exceed 1/32".
7. Make weights of connections and accessories adequate to safely sustain and withstand stresses to which they will be subjected.
8. All steel work except stainless steel and bronze materials shall be painted with an approved coat of primer and one (1) coat of baked enamel paint.
9. Cab Finish Warranty Enhancement
 - a. Contractor shall be responsible for engineering and installing interior cab finishes in a manner that will withstand all code mandated inspections and test procedures. Failure of finishes during testing shall be repaired by the contractor without expense to the owner. Any objections or qualifications to material selection or design shall be identified during the engineering of the cab interior drawings for review by the owner.

C. Passenger Elevators

1. Wall Panels:
 - a. 9/16" thick, clear, transparent, laminated glass panels in stainless steel mullions. Mullion corners shall be mitered, welded and ground smooth for unit frame appearance. Use 1/8" thick durometer neoprene gasket for installing the glass panels.
 - 1) Alternate: 3/4" thick fire retardant plywood or particleboard with all surfaces faced with textured stainless steel as directed by the Architect. The panels shall be constructed as the removable type.
2. Canopy: Paint canopy with a coat of primer and one coat of low sheen enamel paint.
3. Front Return Panels: Stainless steel with No. 4 finish.
4. Cab Doors: Stainless steel with No. 4 finish.
5. Ceiling:
 - a. Suspended 3/4" thick fire retardant plywood or particleboard with all surfaces finished in brushed stainless steel.

6. Handrails:
 - a. Round stainless steel handrail at the rear wall with size selected by the architect.
7. Lighting:
 - a. The cab lighting system shall be as shown on the drawings.
 - b. Fully recessed rectangular LED down light fixtures with bronze reflector. Unless otherwise shown on the drawings, provide a light fixture in each ceiling panel.
8. Base: Provide a 4" high stainless steel base, flush with wall panels at the sides and rear of the cab enclosure.

D. Elevator Security Mirror (NYC Multiple Dwellings)

1. Provide a mirror within the car enclosure which will enable waiting passengers to view the inside of the cab to determine if any person is in the elevator prior to entering.

E. Inspection Certificate and Frame (NYC Buildings)

1. Provide the mandated inspection card frame for posting the required certificate or an alternate plaque as directed by the Owner designee.
2. The alternate plaque shall indicate the location of the certificate within the building, including floor and/or room designation, where access is available during normal business hours.

2.12 EMERGENCY LIGHTING / COMMUNICATIONS / SIGNALING

A. Battery Back Up Emergency Lighting Fixture and Alarm

1. Provide a self-powered emergency light unit.
 - a. The light fixture shall contain a minimum of two (2) LED lamps. Flush mount the light fixture in the main car station. The fixture shall have a milk white lens.
2. Provide a car-mounted battery unit including solid-state charger and testing means enclosed in common metal container.
 - a. The battery shall be rechargeable nickel cadmium with a ten (10)-year minimum life expectancy. Mount the power pack on the top of the car.
 - b. Provide a 6" diameter alarm bell mounted directly to the battery/charger unit and connected to sound when any alarm push button or stop switch in the car enclosure is operated.

- c. The bell shall be configured to operate from power supplied by the building emergency power generator. The bell shall produce a sound output of between 80-90 dBa (measured from a distance of 10') mounted on top of the elevator car.
 - 1) Activation of this bell shall be controlled by the stop switch and alarm button in the car operating station.
 - 2) The alarm button shall illuminate when pressed.
3. Where required by Code for the specific application, the unit shall provide mechanical ventilation for at least one (1) hour.
4. The operation shall be completely automatic upon failure of normal power supply.
5. Unit shall be connected to normal power supply for car lights and arranged to be energized at all times so it automatically recharges battery after use.

B. Central Exchange Communication System / Intercom

1. Provide an ADA compatible, hands-free intercommunication system for all elevators for two-way, multi-path communication between the elevator car stations and master stations using a central exchange design system.
2. The communication system shall include:
 - a. A car station in each elevator.
 - b. A master station in each machine room to communicate with the central and satellite monitor panels, and with each car within its group.
 - c. A master station where selected by the Owner.
3. The car station shall have a loudspeaker and a microphone to provide hands-free communication. The station shall be installed behind the car operating panel.
4. Master stations shall include:
 - a. Selector push buttons.
 - b. Annunciator lights for each connected station.
 - c. Speaker/microphone.
 - d. Volume control and function buttons.
5. The master stations shall communicate with other master stations and any elevator in that group.
6. A call shall be placed from the elevator car station by pressing the emergency call or alarm button.
 - a. This action shall cause the lamp in the corresponding button of all the designated master stations to flash and an intermittent tone to be heard.
 - b. When the incoming call is answered, the flashing light shall go to a steady condition.
 - c. Disconnection of a call is simply done by depressing the designated car button once.

- d. If a call request is placed during a conversation, it shall be indicated by a flashing light and short tone of every designated master station.
 - e. When the original conversation is completed, the normal intermittent tone shall resume.
7. A master station shall be connected to any of its designated car stations by depressing the corresponding call button.
 - a. The lamp in the button shall be illuminated while the button is depressed.
 - b. In the car station an audible tone shall be emitted and immediate communication is established.
 - c. The call shall be ended by depressing the button a second time, disconnecting the circuit.
 - d. The master stations shall call any other master station by depressing the corresponding call button.
 - e. The button shall lock in its down position and the lamp shall be lit with a steady light.
 - f. At the called master station, a short tone shall be sent out and the lamp in the button corresponding to the “calling” party shall be lit.
 - g. After the tone, immediate communication is established.
 8. On all non-called master stations, the lamps corresponding to the calling and called stations shall be illuminated as an indication that those stations are busy.
 9. Provide all power supplies, wire, conduit, fittings, etc., for both systems.
 10. Location of the stations, in the specified rooms or areas, shall be directed by the Owner.
 11. The intercom system shall include the following features:
 - a. Test button and monitoring features to verify audio circuit path.
 - b. All call buttons to initiate a call to all cars in the systems.
 - c. Priority button in the remote monitoring panel stations.
 - d. Visual acknowledgment and engraving for the hearing impaired.
 12. Provide a battery backup power supply for the intercom capable of providing sufficient power to operate the complete system for a minimum of four (4) hours.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspection

1. Study the Contract Documents with regard to the work as specified and required so as to ensure its completeness.
2. Examine surface and conditions to which this work is to be attached or applied and notify the Owner in writing if conditions or surfaces are detrimental to the proper

and expeditious installation of the work. Starting the work shall imply acceptance of the surfaces and conditions to perform the work as specified.

3. Verify, by measurements at the job site, dimensions affecting the work. Bring field dimensions which are at variance with those on the accepted shop drawings to the attention of the Owner. Obtain the decision regarding corrective measures before the start of fabrication of items affected.
4. Cooperate in the coordination and scheduling of the work of this section with the work of other sections so as not to delay job progress.

3.2 INSTALLATION / PROJECT PHASING

A. Installation

1. Install the elevators, using skilled personnel in strict accordance with the final accepted shop drawings and other submittals.
2. Comply with the code, manufacturer's instructions and recommendations.
3. Coordinate work with the work of other building functions for proper time and sequence to avoid delays and to ensure right-of-way of system. Use lines and levels to ensure dimensional coordination of the work.
4. Accurately and rigidly secure supporting elements within the shaftways to the encountered construction within the tolerance established.
5. Provide and install motor, switch, control, safety and maintenance and operating devices in strict accordance with the submitted wiring diagrams and applicable codes and regulations having jurisdiction.
6. Ensure sill-to-sill running clearances do not exceed 1 ¼" at all landings served.
7. Erect guide rails plumb and parallel with a tolerance of 1/8" (plus or minus 1/16").
8. Install rails so joints do not interfere with brackets, attachment points and divider beam.
9. Set entrance plumb in hoistway and in alignment with guide rails prior to erection of the front walls.
10. Arrange door tracks and sheaves so that no metal-to-metal contact exists.
11. Reinforce hoistway fascias to allow not more than 1/2" of deflection.
12. Install elevator cab enclosure on platform plumb and align cab entrance with hoistway entrances.
13. Sound isolate cab enclosure from car structure. Allow no direct rigid connections between enclosure and car structure and between platform and car structure.
14. Isolate cab fan from canopy to minimize vibration and noise.
15. Remove oil, dirt and impurities and give a factory coat of rust inhibitive paint to all exposed surfaces of struts, hanger supports, covers, fascias, toe guards, dust covers and other ferrous metal.
16. Prehang traveling cables for at least twenty-four (24) hours with ends suitably weighted to eliminate twisting after installation.
17. After installation, touch up in the field, surfaces of shop primed elements which have become scratched or damaged.
18. Lubricate operating parts of system as recommended by the manufacturer.

3.3 FIELD QUALITY CONTROL

A. Inspection and Testing

1. Upon completion of each work phase or individual elevator specified herein, the Contractor shall, at its own expense, arrange and assist with inspection and testing as may be required by the A.H.J. in order to secure a permit to operate.

B. Substantial Completion

1. The work shall be deemed “Substantially Complete” for an individual unit or group of units when, in the opinion of the Consultant, the unit is complete, such that there are no material and substantial variations from the Contract Documents, and the unit is fit for its intended purpose.
2. Governing authority testing shall be completed and approved in conjunction with inspection for operation of the unit; a certificate of operation or other required documentation issued; and remaining items mandated for final acceptance completion are limited to minor punch list work not incorporating any life safety deficiencies.
3. The issuance of a substantial completion notification shall not relieve the Contractor from its obligations hereunder to complete the work.
4. Final completion cannot be achieved until all deliverables, including but not limited to training, spare parts, manuals, and other documentation requirements, have been completed.

3.4 PROTECTION / CLEANING

A. Protection and Cleaning

1. Adequately protect surfaces against accumulation of paint, mortar, mastic and disfiguration or discoloration and damage during shipment and installation.
2. Upon completion, remove protection from finished surfaces and thoroughly clean and polish surfaces with due regard to the type of material. Work shall be free from discoloration, scratches, dents and other surface defects.
3. The finished installation shall be free of defects.
4. Before final completion and acceptance, repair and/or replace defective work, to the satisfaction of the Owner, at no additional cost.
5. Remove tools, equipment and surplus materials from the site.

3.5 DEMONSTRATION

A. Performance and Operating Requirements

1. Passenger elevators shall be adjusted to meet the following performance requirements:
 - a. Speed: within $\pm 3\%$ in both directions of travel under any loading condition.

- b. Leveling: within $\pm 1/4''$ as measured between the car entrance threshold and the landing sill on any given floor under any loading condition.
- c. Typical Floor-to-Floor Time: (Recorded from the doors start to close on one floor until they are $3/4$ open at the next floor) under various loading conditions.

Group Passenger Elevators 8.5 seconds.

- d. Door Operating Times

Door Type	Opening	Closing
36" single speed side opening	1.0 sec.	2.0 sec.

- e. Door dwell time for hall calls: 4.0 sec with Advance lantern signals.
- f. Door dwell time for hall calls: 5.0 sec without Advance lantern signals.
- g. Door dwell time for car calls: 3.0 seconds.
- h. Reduced non-interference dwell time: 1.0 seconds.

- 2. Maintain the following ride quality requirements for the passenger elevators:

- a. For speeds up to 1400 fpm, the speed of the car roller guides shall not exceed 500 rpm.
- b. Where pit permits, extend bottom roller guides by not less than one half the distance from the centerline of the upper roller guides to the platform.
- c. Noise levels inside the car shall not exceed the following:
 - 1) Car at rest with doors closed and fan off - 40 dba.
 - 2) Car at rest with doors closed, fan running - 55 dba.
 - 3) Car running at high speed, fan off - 50 dba.
 - 4) Door in operation - 60 dba.
- d. Vertical and horizontal accelerations shall not exceed 14 milli-g.
 - 1) The accelerometer used for this testing shall be capable of measuring and recording acceleration to nearest 0.01 m/s^2 (1 milli-g) in the range of $0-2 \text{ m/s}^2$ over a frequency range from 0-80 Hz with ISO 8041 filter weights applied. Accelerometer should provide contact with the floor similar to foot pressure, 60 kPA (8.7psi).
- e. The amplitude of acceleration and deceleration shall not exceed 2.6 - 2.8 ft./sec^2 for geared and MRL traction, and 3.5 - 4 ft./sec^2 for gearless traction elevators.
- f. The maximum jerk rate shall be 1.5 to 2.0 times the acceleration and deceleration.

- g. The maximum velocity which the elevator achieves in either direction of travel while operating under load conditions that vary between empty car and full rated load shall be within $\pm 3\%$ of the rated speed.

B. Acceptance Testing

1. Comply with the requirements of Division 01.
2. The Contractor shall provide at least five (5) days prior written notice to the Owner and Consultant regarding the exact date on which work specified in the Contract Documents will reach completion on any single unit of vertical transportation equipment.
3. In addition to conducting whatever testing procedures may be required by local inspecting authorities in order to gain approval of the completed work, and before seeking approval of said work by the Owner, the Contractor shall perform certain other tests in the presence of the Consultant.
4. The Contractor shall provide test instruments, test weights, and qualified field labor as required to safely operate the unit under load conditions that vary from empty to full rated load and, in so doing, to successfully demonstrate compliance with applicable performance standards set forth in the project specifications with regard to:
 - a. Operation of safety devices.
 - b. Sustained high-speed velocity of the elevator in either direction of travel.
 - c. Brake-to-brake running time and floor-to-floor time between adjacent floors.
 - d. Floor leveling accuracy.
 - e. Door opening/closing and dwell times.
 - f. Ride quality inside the elevator car.
 - g. Communication system.
 - h. Load settings at which anti-nuisance, load dispatch, and load non-stop features are activated.
5. Upon completion of work specified in the Contract Documents on the last car in any group of elevators, and in conjunction with the aforementioned testing procedures, the Contractor shall carry out additional testing of group dispatch/supervisory control features in the presence of the Consultant.
6. The Contractor shall provide test instruments and qualified field labor as required to successfully demonstrate:
 - a. The back-up operating mode for group dispatch failure.
 - b. Simulated and actual emergency power operation.
 - c. Firefighter, attendant and independent service operations.
 - d. Restricted access security features and card reader controls.
 - e. Zoning operations and floor parking assignments.
 - f. Up/down peak operation.
7. After hour tests of systems such as emergency generators, fire service, and security systems shall be conducted at no extra cost to the Owner.

END OF SPECIFICATION

SECTION 21 00 00 - GENERAL REQUIREMENTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.01 SUMMARY

- A. Division 21 of the specifications requires the furnishing and installing of all items, including every article, device, or accessory reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the Work include, but are not limited to, materials, labor, supervision, supplies, equipment, transportation, rigging, storage, utilities, and all required permits and licenses.
- B. Before submittal of bid, examine all drawings, specifications, addenda, alternates, special conditions, and all other bidding documents of all sections of this project, verify all governing conditions at the site, and become fully informed as to the extent and character of the work required, as well as its relation to other work in the building. Submittal of a bid is an agreement to all requirements of the Contract Documents, and no consideration will be granted for any claimed misunderstanding thereof.
- C. Submittal of a bid is a representation by the bidder that it is qualified in all respects properly to perform the work for which it is bidding and has experience with similar work. Bidders are deemed to be aware, on the basis of their background and experience, materials which may be required in their responsibilities, even though unspecified.

1.02 ABBREVIATIONS

ADA	Americans with Disabilities Act
AHJ	Authority Having Jurisdiction
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
BSA	New York City Board of Standards & Appeals
CDA	Copper Development Association
EPA	Environmental Protection Agency
FM	Factory Mutual
IEEE	Institute of Electrical and Electronic Engineers
IRI	Industrial Risk Insurers
MSDS	Materials Safety Data Sheet
MSS	Manufacturers' Standardization Society Standards.
NEBB	National Environmental Balancing Bureau

NEC	National Electrical Code (NFPA 70)
NEMA	National Electrical Manufacturers Association
NETA	National Electrical Testing Agency
NFPA	National Fire Protection Association
NUSIG	National Uniform Seismic Installation Guidelines
OSHA	Occupational Safety Health Administration.
UL	Underwriters Laboratories

1.03 DEFINITIONS

- A. For purposes of these specifications the following definitions apply:
1. ARCHITECT: The Architect of record.
 2. ENGINEER: The Engineer of record.
 3. CONTRACTOR: The individual, partnership or corporation to whom has been awarded the contract for providing the fire protection work.
 4. SUBCONTRACTOR: The individual, partnership or corporation to whom has been awarded the contract for providing assistance to the Contractors work.
 5. GENERAL CONTRACTOR: An individual or group that contracts with another organization or individual (Owner) for the construction of a building or other structure. They may or may not do any actual construction of a portion of the project.
 6. PROVIDE: To “furnish” and “install”.
 7. INSTALL: To join; unite; fasten; link; attach; set up or otherwise connect together; complete, tested and ready for normal satisfactory operation.
 8. FURNISH: To supply all materials, labor, equipment, testing apparatus, controls, tests, accessories, and all other items customarily required for the proper and complete application.
 9. AS DIRECTED: As directed by the Architect or the Engineer.
 10. CONCEALED: Embedded in masonry or other construction, installed behind wall furring or within double partitions, or installed within hung ceilings or accessible raised floor cavities.
 11. SUBMIT: Submit to the Architect and/or the Engineer for review.

12. **FINISHED SPACES:** Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspace, and tunnels.
13. **EXPOSED:** Exposed to view.
14. **SUPPLY:** To purchase, procure, acquire, and deliver complete with related accessories.
15. **WORK:** Includes labor, materials, equipment, services, and all related accessories necessary for the proper and complete installation of complete systems.
16. **PIPING:** Includes pipe, tube, fittings, flanges, valves, controls, strainer, hangers, supports, unions, traps, drains, insulation, and all related accessories.
17. **WIRING:** Includes raceway, fittings, wire, boxes, and all related accessories.
18. **INDICATED:** As shown or noted on the drawings or specifications.

1.04 RELATED DOCUMENTS

- A. The General Conditions and Supplementary Conditions accompanying these specifications are hereby made a part of the requirements for the work under this section of the specifications.
- B. No General Conditions and/or Supplementary General Conditions clause referring to the work of this section shall be considered waived unless specifically stated herein.
- C. Refer to Owner's "Commissioning Requirements" for the scope of work related to systems furnished and installed under Division 21.

1.05 REFERENCE STANDARDS

- A. Comply with the currently enforced versions of all applicable laws, rules, regulations, codes and ordinances of New York City and shall be BSA approved or have an OTCR approval. Modifications required by the Authorities Having Jurisdiction shall be made without additional cost to the Owner.
 1. Secure and pay for necessary approvals, permits, inspections, carting, legal dumping, etc., and deliver the official records of the granting of permits to the Owner without additional cost to the Owner.

2. The drawings have been filed. Contractor shall pay all fees to obtain release of approved plans and shall complete and file all forms, tabulations, plans, etc., required for Special Inspections.
 3. Where so required by the Building Code of the City of New York, the Owner shall employ the services of a Special Inspector to perform inspections of materials, installations, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and reference standards.
- B. All equipment, materials, and methods to be furnished and/or installed by this division shall comply with all applicable requirements of laws, codes, ordinances, legislation, standards, etc., of all federal, state, and local authorities, whether indicated on the Contract Documents or not.
 - C. Where Contract Drawing and specification requirements are in excess of rules, regulations and code requirements, and are permitted under the code, the Contract Drawings and specifications shall govern. In the event of a conflict between the Contract Documents and the applicable laws, rules, regulations, codes, and ordinances of federal, state, and local Authorities Having Jurisdiction, the latter shall govern.
 - D. Where alterations to and/or deviations from the Contract Drawings and specifications are required by the Authorities listed above, report the requirements to the Architect and secure his written approval before starting the required modifications.
 - E. Pay royalties or fees required in connection with the use of patented devices, or systems, and save the Owner, the Engineer and the General Contractor harmless from any claims or lawsuits arising from such use and indemnify each thereof against attorneys' fees in connection therewith.

1.06 QUALITY ASSURANCE

- A. All materials and equipment shall be fabricated by companies whose primary business expertise is the manufacturing of commercial and industrial products of the type specified herein. The manufacturer shall have been in continuous operation in the manufacture of the products specified for a minimum of ten (10) years.
- B. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.

- C. Make every effort to furnish all equipment of any equipment type (such as pumps, hot water heaters, storage tanks, etc.) from one manufacturer.
- D. After completion of installation, but prior to Final Completion, this Contractor shall certify in writing in a format acceptable to the Owner that products and materials installed, and processes used, do not contain asbestos, or polychlorinated biphenyls (PCB's) or other hazardous materials as determined by the Owner. A "Materials Safety Data Sheet" (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.
- E. All adhesives specified herein or utilized in the manufacture of equipment or components which are specified herein shall meet or exceed the volatile organic compound (VOC) limits of South Coast Air Quality Management District Rule No. 1168.
- F. All sealants specified herein or utilized in the manufacture of equipment or components which are specified herein shall meet or exceed Bay Area Resources Board Reg. 8, Rule 51. Submit as part of the shop drawing process for review by the Engineer and/or Owner, supporting documentation which demonstrates conformance with these requirements.
- G. In the event that products, materials and/or processes are not available that do not contain asbestos, PCB's, VOC's formaldehyde formulations, hazardous materials or may result in hazardous out-gassing as determined by the manufacturer a "Materials Safety Data Sheet", as described above, shall be submitted as part of the shop drawing process for review by the Engineer and/or Owner.
- H. Furnish all equipment, materials and accessories new and free from defects.

1.07 ENGINEERING REFERENCE POINTS

- A. The General Contractor shall provide benchmarks, monuments, and other reference points on the job which will be available for this Contractor's use.
- B. Maintain all existing benchmarks, monuments and other reference points and perform all field engineering required to ensure that work under this section shall conform with grades, elevations and lines required.

1.08 INDEMNIFICATION

- A. Covenant and agree that this Contractor and his Subcontractors and his and their agents, servants and employees will provide and maintain a safe place to work and that he and they will comply with all laws and regulations of any governmental Authority Having Jurisdiction thereof.

- B. This Contractor agrees to indemnify, defend and hold harmless the Owner, Owner's agents and Engineer from and against any liability, loss, damage or expense, including attorneys' fees, arising from a failure or alleged failure on the part of this Contractor, his Subcontractors and his and their agents, servants and employees to provide and maintain a safe place to work or to comply with all laws and regulations of any governmental Authority Having Jurisdiction thereof.
- C. This Contractor agrees to indemnify, defend and hold harmless the Owner, Owner's agents and Engineer from and against any liability, loss, damage or expense, including attorneys' fees, arising from a failure or alleged failure on the part of this Contractor, his Subcontractors and his and their agents, servants and employees to discharge the obligations assumed by him or them in the performance of the work, including any act or omission allegedly resulting in death or personal injury or property damage, or due to improper construction, construction techniques, or the use of improper or inappropriate material or tools.

1.09 COMPLETE PERFORMANCE OF WORK

- A. Work shall be executed in strict accordance with the best practice of the trades in a thorough, workmanlike manner by competent, skilled technicians and trade personnel.
- B. This Contractor shall provide a competent, experienced, full-time Superintendent who is authorized to make decisions on behalf of the Contractor.
- C. All labor, materials, apparatus, and appliances essential to the complete and proper functioning of the systems described and/or indicated herein, or which may be reasonably implied as essential, whether mentioned in the Contract Drawings and specifications or not, shall be provided by the Contractor. The entire installation shall be ready in every respect for the satisfactory and efficient operation when completed.
- D. In cases of doubt as to the work intended, or in the event of need for explanation thereof, request supplementary written instructions in the form of a Request for Information (RFI) from the Architect and/or Engineer.
- E. Coordinate the work specified herein and shown on the Contract Drawings with all other trades.
- F. Be responsible for material and workmanship until completion and final acceptance. Replace any of same which may be damaged, lost or stolen, without additional cost to Owner. Guard the building and its contents against damage by this Contractor, his employees or Subcontractors, and make good any damage free of charge.

- G. Where, due to union regulations or trade agreements, any of the work shown on the drawings or specified herein is not considered this trade's work, subcontract the work in question, but assume full responsibility for the complete installation. Except for such changes as may be specifically approved by the Architects and Consulting Engineers, in accordance with alternates or options stated hereinafter, all work must be in full accordance with the intent of the plans and specifications, complete in every way and ready for satisfactory and efficient operation when delivered to the Owner.
- H. Provide signs required by the Authorities Having Jurisdiction.
- I. Provide all rigging required for complete installation and furnish drawings showing necessary points of support, reactions and supplementary bracing. This shall be submitted for approval by the Owner. Should any shoring be required, provide same after Owner's approval.
- J. Become thoroughly acquainted with the work involved, obtain and verify at the building all measurements necessary for the proper installation of work. Furnish to other Contractors any information relating to work of this division necessary for the proper installation of their contracts. Coordinate with other Contractors for finish adjacent to work of this section and arrange to have visible portions of the work (such as access doors, escutcheons, etc.) fit in with the finish in a manner satisfactory to the Architects.
- K. Transmit to trades doing work of other sections all information required for work to be provided under their respective sections (such as foundations, electric wiring, access doors, and the like) in ample time for installation.
- L. Wherever this Contractor's work interconnects with work of other Contractors, this Contractor shall coordinate his work with these Contractors to ensure that all Contractors have the information necessary so that they may properly install all the necessary connections and equipment. Identify all work items (valves, dampers, pull boxes, etc.) in an approved manner in order that the other trades may know where to install such items such as access doors, panels, etc.
- M. Provide required supports and hangers for piping and equipment, so that loading will not exceed allowable loadings of structure. Submittal of a bid shall be deemed a representation that the Contractor submitting such bid has ascertained allowable loadings and has included in his estimates the costs associated with furnishing required supports.
- N. Field drilling, cutting and/or reinforcing of holes in structural metal deck required for work under this section shall be coordinated through the General Contractor and approved by the Structural Engineer. All such drilling, cutting and reinforcing costs shall be borne by this Contractor.

- O. At the conclusion of each day's work, clean up and stockpile on site, at a location designated by the General Contractor, all rubbish, debris and trash, which may have accumulated during the day as a result of work of this Contractor and of his presence on the job.
 - 1. Sidewalks and streets adjoining the property shall be kept broom-clean and free of debris, rubbish, trash and obstructions of any kind caused by work of this Contractor, which will affect the condition and safety of streets, walks, utilities and property.
- P. Due to the nature of the alteration work, which requires the building to be kept operable at all times, except for those floors being actively altered, this Contractor shall coordinate his activities with the General Contractor and the building Owner. Any interruption of building services must be done at the convenience of the building Owner. If temporary connections to maintain services are required or if the work must be performed after hours, this work shall be so arranged with all parties involved.
- Q. If this Contractor must perform work in occupied areas, he shall make arrangements with the General Contractor and the Owner as to the time and method by which this work shall be performed. He shall arrange for all adjacent areas to be properly protected against damage, dirt and dust.

1.10 DESCRIPTION OF BID DOCUMENTS

- A. Specifications, in general, describe quality and type of materials and equipment.
- B. The drawings show the various systems schematically, no added compensation shall be permitted for variations due to field conditions.
- C. Where disagreements occur between the plans and the specifications or within either document itself, the item or arrangement of better quality, greater quantity or higher cost shall be included in the Base Bid.
- D. Work not shown on the drawings but called for in the specifications, or vice versa, shall be provided by the Contractor without additional expense to the Owner.
- E. Where a variance occurs between the drawings and specifications, or within either document itself, the Contractor shall request through the General Contractor, clarification in writing from the Architect on which item and manner in which the work shall be installed.
- F. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.

- G. Equipment shown on the drawings with particular manufacturers identified has been coordinated for structural penetrations, electrical connection, operating and service (maintenance) requirements, and physical size with regard to the space where the equipment is shown. If they comply with the project specifications, these and the other specified manufacturers of this equipment will be acceptable contingent on the Contractor providing a complete installation and maintaining full responsibility to provide, at no additional cost, any modifications to the structure or electrical service that are required to properly install, operate, and service the equipment being used. These modifications shall not include additional area for equipment unless approved by the Architect.
1. The Contractor shall note these changes on the equipment submittal and shall show all differences in equipment being supplied from that shown on the drawings. Failure of the Contractor to provide this information with the submittal will indicate that the submitted equipment meets or exceeds the equipment shown on the drawings in performance and is physically no larger in housing size.
 - a. Failure of the Contractor to comply with the above and any discrepancies found shall result in the Contractor providing equipment equal to that specified at the Contractor's expense.

1.11 SUBMITTALS

- A. No part of the work shall be started in the shop or in the field until the Architect and/or Engineer have reviewed the shop drawings and samples for that portion of the work. Thereafter, the work shall be executed in accordance with the Contract Documents and the indicated status of the reviewed shop drawing.
- B. All shop drawings and samples shall be identified as follows:
1. Date of submittal.
 2. Title of project (including floor and room designations).
 3. Name of Contractor and date of his approval.
 4. Name of Subcontractor or supplier and date of submittal to Contractor.
 5. Number of submissions.
 6. Any qualification(s), departure(s) or deviation(s) from the requirements of the Contract Documents.

7. Federal specification, FM Approval, UL Listing, or ASTM number or any local listing or approval where required.
 8. Such additional information as may be required by the specifications for the particular material being furnished.
 9. When the submitted materials modify components, styles, etc., on the same drawing, or alternate or options available for the intended material, the material shall be appropriately annotated in a manner to avoid any misunderstanding of the submission.
- C. Shop drawings and samples shall be submitted for review sufficiently in advance of the scheduled start of the work in the shop or in the field to allow ample time, in consideration of the number and complexity of the drawings in the submittal, for the Architect and/or Engineer to make an orderly review. No extension of the time to complete the work shall be granted to the Contractor by reason of his failure in this respect.
- D. The Contractor shall carefully check shop drawings and samples, including those received by him from Subcontractors and manufacturers, for accuracy, completeness of required information, and conformance with the Contract Documents. Shop drawings found to be inaccurate, incomplete or not in conformance with the Contract Documents shall be corrected before being submitted to the Architect and/or Engineer for review.
- E. Within three (3) weeks after award of the Contract, the Contractor shall submit for the Architect's and/or Engineer's review, a list of the manufacturers and Subcontractors whose products and services he proposes to use for the work. Proposed substitutions for material and equipment required by the Contract Documents shall be submitted to the Architect and/or Engineer for review during this period. Submittals proposing or requesting substitutions shall be expressly identified as such in a letter of transmittal, with the reasons for requesting the substitution stated. Submittals for this purpose shall be complete in every respect, shall conform to all the information requirements for shop drawing and sample submittals, and shall include, at no cost to the Owner, the necessary revisions to other related work required by the Contract Documents. The judgment of the Architect and/or Engineer with respect to the adequacy and acceptability of a proposed substitution shall be final and binding on the Contractor and shall not be subject to question in any other place. After the expiration of this period, substitutions for material or equipment shall not be proposed or requested in shop drawing and sample submittals, and the Contractor shall be required to execute the work in accordance with the provisions of the Contract Documents.

- F. Within six (6) weeks after award of the Contract, the Contractor shall submit a schedule listing all shop drawings and samples with the projected date that each item will be submitted to the Architect and/or Engineer for review.
- G. Prior to Final Acceptance, the following data shall be furnished in accordance with the Conditions of the Construction Contract, Division 01 Specifications, and Division 21 Specifications, and shall include, but not be limited to:
 - 1. Record Drawings.
 - 2. Operating and Maintenance Books.
 - 3. Contract or Coordination Drawings.

1.12 SAMPLES

- A. Samples shall be identical in all respects to the material which is to be installed or applied in the execution of the work and shall be of sufficient size or quantity to permit proper evaluation and review. Manufacturer's descriptive labels and printed application instructions which are normally attached to the material or its packaging shall be furnished with the sample. Samples shall be submitted for review when requested by the Architect and/or Engineer.
- B. Submit names, sizes, catalog numbers and/or samples of the following materials for approval:
 - Fittings
 - Hangers
 - Pipe
 - Seismic Restraints
 - Sleeves and Escutcheons
 - Sprinkler Heads

1.13 SHOP DRAWINGS

- A. The term "shop drawings" shall include layout, detail, and assembly drawings, diagrams, schedules, catalog sheets, printed descriptive matter, and tabular and graphical presentations of operating and performance data that describe work required by the Contract Documents. Catalogs and catalog sheets shall be clearly annotated indicating the specific items being proposed.
- B. In addition, during the installation period, submit detailed shop layout drawings for each floor of the project, including all the Mechanical Equipment Rooms,

showing equipment and piping work and other distribution services described herein, including locations and sizes of all openings in cellular steel floor decks, walls and floors. Shop drawings with multiple parts shall be submitted as a package. Shop drawings will be 3/8 inch equal to 1 ft. 0 in. scale. Piping shop drawings shall also indicate the point loading and spacing of each hanger and the method of support. Drawings shall include full coordinated plans and sections for Mechanical Equipment Rooms, floor plans and risers. In addition, required detail drawings, such as anchor and guide details, etc., shall be submitted.

- C. Shop drawings for Equipment Rooms, and for piping and similar distribution services shall show by dimension the exact size and location of each element of the system in both the horizontal and vertical plane, as well as relationship to the building structure, architectural construction, equipment, and the work of other trades. Where new work is added to an existing structure, the shop drawings shall show the location of all existing services and equipment. Pads, foundations, anchorages, supports and attachments to the building structure where required for the installation of the work shall be shown in layout and detail with sizes, dimensions, materials and methods of construction noted. The work described in any shop drawing submission shall be carefully checked by this Contractor for all clearances field conditions, maintenance of architectural conditions and proper coordination with all trades on the job.
- D. Each submitted shop drawing shall include a certification by the General Contractor that all related job conditions have been checked and that no conflict exists. No shop drawing submission shall be reviewed without such certification.
- E. The Contractor shall submit shop drawings of the following work for review:
 - 1. Construction details for piping.
 - 2. All items of manufactured material and equipment.
 - 3. Other specific items of work as required by the provisions of the technical sections of the Contract Documents should be included in Submittal section.
- F. Submit piping details for the following equipment installations:

1.14 CERTIFICATION

- A. Any certifications required by the specifications, in addition to those required for shop drawings, product data, equipment and other items, shall be so certified by the Owner, a Partner, or a Corporate Officer of the firm required to provide the Certification, or by another person duly authorized to sign binding agreements for and in behalf of the Owner, Partner, or Corporation.

1.15 CONTRACTOR'S COORDINATION DRAWINGS

- A. Contractor shall furnish in writing, with copies to the Architect and Construction Manager any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.
- B. This Contractor and his Subcontractors shall prepare a complete set of construction "Coordination Drawings" indicating the equipment actually purchased and the exact routing and elevations for all lines such as piping, busway, conduit, ductwork, etc., including conduit embedded in concrete. The "Coordination Drawing" preparation and completion shall comply with the requirements of the project construction schedule. The sheet metal drawings, prepared on electronic media (CAD) at a scale not less than 3/8 in. = 1 ft. 0 in., shall serve as the base drawings to which all other Contractors will overlay and add their work. Each trade shall draw their work on separate layers represented by individual colors. Each "Coordination Drawing" shall be completed and signed off by the other Contractors and this Contractor prior to the installation of the work in the area covered by the specific coordination drawing. The Contractors work shall be installed in accordance with the shop drawings and the "Coordination Drawings". If the Contractor allows one trade to install their work before coordinating with the work of other trades, the Contractor shall make necessary changes to correct the condition without extra cost to the Owner. The Contractor's "Coordination Drawings" indicating piping, conduit, busway, and equipment support points and loads exceeding 200 lb. imposed on the building structure shall be submitted to the Project Structural Engineer for review and approval. The elevation, location, support points, static, dynamic and expansion forces and loads imposed on the structure at support, and anchor points, and the size of all lines shall be indicated. All beam penetrations and slab penetrations shall be indicated and sized and shall be coordinated. All work routed underground or embedded in concrete shall be indicated by dimension to column and building lines and shall be coordinated. This requirement for "Coordination Drawings" shall not be construed as authorization for the Contractor or Subcontractor to make any unauthorized changes to the Contract Drawings. Prior to final acceptance of the work of this section, the Contractor shall give the drawing files, in AutoCAD containing the Contractor's coordination documentation to the Owner.

1.16 ARCHITECT'S AND ENGINEER'S REVIEW

- A. The Architect and Engineer shall review shop drawings and samples for conformance with the design concept of the project and the information contained in the Contract Documents. The review of shop drawings and samples shall be only for the convenience of the Owner in following the work and shall not relieve the Contractor of responsibility for deviations from the requirements of the

Contract Documents. The review shall not be construed as a complete or detailed check of the work submitted, nor shall it relieve the Contractor of responsibility for errors of any sort in the shop drawings and samples, or from the necessity of furnishing any work required by the Contract Documents which may have been omitted from the shop drawing submittals. The review of a separate item shall not indicate review of the complete assembly in which it functions. Nothing in the Architect's and/or Engineer's review of shop drawings and samples shall be considered as authorizing a departure from Contract Documents or specifications; additional cost to the Owner; or increased time for completion of the work.

- B. Architect's and/or Engineer's review is for general compliance with the design concept and Contract Documents. Markings or comments shall not be construed as relieving the Contractor from compliance with the project plans and specifications, nor departing therefrom. The Contractor remains solely responsible for details and accuracy, for confirming and correlating all quantities and dimensions, for coordination with other work, whether new or existing and other trades, for selecting fabrication processes, for techniques of construction, for performing his work in a safe manner.
- C. The Architect and/or Engineer shall review shop drawings and samples with reasonable promptness and shall return them to the Contractor stamped to indicate the appropriate action as follows:
1. "NO EXCEPTION TAKEN" means that fabrication, manufacture or construction may proceed, providing the submittal complies with the Contract Documents.
 2. "EXCEPTIONS AS NOTED" means that fabrication, manufacture or construction may proceed, providing the submittal complies with the Architect's and/or Engineer's notations and the Contract Documents. A copy of the corrected submittal shall be returned to the Architect and/or Engineer for record. If, for any reason, the Contractor cannot comply with the notations, the Contractor shall resubmit as described for submittals stamped "REVISE AND RESUBMIT".
 3. "REVISE AND RESUBMIT" means that the Contractor must comply with the Architect's and/or Engineer's notations and resubmit before fabrication, manufacture or construction may proceed. Submittals stamped in this manner shall not be permitted on the job site.
 4. "REJECTED" means that the submittal does not comply with the Contract Documents and that fabrication, manufacture or construction shall not proceed. Submittals stamped in this manner shall not be permitted on the job site.

- D. Each submitted shop drawing shall bear the Contractor's stamped and signed certification that the work has been checked for all related job conditions, for maintenance of architectural conditions, and has been coordinated with the shop drawings of other affected trades for interrelated work, as required for the proper and complete performance of the work. No shop drawing submittal shall be reviewed without this certification.
- E. Shop drawings for manufactured material and equipment shall include model numbers, dimension drawings, operating weights, material specifications, operating features and controls, wiring diagrams, performance characteristics, service procedures, including clearance requirements for maintenance work, and conformance to specified codes and code ratings. Note that in addition to these requirements, other specific submittal data, and forms of data submission, are required by the Contract Documents for particular items of equipment and material.
- F. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein shall be the minimum standards acceptable. The Engineer shall retain the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require that the specified materials and equipment which conform to the requirements of the Contract Documents be furnished.

1.17 MANUFACTURER'S RECOMMENDATIONS

- A. With the exceptions as specified and/or indicated on the drawings or in the specifications, the Contractor shall apply, install, connect, erect, use, clean, commission and condition manufactured articles, materials, and equipment per manufacturer's current printed instructions and recommendations. Copies of such printed recommendations shall be kept at the project site and made available as required.
- B. Where the manufacturer's recommendations conflict with the Contract Documents, the conflict shall be brought to the Engineer's attention immediately.

1.18 SPACE LIMITATIONS

- A. The equipment selections used in the preparation of the Contract Documents shall fit into the physical spaces provided and indicated, allowing ample room for access, servicing, removal and replacement of parts. Adequate space shall be allowed for clearance in accordance with code requirements, the requirements of the Local Authorities Having Jurisdiction, and the equipment manufacturer's recommendations.

- B. In the preparation of drawings, a reasonable effort to accommodate acceptable equipment manufacturer's space requirements has been made. However, since space requirements and equipment arrangement vary according to each manufacturer, the responsibility for initial access, maintenance access, code-required access, and proper fit rests with the Contractor.
- C. Physical dimensions and arrangements of equipment to be installed shall be subject to the Architect's and Engineer's review.
- D. Coordinate the installation of piping and equipment with lighting fixtures, special ceiling construction, air distribution equipment and the structure. Provide additional risers, drops and offsets as required. If, after installed, new piping or equipment is found to be in conflict with the architecture, structure, or other trade work which is either existing or shown on the Contract Documents, the piping or equipment shall be relocated without additional cost to the Owner.
- E. No piping or equipment shall be installed in the eight (8) inch high zone directly above the finished ceiling in Tenant areas to allow for Tenant build-out and flexibility unless otherwise specifically shown on the drawings or prior written authorization is received from the Engineer.
- F. The Contractor shall follow the drawings in laying out the Work and check drawings of all trades to verify spaces in which Work will be installed. Maintain maximum headroom and, where space conditions appear inadequate, the Architect shall be notified before proceeding with the installation.

1.19 RECORD DRAWINGS

- A. The Contractor shall maintain on a daily basis at the project site a complete set of "Record Drawings". The "Record Drawings" shall consist of a set of blue-line prints and AutoCAD files of the Contractor Coordination Drawings for this division. The prints shall include the updated AutoCAD files, which shall be periodically electronically updated to show the precise location of all buried or concealed work and equipment, including embedded piping and valves, and all changes and deviations in the mechanical work from that shown on the Contract Documents. This requirement shall not be construed as authorization for the Contractor to make changes in the layout or work without written definite instructions from the Architect or Engineer. Prior to commencing work, the Contractor shall obtain from the Architect or Engineer a set of AutoCAD format Architectural and Engineering Drawings on CD-ROM, to be used only to produce the Contractor's Coordination Drawings. The continuously updated coordination drawings shall be used to produce the final "Record Drawings" which shall be delivered to the Owner in AutoCAD electronic format upon project completion. The Contractor shall give to the Engineer a written release signed by a corporate officer of the Contractor prior to receipt of the Engineer's disks.

- B. Dimensions shall clearly and accurately delineate the work as installed; locations shall be suitably identified by at least two (2) dimensions to permanent structures.
- C. Upon completion of the Work, the Contractor and his Subcontractors shall certify all "Record Drawings" on the front lower right-hand corner adjacent to the above marking with a rubber stamp impression or an AutoCAD image that states the Project name, the Contractor's name, the area covered, and the date.
- D. Prior to final acceptance of the work of this division, the Contractor shall submit properly certified "Record Drawings" to the Architect and Engineer for review and shall make changes, corrections, or additions as the Architect and/or Engineer may require to the "Record Drawings". Submit four (4) prints of each version until accepted.
- E. After the Architect's and Engineer's review, and any required Contractor revisions, the "Record Drawings" shall be delivered to the General Contractor in AutoCAD format for the Owner's use. Upon acceptance, provide electronic versions within sixty (60) days of Final Acceptance.

1.20 ELECTRICAL EQUIPMENT AND ELECTRICAL ROOM PRECAUTIONS

- A. In general, the Contractor shall not install piping or equipment in any switchboard, switchgear, transformer, elevator equipment, telephone, telecommunications, or electrical equipment rooms unless this piping or equipment serves only these rooms. Installation is strictly prohibited where it violates the requirements of the applicable Electrical Code.
- B. No piping or other equipment foreign to the electrical installation shall be installed within the dedicated zone above switchboards, panelboards, distribution boards, and motor control centers to a height of six (6) feet above the equipment or the structural ceiling, whichever is lower. The area above the dedicated space shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks or breaks in such foreign systems.
- C. Caution workers both verbally and in writing as to the dangers involved in doing work within or adjacent to electrical equipment within electrical closets on various floors, the Mechanical Rooms and the Switchgear Rooms, Elevator Machine Rooms, due to dangers caused by the presence of high voltages and currents in these spaces.
- D. Provide all necessary personal protective equipment meeting OSHA requirements when working in areas within live electrical equipment.

1.21 CUTTING AND PATCHING

- A. In general, cutting and patching will be done under other divisions of the specifications.
- B. Furnish to the General Contractor necessary information so that openings for this work can be built into the floors and walls in time. Such cooperation is required to keep cutting of walls and floors to a minimum.
- C. Set sleeves for pipes accurately before concrete floors are poured or set boxes on the forms to leave openings in the floors and subsequently set required sleeves in the openings.
- D. Should Contractor neglect to perform preliminary work and should cutting be required in order to install equipment, the expense of this cutting and restoring of surfaces to their original condition shall be borne by this Contractor.

1.22 PROTECTION OF EQUIPMENT AND MATERIALS

- A. Protect from damage, water, dust all material and equipment provided under this division, both in storage and installed in accordance with manufacturer's recommendations until Notice of Completion has been filed and accepted.
- B. Arrange with General Contractor for storage facilities for materials and equipment.
- C. All products stored off site and delivered to the site must be kept in factory packing with positioning devices in place until installation. Equipment which is subject to damage from moisture shall be stored indoors in a suitably controlled environment with factory covering in place.
- D. Material, equipment or apparatus damaged because of improper storage or protection shall be rejected.
- E. Protect equipment from damage due to moisture, water, spray-on fireproofing, and construction debris during construction.
- F. Cover and protect all openings left in floor for passage of pipes. Protect pipes with suitable coverings as soon as set. Close all open ends of pipes with a plug fitting and conduits with caps to prevent obstruction and damage.
- G. Protect the system against freezing in cold weather.
- H. Prior to starting equipment, remove all protective materials, shipping bars, retainers, positioning devices.

1.23 CONSTRUCTION REVIEW

- A. Work may be reviewed at any time by the Architect or Engineer.
- B. Advise the Architect and/or Engineer that work is ready for review at the following times:
 - 1. Prior to concealment of work in walls and above ceilings.
 - 2. Testing of systems and equipment.
 - 3. When all requirements of the Contract have been completed.

1.24 FINAL REVIEW

- A. At a time designated, the entire installation shall be reviewed for compliance with the Contract Drawings and specifications. The Contractor shall be available at all times during this Review.
- B. The Contractor shall demonstrate prior to the Final Review that all systems and all equipment have been properly balanced and adjusted and are in compliance with the requirements of the Contract Documents. After these demonstration tests are completed satisfactorily, but prior to the Final Review field visit by the Engineer, the Contractor shall submit to the Engineer a written certification that attests to Contract Document compliance for this project.
- C. Certificates and documents required herein shall be in order and presented to the Architect and Engineer at least two (2) weeks prior to the Final Review.
- D. After the Final Review, any changes or corrections noted as necessary for the Work to comply with these specifications and the drawings shall be accomplished without delay in order to secure final acceptance of the Work.

1.25 EARLY OCCUPANCY

1.26 DATE OF COMPLETION AND TESTING OF SYSTEMS

- A. The date for the final performance and acceptance testing shall comply with the project construction schedule and shall be sufficiently in advance of the Contract completion date to permit the execution of the testing by the Contractor prior to occupancy and the close-out of the Contract. Any adjustments and/or alterations which the final acceptance tests indicate as necessary for the proper and satisfactory functioning of all equipment and systems shall be completed prior to the close-out of the Contract. Re-tests shall not relieve the Contractor of completion date responsibility.

- B. The Contractor shall provide a detailed schedule of completion indicating when each system component and entire system is to be completed and outlining when tests will be performed. Completion schedule shall be submitted to the Architect, Engineer, and Owner for review at a time requested by the General Contractor after the notice to proceed has been given by the General Contractor to the respective Division 21 Subcontractors. This schedule shall be updated periodically by the Contractor as the project progresses. Each update shall be submitted to the General Contractor, Architect, Engineer, and Owner for review.

1.27 WARRANTY PERIOD

- A. The warranty period shall be for the period from beneficial use by the Owner, in accordance with the construction schedule.
- B. During the warranty period, the Contractor shall guarantee the following in a form satisfactory to the Owner:
 - 1. All work installed will be free from any and all defects in workmanship and/or materials.
 - 2. All apparatus will develop capacities and performance characteristics specified.
 - 3. The systems shall operate without malfunction.
- C. The Contractor shall, without cost to the Owner, remedy any defects within a reasonable time to be specified in notice from the Architect. In default thereof, the Owner may have such work done and charge all costs to the Contractor.
- D. The start of the Contractor's warranty period, as defined in the General Conditions, shall commence on the issue of a "Certificate of Substantial Completion" by the Owner or the Owner's Representative for each item of material, equipment, or system.
- E. The Subcontractor shall confer with the General Contractor prior to the bid date concerning the project schedule and determine if there is a need to operate any items of equipment or systems for temporary heating and/or cooling or other reasons prior to "Substantial Completion". All required extended warranty costs for equipment, materials, and systems shall be included in the Subcontractor's bid.
- F. Provide complete documentation of all component and system tests prior to Owner acceptance and turnover of components or systems. In addition, the Owner reserves the right to review all test objectives, test plans and test cases, and witness all preoperational tests. Provide the Owner with a comprehensive

schedule detailing the preparation of testing documentation and the conduct of all component or system tests.

- G. Warrant that all components, subsystems and systems will perform their specified functions from the date of turnover and commercial operation through the useful life of the system, as determined by the various equipment manufacturers and installing Contractor. In the event components fail for any reason, be responsible to repair/replace said components, and reimburse the Owner for all costs associated with the component, subsystem or system that failed to perform the specified function.

1.28 GUARANTEE

- A. Submit a single guarantee stating that all portions of the work are in accordance with Contract requirements. Guarantee all work against faulty and improper material and workmanship for a period of one year from date of final acceptance by the Owner; except that where guarantees or warranties for longer terms are specified herein, such longer term shall apply. At no additional cost to Owner, within 24 hours after notification, correct any deficiencies which occur during the guarantee period, all to the satisfaction of the Owner and Architect. Require similar guarantees from his Subcontractors.
- B. Guarantee that the materials and workmanship supplied under these specifications will be of the best grade, that the apparatus will be erected in a practical and first class manner, that it will be complete in operation, nothing being omitted in the way of labor and material required to make this so, although not specifically shown or mentioned herein and that it will be delivered in well working order, complete and perfect in every respect without additional cost - whether or not shown in detail on the drawings or described in detail in this specification.
- C. Be responsible for all damage to or caused by the work performed under this division for a period of one year from date of the acceptance of work under this Contract. Repair at no cost to Owner all such damage which occurs within 24 hours' notice thereof by the Owner. Damage which occurs prior to the completion of this Work shall be repaired at once. Be responsible for any damage and repair thereof and reimburse Owner for all expense incurred thereby. Indemnify the Owner, the Architect, the Consulting Engineers and the General Contractor against loss, liability, damage or expense, including reasonable attorneys' fees, in connection with any claim resulting from such leaks which may be asserted by tenants or any other third person.

1.29 DELIVERY, STORAGE AND HANDLING

- A. Include all delivery, hauling, hoisting, shoring, and placement in the building of equipment and materials specified herein, including any equipment pre-purchased

by the General Contractor for installation by this Contractor. The Contractor shall be responsible for the timely delivery and introduction of equipment to the Project as required by the construction schedule for this Project. If any item of equipment is received prior to the time it is required, the Contractor shall be responsible for its proper storage and protection until such time as it may be required. The Contractor shall pay for all costs of demurrage or storage in a bonded warehouse.

- B. If any item of equipment is not delivered to or installed at the project site in a timely manner as required by the project construction schedule, the Contractor shall be solely responsible for disassembly, re-assembly, manufacturer's supervision, shoring, general construction modifications, delays, overtime costs, etc. No additional cost or delays shall be incurred by the Owner.

PART 2 - PRODUCTS

2.01 UNAUTHORIZED MATERIALS

- A. Materials and products required for work of this section shall not contain asbestos, polychlorinated biphenyls (PCB's) or other hazardous materials identified by the Owner.

2.02 GENERAL

- A. Refer to specific specification sections for addition equipment and system piping requirements.

PART 3 - EXECUTION

3.01 GENERAL

- A. Installation shall be in accordance with the specification section pertaining to the individual equipment and system piping.

END OF SECTION 21 00 00

SECTION 21 05 00 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Contractor and his Subcontractors shall provide all labor, materials, tools, scaffolding, machinery, equipment, appliances, and services necessary to complete the fire suppression work under this Contract. All systems and equipment shall be complete in every respect and all items of material, equipment and labor shall be furnished and installed for a fully operational system. This Contractor shall coordinate his work with the work of the other trades so as to resolve conflicts without impeding job progress or the project construction schedule. Provide notice with the bid proposal of any concrete work required by this division that is not indicated on the Structural or Architectural drawings or drawings of other trades.
- B. This Contractor shall examine all Contract Documents for all divisions of the specifications in order to determine the extent of work required to be completed under this division. Failure to examine all the Contract Documents for this project will not relieve this Contractor of the responsibility to perform all the work required for a complete, fully operational and satisfactory installation.
- C. Provide all miscellaneous common fire suppression products required for a complete fire suppression installation as indicated, in accordance with the requirements of the Contract Documents.
- D. Section includes:
 - 1. Sleeves.
 - 2. Mechanical sleeve seals.
 - 3. Access doors.
 - 4. Formed steel channel.
 - 5. Escutcheons.
 - 6. Protective pans.

1.02 RELATED SECTIONS

- A. Refer to Divisions 01, 22, 23, 26 and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.

- B. Refer to Section 21 00 00– Table of Contents for Fire Suppression for specification sections that apply to all work herein.

1.03 REFERENCES

- A. Each product required for the common fire suppression work shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:
 - 1. Codes: Perform all work in accordance with the latest applicable codes and standards for New York City.
 - a. New York City Building Code.
 - b. New York City Fire Code.
 - 2. Reference Standards
 - a. ASTM International
 - 1) ASTM A653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.
 - b. FM Global (FM)
 - 1) Property Loss Prevention Data Sheet 2-0: Installation Guidelines for Automatic Sprinklers.
 - 2) Property Loss Prevention Data Sheet 2-8: Earthquake Protection for Water-Based Fire Protection Systems.

1.04 SUBMITTALS

- A. The following submittal data shall be furnished according to the Conditions of the Contract, Division 01, and Section 21 00 00 and shall include, but not be limited to:
 - 1. Product cut sheets and schedule of sleeves and mechanical sleeve seals used for the project. The schedule shall include the material, diameter, length, number of links, location and service the sleeve and sleeve seal will be provided.

2. Product cut sheets and schedule of access doors used for the project. The schedule shall include the material, size, finish type, location and purpose of installation the access door will be provided.
 3. Product cut sheets of formed steel channel.
 4. Product cut sheets of escutcheons. The cut sheets shall indicate the size, finish and location, which the escutcheons will be installed.
- B. Product Data: Submit manufacturer's literature, including general assembly.
- C. Manufacturer's Installation Instructions: Submit support details, installation instructions and connection requirements for each product and system that is installed.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 21 00 00 shall apply to all work specified herein.
- B. All materials and equipment shall be fabricated by companies, whose primary business expertise is the manufacturing of commercial and industrial products of the type specified herein. The manufacturer shall have been in continuous operation in the manufacture of the products specified for a minimum of ten (10) years.
- C. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- D. Make every effort to furnish all materials of any type from one manufacturer.
- A. Furnish all equipment, materials and accessories new and free from defects.

1.06 WORK INCLUDED

- A. The work includes, but is not limited to, the following systems, equipment and services:
1. Fire suppression system consisting of all items indicated on the drawings and/or specified herein, such as:

- a. Automatic sprinkler systems.
2. Furnish and install all miscellaneous supports for Division 21 work and equipment.
3. Furnishing of shop drawings, product data and samples.
4. Furnishing of “Record Drawings”.
5. Furnishing of Contractor “Coordination Drawings”.
6. Miscellaneous items as required for complete and functioning systems as specified herein and as indicated on the drawings.
7. All systems specified herein shall be furnished and installed complete and ready for use.
8. Furnish and install all sleeves for the fire protection work complete with seals and firestop as specified herein and as required by the Authority Having Jurisdiction.
9. Patching or replacement of all fireproofing if it is damaged or removed during the installation of the Division 21 work.
10. Participate in and assist in the operation of the fire safety ventilation equipment as required during the performance testing and startup of the Division 28 fire detection, alarm and communication systems. Refer to Division 28 - Fire Detection, Alarm and Communication System for additional requirements.
11. Participate in and provide equipment, materials, and labor as required to construct at the project site a complete mechanical, plumbing, and fire protection “mockup”, in or out of sequence, of one (1) typical floor and the associated Air Handling Unit Room. Refer to Division 01 for details and construction requirements. The field “mockup” shall remain in place for use in the completed building systems. The “mockup” shall be reviewed and shall serve as a model for the fire suppression installation and other similar typical floors.
12. Participate in and provide equipment, materials, and labor as required to construct at the project site a complete Toilet Room “mockup”, in or out of sequence. See Architectural Section 09 00 00 for details and construction requirements. The field “mockup” shall remain in place for use in the completed building systems. The “mockup” shall be reviewed

and shall serve as a model for the fire suppression installation and other similar typical floor Toilet Rooms.

13. Instruments as required for operating and testing the various systems shall be furnished and installed complete as specified herein.
14. Hydrostatic testing, operational testing and adjusting of all systems.
15. Complete flushing and chemical treatment and initial water treatment for all water systems.
16. Complete all tests required by all rules, regulations, etc., of all Authorities Having Jurisdiction and prepare, complete and file all forms, tabulations, plans, etc., pertinent thereto with the referenced authorities, and accomplish such work with personnel of proper caliber, in particular, Professional Engineers, where so required.
17. Participate in and provide all labor as required for “off-hour” testing of equipment and systems if required by job conditions or by Authorities Having Jurisdiction and as required to obtain the “Temporary Certificates of Occupancy (TCO).”
18. Participate in and provide all labor as required for system commissioning including any time required for a detailed review of the commissioning process as requested by the Engineer or the Owner.
19. Sprinkler systems shall be hydraulically calculated to the following hazard classification parameters:
 - a. Office Areas: Light Hazard, 0.10 gpm/sq.ft. over 1,500 sq.ft.
 - b. Storage, Mechanical Equipment Rooms: Ordinary Hazard Group 1, 0.15 gpm/sq.ft. over 1,500 sq.ft.

1.07 WORK OF OTHER DIVISIONS

- A. Painting, except touch-up painting and as otherwise specified herein.
- B. Installing access doors in general construction.

1.08 VERIFYING EXISTING CONDITIONS

- A. Before commencing work, examine all adjoining work on which this work is in any way dependent for perfect workmanship according to the intent of this specification, and report to the Construction Manager any condition, which

prevents performance of first-class work. No “waiver of responsibility” for incomplete, inadequate or defective adjoining work will be considered unless notice has been filed before submittal of a proposal.

- B. Become thoroughly familiar with actual existing conditions at the building of the present installations to which connections must be made or which must be changed or altered. The intent of the work is shown on the drawings and described hereinafter, and no consideration shall be granted by reason of lack of familiarity on the part of the Contractor with actual physical conditions at the site. Inspect each and every area affected by the total alteration of the building before submitting bid.

1.09 SUBCONTRACTS

- A. Where Contract Documents require manufacturers’ services, and wherever the staff of this Contractor performing the work of this section cannot adequately perform such services, this Contractor shall stipulate such performance in its contracts with its Subcontractors or Sub-Subcontractors, vendors, manufacturers, and the like, or else subsequently pay them any additional fees required therefor.

1.10 FACTORY TESTING

- A. All mechanical sleeve seals and access doors shall be fully assembled and factory tested for full functionality at the manufacturer’s factory prior to shipment.

1.11 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Division 01 and Section 21 00 00.
- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer’s installation instructions.
- C. Protect all components from physical damage, including effects of weather, water and construction debris.

1.12 COORDINATION

- A. Coordinate the installation of work in this section with the following:
 - 1. Division 04 - Masonry.
 - 2. Division 05 - Metals.
 - 3. Division 09 - Finishes.

4. Division 10 - Specialties.

1.13 WARRANTY

- A. Comply with the requirements of Division 01 and Section 21 00 00.
- B. Warranty period shall commence upon final acceptance by the Owner.
- C. Furnish a one (1) year manufacturer's warranty for each mechanical sleeve seal and access door.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Being listed herein as an acceptable manufacturer does not permit the manufacturer to provide standard manufactured equipment that does not comply with the performance and/or physical characteristic requirements of the Contract Documents.
- B. All substitutions must be identified in the Base Bid as a voluntary Deduct Alternate and must be accompanied by a Letter of Equivalency certifying the product's equivalency in all performance and physical characteristics to the products listed herein. The proposed substitutions shall be inclusive of all cost and physical implications throughout the project. Under no circumstances should the substitution result in added cost to the project. Should the substitution be approved neither the project specifications nor the Contract Documents will be revised to reflect the substitution.
- C. Access Doors
 1. Karp Associates, Inc.
 2. Milcor.
 3. Williams Brothers Corp.
- D. Escutcheons
 1. Chicago Specialty.
 2. Producers Specialty.
 3. Sanitary-Dash.
- E. Formed Steel Channel
 1. Allied Tube & Conduit Corp.
 2. B-Line Systems.

- 3. Unistrut Corp.
- F. Mechanical Sleeve Seals
 - 1. Metraflex Co.
 - 2. Pipeline Seal & Insulator Inc. (Link-Seal)
 - 3. Calpico, Inc.
- G. Sleeves
 - 1. Metraflex Co.
 - 2. Pipeline Seal & Insulator Inc. (Link-Seal)
 - 3. Calpico, Inc.

2.02 GENERAL REQUIREMENTS

- A. All materials and equipment shall be new, in good condition and free from defect. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- B. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein are the minimum standards acceptable. The Engineer retains the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require the specified materials and equipment which conform to the requirements of the Contract Documents be furnished.
- C. Materials and equipment, which are found to have factory defects shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Contractor shall be responsible for all costs associated with testing, replacement or repair including, but not limited to, all replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, re-commissioning of the equipment, etc.

2.03 SLEEVES

- A. Furnish sleeves for all pipes passing through floors, walls and concrete, or concrete fireproofed beams.
- B. Sleeves in Concrete Beams, Through Concrete Walls, and Exposed Pipes Penetrating Floors: Schedule 40 steel pipe.

- C. Provide sleeves in foundation walls and in concrete pits with anchor flange.
- D. Sleeves within Furred-out Enclosures in Floors, Through Partitions, Steel Beams and Walls: 18 gauge (1.2 mm) thick galvanized steel.

2.04 MECHANICAL SLEEVE SEALS

- A. Provide modular, mechanical type sleeve seals for all piping passing through waterproof concrete foundation walls, pit walls and similar construction, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between the pipe and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.
- B. Where mechanical sleeve seals are required but cannot be provided due to space limitations, caulk the annular space with lead and oakum.

2.05 ACCESS DOORS

- A. Provide access doors as required for all concealed valves, cleanouts and other elements requiring access above ceilings or behind walls or as indicated on the drawings. The installation of all doors will be performed under the work of another section. Coordinate the work and assume responsibility for the accessibility of all valves.
- B. Provide access doors factory made, completely flush, heavy metal access doors as manufactured by Karp Associates, Inc.
- C. Frames shall be a 14 gauge steel, welded with mitered corners ground smooth, anchors.
- D. Doors shall be 14 gauge steel, heavy hinges flush with frame, invisible when closed, wing-type airplane catches; no bolts, screws, nuts or other loose devices required for opening of door.
- E. All access doors and frames shall be given a prime coat of corrosion-resistant paint at the factory.
- F. Furnish the following access doors as manufactured by Karp Associates, Inc.
 - 1. In plaster ceilings, KARP DSC 210-PL.
 - 2. In 3-hour masonry enclosures (pipe or duct shafts), KARP DSC-211-FRT with 1-1/2 inch vermiculite plaster fill. Metal lath lining for plaster shall be self-furring type, tack-welded to pan.

3. In nonrated masonry, KARP DSC-211.
4. In drywall construction, KARP DSC-214M.

2.06 FORMED STEEL CHANNEL

- A. Provide formed steel channel as required to sufficiently support piping and equipment in accordance with the Contract Documents.
- B. Formed steel channel shall be galvanized 12 gauge (2.8 mm) thick steel, with holes 1-1/2 inches (38 mm) on center.

2.07 ESCUTCHEONS

- A. Provide escutcheons as required to sufficiently enclose penetrations in fire and smoke rated walls and partitions in accordance with the Contract Documents.
- B. Where pipes penetrate fire or smoke rated walls provide metal escutcheons on both sides of the wall penetration.
- C. Escutcheons shall be either one-piece or two-piece construction, chrome-plated brass or stainless steel.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and returned to the manufacturer for replacement.

3.02 INSTALLATION

- A. Installation shall be in accordance with the specification section pertaining to the individual equipment.
- B. The arrangement, positions and connections of pipes, fixtures, drains, valves, and the like, indicated on the drawings shall be followed as closely as possible, but the right is reserved by the Architect to change locations and elevations to accommodate conditions which may arise during the progress of the work, prior to installation, without additional compensation for such changes. The responsibility for accurately laying out the work and coordinating the installation with other trades rests with this Contractor. Should it be found that any work is laid out so that interferences will occur, report that to the Architect before commencing work.

- C. Carry fixture connections, concealed in building construction, to points above floor, break out close to the underside or adjacent to fixture and continue exposed to fixture.
- D. Piping Installation
 - 1. Install pipes approximately as shown on the drawings and as directed during installation, as straight and direct as possible, forming right angles or parallel lines with building walls and other pipes, and neatly spaced. Erect pipe risers plumb and true, and parallel with walls and other pipes and neatly spaced.
 - 2. Keep all horizontal runs of piping, except where concealed in partitions, as high as possible and close to walls.
 - 3. Do not install pipes or other apparatus in a manner, which interferes with the full swing of the doors.
 - 4. Ream all pipe smooth before installation. Do not bend, flatten, split or otherwise injure pipe.
 - 5. Use reducing fittings, unless otherwise approved in special cases, in making reduction in size of pipe. Bushings shall not be allowed unless specifically approved.
 - 6. Do not install exterior piping in water or when trench or weather conditions are unsuitable for the work, as decided by the Architect.
- E. Sleeves
 - 1. Set sleeves in position in forms. Provide reinforcing around sleeves.
 - 2. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
 - 3. Extend waterproof sleeves through floors **1 inches (25 mm)** above finished floor level. Caulk sleeves tight.
 - 4. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with firestopping and caulk airtight. Provide close-fitting metal collar or escutcheon covers at both sides of penetration.
 - 5. Sleeves passing through fire-rated floors or walls shall be sealed with an intumescent formulation similar to Metraflex Metraseal 120 FireSeal or approved.

6. Sleeves passing through foundation walls or pit walls shall be sealed utilizing a mechanical seal similar to Link-Seal or approved.
7. Install chrome-plated steel escutcheons at finished surfaces.
8. Set sleeves as construction progresses and secure in place during pouring of concrete.
9. Firestopping shall be installed as specified under Section 07 84 00.

F. Mechanical Sleeve Seals

1. Mechanical sleeve seal installation shall be in accordance with the manufacturer's recommendations and as indicated on the drawings.
2. Install mechanical sleeve seals at all exterior watertight entries, foundation walls and pit walls.

G. Access Doors

1. Size access doors as required for the equipment being accessed, however access doors shall not be smaller than 16 inches by 16 inches. Install all valves to fit within the limit of the following size access doors; where two (2) or less valves are located with their bonnets within 12 inches of the face of the door and all portions of the valves are within the area defined by the opening in the door, 16 inch x 16 inch doors may be used. Where more than two (2) valves are served by a door and the bonnets are within 12 inches of the face of the door, the size of the door shall be increased so that all portions of the valves are within the area defined by the opening in the door. Where the bonnets of the valves are more than 12 inches from the face of the door, the doors shall be minimum of 20 inch x 20 inch clear opening.
2. Furnish buttons or tabs to Ceiling Contractor for setting, as approved by Architect, to indicate location of valves, cleanouts or other equipment located above removable-type ceilings where access doors are not furnished.

H. Escutcheons

1. Provide pipe escutcheons with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings, and pipe sleeve extensions, if any. Furnish

pipe escutcheons with chrome finish for occupied areas, prime paint finish for unoccupied areas.

2. Escutcheons for waterproof floors, and areas where water and condensation can be expected to accumulate shall be stainless steel or chrome plated cast brass, solid or split hinged.
3. Escutcheons for dry areas shall be chrome plated cast brass or galvanized sheet steel, solid or split hinged.

3.03 CLEANING

- A. Before final connections are made and before operation of equipment and piping, thoroughly blow out, rod out, or wash out all piping at least twice, in a manner as directed and/or approved by the Architect, to remove all accumulation of dirt, chips or other deleterious material. Make all temporary connections and furnish all appliances required for the purpose of cleaning at no extra expense to the Owner.
- B. Clean up all equipment and leave in condition for finish painting before acceptance.

3.04 PROTECTIVE PAINTING

- A. Painting, except as specified herein or indicated otherwise, shall be done under another division. This division shall cooperate with the other divisions to determine the size of equipment, sizes and lengths of pipes, etc., to be painted.
- B. Equipment and materials furnished under this section shall be factory-finished as specified. If the factory finish is damaged during shipment, storage, installation, etc., it shall be repainted by this Contractor subject to the Engineer's approval. Touch-up painting is acceptable only for minor finish damage.
- C. Repair damaged and marred factory-painted finishes with materials and procedures to match original factory finish.
- D. Paint products for identification of fire suppression systems shall be exterior grade, alkyd-based products.
- E. Finish painting of the fire standpipe and sprinkler risers, cross-connections, handles of all fire protection valves and apparatus shall be in accordance with Local Law 58 of 2009. Refer to Section 09 90 00 for all painting requirements, including, but not limited to, work included, materials, primers, application, surface preparation, paint specification for ferrous pipe and VOC limits.

- F. Provide a heavy field coat of paint as specified in Section 09 90 00, on all fire standpipe and sprinkler piping in accordance with Local Law 58 of 2009, prior to the hydrostatic pressure test and whether the pipe will be encased, partially encased in building construction or exposed, as described herein:
 - 1. Combination Fire Standpipe Systems
 - a. Main distribution piping, cross-connection and risers shall be painted red.
 - 2. Sprinkler Systems
 - a. Main distribution piping, cross-connection and risers shall be painted red.

3.05 FIELD TESTS

- A. Test all systems in full accordance with applicable Underwriters' and Municipal requirements.
- B. Notify the Architects and Inspectors Having Jurisdiction at least 48 hours in advance of performing the required tests, so that arrangements may be made for their presence to witness the tests.
- C. Furnish and pay for all devices, materials, supplies, labor and power required in connection with tests. Make all tests in the presence and to the satisfaction of the Architects, fire suppression and other Inspectors of the City, applicable Insurance Association and Public Utilities Inspectors Having Jurisdiction.
- D. Repair or, if required by the Architects, replace defective work with new work without extra charge to the Owner. Repeat tests as directed, until all work is proven satisfactory.
- E. Restore to its original condition any work damaged or disturbed by tests, engaging the original trades to do the work of restoration.
- F. Test the systems before any paint or insulation is applied.
- G. Test equipment in service and demonstrate that the equipment performs the work intended for it and that it complies with the requirements of these specifications for such equipment.
- H. Performance Tests

1. Prior to applying the hydrostatic test, the system shall be tested with 50 psig compressed air or dry nitrogen for a period of ten minutes with no loss in pressure.
 2. Apply a hydrostatic test to each fire standpipe and sprinkler system. Each system shall be tested to a pressure not less than 200 psig or 50 psig above the normal operating pressure, whichever is greater. Apply the test for a minimum of two (2) consecutive hours with no loss in pressure.
- I. Final Acceptance
1. Prior to final acceptance the Contractor shall submit all performance test reports for each test performed. The reports shall be bound in a three-ring binder and submitted to the Architect, Engineer and Owner for review.
 2. Final acceptance testing shall comply with the project construction schedule and shall be sufficiently in advance of the Contract completion date to permit the execution of the testing by the Contractor prior to occupancy and the close-out of the Contract.
 3. Any adjustments and/or alterations which the final acceptance tests indicate as necessary for the proper and satisfactory functioning of all equipment and systems shall be completed prior to the closeout of the Contract. Re-tests shall not relieve the Contractor of completion date responsibility.

END OF SECTION 21 05 00

**SECTION 21 05 29 - HANGERS AND SUPPORTS FOR FIRE SUPPRESSION
PIPING AND EQUIPMENT**

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide all hangers, supports and anchors required for piping and equipment as indicated on and in accordance with the requirements of the Contract Documents.
- B. The Division 21 Subcontractor shall assume complete responsibility for the anchoring of the equipment, piping systems, specified hereinafter to the concrete foundation pads, to the concrete inertia bases, and to the supporting structural steel and concrete beams.
- C. Section includes:
 - 1. Pipe hangers and supports.
 - 2. Attachments to structure.
 - 3. Formed steel channel supports and accessories.

1.02 RELATED SECTIONS

- A. Refer to Divisions 01, 22, 23, 26, and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.

Refer to Section 21 00 00 – Table of Contents for Fire Suppression for specification sections that apply to all work herein.

1.03 REFERENCES

- A. All hangers and supports, including all components shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:
 - 1. Codes: Perform all work in accordance with the latest applicable codes and standards for New York City.
 - a. New York City Building Code.
 - b. New York City Fire Code.
 - 2. Reference Standards

- a. American Society of Mechanical Engineers
 - 1) ASME B31.1: Power Piping.
- b. ASTM International
 - 1) ASTM A 36: Standard Specification for Carbon Structural Steel.
 - 2) ASTM A 47: Standard Specification for Ferritic Malleable Iron Castings.
 - 3) ASTM A 48: Standard Specification for Gray Iron Castings.
 - 4) ASTM A 123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 5) ASTM A 240: Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - 6) ASTM A 283: Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
 - 7) ASTM A 536: Standard Specification for Ductile Iron Castings.
 - 8) ASTM A 575: Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
 - 9) ASTM A 668: Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use.
 - 10) ASTM A 1011: Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 - 11) ASTM B 633: Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
 - 12) ASTM E 84: Test Method for Surface Burning Characteristics of Building Materials.

- 13) ASTM E 119: Method for Fire Tests of Building Construction and Materials.
 - 14) ASTM E 814: Test Method of Fire Tests of Through Penetration Firestops.
 - 15) ASTM F 708: Standard Practice for Design and Installation of Rigid Pipe Hangers.
- c. American Welding Society
- 1) AWS D1.1: Structural Welding Code - Steel.
- d. FM Global
- 1) Property Loss Prevention Data Sheet 2-0: Installation Guidelines for Automatic Sprinklers.
 - 2) Property Loss Prevention Data Sheet 2-8: Earthquake Protection for Water-Based Fire Protection Systems.
- e. Manufacturers Standardization Society of the Valve and Fittings Industry
- 1) MSS SP 58: Pipe Hangers and Supports - Materials, Design and Manufacturer.
 - 2) MSS SP 77: Guidelines for Pipe Support Contractual Relationships.
 - 3) MSS SP 89: Pipe Hangers and Supports - Fabrication and Installation Practices.
 - 4) MSS SP 90: Guidelines on Terminology for Pipe Hangers and Supports.
 - 5) MSS SP 127: Bracing for Piping Systems Seismic-Wind-Dynamic Design, Selection, Application.
- f. National Fire Protection Association (NFPA)
- 1) NFPA 13: Standard for the Installation of Sprinkler Systems.

1.04 SUBMITTALS

- A. The following submittal data shall be furnished according to the Conditions of the Contract, Division 01, and Section 21 00 00 and shall include, but not be limited to:
1. Provide shop drawings indicating system layout with location showing critical dimensions, sizes, pipe hanger and support locations and detail of trapeze hangers.
 2. Method of attachment to and load imposed on building structures by hangers, anchors, supports, guides and supplemental steel shall be submitted for review and approved by the project Architect and Structural Engineer.
 3. Shop drawings indicating support methods, point loadings to the building structure and hanger locations shall be submitted for review sufficiently in advance of concrete pouring schedules to permit evaluation, critique and any necessary changes to hanging and support methods.
- B. Product Data: Submit manufacturer's literature including general assembly,
1. Hangers and Supports: Submit manufacturer's catalog data including load capacity and sizing schedules specific to this project.
 2. Inserts: Submit manufacturer's catalog data including load capacity.
- C. Design Data: Indicate load-carrying capacity of trapeze, multiple pipe, and riser support hangers. Indicate calculations used to determine load-carrying capacity of trapeze, multiple pipe, and riser support hangers. Submit sizing methods and calculations sealed by a Professional Engineer licensed in State of New York.
- D. Test Reports: Indicate procedures and results for specified factory and field acceptance testing and inspections.
- E. Manufacturer's Installation Instructions: Submit support details, installation instructions, connection requirements, for the system.
1. Hangers and Supports: Submit special procedures and assembly of components.
 2. Firestopping: Submit preparation and installation instructions.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 21 00 00 shall apply to all work specified herein.
- B. All products and equipment specified herein shall be fabricated by companies whose primary business expertise is the manufacturing of commercial and industrial products and equipment with a minimum of ten (10) years documented experience.
- C. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- D. Make every effort to furnish all equipment of any equipment type from one manufacturer.
- E. Furnish all equipment, materials and accessories new and free from defects.
- F. Maintain one (1) copy of the approved submittals for each product on site.

1.06 FACTORY TESTING

- A. All hangers, rods, supports and accessories shall be fully assembled and factory tested for full functionality at the manufacturer's factory prior to shipment.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the requirements of Division 01 and Section 21 00 00.
- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer's rigging and installation instructions.
- C. Protect all components from physical damage, including effects of weather, water, and construction debris.

1.08 COORDINATION

- A. Coordinate with other trades to use common means of support. Submit for approval all pertinent design data relating to the support as well as verification of the responsibility for the support.

1.09 UNIT PRICES

- A. Reserved.

1.10 WARRANTY

- A. Comply with the requirements of Division 01 and Section 21 00 00.
- B. Furnish a five (5) year manufacturer's warranty for all pipe hangers and supports.
- C. Warranty period shall commence upon final acceptance by the Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Being listed herein as an acceptable manufacturer does not permit the manufacturer to provide standard manufactured equipment that does not comply with the performance and/or physical characteristic requirements of the Contract Documents.
- B. All substitutions must be identified in the Base Bid as a voluntary Deduct Alternate and must be accompanied by a Letter of Equivalency certifying the product's equivalency in all performance and physical characteristics to the products listed herein. The proposed substitutions shall be inclusive of all cost and physical implications throughout the project. Under no circumstances should the substitution result in added cost to the project. Should the substitution be approved neither the project specifications nor the Contract Documents will be revised to reflect the substitution.
- C. Anchors and Inserts (Wedge Type)
 - 1. DeWalt.
 - 2. Hilti.
 - 3. ITW Red Head.
 - 4. MKT Fastening, LLC.
 - 5. Simpson Strong-Tie.
- D. Anchors and Inserts (Adhesive Type)
 - 1. DeWalt.
 - 2. Hilti.
 - 3. ITW Red Head.
 - 4. Simpson Strong-Tie.
- E. Formed Steel Channel Supports
 - 1. Anvil International.
 - 2. Carpenter & Patterson, Inc.
 - 3. Empire Industries, Inc.
 - 4. Eaton

5. Hilti.
 6. National Pipe Hanger Corporation.
 7. PHS Industries, Inc.
 8. Piping Technology and Products.
 9. Thomas & Betts - Kindorf.
- F. Pipe Hangers, Supports and Guides
1. Anvil International.
 2. Carpenter & Patterson.
 3. Empire Industries, Inc.
 4. Eaton
 5. Hilti.
 6. National Pipe Hanger Corporation.
 7. PHS Industries, Inc.
 8. Piping Technology and Products.
 9. Thomas & Betts - Kindorf.

2.02 GENERAL REQUIREMENTS

- A. All materials and equipment shall be new, in good condition and free from defect. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- B. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein are the minimum standards acceptable. The Engineer retains the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require the specified materials and equipment which conform to the requirements of the Contract Documents be furnished.
- C. Materials and equipment which are found to have factory defects shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Contractor shall be responsible for all costs associated with testing, replacement or repair, including but not limited to, all replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, re-commissioning of the equipment, etc.

2.03 PIPE HANGERS AND SUPPORTS

- A. Provide suitable and substantial hangers and supports for all piping and equipment. Hangers and supports shall be of the type, size and spacing specified or as required by the Authority Having Jurisdiction.

- B. Hangers shall be UL Listed and/or FM Approved and approved for use on fire service as listed in NFPA 13. All hangers and supports shall be designed to support five (5) times the weight of the water-filled pipe plus 250 lb. (114 Kg) at each point of piping support.
- C. Comply with maximum load ratings with consideration for allowable stresses prescribed by ASME B31.1 or MSS SP-58 and shall comply with NFPA 13 requirements.
- D. Pipe hangers, anchors, supports and guides shall be manufactured, selected, fabricated and installed in accordance with MSS SP-58, MSS SP-69 and MSS SP-89.
- E. Provide supports, guides and anchors that do not transmit unacceptable vibration to building structure.
- F. The support systems shall provide for, and control, the free or intended movement of the piping, including its movement in relation to that of connected equipment.
- G. Provide for vertical adjustments after installation of supported material and during commissioning, where feasible, to ensure pipe is at design elevation and slope.
- H. Select hangers and supports to perform under all conditions of operation, allowing free expansion and contraction, and to prevent excessive stresses being introduced into piping system and connected equipment.
- I. Where piping is required to be seismically restrained, the yoke on clevis hangers and/or roller hangers shall be reinforced to prevent the yoke from deforming. In the case of clevis hangers providing nuts on the inside and outside of the threaded rod connecting the yoke and clevis is acceptable.
- J. Provide drawings indicating pipe loads, including method of suspension and hanger location, and submit them for approval prior to proceeding with installation. Provide all the supplementary steel required to support, guide and anchor piping within shafts, Mechanical Equipment Rooms and all the other floors.
- K. Particular care shall be taken to support all pipes in a manner approved by the Architect, including the providing of supplementary steel, if required.
- L. Finishes
 - 1. Hangers, anchors, inserts, supports and guides (swivel ring, split ring, roller, wrought pipe clamp, or adjustable wrought clevis-type hangers, roller supports, floor stands, wall brackets, etc.) installed within the

building shall be hot dipped galvanized in accordance with ASTM A123 or stainless steel.

2. Strut channels installed indoors shall be pre-galvanized in accordance with ASTM A653 SS Grade 33 G90.
3. Hangers, anchors, supports, guides and strut located outdoors shall be hot dip galvanized after fabrication in accordance with ASTM A123 or stainless steel. All hanger hardware shall be hot-dip galvanized or stainless steel. Zinc-plated hardware shall not be acceptable for outdoor or corrosive use.

M. Hangers

1. Pipes 2 inches (50 mm) and smaller shall be supported with one of the following:
 - a. Adjustable steel swivel ring (band type) hanger.
 - b. Malleable iron split ring hanger.
 - c. Adjustable steel clevis hanger.
2. Pipes 2-1/2 inches (63.5 mm) and larger shall be supported with one of the following:
 - a. Adjustable steel swivel ring (band type) hanger.
 - b. Adjustable steel clevis hanger.

N. Trapeze Hangers

1. Shall be constructed of one of the following:
 - a. 12 gauge roll-formed 1-5/8 inch (40 mm) by 1-5/8 inch (40 mm) minimum structural steel channel.
 - b. Two (2) structural steel channels secured together with 1/2 inch (12.5 mm) or 3/4 inch (20 mm) steel pipe sections.
2. Pipes shall be secured to trapeze by one of the following methods:
 - a. Uninsulated Pipe: 2-piece pipe straps with thermoplastic elastomeric liner sized for outside diameter of pipe.

- b. Insulated Pipe: 2-piece pipe straps sized for outside diameter of pipe and insulation using insulation shields.
- O. Accessories
 - 1. Pipe protection saddles shall be formed from carbon steel, 1/8 inch (3 mm) minimum thickness, sized for insulation thickness.
 - 2. Preinsulated shields shall be 180 degree, 18 gauge minimum galvanized sheet metal, minimum 12 inch (305 mm) long, with high density water-repellant Kaylo insulation, foam glass or high-density polyisocyanurate inserts minimum thickness to match outside diameter of the insulated pipe.

2.04 ATTACHMENTS TO STRUCTURE

- A. All piping shall be carried by pipe hangers and supports attached to building structure. All supports and restraints requiring connections to steel-plated building construction shall be welded to steel plating.
- B. Method of attachment to and load imposed on building structures by hangers, anchors, supports, guides and supplemental steel shall be submitted for review.
- C. In no case shall hangers be supported by means of vertical expansion bolts.
- D. Powder and power-actuated devices, grip nails, and/or expansion nails shall NOT be permitted.
- E. Structural Steel Attachments
 - 1. Center-loaded beam clamps or welded beam attachments shall be used where piping is to be suspended from building steel. Clamp shall be forged steel or malleable iron with cross bolts sized as required to fit beams and selected on the basis of load configuration and load to be supported.
 - 2. Where allowed by Structural Engineer, C-clamps with locknuts, cup point set screws and retaining straps shall be used. Top flange C-clamps shall be used when attaching a hanger rod to the top flange of structural shapes. Set screw torque shall be in accordance with manufacturer's recommendation.
- F. Concrete Inserts
 - 1. Cast-in-place continuous or spot concrete inserts shall be used where applicable.

2. Continuous inserts shall be made of 12 gauge, ASTM A1011 SS Grade 33 structural quality carbon steel, complete with styrofoam inserts and end caps with nail holes for attachment to forms. The continuous concrete insert shall have a load rating of 2,000 lbs./ft. in concrete.
3. Spot inserts shall be constructed of one of the following:
 - a. Malleable iron or pressed steel having a space for rods of all sizes. All inserts for pipes 3 inches (75 mm) and larger in size shall be installed with a reinforcing rod 5/8 inch (16 mm) in diameter, run through a slot in the insert specifically provided for this purpose.
 - b. Internally threaded machined steel insert with large, flanged heads suitable for installation on wood forms and/or formed metal decking.

G. Post Installed Anchors

1. Contractor shall submit each anchor's ICC-ES report to the Structural Engineer of the project for review.
 - a. Anchors shall be installed in accordance with the manufacturer's ICC-ES report and published installation instructions.
 - b. All post-installation anchors shall be listed in the manufacturer's ICC-ES report for use in cracked concrete.
2. Contractor shall review the structural composition of all concrete slabs where post-installation anchors will be used and only anchor models/types approved for use in the specific structural slab type shall be permitted, in accordance with the manufacturer's ICC-ES report and per approval of the project's Structural Engineer.
3. Each post-installation anchor shall be sized for the worst-case operating loads imposed to the structure.
4. Post-installed anchors may be installed in the vertical position under any of the following conditions:
 - a. When used in concrete having gravel or crushed stone aggregate to support pipes 4 inches or less in diameter.
 - b. When post-installed anchors are alternated with hangers connected directly to the structural members, such as trusses and girders, or to the sides of concrete beams to support pipe 5 inches and larger.

- c. When post-installed anchors are spaced not over 10 ft. apart to support pipes 4 inches or larger.
5. Post-installed anchors shall not be used in ceilings of gypsum or other similar soft material.
6. Post-installed anchors shall not be used in cinder concrete, except for branch lines where the post-installed anchors are alternated with through-bolts or hangers attached to beams.
7. Where through-bolts or hangers attached to beams is not feasible, the Contractor is responsible for providing hangers certified by a registered Professional Engineer capable of complying with the following:
 - a. Hangers shall be designed to support five times the weight of the water-filled pipe plus 250 lbs (114 kg) at each point of piping support.
 - b. These points of support shall be adequate to support the system.
 - c. The spacing between hangers shall not exceed the value given for the type of pipe as indicated in Table 9.2.2.1(a) or Table 9.2.2.1(b) of NFPA13-2007.
 - d. Hanger components shall be ferrous.
 - e. Detailed calculations shall be submitted, when required by the reviewing authority, showing stresses developed in hangers, piping, and fittings and safety factors allowed.
8. Where periodic/continuous Special Inspections are required, coordinate with the Special Inspector prior to and during the installation of anchors.

2.05 FORMED STEEL CHANNEL SUPPORTS AND ACCESSORIES

- A. Formed steel channel supports shall be capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.3 and shall comply with NFPA 13 requirements.
- B. Channel shall be made of minimum 12 gauge ASTM A570 Grade 33 steel electro galvanized after fabrication. Channel sections may be formed by single or factory welded multiple sections of any of the following:
 1. 1-5/8 inch (41.25 mm) x 1-5/8 inch (41.25 mm) channel.
 2. 2-7/16 inch (62 mm) x 1-5/8 inch (41.25 mm) channel.

3. 3-1/4 inch (82.5 mm) x 1-5/8 inch (41.25 mm) channel.
- C. Grip/Lock nuts shall be made of 3/8 inch (10 mm) thick case hardened mild steel bars electro galvanized after fabrication.
- D. All angle brackets connectors and washers shall be made of 1/4 inch (6.35 mm) steel plate electro galvanized after fabrication.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and replaced by the manufacturer.

3.02 INSTALLATION

- A. Hanger, rods, supports and accessories shall be installed in accordance with the manufacturer's recommendations and the Authorities Having Jurisdiction.
- B. Furnish and install all necessary supports for equipment furnished under this section. To meet the varying conditions in each case, these supports shall consist of pipestands, steel angle or strap hangers, saddles, brackets, as required for a complete installation.
- C. All such supports shall have substantial flanges bolted to floor construction; hangers shall be supported from the framing as described hereinabove. Supports shall be properly located with reference to any supporting pads, legs of the equipment carried and must be distributed as not to bring any undue strains to the equipment.
- D. All hanger and support details shall be submitted for review and approval.
- E. Guarantee that the work, as installed under this section of the specifications, will not result in the transmission of objectionable noise or vibration to any occupied parts of the building, and take full responsibility for any necessary modifications of this equipment, or of the foundations and supports for the same, necessary to secure this result.
- F. All attachments to the building structure shall comply with the requirements of Section 21 05 48.13 Vibration Isolation for Fire Suppression Piping and Equipment and Section 21 05.48.16 Seismic Controls for Fire Suppression Piping and Equipment

- G. Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom beam flanges.
- H. Proper care and ventilation should be given when welding galvanized components.
- I. Support from Structural Members: Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.
- J. Field welding of supports should be done by qualified welders using qualified welding procedures.
- K. Space supports so that there is at least one hanger for each length of pipe, with one hanger within 30 inches (762 mm) of the end sprinkler head.
- L. Horizontal piping shall be supported in accordance with the following schedules:

SINGLE ROD SUPPORT - STEEL PIPE		
Pipe Size	Maximum Hanger Spacing	Rod Size
1 to 2 inches (25 mm to 50 mm)	10 feet 0 inches (3,048 mm)	3/8 inch (10 mm)
2-1/2 and 3 inches (63 mm to 75 mm)	12 feet 0 inches (3,658 mm)	1/2 inch (12.5 mm)
4 to 5 inches (100 mm to 125 mm)	12 feet 0 inches (3,658 mm)	5/8 inch (16 mm)
6 to 10 inches (150 mm to 250 mm)	12 feet 0 inches (3,658 mm)	3/4 inch (20 mm)
DOUBLE ROD SUPPORT		
Pipe Size	Maximum Hanger Spacing	Rod Size
6 to 8 inches (150 mm to 200 mm)	12 feet 0 inches (3,658 mm)	1/2 inch (12.5 mm)
10 to 12 inches (250 mm to 300 mm)	12 feet 0 inches (3,658 mm)	5/8 inch (16 mm)

- M. Maximum hanger spacing may not be exceeded; however, actual installed spacing will depend on location of structural framing and floor slab construction. Where

building construction does not permit the above spacing, provide additional steel supports.

- N. Unsupported lengths of branch sprinkler piping shall be in conformance with NFPA standards based on static or flowing pressure, whichever is greater. Systems with pressures exceeding 100 psi have more restrictive unsupported lengths and require restraints to prevent upward movement of the pipe.
- O. Install lock nuts at the bottom of all hanger rods.
- P. Where hangers cannot be supported from building framing, they may be supported from concrete inserts, subject to the approval of the Structural Engineer. Furnish, locate and set such inserts and make sure that such inserts are in place when the concrete is poured.
- Q. Set all inserts for all pipes in ample time to allow the work of the other trades to be performed on scheduled time.
- R. Smaller pipes may be suspended from cross-pieces of pipe or steel angles, which, in turn, shall be hung from building concrete construction by means of rods and inserts. The intention is to provide supports which, in each case, shall be amply strong and rigid for the load, but which shall not weaken or unduly stress the building construction.
- S. No piping shall be hung from other piping or ductwork. In no case shall hangers be supported by means of vertical expansion bolts.

3.03 CLEANING

- A. Before final adjustments are made and before operation of equipment, clean and remove all accumulation of dirt, chips or other deleterious material. Leave all hangers and supports in condition suitable for finish painting, before final acceptance.
- B. Touch up, repair or replace damaged products before Substantial Completion.

3.04 INSPECTION AND STARTUP SERVICE

- A. Inspect each hanger, rod and support for piping and equipment for proper installation according to the manufacturer's instructions.

3.05 FIELD TESTS

- A. Performance Test: All hanger and support devices and components shall be tested in accordance with the latest applicable industry standards.

3.06 ADJUSTING AND BALANCING

- A. Adjust all pipe hangers, miscellaneous supports and equipment supports to equalize load for the piping and equipment they carry and to ensure that rods are vertical under operating conditions.
- B. Hangers at equipment shall be adjusted to ensure that there are no loads imposed on the equipment by the piping connected to the equipment.
- C. Hangers and Supports
 - 1. Ensure that rod is vertical under operating conditions.
 - 2. Equalize loads for all piping and equipment supports.
- D. Adjustable Clevis
 - 1. Tighten hanger load nut securely to ensure proper hanger performance.
 - 2. Tighten upper nut after adjustment.
- E. Beam Clamps: Tighten all set screws and lock nuts.

END OF SECTION 21 05 29

**SECTION 21 05 53 - IDENTIFICATION FOR FIRE SUPPRESSION
PIPING AND EQUIPMENT**

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide all identification nameplates and tags required for equipment and piping as indicated on and in accordance with the requirements of the Contract Documents.
- B. Section includes:
 - 1. Charts.
 - 2. Equipment nameplates.
 - 3. Pipe identification.
 - 4. Signage.
 - 5. Valve tags.

1.02 RELATED SECTIONS

- A. Refer to Divisions 01, 22, 23, 26, and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.
- B. Refer to Section 21 00 00 – Table of Contents for Fire Suppression for specification sections that apply to all work herein.

1.03 REFERENCES

- A. All nameplates, signs and valve tags shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:
 - 1. Codes: Perform all work in accordance with the latest applicable codes and standards for New York City.
 - a. New York City Building Code.
 - b. New York City Fire Code.
 - 2. Reference Standards

- a. American Society of Mechanical Engineers
 - 1) ASME A13.1: Scheme for the Identification of Piping Systems.
- b. American National Standards Institute
 - 1) ANSI Z535: Safety Color Code - Environmental Facility Safety Signs - Criteria for Safety Symbols - Product Safety Sign & Labels - Accident Prevention Tags.
- c. ASTM International
 - 1) ASTM D 882: Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
- d. National Fire Protection Association (NFPA)
 - 1) NFPA 13: Standard for the Installation of Sprinkler Systems.
 - 2) NFPA 25: Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems.
 - 3) NFPA 72: National Fire Alarm Code.
 - 4) NFPA 101: National Life Safety Code.

1.04 SUBMITTALS

- A. The following submittal data shall be furnished according to the Conditions of the Contract, Division 01, and Section 21 00 00 and shall include, but not be limited to:
 - 1. Catalog cuts of pipe markers.
- B. Submit two (2) samples of each type of the following:
 - 1. Tags, including colors and lettering styles.
 - 2. Piping markers.
- C. Product Data: Submit manufacturer's literature for each product submitted.

- D. Manufacturer's Installation Instructions: Submit support details, installation instructions, connection requirements, for the system.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 21 00 00 shall apply to all work specified herein.
- B. All products and equipment specified herein shall be fabricated by companies whose primary business expertise is the manufacturing of commercial and industrial products and equipment with a minimum of ten (10) years documented experience.
- C. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- D. Furnish all equipment, materials and accessories new and free from defects.
- E. Maintain one (1) copy of the approved submittals for each product on site.
- F. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories and ANSI Z535 - Safety Color Code - Environmental Facility Safety Signs - Criteria for Safety Symbols - Product Safety Sign & Labels - Accident Prevention Tags.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Division 01 and Section 21 00 00.
- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer's rigging and installation instructions.
- C. Protect all components from physical damage, including effects of weather, water, and construction debris.
- D. Store tapes, adhesives, mastics, and labeling materials in ambient conditions acceptable to and in accordance with the recommendations of the manufacturer.
- E. Labeling and markers which become damaged in the opinion of the Engineer may be rejected and shall be repaired or replaced by the Contractor at no additional expense to the Contract.

1.07 WARRANTY

- A. Comply with the requirements of Division 01 and Section 21 00 00.
- B. Furnish a one (1) year manufacturer's warranty for all system tags and nameplates.
- C. Warranty period shall commence upon final acceptance by the Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Being listed herein as an acceptable manufacturer does not permit the manufacturer to provide standard manufactured equipment that does not comply with the performance and/or physical characteristic requirements of the Contract Documents.
- B. All substitutions must be identified in the Base Bid as a voluntary Deduct Alternate and must be accompanied by a Letter of Equivalency certifying the product's equivalency in all performance and physical characteristics to the products listed herein. The proposed substitutions shall be inclusive of all cost and physical implications throughout the project. Under no circumstances should the substitution result in added cost to the project. Should the substitution be approved neither the project specifications nor the Contract Documents will be revised to reflect the substitution.
- C. Pipe Identification
 - 1. Brady Corporation.
 - 2. Brimar Industries Incorporated.
 - 3. Marking Services Incorporated.
 - 4. Seton Nameplate Corp.

2.02 GENERAL REQUIREMENTS

- A. All materials and equipment shall be new, in good condition and free from defect. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- B. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein are the minimum standards acceptable. The Engineer retains the sole right to judge the

equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require the specified materials and equipment which conform to the requirements of the Contract Documents be furnished.

- C. Materials and equipment which are found to have factory defects shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Contractor shall be responsible for all costs associated with testing, replacement or repair, including but not limited to, all replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, re-commissioning of the equipment, etc.

2.03 PIPING IDENTIFICATION

- A. All piping shall be identified as to type of use, service and direction of flow in accordance with ANSI A13.1.
- B. Pipe markers shall meet ANSI and OSHA requirements for identifying the service, direction of flow, system and zone, for the various piping systems.
- C. They shall be factory-fabricated, flexible, semi-rigid UV-resistant heavy-duty vinyl, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.
- D. Each marker shall consist of one (1) label with direction-of-flow arrows and the name of the service printed in black letters not less than 1 inch (25 mm) high for pipe 2-1/2 inches (60 mm) and smaller, 2 inch (50 mm) high for 3 inches (75 mm) pipe and larger. Markers shall have backgrounds of different colors for the various service groups.
- E. Locate markers at each valve, at each entry thru walls, within access doors and on 20 foot (6,096 mm) centers for straight runs of pipe.
- F. Painting
 - 1. All sprinkler main and branch piping shall be painted in accordance with the Authorities Having Jurisdiction.
 - 2. All fire standpipe and sprinkler piping shall be painted in accordance with the New York City Building Code, prior to the hydrostatic pressure test and whether the pipe will be encased, partially encased in building construction or exposed. as described herein:
 - a. Combination Fire Standpipe Systems

- 1) Main distribution piping, cross connection and risers shall be painted red.
- b. Sprinkler Systems
 - 1) Sprinkler floor control assemblies and main distribution piping within egress stairs shall be painted red.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and replaced by the manufacturer.

3.02 CLEANING

- A. Clean and remove all accumulation of dirt, chips or other deleterious material on equipment nameplates, valve tags and signage. Leave all valve tags and equipment nameplates in clean and legible condition before final acceptance.
- B. Touch-up, repair or replace damaged tags and nameplates before final acceptance.

END OF SECTION 21 05 53

SECTION 21 13 13 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. Furnish and install all piping, material, fittings and appurtenances required for a complete sprinkler system as indicated on and in accordance with the requirements of the Contract Documents.
- B. Section includes:
 - 1. Material of piping systems.
 - 2. Signage.
 - 3. Sprinkler heads.
 - 4. Sprinkler drains.

1.02 RELATED SECTIONS

- A. Refer to Divisions 01, 22, 23, 26, and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.
- B. Refer to Section 21 00 00 – Table of Contents for Fire Suppression for specification sections that apply to all work herein.

1.03 REFERENCES

- A. All piping, materials, fittings and appurtenances and all associated components of the sprinkler system shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:
 - 1. Codes: Perform all work in accordance with the latest applicable codes and standards for New York City.
 - A. New York City Building Code.
 - B. New York City Fire Code.
 - 2. Reference Standards
 - A. American Society of Mechanical Engineers

1. ASME B16.1: Cast Iron Pipe Flanges and Flanged Fittings.
 2. ASME B16.3: Malleable Iron Threaded Fittings.
 3. ASME B16.4: Gray Iron Threaded Fittings.
 4. ASME B16.5: Pipe Flanges and Flanged Fittings.
 5. ASME B16.9: Factory-Made Wrought Steel Buttwelding Fittings.
 6. ASME B16.11: Forged Fittings, Socket-Welding and Threaded.
 7. ASME B16.25: Buttwelding Ends.
 8. ASME B36.10M: Welded and Seamless Wrought Steel Pipe.
- B. ASTM International
1. ASTM A 53/A 53M: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 2. ASTM A 135: Standard Specification for Electric-Resistance-Welded Steel Pipe.
 3. ASTM A 234: Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
 4. ASTM A 733-16: Standard Specification for Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples
 5. ASTM A795: Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.
- C. American Welding Society
1. AWS A5.8: Specification for Filler Metals for Brazing and Braze Welding.

2. AWS D1.1: Structural Welding Code - Steel.
 3. AWS D10.12M/D10.12: Guide for Welding Mild Steel Pipe
- D. FM Global (FM)
1. Property Loss Prevention Data Sheet 2-0: Installation Guidelines for Automatic Sprinklers.
 2. Property Loss Prevention Data Sheet 2-1: Prevention and Control of Internal Corrosion in Automatic Sprinklers.
 3. Property Loss Prevention Data Sheet 2-81: Fire Protection System Inspection, Testing and Maintenance.
- E. Manufacturers Standardization Society
1. MSS SP6: Contact Faces of Pipe Flanges and Connecting-end Flanges of Valves and Fittings.
 2. MSS SP9: Spot Facing for Bronze, Iron and Steel Flanges.
 3. MSS SP43: Wrought Stainless Steel Butt-welding Fittings.
 4. MSS SP44: Steel Pipe Line Flanges.
 5. MSS SP-51: Class 150LW Corrosion Resistant Cast Flanges and Flanged Fittings.
 6. MSS SP-75: Specifications for High-Test Wrought Butt Welding Fittings.
 7. MSS SP-77: Guidelines for Pipe Support Contractual Relationships.
 8. MSS SP-83: Steel Pipe Unions Socket-Welding and Threaded.
 9. MSS SP-97: Forged Carbon Steel Branch Outlet Fittings- Socket Welding, Threaded and Butt-welding Ends.
- F. National Fire Protection Association (NFPA)

1. NFPA 13: Standard for the Installation of Sprinkler Systems.
2. NFPA 25: Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems.
3. NFPA 45: Standard on Fire Protection for Laboratories Using Chemicals.
4. NFPA 72: National Fire Alarm Code.
5. NFPA 101: Life Safety Code.

1.04 SUBMITTALS

- A. The following submittal data shall be furnished according to the Conditions of the Contract, Division 01, and Section 21 00 00 and shall include, but not be limited to:
 1. Provide a pipe, material and fitting schedule for all sprinkler systems including:
 - A. System working pressure.
 - B. Type of pipe including material of construction.
 - C. Fitting type of each type of pipe and each size.
 2. Sprinkler system appurtenances, sprinkler heads, sprinkler guards and signage as required by the Authority Having Jurisdiction.
 3. The Contractor shall submit piping shop drawings and hydraulic calculations for review prior to fabrication of any of the systems. Shop drawings shall indicate plan locations and elevations of piping and hangers, including bottom elevation of major piping and be coordinated with ductwork and other mechanical and electrical services.
 4. Provide hydraulic calculations indicating compliance with the construction documents and the local code requirements.
- B. Welders' Certificate: Submit welders' certification of compliance with ASME Section IX and AWS D1.1 prior to proceeding with any welding.
- C. Product Data: Submit manufacturer's literature including general assembly, materials of construction, manufacturing process, pressure ratings and approvals.

- D. Test Reports: Indicate procedures and results for specified factory and field acceptance testing and inspections.
- E. Manufacturer's Installation Instructions: Submit support details, installation instructions and connection requirements for the system.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 21 00 00 shall apply to all work specified herein.
- B. All products and equipment specified herein shall be fabricated by companies whose primary business expertise is the manufacturing of commercial and industrial products and equipment with a minimum of ten (10) years documented experience.
- C. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- D. Make every effort to furnish all equipment of any equipment type from one manufacturer.
- E. Furnish all equipment, materials and accessories new and free from defects.
- F. An independent testing agency shall observe the fitting-up and making of welds and subject a percentage of both shop welds and field welds to either ultrasonic or magnetic particle flaw testing. These observations and tests shall be performed on a random basis.
- G. The Contractor must maintain on site current copies of each welder or welding operator's Procedure Qualification Record.
- H. All welds shall bear the identifying number, letter or symbol of the welder or welding operator.
- I. To ensure uniformity and compatibility of piping components in grooved in piping system all grooved products and grooving tools must be the products of a single manufacturer.
- J. The manufacturer of grooved piping fittings shall provide on-site training for Contractor's field personnel by a factory trained representative in the proper use

of grooving tools, application of groove, and product installation. In addition, the manufacturer's representative shall periodically visit the job site and inspect installation. Contractor shall remove and replace any improperly installed products.

- K. Maintain one (1) copy of the approved submittals for each product on site.

1.06 FACTORY TESTING

- A. All piping, fittings and couplings shall be fully assembled, and factory tested for full functionality at the manufacturer's factory prior to shipment and as specified herein:
 - 1. The piping manufacturer shall provide hydrostatic test reports indicating pressure rating and compliance with the specifications.
 - 2. The fitting and coupling manufacturer shall provide hydrostatic test reports indicating pressure rating and compliance with the specifications.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Division 01 and Section 21 00 00.
- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer's rigging and installation instructions.
- C. Protect all components from physical damage, including effects of weather, water, and construction debris.

1.08 COORDINATION

- A. Certain materials will be furnished, installed, or furnished and installed, under other sections of the specifications. Examine the Construction Documents to ascertain these requirements.
- B. Carefully check space requirements with other trades to ensure that all material can be installed in the spaces allotted thereto. Finished suspended ceiling elevations are indicated on the general construction drawings.
- C. Transmit to trades doing work of other sections all information required for work to be provided under their respective sections (such as foundations, electric wiring, access doors, and the like) in ample time for installation.
- D. Set all inserts for all pipes in ample time to allow the work of the other trades to be performed on scheduled time.

- E. Furnish and set all sleeves for passage of pipes through structural masonry and concrete walls and floors and elsewhere as required for proper protection of each pipe passing through building surfaces. Coordinate this work with Choose an item. in order to expedite and properly perform this work.
- F. Field drilling, cutting and/or reinforcing of holes in structural metal deck required for work under this section shall be coordinated through the Choose an item. and must be approved by the Structural Engineer.
- G. Should the Contractor neglect to perform preliminary work and should cutting be required in order to install equipment, the expense of this cutting and restoring of surfaces to their original condition shall be borne by this Contractor.
- H. Due to the type of the installation, a fixed sequence of operation is required to properly install the complete systems. It shall be the responsibility of this Contractor to coordinate, protect and schedule his work with other trades in accordance with the construction sequence.
- I. Architectural drawings shall be checked for ceiling height requirements.

1.09 UNIT PRICES

- A. The Contractor shall state in the proposal, unit prices in accordance with the following schedule and the requirements of Section 21 00 00.
- B. Piping
 - 2-1/2 inch (63 mm) \$ _____/l.f. (m)
- C. Sprinkler Heads (shall include arm-over/10 ft. [3 m] of pipe)
 - Concealed Pendant \$ _____/each
 - Sidewall Standard Coverage \$ _____/each
 - Upright/Pendant \$ _____/each

1.10 WARRANTY

- A. Comply with the requirements of Division 01 and Section 21 00 00.
- B. Furnish a five (5) year manufacturer's warranty for all piping.
- C. Furnish a five (5) year manufacturer's warranty for all fittings and couplings.

- D. Warranty period shall commence upon final acceptance by the Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Being listed herein as an acceptable manufacturer does not permit the manufacturer to provide standard manufactured equipment that does not comply with the performance and/or physical characteristic requirements of the Contract Documents.
- B. All substitutions must be identified in the Base Bid as a voluntary Deduct Alternate and must be accompanied by a Letter of Equivalency certifying the product's equivalency in all performance and physical characteristics to the products listed herein. The proposed substitutions shall be inclusive of all cost and physical implications throughout the project. Under no circumstances should the substitution result in added cost to the project. Should the substitution be approved neither the project specifications nor the Contract Documents will be revised to reflect the substitution.
- C. Material of Piping Systems
1. Mechanical Couplings and Fittings for Grooved Steel Pipe
 - A. Grinnell
 - B. Gruvlok.
 - C. Victaulic
 2. Steel Pipe
 - A. Allied Pipe & Tube.
 - B. Ward Mfg.
 - C. Wheatland Pipe & Tube.
 3. Steel Pipe Flanges
 - A. Anvil International.
 - B. Taylor Forge.
 - C. Weldbend.
 4. Threaded Steel Pipe Fittings
 - A. Anvil International
 - B. Ward Mfg.

5. Welded Steel Pipe Fittings
 - A. Merit
 - B. National Flange and Fitting Co.
 - C. Weldbend.
- D. Sprinkler Heads
 1. Reliable Sprinkler Corp.
 2. Tyco Fire.
 3. Victaulic
 4. Viking Corp.

2.02 GENERAL REQUIREMENTS

- A. All materials and equipment shall be new, in good condition and free from defect. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- B. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein are the minimum standards acceptable. The Engineer retains the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require the specified materials and equipment which conform to the requirements of the Contract Documents be furnished.
- C. Materials and equipment which are found to have factory defects shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Contractor shall be responsible for all costs associated with testing, replacement or repair, including but not limited to, all replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, re-commissioning of the equipment, etc.
- D. Use materials as scheduled and indicated on the fire protection drawings.

All piping, fittings and appurtenances shall be UL Listed and/or FM approved.
- F. An inspection certificate shall be provided by the Contractor stating the installation complies with the local Authority Having Jurisdiction.

- G. All piping, fittings, and appurtenances shall be installed according to NFPA 13.
- H. Pitch all branch piping at a minimum 1/2 in. (13 mm) in 10 feet (3 m) and all main distribution piping at a minimum 1/4 in. (7.5 mm) in 10 feet (3 m). All trapped piping shall be provided with low point drains where required.

2.03 MATERIAL OF PIPING SYSTEMS

A. Piping:

- 1. Sprinkler piping shall be as indicated in the "Material Schedule" on the Construction Documents. Pipe ends may be factory or field-formed to match joining method.
- 2. Sprinkler drain piping shall be Schedule 40 galvanized steel pipe.
- 3. All Schedule 40 sprinkler pipe, black steel or galvanized, shall be of United States or Canadian origin and manufactured in accordance with ASTM A-53A-53M, Type E, Grade B.
- 4. Each length of pipe shall be legibly marked by the Manufacturer to show company name, type of pipe, specification number and pipe length.
- 5. Black steel and galvanized pipe nipples shall be manufactured in accordance with ASTM A733-16, and made of ASTM A53/A53M, standard-weight, seamless steel pipe with threaded ends.

B. Fittings

- 1. Fittings shall be threaded or welded, standard weight or extra-heavy pattern, UL and/or FM approved fittings, manufactured of steel, ductile iron or malleable iron as required for the pressures experienced in the system. Grooved ductile iron fittings with mechanical couplings may be used in lieu of threaded fittings.
- 2. When grooved pipe and rigid fittings are utilized, mechanical couplings shall be Victaulic Model No. 07 "Zero-Flex".
- 3. Welded joints and fittings may be used where permitted by the Authorities Having Jurisdiction. Safety procedures described in NFPA 13 must be followed and pressure ratings shall meet or exceed maximum system working pressures.
- 4. Welding filler metals shall comply with AWS D10.12M/D10.12.

5. Mechanical-T fittings may be used for less than full size branch pipe connections 2 in. (50 mm) and larger. Mechanical-T fittings shall be Victaulic Model No. 920 with a locating collar engaged into the pipe.
 6. The manufacturer's hole cutting tool with coupon retaining pilot dual bit shall be used for all holes made outside of the fabrication shop.
 7. The following pipe preparation and installation procedures shall be followed:
 - A. Holes must be drilled on centerline of pipe.
 - B. Make certain the hole to receive the Mechanical-T is the proper size.
 - C. Check pipe surface within 5/8 in. (16 mm) of hole to be certain it is clean, smooth and free from indentations or projections which would affect gasket sealing. The pipe around the entire circumference within the Mechanical-T fitting shall be free of any dirt, scale or projection, which might prevent the Mechanical-T from seating fully on the pipe surface.
 - D. Remove any burrs, sharp or rough edges from the hole, which might affect assembly, proper seating of the locating collar, or flow from the outlet or gasket seating.
 - E. Install in accordance with the manufacturer's installation instructions.
 - F. Tighten bolt nuts uniformly until the upper housing is in complete surface contact in the gasket pocket area and the assembly is rigid. Nuts must be tightened to 50 lb.ft. with even gaps between the bolt pads.
- C. Joining Methods
1. Make threaded joints with the use of utility compound or teflon tape applied to male threads only. The use of lampwick or filler shall not be acceptable.
 2. Cut or rolled grooves in pipe for use with mechanical grooved couplings shall be made with an approved machine manufactured by the supplier of the couplings.

3. Make welded joints (except for pipe welded end-to-end) with forged one-piece welding flanges, caps, nozzles, elbows, branch outlets and tees. Submit cut samples for approval if directed. Use fittings of a type which maintains full wall thickness at all points, ample radius and fillets, and proper bevels or shoulders at ends. "Weld-o-lets" may be used where standard fittings of required sizes are not available and elsewhere as approved. Weld fittings shall be UL and FM listed.
4. All job welding shall be done by the electric arc welding process in accordance with the following:
 - A. All joints shall be 45 degree bevel type. Pipe mill-beveled or machine-beveled by this Contractor.
 - B. All scale and oxide removed with hammer, chisel or file and bevel left smooth and clean.
 - C. Pipe lengths lined up straight with abutting pipe ends concentric.
 - D. Both conductors from the welding machine shall be extended to locations at which welding work is being done. The leads from welding machine to location of welding work shall be held together with tape or other approved means so as to prevent induced current in structural steel, in piping or in other metals within the building. The ground lead shall be connected to length of pipe with suitable clamp in such manner that welding current will not flow through joints in pipe, structural steel of building or steel pipe supports.
 - E. Weld metal thoroughly fused with base metal at all sections. Welds shall be of sound metal, free from laps, slag inclusion or other defects.
5. All welders shall be certified for the service for which they are employed and on which they work by the National Certified Pipe Welding Bureau of the Mechanical Contractors Association of America.
6. Connections to equipment shall be made with weld neck flanges of forged steel or stainless steel as required.

2.04 SPRINKLER PIPING SPECIALTIES

- A. Sprinkler Inspector's Test Fittings

1. Basis of Design Product: Subject to compliance with requirements, provide AGF Manufacturing "DrainanTest" or equal.
2. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
3. Pressure Rating: 300 psig (2,070 kPa).
4. Body Material: Cast bronze housing with sight glass.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded or grooved end.
7. Provide with pressure-relief valve for sprinkler systems with pressure-reducing valves.

B. Adjustable Drop Nipples

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a) Aegis Technologies, Inc.
 - b) Merit Manufacturing.
2. Standard: UL 1474.
3. Pressure Rating 300 psig (2,070 kPa).
4. Body Material: Steel pipe with EPDM rubber O-ring seals.
5. Size: Same as connected piping.
6. Length: Adjustable.
7. Inlet and Outlet: Threaded.

2.05 SIGNAGE

Provide all designating signs for sprinkler control valves, alarms and hydraulically designed systems as required by the Authorities Having Jurisdiction.

2.06 SPRINKLER HEADS

- A. Sprinkler heads shall be as scheduled on the drawings.
- B. Furnish and install all sprinkler heads required for a complete sprinkler system installation in accordance with these specifications, the Authority Having Jurisdiction, and applicable standards with UL and or FM approval.
- C. Provide automatic sprinkler heads of finish as approved by the Architect.
- D. All sprinkler heads shall be commercial quick response sprinklers with 1/2 in. (13 mm) diameter orifice. Sprinkler heads shall be upright, pendent concealed pendant or dry type pendent to fit the conditions in which they are installed.
- E. All pendent sprinkler heads installed in finished areas with ceilings shall be chrome plated with chrome plated escutcheons unless otherwise noted on the construction documents.
- F. All upright, sidewall and pendent sprinkler heads in areas without ceilings or unfinished areas shall be rough brass construction unless otherwise noted on the construction documents.
- G. All concealed sprinkler heads installed in finished areas with ceilings shall have white cover plates unless otherwise noted on the Construction Documents.

All sprinkler heads shall be of the proper temperature rating for the locations in which they are installed. In general temperature rating shall be an ordinary temperature rating of 165°F (74°C), except for Mechanical Equipment Rooms and Kitchen areas, which shall be 286°F (141°C). Where the maximum ceiling temperatures exceed 100°F (38°C), install sprinkler heads with temperature ratings in accordance with NFPA 13.

- I. In lieu of rigid pipe offsets or return bends for sprinkler drops, the Victaulic VicFlex Multiple-Use Flexible Stainless Steel Sprinkler Drop System (with captured coupling Style 108) may be used to locate sprinklers as required by final finished ceiling tiles and walls. The drop system shall consist of a braided-type 304 stainless steel flexible tube, zinc-plated steel male threaded nipple or Victaulic FireLock IGS Groove Style 108 coupling for connection to branch-line piping, and a zinc-plated steel reducer with a female thread for connection to the sprinkler head.
 - 1. The drop shall include a UL-approved Series AH2 or AH2-CC braided hose with a bend radius to 2 in. to allow for proper installation in confined spaces. The hose shall be listed for either four (4) bends at 31 in. length;

- five (5) bends at 36 in. length; eight (8) bends at 48 in. length; ten (10) bends at 60 in. length; or twelve (12) bends at 72 in. length.
2. Union joints shall be provided for ease of installation. The flexible drop shall attach to the ceiling grid using a one-piece open-gate Series AB1 or AB2 bracket. The bracket shall allow installation before the ceiling tile is in place. The braided drop system is UL-listed for sprinkler services to 175 psi (1,206 kPa) and FM-approved to 200 psi (1,380 kPa).
 3. Listed flexible hose fittings and their anchoring components intended for use in installations connecting the sprinkler system piping to sprinklers shall be rigidly fixed to the building structure at the sprinkler end of the flexible hose, independent of the ceiling suspension and support system in accordance with ASTM C635, Section 3.1.1.10, as modified by Appendix R of the New York City Building Code and Section 9.2.1.3.3.1 of NFPA 13-2007 as modified by New York City Building Code Appendix Q.
 4. All hoses shall be factory pressure-tested to 400 psi (2,760 kPa).
 5. Approvals: FM-1637 and UL 2443
 6. Contractor is responsible for coordinating each ceiling condition with the UL-Listed mounting assembly offered by the manufacture and to provide all components for a complete installation.
 7. The flexible sprinkler head manufacturer shall provide onsite training for Contractor's field personnel as per Section 3 - Execution.
 8. Refer to the Victaulic I-VICFLEX installation manual and the Victaulic VicFlex Design Guide, as shown in Product Submittal 10.85 to ensure proper installation.
- J. All sprinkler heads located in areas subject to damage or less than 7 ft. 0 in. above the finished floor shall be provided with a protective sprinkler guard. Sprinkler guards shall be Reliable Model C for sprinklers installed prior to cage assembly and Reliable Model D for sprinkler guard installation prior to sprinkler installation.
- K. Furnish and install, where directed, one (1) approved type sprinkler cabinet containing not less than six (6) extra sprinkler heads, of the various degrees used in the work and provide one (1) sprinkler wrench for emergency use. The sprinkler cabinet shall be Reliable Sprinkler Model A4.

2.07 SPRINKLER DRAINS

- A. Provide all necessary drain valves, capped nipples and auxiliary piping as required to drain trapped portions of the sprinkler system.
- B. Inspector test connections shall be provided with a sight connection and piped to waste.
- C. Main drain and test connection shall be piped to waste.
- D. All sprinkler drain piping and auxiliary piping shall be Schedule 40 galvanized steel pipe.
- E. Provide all piping required to spill the drains and test connections to the floor, funnel or other drainage connections provided under the Plumbing Contract or arrange with the Plumbing Subcontractor to provide additional drainage facilities, in which case pay all charges related to the additional plumbing work.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and replaced by the manufacturer.
- B. Verify existing conditions prior to starting work.
- C. Carefully check space requirements with other trades to ensure that all material can be installed in the spaces allotted thereto.
- D. Wherever this Contractor's work interconnects with work of other Contractors, this Contractor shall coordinate his work with these Contractors to ensure that all Contractors have the information necessary so that they may properly install all the necessary connections and equipment. Identify all work items in an approved manner in order that the Ceiling Trade may know where to install access doors and panels.
- E. The General Contractor will provide benchmarks, monuments, and other reference points on the job, which will be available for this Contractor's use.
- F. Maintain all existing benchmarks, monuments and other reference points and perform all field engineering required to ensure that work under this section shall conform with grades, elevations and lines required.

3.02 INSTALLATION

- A. Install work in accordance with NFPA 13 and the New York City Building Code.
- B. Run and arrange piping approximately as indicated on the construction documents and coordinate with other trades.
- C. The arrangement, positions and connections of pipes, drains, valves and the like, indicated on the Construction Documents shall be followed as closely as possible; however, the right is reserved by the Architect to change locations and elevations to accommodate conditions that may arise during the progress of the work, without additional compensation for such changes, provided that no additional appurtenances are required prior to the installation of the work.
- D. Install piping in concealed spaces above finished ceilings and as neatly spaced, straight and direct as possible, forming right angles or parallel lines with building walls and other pipes.
- E. Erect all risers plumb and true, parallel with walls and other pipes.
- F. Ream all pipe smooth before installation. Do not bend, split, flatten nor otherwise injure pipe.
- G. The Contractor shall provide all equipment and appurtenances necessary to complete the installation according to code requirements, whether indicated on the drawings or not.
- H. Do not install pipes or other apparatus in a manner, which interferes with the full swing of the doors.
- I. Provide all equipment and appurtenances necessary to complete the installation according to code requirements, whether indicated on the drawings or not. Include the complete installation of the quantity of heads indicated on the drawing with all required piping, valves, etc. The layout to be determined and shop drawings prepared after the tenant layouts and reflected ceiling plans are available.
- J. Install sprinkler heads in all areas on a true axis line in both directions in center of tile with a maximum deviation of 1/2 in. (13 mm) plus or minus from the axis line as established by the Architect for use of all trades. At the completion of the installation, remove and reinstall any heads found to exceed the tolerance above.
- K. Install flush plate sprinkler heads within the manufacturer's tolerances.

- L. Prior to installation of flush plates, notify Architect and Consulting Engineer for verification of installation.
- M. Install “U” bends for all pendent heads. Any heads found out of tolerance shall be removed and reinstalled.
- N. Install all pendent sprinkler heads in exposed hung ceiling areas, in strict accordance with shop drawings. The Architect reserves the right to reject any and all installed heads not in accordance with the approved shop drawings.
- O. The arrangement, positions and connections of pipes, drains, valves, and the like, indicated on the construction documents shall be followed as closely as possible, however the right is reserved by the Architect to change locations, and elevations, to accommodate conditions which may arise during the progress of the work, without additional compensation for such changes, provided that no additional fire standpipe appurtenances are required prior to the installation of the work.
- P. It is the responsibility of this Contractor for accurately laying out the work. Should it be found that any work is laid out so that interferences will occur, report that to the Architect before commencing work.
- Q. No piping shall pass over high voltage (440V) electrical bus duct, motor control centers, motor starter racks, telephone equipment, transformer equipment, switchgear equipment or any other electrical equipment. Where required, provide protective pans under or over individual pipes and construct the pans of 16 gauge stainless steel with a 6 in. (150 mm) lip, the corners being welded to make the pans watertight. The pan shall drain clear of the bus duct or electrical or telephone equipment. Where pans are above piping, they shall be designed to serve as a deflector plate. Pans over bus duct and electrical or telephone equipment shall be sized to fully protect equipment. Support pans with pipe hangers/Kindorf and pipe drain clear of the equipment below to safe waste. Give each pan three (3) coats of Rust-Oleum paint and support with pipe hangers and drain clear of the equipment below.
- R. Route piping in an orderly manner parallel and perpendicular to walls maintaining gradient and headroom without interfering with use of space or taking more space than necessary. Whenever practical group piping at common elevations.
- S. Do not install pipes or other apparatus in a manner that interferes with the full swing of the doors and the path of egress as determined by the Architectural Documents.
- T. Furnish and install sleeves for pipe passing through partitions, walls and floors.

- U. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- V. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- W. Welded Piping:
 - 1. All welded joints (except pipe welded end-to-end) shall be made by the use of flanges, caps, nozzles, elbows, branch outlets and tees. Cut samples shall be submitted for approval if directed. All such fittings, etc., shall be of a type which maintains full wall thickness at all points, ample radius and fillets, and proper bevels or shoulders at ends. "Weld-o-lets" may be used where standard fittings of required sizes are not available and elsewhere as approved. All job welding shall be done by the electric arc welding process in accordance with the following:
 - A. Joints shall be 45 degree mill beveled or machine beveled.
 - B. All scale and oxide shall be removed with hammer, chisel, file and/or grinding wheel. Bevel shall be left smooth and clean.
 - C. Pipe lengths must be lined up straight with abutting pipe ends concentric.
 - D. Both conductors from the welding machine shall be extended to locations at which welding work is being done. The leads from welding machine to location of welding work shall be held together in an approved manner and then taped so as to prevent induced current in structural steel, in piping or in other metals within the building. The ground lead shall be connected to length of pipe with suitable clamp in such manner that welding current will not flow through joints in pipe, structural steel of building or steel pipe supports.
 - E. Weld metal must be thoroughly fused with base metal at all sections and must exhibit complete penetration to weld root. Welds shall be of sound metal, free from laps, slag inclusion or other defects.
 - F. Welders shall be certified by the National Certified Pipe Welding Bureau of the Mechanical Contractors Association of America or by ASME Section 9. Welders shall possess and maintain current

Procedure Qualification Records for the service for which they are employed and on which they work.

- G. All welds shall bear the identifying number, letter or symbol of the welder or welding operator.

X. Grooved Piping:

1. All grooved end components shall be the product of one manufacturer.
2. The manufacturer shall provide on-site training for Contractor's field personnel by a factory trained representative in the proper use of grooving tools, application of groove, and product installation. In addition, the manufacturer's representative shall periodically visit the job site and inspect installation. Contractor shall remove and replace any improperly installed products.
3. Piping shall have rolled or cut grooved-ends as appropriate to pipe material, wall thickness, pressures, size and method of joining. Pipe ends shall be grooved in accordance with coupling manufacturer's current listed standards conforming to ANSI/AWWA C-606.
4. Mechanical couplings for grooved pipe couplings shall be of the rigid or flexible type as required for the installation, with plated nuts and bolts to secure housing sections together and a synthetic rubber flush seal gasket of the cavity pressure-responsive design.
5. Grooved piping systems shall be installed in accordance with the requirements of the manufacturer's latest published literature.
6. Flexible type couplings shall be installed at final connections to equipment and/or in locations where vibration attenuation and stress relief are required as determined by the Engineer.
7. Coupling housings shall be cast ductile iron conforming to ASTM A 536 (Grade 65-45-12), or malleable iron conforming to ASTM A 47, finished painted with alkyd enamel.
8. Flange adapters shall be cast ductile iron conforming to ASTM A 536 (Grade 65-45-12), or malleable iron conforming to ASTM A 47, finished painted with alkyd enamel.
9. Gaskets for mechanical couplings and flange adapters shall be molded flush seal type conforming to the outside diameter of the steel pipe.

Synthetic rubber of elastomers having properties as indicated in ASTM D 2000 shall be used. Gasket selection shall comply with the coupling manufacturer's standards, installation and design requirements and shall be suitable for the intended service and temperature range.

10. Gaskets for water service from -30°F (-34°C) to 230°F (110°C) shall be Grade "E" EPDM.
11. Bolts for mechanical couplings shall be zinc plated (ASTM B 633) heat treated carbon steel track head conforming to physical properties of ASTM A 183, minimum tensile strength 110,000 psi (7,585 bar).

3.03 CLEANING

- A. During construction, properly cap all lines, so as to prevent the entrance of sand, dirt, etc. Each system of piping shall be blown through after completion (for the purpose of removing grit, dirt, sand, etc., from coils and piping), for as long a time as required to thoroughly clean the apparatus.
- B. Before final adjustments are made and before operation of equipment, clean and remove all accumulation of dirt, chips or other deleterious material. Leave all sprinkler piping and appurtenances in suitable condition, before final acceptance.
- C. Touch up, repair or replace damaged piping before final acceptance.
- D. As soon as sprinkler heads are in place, cover each head with a small paper bag of an approved type, and remove it only after all painting is complete. After the bag is removed, clean and polish all heads.
- E. Cover and protect all openings left in floor for passage of pipes. Protect pipes with suitable coverings as soon as set. Close all open ends of pipes with a plug fitting to prevent obstruction and damage.
- F. Protect the system against freezing in cold weather.

3.04 INSPECTION AND STARTUP SERVICE

- A. All inspections, examinations and tests required by the authorities and/or agencies specified hereinbefore shall be arranged and paid for by this Fire Protection Subcontractor, as necessary to obtain complete and final acceptance of the system as installed.
- B. The certificates of inspection shall be provided in quadruplicate and shall be delivered to the Architect for distribution.

- C. Inspect all piping, hangers, rod and support for piping and equipment for proper installation according to the manufacturer's instructions.
- D. Repair, or if required by the Architect replace, defective work with new work without extra charge to the Owner. Repeat tests as directed, until all work is proven satisfactory.
- E. Restore to its original condition any work damaged or disturbed by tests, engaging the original trades to do the work of restoration.
- F. Notify the Architect and Inspectors Having Jurisdiction at least 48 hours in advance of making the required tests, so that arrangements may be made for their presence to witness the tests.
- G. Test equipment in service and demonstrate that the equipment performs the work intended for it and that it complies with the requirements of these specifications for such equipment.

3.05 FIELD QUALITY CONTROL

- A. Welding Quality Control
 - 1. An independent testing agency shall observe the fitting-up and making of welds as prescribed in ASME/ANSI B31.1 and ASME/ANSI B31.9. The inspection and testing protocol requirements shall be as follows:
- B. Grooved Piping Installation Certification: A factory inspector shall inspect the installation of all grooved piping products to ensure that the installation has been made in accordance with the manufacturer's installation instructions as follows:
 - 1. Inspector shall perform periodic observations of coupling installations in accordance with the latest revisions of the coupling manufacturer's installation instructions. The frequency of the observations shall be adjusted with the pace of the project to ensure that no less than Choose an item. of the installation is observed at each stage of completion.
 - 2. The inspector shall have the authority to randomly select which fittings will be inspected. The installing Contractor must provide access to all fittings.

3. The inspector's observations shall be recorded and all deficiencies noted in the installation shall be tagged for remediation.
4. At the conclusion of each day's observations the inspector shall issue a report of their findings referencing the specific systems examined and describing any deficiencies requiring corrective action to the Engineer of record and the installing Contractor.
5. Based on the results of the observation reports a determination of the extent of the subsequent testing beyond the minimum shall be established by the Engineer.
6. Upon conclusion of the required inspections and confirmation that any and all deficiencies have been corrected the manufacturer shall provide a report to the Engineer and installing Contractor certifying that the entire installation is in compliance with the manufacturer's requirements.
7. All costs for additional testing above and beyond the protocol requirements listed above and all costs associated with repair, replacement, schedule impacts, etc., shall be borne by the Contractor.

3.06 FIELD TESTS

A. Performance Test

1. Test all systems before any paint is applied, piping is insulated, furred in or otherwise covered.
2. Required tests shall be witnessed by Fire Marshal, Authority Having Jurisdiction, Owner's representative or Engineer.
3. Test all systems in full accordance with applicable Underwriters' and Municipal requirements, but in no case shall the system be tested at less than 200 psi (13.8 bar) hydrostatic pressure. Apply the test for a minimum of one (1) hour with no loss in pressure. Prior to applying the hydrostatic test, the system shall be tested with 50 psi (3.5 bar) compressed air for a period of ten minutes with no loss in pressure.
4. Furnish and pay for all devices, materials, supplies, labor and power required in connection with tests. Make all tests in the presence and to the satisfaction of the Architect, Insurance Underwriters and City Inspectors Having Jurisdiction.

B. Final Acceptance Test

1. After completion of the sprinkler system and at the beginning of the warranty period the Contractor shall perform, without charge to the Owner, one (1) inspection of the sprinkler system during the warranty period. Inspection shall be as per the applicable NFPA No. 25, “Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems”, plus the following maintenance to be performed during the course of the inspection:
 - A. The Standard Form of the National Fire Sprinkler Association, Inc., “Report of Inspection” (Sheets 1 and 2), shall be filled out in triplicate after each inspection and the copies sent to the Architect and Owner.

3.07 ADJUSTING AND BALANCING

- A. Upon completion of installation, hangers for piping, and supports for equipment shall be adjusted to ensure that the loads are distributed evenly and that there are no loads imposed by the piping or the equipment that it is connected to.
- B. Securely tighten clevis hanger load nuts first to ensure proper hanger performance. Tighten top nut after adjustment.

END OF SECTION 21 13 13

SECTION 22 00 00 - GENERAL REQUIREMENTS FOR PLUMBING

GENERAL

1.01 SUMMARY

- A. Division 22 of the specifications requires the furnishing and installing of all items, including every article, device or accessory reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include, but are not limited to, materials, labor, supervision, supplies, equipment, transportation, rigging, storage, utilities, and all required permits and licenses.
- B. Before submittal of bid, examine all drawings, specifications, addenda, alternates, special conditions, and all other bidding documents of all sections of this project, verify all governing conditions at the site, and become fully informed as to the extent and character of the work required, as well as its relation to other work in the building. Submittal of a bid is an agreement to all requirements of the Contract Documents, and no consideration will be granted for any claimed misunderstanding thereof.
- C. Submittal of a bid is a representation by the bidder that it is qualified in all respects properly to perform the work for which it is bidding and has experience with similar work. Bidders are deemed to be aware, on the basis of their background and experience, materials which may be required in their responsibilities, even though unspecified.

1.02 ABBREVIATIONS

ADA	Americans with Disabilities Act
AGA	American Gas Association
AHJ	Authority Having Jurisdiction
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
AHRI	Air-Conditioning, Heating, and Refrigeration Institute
ASA	Acoustical Society of America
ASME	American Society of Mechanical Engineers
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
ASPE	American Society of Plumbing Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
BSA	New York City Board of Standards and Appeals
CDA	Copper Development Association

CISPI	Cast Iron Soil Pipe Institute
ECCCNYS	Energy Conservation Construction Code of New York State
EPA	Environmental Protection Agency
ETL	Electrical Testing Laboratory
FM	Factory Mutual
IEEE	Institute of Electrical and Electronics Engineers
IRI	Industrial Risk Insurers
MSDS	Material Safety Data Sheet
MSS	Manufacturers Standardization Society
NEBB	National Environmental Balancing Bureau
NEC	National Electrical Code (NFPA 70)
NEMA	National Electrical Manufacturers Association
NETA	International Electrical Testing Association
NFPA	National Fire Protection Association
NUSIG	National Uniform Seismic Installation Guidelines
OSHA	Occupational Safety and Health Administration
OTCR	New York City Office of Technical Certification and Research
PDI	Plumbing and Drainage Institute
TEMA	Tubular Exchanger Manufacturers Association, Inc.
UL	Underwriters Laboratories

1.03 DEFINITIONS

- A. For purposes of these specifications the following definitions apply:
1. ARCHITECT: The Architect of record.
 2. ENGINEER: The Engineer of record.
 3. CONTRACTOR: The individual, partnership or corporation to whom has been awarded the contract for providing the plumbing work.
 4. SUBCONTRACTOR: The individual, partnership or corporation to whom has been awarded the contract for providing assistance to the Contractors work.
 5. GENERAL CONTRACTOR: An individual or group that contracts with another organization or individual (Owner) for the construction of a building or other structure. They may or may not do any actual construction of a portion of the project.
 6. CONSTRUCTION MANAGER: An individual or group that contracts with another organization or individual (Owner) for the scheduling and coordination of all design and construction processes, including the selection, hiring and oversight of specialty Trade Contractors, for a building or other structure.

7. PROVIDE: To “furnish” and “install”.
8. INSTALL: To join, unite, fasten, link, attach, set up or otherwise connect together; complete, tested and ready for normal satisfactory operation.
9. FURNISH: To supply all materials, labor, equipment, testing apparatus, controls, tests, accessories, and all other items customarily required for the proper and complete application.
10. AS DIRECTED: As directed by the Architect or the Engineer.
11. CONCEALED: Embedded in masonry or other construction, installed behind wall furring or within double partitions, or installed within hung ceilings or accessible raised floor cavities.
12. SUBMIT: Submit to the Architect and/or the Engineer for review.
13. FINISHED SPACES: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
14. EXPOSED: Exposed to view.
15. SUPPLY: To purchase, procure, acquire, and deliver complete with related accessories.
16. WORK: Includes labor, materials, equipment, services, and all related accessories necessary for the proper and complete installation of complete systems.
17. PIPING: Includes pipe, tube, fittings, flanges, valves, controls, strainer, hangers, supports, unions, traps, drains, insulation, and all related accessories.
18. WIRING: Includes raceway, fittings, wire, boxes, and all related accessories.
19. INDICATED: As shown or noted on the drawings or specifications.

1.04 RELATED DOCUMENTS

- A. The General Conditions and Supplementary Conditions accompanying these specifications are hereby made a part of the requirements for the work under this section of the specifications.

- B. No General Conditions and/or Supplementary General Conditions clause referring to the work of this section shall be considered waived unless specifically stated herein.
- C. Refer to Owner's "Commissioning Requirements" for the scope of work related to systems furnished and installed under Division 22.

1.05 REFERENCE STANDARDS

- A. Comply with the currently enforced versions of all applicable laws, rules, regulations, codes and ordinances of New York City and shall be BSA approved or have an OTCR approval. Modifications required by the Authorities Having Jurisdiction shall be made without additional cost to the Owner.
 - 1. Secure and pay for necessary approvals, permits, inspections, carting, legal dumping, etc., and deliver the official records of the granting of permits to the Owner without additional cost to the Owner.
 - 2. The drawings have been filed. Contractor shall pay all fees to obtain release of approved plans and shall complete and file all forms, tabulations, plans, etc., required for Special Inspections.
 - 3. Where so required by the Building Code of the City of New York, the Owner shall employ the services of a Special Inspector to perform inspections of materials, installations, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and reference standards.
- B. All equipment, materials, and methods to be furnished and/or installed by this division shall comply with all applicable requirements of laws, codes, ordinances, legislation, standards, etc., of all federal, state, and local authorities, whether indicated on the Contract Documents or not.
- C. Where Contract Drawing and specification requirements are in excess of rules, regulations and code requirements, and are permitted under the code, the Contract Drawings and specifications shall govern. In the event of a conflict between the Contract Documents and the applicable laws, rules, regulations, codes, and ordinances of federal, state, and local Authorities Having Jurisdiction, the latter shall govern.
- D. Where alterations to and/or deviations from the Contract Drawings and specifications are required by the authorities listed above, report the requirements to the Architect and secure his written approval before starting the required modifications.

- E. Pay royalties or fees required in connection with the use of patented devices, or systems, and save the Owner, the Engineer and the General Contractor harmless from any claims or lawsuits arising from such use and indemnify each thereof against attorneys' fees in connection therewith.

1.06 QUALITY ASSURANCE

- A. All materials and equipment shall be fabricated by companies whose primary business expertise is the manufacturing of commercial and industrial products of the type specified herein. The manufacturer shall have been in continuous operation in the manufacture of the products specified for a minimum of ten (10) years.
- B. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- C. After completion of installation, but prior to Final Completion, this Contractor shall certify in writing in a format acceptable to the Owner that products and materials installed, and processes used, do not contain asbestos, or polychlorinated biphenyls (PCB's) or other hazardous materials as determined by the Owner. A "Materials Safety Data Sheet" (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.
- D. All adhesives specified herein or utilized in the manufacture of equipment or components which are specified herein shall meet or exceed the volatile organic compound (VOC) limits of South Coast Air Quality Management District Rule No. 1168.
- E. All sealants specified herein or utilized in the manufacture of equipment or components which are specified herein shall meet or exceed Bay Area Resources Board Reg. 8, Rule 51. Submit as part of the shop drawing process for review by the Engineer and/or Owner, supporting documentation which demonstrates conformance with these requirements.
- F. In the event that products, materials and/or processes are not available that do not contain asbestos, PCB's, VOC's formaldehyde formulations, hazardous materials or may result in hazardous out-gassing as determined by the manufacturer a "Materials Safety Data Sheet", as described above, shall be submitted as part of the shop drawing process for review by the Engineer and/or Owner.
- G. Furnish all equipment, materials and accessories new and free from defects.

1.07 ENGINEERING REFERENCE POINTS

- A. The General Contractor shall provide benchmarks, monuments, and other reference points on the job which will be available for this Contractor's use.

- B. Maintain all existing benchmarks, monuments and other reference points and perform all field engineering required to ensure that work under this section shall conform with grades, elevations and lines required.

1.08 INDEMNIFICATION

- A. Covenant and agree that this Contractor and his Subcontractors and his and their agents, servants and employees will provide and maintain a safe place to work and that he and they will comply with all laws and regulations of any governmental Authority Having Jurisdiction thereof.
- B. This Contractor agrees to indemnify, defend and hold harmless the Owner, Owner's agents and Engineer from and against any liability, loss, damage or expense, including attorneys' fees, arising from a failure or alleged failure on the part of this Contractor, his Subcontractors and his and their agents, servants and employees to provide and maintain a safe place to work or to comply with all laws and regulations of any governmental Authority Having Jurisdiction thereof.
- C. This Contractor agrees to indemnify, defend and hold harmless the Owner, Owner's agents and Engineer from and against any liability, loss, damage or expense, including attorneys' fees, arising from a failure or alleged failure on the part of this Contractor, his Subcontractors and his and their agents, servants and employees to discharge the obligations assumed by him or them in the performance of the work, including any act or omission allegedly resulting in death or personal injury or property damage, or due to improper construction, construction techniques, or the use of improper or inappropriate material or tools.

1.09 COMPLETE PERFORMANCE OF WORK

- A. Work shall be executed in strict accordance with the best practice of the trades in a thorough, workmanlike manner by competent, skilled technicians and trade personnel.
- B. This Contractor shall provide a competent, experienced, full-time Superintendent who is authorized to make decisions on behalf of the Contractor.
- C. All labor, materials, apparatus, and appliances essential to the complete and proper functioning of the systems described and/or indicated herein, or which may be reasonably implied as essential, whether mentioned in the Contract Drawings and specifications or not, shall be provided by the Contractor. The entire installation shall be ready in every respect for the satisfactory and efficient operation when completed.
- D. In cases of doubt as to the work intended, or in the event of need for explanation thereof, request supplementary written instructions in the form of a Request for Information (RFI) from the Architect and/or Engineer.

- E. Coordinate the work specified herein and shown on the Contract Drawings with all other trades.
- F. Be responsible for material and workmanship until completion and final acceptance. Replace any of same which may be damaged, lost or stolen, without additional cost to Owner. Guard the building and its contents against damage by this Contractor, his employees or Subcontractors, and make good any damage free of charge.
- G. Where, due to union regulations or trade agreements, any of the work shown on the drawings or specified herein is not considered this trade's work, subcontract the work in question, but assume full responsibility for the complete installation. Except for such changes as may be specifically approved by the Architects and Consulting Engineers, in accordance with alternates or options stated hereinafter, all work must be in full accordance with the intent of the plans and specifications, complete in every way and ready for satisfactory and efficient operation when delivered to the Owner.
- H. Provide signs required by the Authorities Having Jurisdiction.
- I. Provide all rigging required for complete installation and furnish drawings showing necessary points of support, reactions and supplementary bracing. This shall be submitted for approval by the Owner. Should any shoring be required, provide same after Owner's approval.
- J. Become thoroughly acquainted with the work involved, obtain and verify at the building all measurements necessary for the proper installation of work. Furnish to other Contractors any information relating to work of this division necessary for the proper installation of their contracts. Coordinate with other Contractors for finish adjacent to work of this section and arrange to have visible portions of the work (such as access doors, escutcheons, etc.) fit in with the finish in a manner satisfactory to the Architects.
- K. Transmit to trades doing work of other sections all information required for work to be provided under their respective sections (such as freshwater connections, foundations, electric wiring, access doors, and the like) in ample time for installation.
- L. Wherever this Contractor's work interconnects with work of other Contractors, this Contractor shall coordinate his work with these Contractors to insure that all Contractors have the information necessary so that they may properly install all the necessary connections and equipment. Identify all work items (valves, dampers, pull boxes, etc.) in an approved manner in order that the other trades may know where to install such items such as access doors, panels, etc.

- M. Provide required supports and hangers for piping and equipment, so that loading will not exceed allowable loadings of structure. Submittal of a bid shall be deemed a representation that the Contractor submitting such bid has ascertained allowable loadings and has included in his estimates the costs associated with furnishing required supports.
- N. Field drilling, cutting and/or reinforcing of holes in structural metal deck required for work under this section shall be coordinated through the General Contractor and approved by the Structural Engineer. All such drilling, cutting and reinforcing costs shall be borne by this Contractor.
- O. At the conclusion of each day's work, clean up and stockpile on site, at a location designated by the General Contractor, all rubbish, debris and trash, which may have accumulated during the day as a result of work of this Contractor and of his presence on the job.
 - 1. Sidewalks and streets adjoining the property shall be kept broom-clean and free of debris, rubbish, trash and obstructions of any kind caused by work of this Contractor, which will affect the condition and safety of streets, walks, utilities and property.
- P. Due to the nature of the alteration work, which requires the building to be kept operable at all times, except for those floors being actively altered, this Contractor shall coordinate his activities with the General Contractor and the building Owner. Any interruption of building services must be done at the convenience of the building Owner. If temporary connections to maintain services are required or if the work must be performed after hours, this work shall be so arranged with all parties involved.
- Q. If this Contractor must perform work in occupied areas, he shall make arrangements with the General Contractor and the Owner as to the time and method by which this work shall be performed. He shall arrange for all adjacent areas to be properly protected against damage, dirt and dust.

1.10 DESCRIPTION OF BID DOCUMENTS

- A. Specifications, in general, describe quality and type of materials and equipment.
- B. The drawings show the various systems schematically, no added compensation shall be permitted for variations due to field conditions.
- C. Where disagreements occur between the plans and the specifications or within either document itself, the item or arrangement of better quality, greater quantity or higher cost shall be included in the Base Bid.
- D. Work not shown on the drawings but called for in the specifications, or vice versa, shall be provided by the Contractor without additional expense to the Owner.

- E. Where a variance occurs between the drawings and specifications, or within either document itself, the Contractor shall request through the General Contractor, clarification in writing from the Architect on which item and manner in which the work shall be installed.
- F. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- G. Equipment shown on the drawings with particular manufacturers identified has been coordinated for structural penetrations, electrical connection, operating and service (maintenance) requirements, and physical size with regard to the space where the equipment is shown. If they comply with the project specifications, these and the other specified manufacturers of this equipment will be acceptable contingent on the Contractor providing a complete installation and maintaining full responsibility to provide, at no additional cost, any modifications to the structure or electrical service that are required to properly install, operate, and service the equipment being used. These modifications shall not include additional area for equipment unless approved by the Architect.
 - 1. The Contractor shall note these changes on the equipment submittal and shall show all differences in equipment being supplied from that shown on the Drawings. Failure of the Contractor to provide this information with the submittal will indicate that the submitted equipment meets or exceeds the equipment shown on the Drawings in performance and is physically no larger in housing size.
 - a. Failure of the Contractor to comply with the above and any discrepancies found shall result in the Contractor providing equipment equal to that specified at the Contractor's expense.

1.11 SUBMITTALS

- A. No part of the work shall be started in the shop or in the field until the Architect and/or Engineer have reviewed the shop drawings and samples for that portion of the work. Thereafter, the work shall be executed in accordance with the Contract Documents and the indicated status of the reviewed shop drawing.
- B. All shop drawings and samples shall be identified as follows:
 - 1. Date of submittal.
 - 2. Title of project (including floor and room designations).
 - 3. Name of Contractor and date of his approval.
 - 4. Name of Subcontractor or supplier and date of submittal to Contractor.

5. Number of submission.
 6. Any qualification(s), departure(s) or deviation(s) from the requirements of the Contract Documents.
 7. Federal specification, FM Approval or ASTM number or any local listing or approval where required.
 8. Such additional information as may be required by the specifications for the particular material being furnished.
 9. When the submitted materials modify components, styles, etc., on the same drawing, or alternate or options available for the intended material, the material shall be appropriately annotated in a manner to avoid any misunderstanding of the submission.
- C. Shop drawings and samples shall be submitted for review sufficiently in advance of the scheduled start of the work in the shop or in the field to allow ample time, in consideration of the number and complexity of the drawings in the submittal, for the Architect and/or Engineer to make an orderly review. No extension of the time to complete the work shall be granted to the Contractor by reason of his failure in this respect.
- D. The Contractor shall carefully check shop drawings and samples, including those received by him from Subcontractors and manufacturers, for accuracy, completeness of required information, and conformance with the Contract Documents. Shop drawings found to be inaccurate, incomplete or not in conformance with the Contract Documents shall be corrected before being submitted to the Architect and/or Engineer for review.
- E. Within three (3) weeks after award of the Contract, the Contractor shall submit for the Architect's and/or Engineer's review, a list of the manufacturers and Subcontractors whose products and services he proposes to use for the work. Proposed substitutions for material and equipment required by the Contract Documents shall be submitted to the Architect and/or Engineer for review during this period. Submittals proposing or requesting substitutions shall be expressly identified as such in a letter of transmittal, with the reasons for requesting the substitution stated. Submittals for this purpose shall be complete in every respect, shall conform to all the information requirements for shop drawing and sample submittals, and shall include, at no cost to the Owner, the necessary revisions to other related work required by the Contract Documents. The judgment of the Architect and/or Engineer with respect to the adequacy and acceptability of a proposed substitution shall be final and binding on the Contractor and shall not be subject to question in any other place. After the expiration of this period, substitutions for material or equipment shall not be proposed or requested in shop

drawing and sample submittals, and the Contractor shall be required to execute the work in accordance with the provisions of the Contract Documents.

- F. Within six (6) weeks after award of the Contract, the Contractor shall submit a schedule listing all shop drawings and samples with the projected date that each item will be submitted to the Architect and/or Engineer for review.
- G. Prior to Final Acceptance, the following data shall be furnished in accordance with the Conditions of the Construction Contract, Division 01 Specifications, and this Division 22 of the Specifications, and shall include, but not be limited to:
 - 1. Record drawings.
 - 2. Operating and maintenance books.
 - 3. Contract or coordination drawings.

1.12 PRODUCT DATA

- A. Submit the following manufacturers' shop drawings and data for approvals:

Plumbing Fixture Rough-in Data	Pump Controls
Plumbing Fixture Supports	Pumps
Plumbing Fixtures	

1.13 SAMPLES

- A. Samples shall be identical in all respects to the material which is to be installed or applied in the execution of the work and shall be of sufficient size or quantity to permit proper evaluation and review. Manufacturer's descriptive labels and printed application instructions which are normally attached to the material or its packaging shall be furnished with the sample. Samples shall be submitted for review when requested by the Architect and/or Engineer.
- B. Submit names, sizes, catalog numbers and/or samples of the following materials for approval:

Fittings	Sleeves and Escutcheons
Floor, Funnel and Area Drains	
Hangers	
Insulation	Thermostatic Mixing Valves
Pipe	Thermostatic Regulating Valves

	Toilet Accessories
	Valve Tags
Pressure-Reducing Valves	Valves
Roof Drains	

1.14 SHOP DRAWINGS

- A. The term “shop drawings” shall include layout, detail, and assembly drawings, diagrams, schedules, catalog sheets, printed descriptive matter, and tabular and graphical presentations of operating and performance data that describe work required by the Contract Documents. Catalogs and catalog sheets shall be clearly annotated indicating the specific items being proposed.
- B. In addition, during the installation period, submit detailed shop layout drawings for each floor of the project, including all the Mechanical Equipment Rooms, showing equipment and piping work and other distribution services described herein, including locations and sizes of all openings in cellular steel floor decks, walls and floors. Shop drawings with multiple parts shall be submitted as a package. Shop drawings will be 3/8 inch equal to 1 ft. 0 in. scale. Piping shop drawings shall also indicate the point loading and spacing of each hanger and the method of support. Drawings shall include full coordinated plans and sections for Mechanical Equipment Rooms, floor plans and risers. In addition, required detail drawings, such as anchor and guide details, etc., shall be submitted.
- C. Shop drawings for Equipment Rooms, and for piping and similar distribution services shall show by dimension the exact size and location of each element of the system in both the horizontal and vertical plane, as well as relationship to the building structure, architectural construction, equipment, and the work of other trades. Where new work is added to an existing structure, the shop drawings shall show the location of all existing services and equipment. Pads, foundations, anchorages, supports and attachments to the building structure where required for the installation of the work shall be shown in layout and detail with sizes, dimensions, materials and methods of construction noted. The work described in any shop drawing submission shall be carefully checked by this Contractor for all clearances field conditions, maintenance of architectural conditions and proper coordination with all trades on the job.
- D. Each submitted shop drawing shall include a certification by General Contractor that all related job conditions have been checked and that no conflict exists. No shop drawing submission shall be reviewed without such certification.
- E. The Contractor shall submit shop drawings of the following work for review:
 - 1. Construction details for piping.
 - 2. Control and alarm systems.

3. All items of manufactured material and equipment.
 4. Other specific items of work as required by the provisions of the technical sections of the Contract Documents should be included in the Submittal Section.
- F. Submit piping details for the following equipment installations:

Sump Pumps

Hot Water Circulation Pumps

1.15 CERTIFICATION

- A. Any certifications required by the specifications, in addition to those required for shop drawings, product data, equipment and other items, shall be so certified by the Owner, a Partner, or a Corporate Officer of the firm required to provide the Certification, or by another person duly authorized to sign binding agreements for and on behalf of the Owner, Partner, or Corporation.

1.16 CONTRACTOR'S COORDINATION DRAWINGS

- A. Contractor shall furnish in writing, with copies to the Architect and Construction Manager any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.
- B. This Contractor and his Subcontractors shall prepare a complete set of construction "Coordination Drawings" indicating the equipment actually purchased and the exact routing and elevations for all lines such as piping, busway, conduit, ductwork, etc., including conduit embedded in concrete. The "Coordination Drawing" preparation and completion shall comply with the requirements of the project construction schedule. The sheet metal drawings, prepared at a scale not less than 3/8 in. = 1 ft. 0 in., shall serve as the base drawings to which all other Contractors will overlay and add their work. Each trade shall draw their work represented by individual colors. Each "Coordination Drawing" shall be completed and signed off by the other Contractors and this Contractor prior to the installation of the work in the area covered by the specific coordination drawing. The Contractors work shall be installed in accordance with the shop drawings and the "Coordination Drawings". If the Contractor allows one trade to install their work before coordinating with the work of other trades, the Contractor shall make necessary changes to correct the condition without extra cost to the Owner. The Contractor's "Coordination Drawings" indicating piping, conduit, busway, and equipment support points and loads exceeding 200 lb. imposed on the building structure shall be submitted to the Project Structural

Engineer for review and approval. The elevation, location, support points, static, dynamic and expansion forces and loads imposed on the structure at support, and anchor points, and the size of all lines shall be indicated. All beam penetrations and slab penetrations shall be indicated and sized and shall be coordinated. All work routed underground or embedded in concrete shall be indicated by dimension to column and building lines and shall be coordinated. This requirement for "Coordination Drawings" shall not be construed as authorization for the Contractor or Subcontractor to make any unauthorized changes to the Contract Drawings. Prior to final acceptance of the work of this section, the Contractor shall give the drawing files, in AutoCAD containing the Contractor's coordination documentation to the Owner.

1.17 ARCHITECT'S AND ENGINEER'S REVIEW

- A. The Architect and Engineer shall review shop drawings and samples for conformance with the design concept of the project and the information contained in the Contract Documents. The review of shop drawings and samples shall be only for the convenience of the Owner in following the work and shall not relieve the Contractor of responsibility for deviations from the requirements of the Contract Documents. The review shall not be construed as a complete or detailed check of the work submitted, nor shall it relieve the Contractor of responsibility for errors of any sort in the shop drawings and samples, or from the necessity of furnishing any work required by the Contract Documents which may have been omitted from the shop drawing submittals. The review of a separate item shall not indicate review of the complete assembly in which it functions. Nothing in the Architect's and/or Engineer's review of shop drawings and samples shall be considered as authorizing a departure from Contract Documents or specifications; additional cost to the Owner; or increased time for completion of the work.
- B. Architect's and/or Engineer's review is for general compliance with the design concept and contract documents. Markings or comments shall not be construed as relieving the Contractor from compliance with the project plans and specifications, nor departing therefrom. The Contractor remains solely responsible for details and accuracy, for confirming and correlating all quantities and dimensions, for coordination with other work, whether new or existing and other trades, for selecting fabrication processes, for techniques of construction and for performing his work in a safe manner.
- C. The Architect and/or Engineer shall review shop drawings and samples with reasonable promptness and shall return them to the Contractor stamped to indicate the appropriate action as follows:
 - 1. "NO EXCEPTION TAKEN" means that fabrication, manufacture or construction may proceed, providing the submittal complies with the Contract Documents.

2. “APPROVED AS NOTED” means that fabrication, manufacture or construction may proceed, providing the submittal complies with the Architect's and/or Engineer's notations and the Contract Documents. A copy of the corrected submittal shall be returned to the Architect and/or Engineer for record. If, for any reason, the Contractor cannot comply with the notations, the Contractor shall resubmit as described for submittals stamped “REVISE AND RESUBMIT”.
 3. “REVISE AND RESUBMIT” means that the Contractor must comply with the Architect's and/or Engineer's notations and resubmit before fabrication, manufacture or construction may proceed. Submittals stamped in this manner shall not be permitted on the job site.
 4. “REJECTED” means that the submittal does not comply with the Contract Documents and that fabrication, manufacture or construction shall not proceed. Submittals stamped in this manner shall not be permitted on the job site.
- D. Each submitted shop drawing shall bear the Contractor's stamped and signed certification that the work has been checked for all related job conditions, for maintenance of architectural conditions, and has been coordinated with the shop drawings of other affected trades for interrelated work, as required for the proper and complete performance of the work. No shop drawing submittal shall be reviewed without this certification.
- E. Shop drawings for manufactured material and equipment shall include model numbers, dimension drawings, operating weights, material specifications, operating features and controls, wiring diagrams, performance characteristics, service procedures, including clearance requirements for maintenance work, and conformance to specified codes and code ratings. Note that in addition to these requirements, other specific submittal data, and forms of data submission, are required by the Contract Documents for particular items of equipment and material.
- F. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein shall be the minimum standards acceptable. The Engineer shall retain the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require that the specified materials and equipment which conform to the requirements of the Contract Documents be furnished.

1.18 MANUFACTURER'S RECOMMENDATIONS

- A. With the exceptions as specified and/or indicated on the drawings or in the specifications, the Contractor shall apply, install, connect, erect, use, clean,

commission and condition manufactured articles, materials, and equipment per manufacturer's current printed instructions and recommendations. Copies of such printed recommendations shall be kept at the project site and made available as required.

- B. Where the manufacturer's recommendations conflict with the Contract Documents, the conflict shall be brought to the Engineer's attention immediately.

1.19 SPACE LIMITATIONS

- A. The equipment selections used in the preparation of the Contract Documents shall fit into the physical spaces provided and indicated, allowing ample room for access, servicing, removal and replacement of parts. Adequate space shall be allowed for clearance in accordance with code requirements, the requirements of the Local Authorities Having Jurisdiction, and the equipment manufacturer's recommendations.
- B. In the preparation of drawings, a reasonable effort to accommodate acceptable equipment manufacturer's space requirements has been made; however, since space requirements and equipment arrangement vary according to each manufacturer, the responsibility for initial access, maintenance access, code-required access, and proper fit rests with the Contractor.
- C. Physical dimensions and arrangements of equipment to be installed shall be subject to the Architect's and Engineer's review.
- D. Coordinate the installation of piping and equipment with lighting fixtures, special ceiling construction, air distribution equipment and the structure. Provide additional risers, drops and offsets as required. If, after installed, new piping or equipment is found to be in conflict with the architecture, structure, or other trade work which is either existing or shown on the Contract Documents, the piping or equipment shall be relocated without additional cost to the Owner.
- E. The Contractor shall follow the Drawings in laying out the Work and check drawings of all trades to verify spaces in which Work will be installed. Maintain maximum headroom and, where space conditions appear inadequate, the Architect shall be notified before proceeding with the installation.

1.20 RECORD DRAWINGS

- A. The Contractor shall maintain on a daily basis at the project site a complete set of "Record Drawings". The "Record Drawings" shall consist of a set of blue-line prints and AutoCAD files of the Contractor Coordination Drawings for this division. The prints shall include the updated drawings, which shall be periodically electronically updated to show the precise location of all buried or concealed work and equipment, including embedded piping and valves, and all

changes and deviations in the mechanical work from that shown on the Contract Documents. This requirement shall not be construed as authorization for the Contractor to make changes in the layout or work without written definite instructions from the Architect or Engineer. Prior to commencing work, the Contractor shall obtain from the Architect or Engineer a set of AutoCAD format Architectural and Engineering Drawings on CD-ROM, to be used only to produce the Contractor's Coordination Drawings. The continuously updated coordination drawings shall be used to produce the final "Record Drawings" which shall be delivered to the Owner in AutoCAD electronic format upon project completion. The Contractor shall give to the Engineer a written release signed by a corporate officer of the Contractor prior to receipt of the Engineer's disks.

- B. Dimensions shall clearly and accurately delineate the work as installed; locations shall be suitably identified by at least two (2) dimensions to permanent structures.
- C. Upon completion of the work, the Contractor and his Subcontractors shall certify all "Record Drawings" on the front lower right-hand corner adjacent to the above marking with a rubber stamp impression or an AutoCAD image that states the Project name, the Contractor's name, the area covered, and the date.
- D. Prior to final acceptance of the work of this division, the Contractor shall submit properly certified "Record Drawings" to the Architect and Engineer for review and shall make changes, corrections, or additions as the Architect and/or Engineer may require to the "Record Drawings". Submit four (4) prints of each version until accepted.
- E. After the Architect's and Engineer's review, and any required Contractor revisions, the "Record Drawings" shall be delivered to General Contractor in AutoCAD format for the Owner's use. Upon acceptance, provide ____ (#) prints, and ____ (#) electronic versions within sixty (60) days of Final Acceptance.

1.21 ELECTRICAL EQUIPMENT AND ELECTRICAL ROOM PRECAUTIONS

- A. In general, the Contractor shall not install piping or equipment in any switchboard, switchgear, transformer, elevator equipment, telephone, telecommunications, or electrical equipment rooms unless this piping or equipment serves only these rooms. Installation is strictly prohibited where it violates the requirements of the applicable Electrical Code.
- B. No piping or other equipment foreign to the electrical installation shall be installed within the dedicated zone above switchboards, panelboards, distribution boards, and motor control centers to a height of 6 ft. above the equipment or the structural ceiling, whichever is lower. The area above the dedicated space shall be permitted to contain foreign systems, provided protection is installed to avoid damage to the electrical equipment from condensation, leaks or breaks in such foreign systems.

- C. Caution workers both verbally and in writing as to the dangers involved in doing work within or adjacent to electrical equipment within electrical closets on various floors, the Mechanical Rooms and the Switchgear Rooms, Elevator Machine Rooms, due to dangers caused by the presence of high voltages and currents in these spaces.
- D. Provide all necessary personal protective equipment meeting OSHA requirements when working in areas within live electrical equipment.

1.22 CUTTING AND PATCHING

- A. In general, cutting and patching will be done under other divisions of the specifications.
- B. Furnish to the Contractor necessary information so that openings for this work can be built into the floors and walls in time. Such cooperation is required to keep cutting of walls and floors to a minimum.
- C. Set drains and sleeves for pipes accurately before concrete floors are poured or set boxes on the forms to leave openings in the floors and subsequently set required sleeves in the openings.
- D. Should the Contractor neglect to perform preliminary work and should cutting be required in order to install equipment, the expense of this cutting and restoring of surfaces to their original condition shall be borne by this Contractor.

1.23 UTILITY CONNECTIONS

- A. Arrange and pay costs for all specified utilities, including the following:
 - 1. Connection to municipal water mains and sewers.
 - 2. Connection to utility company gas mains.
 - 3. Payment of service charges.
 - 4. Provisions for temporary utilities.
 - 5. Connections to electric and other utility points of service interface.

1.24 PROTECTION OF EQUIPMENT AND MATERIALS

- A. Protect from damage, water, dust all material and equipment provided under this division, both in storage and installed in accordance with manufacturer's recommendations until Notice of Completion has been filed and accepted.

- B. Arrange with General Contractor for storage facilities for materials and equipment.
- C. All products stored off site and delivered to the site must be kept in factory packing with positioning devices in place until installation. Equipment which is subject to damage from moisture shall be stored indoors in a suitably controlled environment with factory covering in place.
- D. Material, equipment or apparatus damaged because of improper storage or protection shall be rejected.
- E. Protect equipment from damage due to moisture, water, spray-on fireproofing, and construction debris during construction.
- F. Cover and protect all openings left in floor for passage of pipes. Protect pipes with suitable coverings as soon as set. Close all open ends of pipes with a plug fitting and conduits with caps to prevent obstruction and damage.
- G. Protect the system against freezing in cold weather.
- H. Prior to starting equipment, remove all protective materials, shipping bars, retainers, positioning devices.

1.25 CONSTRUCTION REVIEW

- A. Work may be reviewed at any time by the Architect or Engineer.
- B. Advise the Architect and/or Engineer that work is ready for review at the following times:
 - 1. Prior to backfilling buried work.
 - 2. Prior to concealment of work in walls and above ceilings.
 - 3. Testing of systems and equipment.
 - 4. When all requirements of the Contract have been completed.

1.26 EQUIPMENT NOISE AND VIBRATION

- A. Equipment and systems, as defined herein, shall be quiet and free of apparent vibration while in operation.
- B. Vibration shall not be apparent to the senses in occupied areas of the building. To this end, both the balancing of rotating machinery and the installation of vibration isolation at various locations are required.

- C. It shall be the responsibility of this Contractor to obtain equipment that is quiet in operation as compared to other available equipment of its size, capacity, and type; to install equipment so that a minimum amount of noise and/or vibration is transmitted to the building; and to fabricate the piping systems so that noises generated in the systems are held to an absolute minimum.
- D. Any additional precautions deemed necessary to provide a quiet installation shall be done as part of the work of this division, subject to review by the Engineer and without additional cost to the Owner. After the systems are in operation, it shall be the responsibility of the Contractor to make any changes to equipment or work installed that may be required to provide systems which are quiet in operation and comply with the acoustic requirements as specified herein.
- E. Except in various special areas listed herein, the system noise level, in occupied spaces, shall be equal to or less than the "lowest value in the range" of the noise criteria curves for the particular space in accordance with the current edition of Applications Volume of the ASHRAE Handbook. The noise criteria curves shall be based on ANSI Standard S1.6-1984 (R-1990) octave bands and a sound pressure level in decibels referenced to 0.002 microbars. Sound levels within the occupied spaces must meet the criteria described above and with all building, wall partition, floor, ceiling plenum depth, and ceiling construction in place as they exist for the individual spaces. The attenuation through boundary construction of Equipment Rooms must be considered in selecting equipment for acceptable noise level as described herein.

1.27 FINAL REVIEW

- A. At a time designated, the entire installation shall be reviewed for compliance with the Contract Drawings and specifications. The Contractor shall be available at all times during this Review.
- B. The Contractor shall demonstrate prior to the Final Review that all systems and all equipment have been properly balanced and adjusted and are in compliance with the requirements of the Contract Documents. After these demonstration tests are completed satisfactorily, but prior to the Final Review field visit by the Engineer, the Contractor shall submit to the Engineer a written certification that attests to Contract Document compliance for this Project.
- C. Certificates and documents required herein shall be in order and presented to the Architect and Engineer at least two (2) weeks prior to the Final Review.
- D. After the Final Review, any changes or corrections noted as necessary for the work to comply with these specifications and the drawings shall be accomplished without delay in order to secure final acceptance of the work.
- E.

1.28 DATE OF COMPLETION AND TESTING OF SYSTEMS

- A. The date for the final performance and acceptance testing shall comply with the project construction schedule and shall be sufficiently in advance of the Contract completion date to permit the execution of the testing by the Contractor prior to occupancy and the close-out of the Contract. Any adjustments and/or alterations which the final acceptance tests indicate as necessary for the proper and satisfactory functioning of all equipment and systems shall be completed prior to the close-out of the Contract. Re-tests shall not relieve the Contractor of completion date responsibility.
- B. The Contractor shall provide a detailed schedule of completion indicating when each system component and entire system is to be completed and outlining when tests will be performed. Completion schedule shall be submitted to the Architect, Engineer, and Owner for review at a time requested by the General Contractor after the notice to proceed has been given by the General Contractor to the respective Division 22 Subcontractors. This schedule shall be updated periodically by the Contractor as the project progresses. Each update shall be submitted to the General Contractor, Architect, Engineer and Owner for review.

1.29 OPERATING INSTRUCTIONS

- A. The Contractor shall provide the services of a factory-trained specialist to supervise the commissioning, startup, and operation of all equipment specified herein and to instruct the Owner's operators during a five (5) day operating instruction period at or near the project site. The operating instruction period shall be defined as straight-time working hours and shall not include nights, weekends, or travel time to and/or from the project and shall include a period for videotaping of the operating instructions. See individual sections of these specifications for additional instructions by manufacturer-trained specialists.
- B. The Owner shall be notified in writing at least two (2) weeks before each operating instruction period begins. The Contractor shall commence no instruction period until the Owner has issued his written acceptance of the starting time.

1.30 WARRANTY PERIOD

- A. The warranty period shall be for the period from beneficial use by the Owner, in accordance with the construction schedule.
- B. During the warranty period, the Contractor shall guarantee the following in a form satisfactory to the Owner:
 - 1. All work installed will be free from any and all defects in workmanship and/or materials.

2. All apparatus will develop capacities and performance characteristics specified.
 3. The systems shall operate without malfunction.
- C. The Contractor shall, without cost to the Owner, remedy any defects within a reasonable time to be specified in notice from the Architect. In default thereof, the Owner may have such work done and charge all costs to the Contractor.
- D. The start of the Contractor's warranty period, as defined in the General Conditions, shall commence on the issue of a "Certificate of Substantial Completion" by the Owner or the Owner's Representative for each item of material, equipment, or system.
- E. The Subcontractor shall confer with the General Contractor prior to the bid date concerning the project schedule and determine if there is a need to operate any items of equipment or systems for temporary heating and/or cooling or other reasons prior to "Substantial Completion". All required extended warranty costs for equipment, materials, and systems shall be included in the Subcontractor's bid.
- F. Provide complete documentation of all component and system tests prior to Owner acceptance and turnover of components or systems. In addition, the Owner reserves the right to review all test objectives, test plans and test cases, and witness all preoperational tests. Provide the Owner with a comprehensive schedule detailing the preparation of testing documentation and the conduct of all component or system tests.
- G. Warrant that all components, subsystems and systems will perform their specified functions from the date of turnover and commercial operation through the useful life of the system, as determined by the various equipment manufacturers and installing Contractor. In the event components fail for any reason, be responsible to repair/replace said components, and reimburse the Owner for all costs associated with the component, subsystem or system that failed to perform the specified function.

1.31 GUARANTEE

- A. Submit a single guarantee stating that all portions of the work are in accordance with Contract requirements. Guarantee all work against faulty and improper material and workmanship for a period of one year from date of final acceptance by the Owner; except that where guarantees or warranties for longer terms are specified herein, such longer term shall apply. At no additional cost to Owner, within 24 hours after notification, correct any deficiencies which occur during the guarantee period, all to the satisfaction of the Owner and Architect. Require similar guarantees from his Subcontractors.

- B. Guarantee that the materials and workmanship supplied under these specifications will be of the best grade, that the apparatus will be erected in a practical and first class manner, that it will be complete in operation, nothing being omitted in the way of labor and material required to make this so, although not specifically shown or mentioned herein and that it will be delivered in well working order, complete and perfect in every respect without additional cost - whether or not shown in detail on the drawings or described in detail in this specification.
- C. Be responsible for all damage to or caused by the work performed under this division for a period of one (1) year from date of the acceptance of work under this Contract. Repair at no cost to Owner all such damage which occurs within 24 hours' notice thereof by the Owner. Damage which occurs prior to the completion of this work shall be repaired at once. Be responsible for any damage and repair thereof and reimburse Owner for all expense incurred thereby. Indemnify the Owner, the Architect, the Consulting Engineers and the General Contractor against loss, liability, damage or expense, including reasonable attorneys' fees, in connection with any claim resulting from such leaks which may be asserted by tenants or any other third person.

1.32 DELIVERY, STORAGE AND HANDLING

- A. Include all delivery, hauling, hoisting, shoring, and placement in the building of equipment and materials specified herein, including any equipment pre-purchased by the General Contractor for installation by this Contractor. The Contractor shall be responsible for the timely delivery and introduction of equipment to the Project as required by the construction schedule for this Project. If any item of equipment is received prior to the time it is required, the Contractor shall be responsible for its proper storage and protection until such time as it may be required. The Contractor shall pay for all costs of demurrage or storage in a bonded warehouse.
- B. If any item of equipment is not delivered to or installed at the project site in a timely manner as required by the project construction schedule, the Contractor shall be solely responsible for disassembly, re-assembly, manufacturer's supervision, shoring, general construction modifications, delays, overtime costs, etc. No additional cost or delays shall be incurred by the Owner.

PRODUCTS

2.01 UNAUTHORIZED MATERIALS

- A. Materials and products required for work of this section shall not contain asbestos, polychlorinated biphenyls (PCB's) or other hazardous materials identified by the Owner.

2.02 GENERAL

- A. Refer to specific specification sections for additional equipment and system piping requirements.

EXECUTION

3.01 GENERAL

- A. Installation shall be in accordance with the specification section pertaining to the individual equipment and system piping.

END OF SECTION 22 00 00

SECTION 22 05 00 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Contractor and his Subcontractors shall provide all labor, materials, tools, scaffolding, machinery, equipment, appliances, and services necessary to complete the plumbing work under this Contract. All systems and equipment shall be complete in every respect and all items of material, equipment and labor shall be furnished and installed for a fully operational system. This Contractor shall coordinate his work with the work of the other trades so as to resolve conflicts without impeding job progress or the project construction schedule. Provide notice with the bid proposal of any concrete work required by this division that is not indicated on the Structural or Architectural Drawings or Drawings of other trades.
- B. This Contractor shall examine all Contract Documents for all divisions of the specifications in order to determine the extent of work required to be completed under this division. Failure to examine all the Contract Documents for this project will not relieve this Contractor of the responsibility to perform all the work required for a complete, fully operational and satisfactory installation.
- C. Provide all miscellaneous common plumbing products required for a complete plumbing installation as indicated, in accordance with the requirements of the Contract Documents.
- D. Section includes:
 - 1. Sleeves.
 - 2. Mechanical sleeve seals.
 - 3. Access doors.
 - 4. Formed steel channel.
 - 5. Escutcheons.

1.02 RELATED SECTIONS

- A. Refer to Divisions 01, 21, 23, 26, and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.
- B. The following specification sections apply to all work herein:
 - 1. Section 22 00 00 - General Requirements for Plumbing

2. Section 22 05 17 - Sleeves and Sleeve Seals for Plumbing Piping
3. Section 22 05 23 - General-Duty Valves for Plumbing Piping
4. Section 22 05 29 and Equipment - Hangers and Supports for Plumbing Piping
5. Section 22 05 53 Equipment - Identification for Plumbing Piping and
6. Section 22 05 76 - Facility Drainage Piping Cleanouts
7. Section 22 07 00 - Plumbing Insulation
8. Section 22 11 16 - Domestic Water Piping
9. Section 22 13 16 - Sanitary Waste and Vent Piping
10. Section 22 13 19 - Sanitary Waste Piping Specialties
11. Section 22 14 13 - Facility Storm Drainage Piping
12. Section 22 14 26 - Facility Storm Drains
13. Section 22 14 29 - Sump Pumps
14. Section 22 42 00 - Commercial Plumbing Fixtures

1.03 REFERENCES

- A. Each product required for the common plumbing work shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:
 1. Codes: Perform all work in accordance with the latest applicable codes and standards for New York City
 - a. New York City Building Code.
 - b. New York City Plumbing Code.
 2. Reference Standards: Perform all work in accordance with, but not limited to, the following standards:
 - a. ASTM A653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.

- b. ISO 9000:2001: Quality Management.

1.04 SUBMITTALS

- A. The following submittal data shall be furnished according to the Conditions of the Contract, Division 01, and Section 22 00 00 and shall include, but not be limited to:
1. Product cut sheets and schedule of sleeves and mechanical sleeve seals used for the project. The schedule shall include the material, diameter, length, number of links, location and service the sleeve and sleeve seal will be provided.
 2. Product cut sheets and schedule of access doors used for the project. The schedule shall include the material, size, finish type, location and purpose of installation the access door will be provided.
 3. Product cut sheets of formed steel channel.
 4. Product cut sheets of escutcheons. The cut sheets shall indicate the size, finish and location, which the escutcheons will be installed.
- B. Product Data: Submit manufacturer's literature including general assembly.
- C. Manufacturer's Installation Instructions: Submit support details, installation instructions and connection requirements for each product and system for which they are installed.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 22 00 00 shall apply to all work specified herein.
- B. All materials and equipment shall be fabricated by companies, whose primary business expertise is the manufacturing of commercial and industrial products of the type specified herein. The manufacturer shall have been in continuous operation in the manufacture of the products specified for a minimum of ten (10) years.
- C. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- D. Make every effort to furnish all materials of any type from one manufacturer.

- E. Furnish all equipment, materials and accessories new and free from defects.

1.06 WORK INCLUDED

- A. The work includes, but is not limited to, the following systems, equipment and services:
 - 1. Plumbing fixtures and their supports.
 - 2. Domestic hot and cold water supply piping.
 - 3. Sanitary waste piping.
 - 4. Storm drain piping.
 - 5. Vent piping.
 - 6. Roof and floor drains.
 - 7. Buried sanitary waste and vent piping.
 - 8. Buried storm water piping.
 - 9. Insulation, controls, safety devices, vibration isolation, etc.
 - 10. Sump pump and sewage ejector pumps and controls.
 - 11. Provide all miscellaneous supports for Division 22 work and equipment.
 - 12. Furnishing of shop drawings, product data and samples.
 - 13. Furnishing of "Record Drawings".
 - 14. Furnishing of Contractor "Coordination Drawings".
 - 15. Miscellaneous items as required for complete and functioning systems as specified herein.
 - 16. All systems, equipment, and services specified herein shall be furnished and installed complete and ready for use.
 - 17. Provide all excavation and backfill required for Division 22 work.
 - 18. Provide all sleeves for the Plumbing work complete with seals and firestop as specified herein and as required by the Authority Having Jurisdiction.
 - 19. Patching or replacement of all fireproofing if it is damaged or removed during the installation of the Division 22 work.

20. Participate in and assist in the operation of the fire safety ventilation equipment as required during the performance testing and startup of the Division 28 fire detection, alarm and communication systems.
21. Participate in and provide equipment, materials, and labor as required to construct at the project site a complete mechanical, plumbing, and fire protection “mockup”, in or out of sequence, of one (1) typical floor and the associated Air Handling Unit Room. Refer to Division 01 for details and construction requirements. The field “mockup” shall remain in place for use in the completed building systems. The “mockup” shall be reviewed and shall serve as a model for the mechanical and plumbing installation and other similar typical floors.
22. Participate in and provide equipment, materials, and labor as required to construct at the project site a complete mechanical and plumbing Toilet Room “mockup”, in or out of sequence. See Architectural Section 09 00 00 for details and construction requirements. The field “mockup” shall remain in place for use in the completed building systems. The “mockup” shall be reviewed and shall serve as a model for the mechanical and plumbing installation and other similar typical floor Toilet Rooms.
23. Instruments as required for operating and testing the various systems shall be furnished and installed complete as specified herein.
24. Hydrostatic testing, operational testing and adjusting of all systems.
25. Complete flushing and chemical treatment and initial water treatment for all water systems.
26. Complete all tests required by all rules, regulations, etc., of all Authorities Having Jurisdiction and prepare, complete and file all forms, tabulations, plans, etc., pertinent thereto with the referenced authorities, and accomplish such work with personnel of proper caliber, in particular, Professional Engineers, where so required.
27. Participate in and provide all labor as required for “off-hour” testing of equipment and systems if required by job conditions or by Authorities Having Jurisdiction and as required to obtain the “Temporary Certificates of Occupancy (TCO).”
28. Participate in and provide all labor as required for system commissioning including any time required for a detailed review of the commissioning process as requested by the Engineer or the Owner.

1.07 WORK OF OTHER DIVISIONS

- A. Electrical connections for motors and mounting of loose motors.

- B. Pits for sumps and pumps. However, this Contractor shall be responsible for correct dimensions, layout, coordination, etc.
- C. All concrete work indicated on the Structural, Architectural, and Mechanical/Electrical Drawings.
- D. Metal architectural louvers.
- E. Painting, except touch up painting and as otherwise specified herein.
- F. Installing access doors in general construction.
- G. Utility mains and piping 5 feet beyond the foundation walls unless shown otherwise on the drawings.
- H. Integrated Automation: Division 23, Section 23 09 00 - Building Automation and Temperature Control.

1.08 VERIFYING EXISTING CONDITIONS

- A. Before commencing work, examine all adjoining work on which this work is in any way dependent for perfect workmanship according to the intent of this specification, and report to the Construction Manager any condition, which prevents performance of first-class work. No “waiver of responsibility” for incomplete, inadequate or defective adjoining work will be considered unless notice has been filed before submittal of a proposal.
- B. Become thoroughly familiar with actual existing conditions at the building of the present installations to which connections must be made or which must be changed or altered. The intent of the work is shown on the drawings and described hereinafter, and no consideration shall be granted by reason of lack of familiarity on the part of the Contractor with actual physical conditions at the site. Inspect each and every area affected by the total alteration of the building before submitting bid.

1.09 SUBCONTRACTS

- A. Where Contract Documents require manufacturers' services, and wherever the staff of this Contractor performing the work of this section cannot adequately perform such services, this Contractor shall stipulate such performance in its contracts with its Subcontractors or Sub-Subcontractors, vendors, manufacturers, and the like, or else subsequently pay them any additional fees required therefor.

1.10 FACTORY TESTING

- A. All mechanical sleeve seals and access doors shall be fully assembled and factory tested for full functionality at the manufacturer's factory prior to shipment.

1.11 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer's installation instructions.
- C. Protect all components from physical damage, including effects of weather, water, and construction debris.

1.12 COORDINATION

- A. Coordinate the installation of work in this section with the following:
 - 1. Division 03 - Concrete
 - 2. Division 04 - Masonry
 - 3. Division 05 - Metals
 - 4. Division 09 - Finishes
 - 5. Division 10 - Specialties

1.13 UNIT PRICES

- A. The Contractor shall state in the proposal, unit prices in accordance with the following schedule and the requirements of Section 22 00 00.
 - 1. Sleeves \$_____/each
 - 2. Mechanical Sleeve Seals \$_____/each
 - 3. Access Doors \$_____/each

1.14 WARRANTY

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Warranty period shall commence upon final acceptance by the Owner.
- C. Furnish a one (1) year manufacturer's warranty for each mechanical sleeve seal and access door.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Being listed herein as an acceptable manufacturer does not permit the manufacturer to provide standard manufactured equipment that does not comply with the performance and/or physical characteristic requirements of the Contract Documents.
- B. All substitutions must be identified in the Base Bid as a voluntary Deduct Alternate and must be accompanied by a Letter of Equivalency certifying the product's equivalency in all performance and physical characteristics to the products listed herein. The proposed substitutions shall be inclusive of all cost and physical implications throughout the project. Under no circumstances should the substitution result in added cost to the project. Should the substitution be approved neither the project specifications nor the Contract Documents will be revised to reflect the substitution.
- C. Access Doors
 - 1. Karp Associates, Inc.
 - 2. Milcor.
 - 3. Williams Brothers Corp.
- D. Escutcheons
 - 1. Chicago Specialty.
 - 2. Producers Specialty.
 - 3. Sanitary-Dash.
- E. Formed Steel Channel
 - 1. Allied Tube & Conduit Corp.
 - 2. B-Line Systems.
 - 3. Unistrut Corp.
- F. Mechanical Sleeve Seals
 - 1. Calpico, Inc.
 - 2. Metraflex Co.

3. Pipeline Seal & Insulator Inc. (Link-Seal).
- G. Sleeves
1. Calpico, Inc.
 2. Metraflex Co.
 3. Pipeline Seal & Insulator Inc. (Link-Seal).

2.02 GENERAL REQUIREMENTS

- A. All materials and equipment shall be new, in good condition and free from defect. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- B. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein are the minimum standards acceptable. The Engineer retains the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require the specified materials and equipment which conform to the requirements of the Contract Documents be furnished.
- C. Materials and equipment, which are found to have factory defects shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Contractor shall be responsible for all costs associated with testing, replacement or repair, including but not limited to, all replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, re-commissioning of the equipment, etc.

2.03 SLEEVES

- A. Furnish sleeves for all pipes passing through floors, walls and concrete, or concrete fireproofed beams.
- B. Sleeves in concrete beams, through concrete walls, and exposed pipes penetrating floors: Schedule 40 steel pipe.
- C. Provide sleeves in foundation walls and in concrete pits with anchor flange.
- D. Sleeves within furred-out enclosures in floors, through partitions, steel beams and walls: 18 gauge (1.2 mm) thick galvanized steel.

2.04 MECHANICAL SLEEVE SEALS

- A. Provide modular, mechanical type sleeve seals for all piping passing through waterproof concrete foundation walls, pit walls and similar construction, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between the pipe and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.
- B. Where mechanical sleeve seals are required but cannot be provided due to space limitations, caulk the annular space with lead and oakum.

2.05 ACCESS DOORS

- A. Provide access doors as required for all concealed valves, cleanouts and other elements requiring access above ceilings or behind walls or as indicated on the drawings. The installation of all doors will be performed under the work of another section. Coordinate the work and assume responsibility for the accessibility of all valves.
- B. Provide access doors factory made, completely flush, heavy metal access doors as manufactured by Karp Associates, Inc.
- C. Frames shall be a 14 gauge steel, welded with mitered corners ground smooth, anchors.
- D. Doors shall be 14 gauge steel, heavy hinges flush with frame, invisible when closed, wing-type airplane catches; no bolts, screws, nuts or other loose devices required for opening of door.
- E. All access doors and frames shall be given a prime coat of corrosion-resistant paint at the factory.
- F. Furnish the following access doors as manufactured by Karp Associates, Inc.
 - 1. In plaster ceilings, KARP DSC 210-PL.
 - 2. In 3-hour masonry enclosures (pipe or duct shafts), KARP DSC-211-FRT with 1-1/2 inch vermiculite plaster fill. Metal lath lining for plaster shall be self-furring type, tack-welded to pan.
 - 3. In non-rated masonry, KARP DSC-211.
 - 4. In drywall construction, KARP DSC-214M.

2.06 FORMED STEEL CHANNEL

- A. Provide formed steel channel as required to sufficiently support piping and equipment in accordance with the Contract Documents.
- B. Formed steel channel shall be galvanized 12 gauge (2.8 mm) thick steel, with holes 1-1/2 inches (38 mm) on center.

2.07 ESCUTCHEONS

- A. Provide escutcheons as required to sufficiently enclose penetrations in fire and smoke rated walls and partitions in accordance with the Contract Documents.
- B. Where pipes penetrate fire or smoke rated walls provide metal escutcheons on both sides of the wall penetration.
- C. Escutcheons shall be either one-piece or two-piece construction, chrome-plated brass or stainless steel.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and returned to the manufacturer for replacement.

3.02 INSTALLATION

- A. Installation shall be in accordance with the specification section pertaining to the individual equipment.
- B. The arrangement, positions and connections of pipes, fixtures, drains, valves, and the like, indicated on the drawings shall be followed as closely as possible, but the right is reserved by the Architect to change locations and elevations to accommodate conditions which may arise during the progress of the work, prior to installation, without additional compensation for such changes. The responsibility for accurately laying out the work and coordinating the installation with other trades rests with this Contractor. Should it be found that any work is laid out so that interferences will occur, report that to the Architect before commencing work.
- C. Carry fixture connections, concealed in building construction, to points above floor, break out close to the underside or adjacent to fixture and continue exposed to fixture.
- D. Piping Installation

1. Install pipes approximately as shown on the drawings and as directed during installation, as straight and direct as possible, forming right angles or parallel lines with building walls and other pipes, and neatly spaced. Erect pipe risers plumb and true, and parallel with walls and other pipes and neatly spaced.
2. Keep all horizontal runs of piping, except where concealed in partitions, as high as possible and close to walls. Maintain minimum 1/8 inch fall per foot on all soil, waste and leader lines.
3. Do not install pipes or other apparatus in a manner, which interferes with the full swing of the doors.
4. Ream all pipe smooth before installation. Do not bend, flatten, split or otherwise injure pipe.
5. Use reducing fittings, unless otherwise approved in special cases, in making reduction in size of pipe. Bushings shall not be allowed unless specifically approved.
6. Where chrome-plated piping is installed, cut and thread pipe so that no unplated pipe threads are visible when the work is completed.
7. Do not install exterior piping in water or when trench or weather conditions are unsuitable for the work, as decided by the Architect.

E. Sleeves

1. Set sleeves in position in forms. Provide reinforcing around sleeves.
2. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
3. Extend sleeves through floors 1 in. (25 mm) above finished floor level. Caulk sleeves tight.
4. Where piping penetrates floor, ceiling or wall, close off space between pipe and adjacent work with firestopping and caulk airtight. Provide close-fitting metal collar or escutcheon covers at both sides of penetration.
5. Sleeves passing through fire-rated floors or walls shall be sealed with an intumescent formulation similar to Metraflex Metraseal 120 FireSeal or approved.
6. Sleeves passing through foundation walls or pit walls shall be sealed utilizing a mechanical seal similar to Link-Seal or approved.

7. Install chrome-plated steel escutcheons at finished surfaces.
 8. Set sleeves as construction progresses and secure in place during pouring of concrete.
 9. Fire stopping shall be installed as specified under Section 07 84 00.
- F. Mechanical Sleeve Seals
1. Mechanical sleeve seal installation shall be in accordance with the manufacturer's recommendations and as indicated on the drawings.
 2. Install mechanical sleeve seals at all exterior watertight entries, foundation walls and pit walls.
- G. Access Doors
1. Size access doors as required for the equipment being accessed, however access doors shall not be smaller than 16 inches by 16 inches. Install all valves to fit within the limit of the following size access doors; where two (2) or less valves are located with their bonnets within 12 inches of the face of the door and all portions of the valves are within the area defined by the opening in the door, 16 inch x 16 inch doors may be used. Where more than two (2) valves are served by a door and the bonnets are within 12 inches of the face of the door, the size of the door shall be increased so that all portions of the valves are within the area defined by the opening in the door. Where the bonnets of the valves are more than 12 inches from the face of the door, the doors shall be minimum of 20 inch x 20 inch clear opening.
 2. Furnish buttons or tabs to Ceiling Contractor for setting, as approved by Architect, to indicate location of valves, cleanouts or other equipment located above removable-type ceilings where access doors are not furnished.
- H. Escutcheons
1. Provide pipe escutcheons with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings, and pipe sleeve extensions, if any. Furnish pipe escutcheons with chrome finish for occupied areas, prime paint finish for unoccupied areas.
 2. Escutcheons for waterproof floors, and areas where water and condensation can be expected to accumulate shall be stainless steel or chrome plated cast brass, solid or split hinged.

3. Escutcheons for dry areas shall be chrome plated cast brass or galvanized sheet steel, solid or split hinged.

3.03 CLEANING

- A. Before final connections are made and before operation of equipment and piping, thoroughly blow out, rod out, or wash out all piping at least twice, in a manner as directed and/or approved by the Architect, to remove all accumulation of dirt, chips or other deleterious material. Make all temporary connections and furnish all appliances required for the purpose of cleaning at no extra expense to the Owner.
- B. Clean up all equipment and leave in condition for finish painting before acceptance.
- C. Disinfect underground water mains after installation and test in accordance with AWWA Standard C-601 and requirements of the local Authorities Having Jurisdiction.
- D. Disinfect interior potable water distribution system in accordance with requirements of the local Authorities Having Jurisdiction. Provide the following procedure where no prescribed method exists:
 1. After the system is flushed, fill with either 50 ppm chlorine-water solution and let stand for 24 hours, or 200 ppm chlorine-water solution and let stand for 3 hours.
 2. Flush system with clean potable water until no excess chlorine remains in system.
 3. Repeat procedure if contamination persists after further test.

3.04 PROTECTIVE PAINTING

- A. Painting, except as specified herein or indicated otherwise, shall be done under another division. This division shall cooperate with the other divisions to determine the size of equipment, sizes and lengths of pipes, etc., to be painted.
- B. Equipment and materials furnished under this section shall be factory-finished as specified. If the factory finish is damaged during shipment, storage, installation, etc., it shall be repainted by this Contractor subject to the Engineer's approval. Touch-up painting is acceptable only for minor finish damage.
- C. Paint products for identification of plumbing systems shall be exterior grade, alkyd-based products.

- D. Repair damaged and marred factory-painted finishes with materials and procedures to match original factory finish.

3.05 FIELD TESTS

- A. Test all systems in full accordance with applicable Underwriters' and Municipal requirements.
- B. Notify the Architects and Inspectors Having Jurisdiction at least 48 hours in advance of performing the required tests, so that arrangements may be made for their presence to witness the tests.
- C. Furnish and pay for all devices, materials, supplies, labor and power required in connection with tests. Make all tests in the presence and to the satisfaction of the Architects, plumbing and other inspectors of the city, applicable Insurance Association and Public Utilities Inspectors Having Jurisdiction.
- D. Repair or, if required by the Architects, replace defective work with new work without extra charge to the Owner. Repeat tests as directed, until all work is proven satisfactory.
- E. Restore to its original condition any work damaged or disturbed by tests, engaging the original trades to do the work of restoration.
- F. Test the systems before any paint or insulation is applied.
- G. Test equipment in service and demonstrate that the equipment performs the work intended for it and that it complies with the requirements of these specifications for such equipment.
- H. Test all fixtures for soundness, stability of support and satisfactory operation.
- I. Performance Tests
 - 1. Gravity Drainage Systems: Subject the sanitary and storm drains, waste, and vent piping inside the building to a standing water test. The standing water test shall include the entire system from the lowest to the highest point of the system. The system shall be tested to a hydrostatic pressure equivalent to at least a ten foot head of water. After filling, shut off water supply and allow it to stand two (2) consecutive hours, with no leakage.
 - 2. Pressure Systems
 - a. Prior to applying the pressure test, the system shall be tested to 50 psig with compressed air or dry nitrogen for a period of ten minutes with no loss in pressure.

3.06 EXCAVATION AND BACKFILLING

- A. Do all excavating and backfilling as required for buried piping, valves, drains, manholes, drainage structures, and connections to utilities.
- B. The excavation shall be divided into three (3) classifications: Solid rock, semi-decomposed rock, and common or earth excavation.
- C. Solid rock shall consist of undecomposed stone which is hard enough to ring under the hammer, and shall be in volume of one-half (1/2) cubic yard or more.
- D. Semi-decomposed rock shall consist of stone which is partly disintegrated and which it is possible to remove by picking, although the Contractor may resort to alternate means as a more economical method for its removal. Blasting must be approved by the Authorities Having Jurisdiction and by adjacent property Owners.
- E. Common excavation shall include all material not covered by the above.
- F. No extra allowance shall be made for mud, peat, quicksand, or other wet work, or for hard clay or gravel formation, nor for grubbing or for removing stumps, etc.; these are to be considered common excavation. Where it is necessary to cut street or sidewalk paving, no extra allowance shall be made for this work, but it shall be included as common excavation. All pavements or sidewalks cut under this section shall be scored in advance of the ditching machines in such a manner as to secure regular edges to the cut and to keep from damaging the rest of the pavement. A 6 inch width of paving shall be removed on either side of trench for the entire length and width of trench.
- G. Wood-sheet all vertical trenches for their entire length, unless otherwise directed. Excavations less than four feet in depth, unless adjacent to footings, are excepted. Keep all sheeting in place and cut off 15 inches below finished grade.
- H. No sidewalk shall be undermined unless shored to carry a minimum live load of 125 pounds per square foot, unless local codes require a heavier live load.
- I. The top portion of pipe trenches may be excavated with sloping or vertical sides to any width, which will not cause damage to adjoining structures, roadways, pavements, utilities or property. For untimbered trenches or trenches held by stay bracing only, the width of the lower portion of the trench to a height of two feet above the top of the pipe shall not exceed maximum trench widths specified hereinafter for the respective size pipes. The width of trenches where solid sheeting is used may be increased, but not greater than necessary to clear the walers when lowering pipes into the trench. Contractor shall avoid long stretches of open trench.

- J. All work shall be done as detailed in “Method of Excavation and Shoring of Trenches” indicated on the drawings.
- K. If trenches are excavated to widths in excess of the above limitations, or collapse because of insufficient bracing and sheeting, Contractor shall be required to use special methods of constructing pipe foundations and backfilling as specified herein at his own expense.
- L. The bottom of the trench shall be cut to the depth of the extrados of the invert of the pipe. The bottom of all trenches, except as otherwise specified, shall be rounded to conform to the bottom of the pipe so as to afford full bearing on the pipe barrel. The depth and width required for such shaping shall be in accordance with the bedding detail indicated on the drawings and hereinafter tabulated. Do not machine-excavate to trench grade. Final grade shall be achieved by hand-excavation. Hand-excavate bell holes as required to permit the barrel of all piping to rest solidly upon the pipe bed with no strain on joints.
- M. All lines must be laid true to line and grade by this Contractor. Lines must be staked out prior to excavation and approval obtained from the Architect/Engineer prior to start of excavation. Should any lines so staked be found to interfere with on-site trees desired to be preserved by the Architect, the Contractor shall relocate the lines as required. Any resulting change in amount of excavation shall be adjusted in accordance with the unit prices.
- N. Reasonable and satisfactory provision shall be made by the Contractor for travel on sidewalks, driveways, etc., by the laying of temporary crossings, etc., as approved by the Architect/Engineer. Contractor shall keep all open excavations protected day and night in accordance with all applicable legal requirements, including all legal notices and signals. He shall keep bright red lights burning the entire night at such points as may be necessary and he shall provide fences, etc., and take any other precautions that may be necessary to protect life and property.
- O. If the material at or below grade is of an improper nature for a foundation, it shall be removed to such depths and widths and in such manner as required, and other material, as directed by the Engineer, put in its place, such material to be paid for at unit prices.
- P. Stone, gravel or crushed rock used for foundation stabilization shall be paid for only to the width of trench for which excavation is paid and for depths authorized by the Engineers.
- Q. No pipe shall be laid in a wet or water-filled trench. Any required dewatering shall be paid for at unit prices as specified hereinafter.
- R. Trench widths for the various pipe sizes shall be in accordance with the following table:

Size Pipe	Maximum Trench Width (Feet)
8 inches (or less)	2.0

- S. In rock excavation, go 6 inches deeper than pipe grade, then bring back up to trench grade with tamped soil to provide the proper cushion for pipe.
- T. All backfill material shall be free from cinders, ashes, refuse, vegetable or organic material, boulders, rocks or stones, or other unsuitable material. Particular care shall be exercised in backfilling around and over the installation. Where the material taken from the trench is not satisfactory, suitable material, meeting the approval of the Engineer, shall be procured and placed and compacted as provided in these specifications.
- U. Backfill shall be neither excessively dry nor excessively wet, as near optimum moisture content as practicable. Backfills shall be built up in layers, and each layer shall be thoroughly compacted before beginning another layer. Layers may be 3 feet in depth if compaction is performed by approved Hydro Hammer. Whenever compaction by hand is done, it shall be in layers of not more than 6 inches in depth per layer, and the number of men backfilling shall not exceed the number of men ramming. Rams of approved size and weight shall be used as specified hereinafter. Puddling shall not be permitted nor shall be frozen or wet material be placed in trenches.
- V. After compaction, the dry weight per cubic foot of any 6 inch depth of backfill shall be at least 95% of the maximum laboratory dry weight per cubic foot as determined by American Association of State Highway Officials Method T-99.
- W. As trenches are backfilled, remove surplus material and refuse and leave same clean and in good order. Maintain in safe condition all roadways and passageways over trench and promptly fill all depressions over and adjoining the trenches caused by the settling of this work. Excavated rock shall not be mixed with backfill material. Surplus rock shall be removed and wasted at points designated by the Owner.
- X. Backfill trenches to the finished grades of the ground as indicated on the Plumbing Plot Plan and/or Architectural Site Plan, with allowance for finished grading.
- Y. All types of hand-tamping bars shall be used: first, a bar with a narrow head, or blade, to tamp under the pipe and couplings; then a bar with a flat head to compact soil at the sides.
- Z. For packing soil under pipe and couplings, tamping bars improvised from two-by-fours, shovel-blades, pick-handles, and the like, shall not be permitted. Tamping

bar should be long enough and of weight to handle easily, heavy enough to do the work, and the right size and shape to pack soil properly.

- AA. Either hand or pneumatic flat tampers may be used.
- BB. Hand-placing and flat-tamping shall be continued to a point three-fourths up the pipe wall. When this point is reached, the tamping can be stopped.
- CC. For inspection during tests, only the top half of the fittings and couplings needs to be exposed. It is essential that the complete line, including the couplings and fittings, be tamped up to the horizontal diameter. Then the pipe shall be backfilled by hand so as to resist movement due to pressure, leaving the top half of couplings and fittings uncovered. Pipe must be weighted down with good soil at the rate of 1 foot depth of soil for each 100 pounds of water pressure.
- DD. Pipe in trenches on a slope should have extra attention to make certain that the new-placed backfill will not become a “blind-drain”, in effect. The backfill for pipe on slopes should be tamped with extra care, and the tamping continued in 4 inch layers right up to the top ground-line of the trench.
- EE. All sand used for backfill shall be a natural-bank sand, graded from fine to coarse, not lumpy or frozen, and free from slag, cinders, ashes, rubbish or other material which is objectionable or deleterious. It shall not contain a total of more than 10 percent by weight of loam and clay, and all material must be capable of being passed through a 3/4 inch sieve. Not more than 5 percent shall remain on a No. 4 sieve.
- FF. Gravel used for backfill shall consist of natural bank gravel having durable particles graded from fine to coarse in a reasonably uniform combination with no boulders or stones larger than 3/4 inch in size nor smaller than 1/4 inch. It shall be free from slag, cinders, ashes, refuse or other deleterious or objectionable materials. It shall not contain excessive amounts of loam and clay and shall not be lumpy or frozen.
- GG. Broken or crushed stone shall be of a quality equal to the best mountain granite, of solid composition, free from dirt and debris. The size shall vary between 1/4 inch and 3/4 inch.
- HH. Slag: Slag shall be of the Birmingham basic slag or its equal and of a size as called for under broken stone.
- II. The Contractor shall be responsible for all damage to the work, whether from fire, wind, rain or other causes, during the execution of the work and until the whole job is accepted even though he may have been paid for the part damaged.
- JJ. In figuring the excavation and backfill for all classifications, the width of the trench shall be considered three inches more on each side than the exterior

dimensions of the pipe at its greatest width, and the depth shall be the depth of the extrados of the invert of the pipe, all lines being vertical or horizontal, provided, however, that in no case shall the width be estimated at less than two (2) feet. The depth of the ditch shall be taken at each grade board and the average of the depth at two adjacent boards shall be used to compute the yardage between said boards, after deducting the semi-decomposed or solid rock, if any.

- KK. Method of wood sheeting shall be calculated based on trench depth, as specified above.
- LL. Contractor shall state a price for dewatering trenches at a cost per hour of pumping.
- MM. Trench drains of crushed stone or gravel shall be constructed to suitably located sumps and the water removed by bailing or pumping. All costs of equipment, labor and materials required for dewatering shall be included in the price bid.

END OF SECTION 22 05 00

SECTION 22 05 17 - SLEEVES AND SLEEVE SEALS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide all sleeves and sleeve seals required as indicated on and in accordance with the requirements of the Contract Documents.
- B. Section includes:
 - 1. Sleeves.
 - 2. Mechanical sleeve seals.

1.02 RELATED SECTIONS

- A. Refer to Divisions 01, 21, 23, 26, and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.
- B. The following specification sections apply to all work herein:
 - 1. Section 220000 - General Requirements for Plumbing
 - 2. Section 220523 - General-Duty Valves for Plumbing Piping
 - 3. Section 220529 - Hangers and Supports for Plumbing Piping and Equipment
 - 4. Section 220553 - Identification for Plumbing Piping and Equipment
 - 5. Section 220576 - Facility Drainage Piping Cleanouts
 - 6. Section 220700 - Plumbing Insulation
 - 7. Section 221116 - Domestic Water Piping
 - 8. Section 221316 - Sanitary Waste and Vent Piping
 - 9. Section 221319 - Sanitary Waste Piping Specialties
 - 10. Section 221413 - Facility Storm Drainage Piping
 - 11. Section 221426 - Facility Storm Drains
 - 12. Section 221429 - Sump Pumps
 - 13. Section 224200 - Commercial Plumbing Fixtures

1.03 REFERENCES

- A. Each product required for the common plumbing work shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:
 - 1. Codes: Perform all work in accordance with the latest applicable codes and standards for the New York City.
 - a. New York City Building Code.
 - b. New York City Plumbing Code.

1.04 SUBMITTALS

- A. The following submittal data shall be furnished according to the Conditions of the Contract, Division 01, and Section 220000 and shall include, but not be limited to:
 - 1. Product cut sheets and schedule of sleeves and mechanical sleeve seals used for the project. The schedule shall include the material, diameter, length, number of links, location and service the sleeve and sleeve seal will be provided.
- B. Product Data: Submit manufacturer's literature, including general assembly.
- C. Manufacturer's Installation Instructions: Submit support details, installation instructions and connection requirements for each product and system that is installed.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 220000 shall apply to all work specified herein.
- B. All materials and equipment shall be fabricated by companies, whose primary business expertise is the manufacturing of commercial and industrial products of the type specified herein. The manufacturer shall have been in continuous operation in the manufacture of the products specified for a minimum of ten (10) years.
- C. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- D. Make every effort to furnish all materials of any type from one manufacturer.

- E. Furnish all equipment, materials and accessories new and free from defects.

1.06 FACTORY TESTING

- A. All mechanical sleeve seals shall be fully assembled, and factory tested for full functionality at the manufacturer's factory prior to shipment.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Division 01 and Section 220000.
- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer's installation instructions.
- C. Protect all components from physical damage, including effects of weather, water, and construction debris.

1.08 COORDINATION

- A. Coordinate the installation of work in this section with the following:
 - 1. Division 03 - Concrete
 - 2. Division 04 - Masonry

1.09 UNIT PRICES

- A. The Contractor shall state in the proposal, unit prices in accordance with the following schedule and the requirements of Section 220000.
 - 1. Sleeves \$ _____/each
 - 2. Mechanical Sleeve Seals \$ _____/each

1.10 WARRANTY

- A. Comply with the requirements of Division 01 and Section 220000.
- B. Warranty period shall commence upon final acceptance by the Owner.
- C. Furnish a one (1) year manufacturer's warranty for each mechanical sleeve seal and access door.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Being listed herein as an acceptable manufacturer does not permit the manufacturer to provide standard manufactured equipment that does not comply

with the performance and/or physical characteristic requirements of the Contract Documents.

- B. All substitutions must be identified in the Base Bid as a voluntary Deduct Alternate and must be accompanied by a Letter of Equivalency certifying the product's equivalency in all performance and physical characteristics to the products listed herein. The proposed substitutions shall be inclusive of all cost and physical implications throughout the project. Under no circumstances should the substitution result in added cost to the project. Should the substitution be approved neither the project specifications nor the Contract Documents will be revised to reflect the substitution.
- C. Mechanical Sleeve Seals
 - 1. Calpico, Inc.
 - 2. Metraflex Co.
 - 3. Pipeline Seal & Insulator Inc. (Link-Seal).
- D. Sleeves
 - 1. Calpico, Inc.
 - 2. Metraflex Co.
 - 3. Pipeline Seal & Insulator Inc. (Link-Seal).

2.02 GENERAL REQUIREMENTS

- A. All materials and equipment shall be new, in good condition and free from defect. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- B. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein are the minimum standards acceptable. The Engineer retains the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require the specified materials and equipment which conform to the requirements of the Contract Documents be furnished.
- C. Materials and equipment, which are found to have factory defects shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Contractor shall be responsible for all costs associated with testing, replacement or repair, including but not limited to, all

replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, re-commissioning of the equipment, etc.

2.03 SLEEVES

- A. Furnish sleeves for all pipes passing through floors, walls and concrete, or concrete fireproofed beams.
- B. Sleeves in concrete beams, through concrete walls, and exposed pipes penetrating floors: Schedule 40 steel pipe.
- C. Provide sleeves in foundation walls and in concrete pits with anchor flange.
- D. Sleeves within furred-out enclosures in floors, through partitions, steel beams and walls: 18 gauge (1.2 mm) thick galvanized steel.
- E. Sleeves shall be sized to provide a minimum 1 inch annular space but not greater than 2 inches between the inside wall of the sleeve and the exterior wall of the piping around the full perimeter of the pipe.

2.04 MECHANICAL SLEEVE SEALS

- A. Provide modular, mechanical type sleeve seals for all piping passing through waterproof concrete foundation walls, pit walls and similar construction, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between the pipe and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.
- B. Where mechanical sleeve seals are required but cannot be provided due to space limitations, caulk the annular space with lead and oakum or non-shrink flexible waterproofed caulking or sealant.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and returned to the manufacturer for replacement.

3.02 INSTALLATION

- A. Installation shall be in accordance with the specification section pertaining to the individual equipment.
- B. The arrangement, positions and connections of pipes, fixtures, drains, valves, and the like, indicated on the drawings shall be followed as closely as possible, but the

right is reserved by the Architect to change locations and elevations to accommodate conditions which may arise during the progress of the work, prior to installation, without additional compensation for such changes. The responsibility for accurately laying out the work and coordinating the installation with other trades rests with this Contractor. Should it be found that any work is laid out so that interferences will occur, report that to the Architect before commencing work.

- C. Carry fixture connections, concealed in building construction, to points above floor, break out close to the underside or adjacent to fixture and continue exposed to fixture.
- D. Sleeves
 - 1. Set sleeves in position in forms. Provide reinforcing around sleeves.
 - 2. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
 - 3. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves tight.
 - 4. Where piping penetrates floor, ceiling or wall, close off space between pipe and adjacent work with firestopping and caulk airtight. Provide close-fitting metal collar or escutcheon covers at both sides of penetration.
 - 5. Sleeves passing through fire-rated floors or walls shall be sealed with an intumescent formulation similar to Metraflex Metraseal 120 FireSeal or as approved.
 - 6. Sleeves passing through foundation walls or pit walls shall be sealed utilizing a mechanical seal similar to Link-Seal or approved.
 - 7. Set sleeves as construction progresses and secure in place during pouring of concrete.
 - 8. Fire stopping shall be installed as specified under Section 078400.
- E. Mechanical Sleeve Seals
 - 1. Mechanical sleeve seal installation shall be in accordance with the manufacturer's recommendations and as indicated on the drawings.
 - 2. Install mechanical sleeve seals at all exterior watertight entries, foundation walls and pit walls.

3.03 CLEANING

- A. Before final connections are made and before operation of equipment and piping, thoroughly blow out, rod out, or wash out all piping at least twice, in a manner as directed and/or approved by the Architect, to remove all accumulation of dirt, chips or other deleterious material. Make all temporary connections and furnish all appliances required for the purpose of cleaning at no extra expense to the Owner.
- B. Clean up all equipment and leave in condition for finish painting before acceptance.

END OF SECTION 22 05 17

SECTION 22 05 23 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide all valves required for equipment as indicated on and in accordance with the requirements of the Contract Documents.
- B. Section includes:
 - 1. Backflow preventer and vacuum breakers.
 - 2. Ball valves.
 - 3. Check valves.
 - 4. Circuit balancing valves.
 - 5. Globe valves.
 - 6. Plug valves.
 - 7. Valve schedule.

1.02 RELATED SECTIONS

- A. Refer to Divisions 01, 21, 23, 26, and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.
- B. The following specification sections apply to all work herein:
 - 1. Section 22 00 00 - General Requirements for Plumbing
 - Section 22 05 00 - Common Work Results for Plumbing
 - 2. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
 - 3. Section 22 05 53 - Identification for Plumbing Piping and Equipment
 - 4. Section 22 07 00 - Plumbing Insulation
 - 5. Section 22 11 16 - Domestic Water Piping
 - 6. Section 22 13 16 - Sanitary Waste and Vent Piping
 - 7. Section 22 13 19 - Sanitary Waste Piping Specialties
 - 8. Section 22 14 13 - Facility Storm Drainage Piping
 - 9. Section 22 14 29 - Sump Pumps
 - 10. Section 22 42 00 - Commercial Plumbing Fixtures

1.03 REFERENCES

- A. Each valve and all components shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:
1. Codes: Perform all work in accordance with the latest applicable codes and standards for New York City.
 - a. New York City Building Code.
 - b. New York City Plumbing Code.
 2. Reference Standards: Perform all work in accordance with, but not limited to, the following standards:
 - a. American Society of Mechanical Engineers (ASME)
 - 1) ASME/ANSI B16.5: Pipe Flanges and Fittings.
 - 2) ASME B16.34: Valves Flanged Threaded and Welding End.
 - 3) ASME PTC 25: Pressure Relief Devices.
 - b. American Water Works Association (AWWA)
 - 1) AWWA C500: Standard for Metal Seated Gate Valves for Water Supply Service.
 - 2) AWWA C508: Standard for Swing Check Valves for Waterworks Service.
 - 3) AWWA C510: Standard for Double Check Valve Backflow Prevention Assembly.
 - 4) AWWA C511: Standard for Reduced Pressure Principle Backflow Prevention Assembly.
 - c. ASTM Society for Testing and Materials (ASTM)
 - 1) ASTM F1508: Standard Specification for Angle Style, Pressure Relief Valves for Steam, Gas and Liquid.
 - d. Manufacturers Standardization Society (MSS)

- 1) MSS SP-6: Standard Finishes for Contact Faces of Pipe Flanges and Connecting-end Flanges of Valves and Fittings.
 - 2) MSS SP-25: Standard Marking System for Valves, Fittings, Flanges and Unions.
 - 3) MSS SP-53: Quality Standard for Steel Castings and Forgings for Valves, Flanges and Fittings and Other Piping Components.
 - 4) MSS SP-55: Quality Standard for Steel Castings for Valves, Flanges and Fittings and Other Piping Components.
 - 5) MSS SP-61: Pressure Testing Steel of Valves.
 - 6) MSS SP-71: Cast Iron Swing Check Valves, Flanged and Threaded Ends.
 - 7) MSS SP-72: Ball Valves with Flanged or Butt-welding Ends for General Service.
 - 8) MSS SP-78: Cast Iron Plug Valves, Flanged and Threaded Ends.
 - 9) MSS SP-80: Bronze Gate, Globe, Angle and Check Valves.
 - 10) MSS SP-82: Valve Pressure Testing Methods.
 - 11) MSS SP-85: Cast Iron Globe and Angle Valves, Flanged and Threaded Ends.
 - 12) MSS SP-110: Ball Valves - Threaded, Socket-welding, Solder Joint, Grooved and Flared Ends.
- e. National Sanitation Foundation International (NSF)
- 1) NSF/ANSI Standard 61: Drinking Water System Components.
- f. United States Environmental Protection Agency (USEPA)
- 1) Safe Drinking Water Act (SDWA).

- 2) Reduction of Lead in Drinking Water Act (Federal Public Law 111-380).

1.04 SUBMITTALS

- A. The following submittal data shall be furnished according to the Conditions of the Contract, Division 01, and Section 22 00 00 and shall include, but not be limited to:
 1. Schedule of valves, complete with typical mill reports.
 2. Valves in the plumbing system for cold water, hot water, and other valves as specified herein.
- B. Product Data: Submit manufacturer's literature including general assembly, including but not limited to the following:
 1. Dimension and specification sheets.
 2. Model number.
 3. Pressure rating.
 4. Working pressure.
 5. List of materials.
 6. Manufacturer's installation instructions.
- C. Schedule of Valves: Submit a single well-organized schedule for all valves indicating the following:
 1. Valve type/model number.
 2. System type.
 3. Location/floor.
 4. Pressure rating.
 5. Pipe size.
 6. Connection method.
- D. Test Reports: Indicate procedures and results for specified factory and field acceptance testing and inspections.

- E. Manufacturer's Installation Instructions: Submit support details, installation instructions, connection requirements, for the system.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 22 00 00 shall apply to all work specified herein.
- B. All products and equipment specified herein shall be fabricated by companies whose primary business expertise is the manufacturing of commercial and industrial products and equipment with a minimum of ten (10) years documented experience.
- C. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- D. Make every effort to furnish all equipment of any equipment type from one manufacturer.
- E. Furnish all equipment, materials and accessories new and free from defects.

1.06 FACTORY TESTING

- A. All valves shall be fully assembled and factory tested for full functionality at the manufacturer's factory prior to shipment as specified herein:
 - 1. The valve manufacturer shall provide documentation that all valves have been factory tested and performs to the performance and pressure ratings specified.
 - 2. All valves shall be factory tested in accordance with the latest applicable standards.
 - 3. All valves provided by this Contractor for use by Division 21 shall be FM Approved, UL Listed and approved for use in fire suppression systems.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer's rigging and installation instructions.

- C. Protect all components from physical damage, including effects of weather, water and construction debris.
- D. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, grooves and weld ends.
 - 3. Set angle, gate and globe valves closed to prevent rattling.
 - 4. Set ball valves open to minimize exposure of functional surfaces.
 - 5. Set butterfly valves closed or slightly open.
 - 6. Block check valves in either closed or open position.
- E. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
 - 3. Use sling to handle large valves and rig sling to avoid damage to exposed valve parts. Do not use handwheels or stems as lifting or rigging points.

1.08 WARRANTY

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Furnish a five (5) year manufacturer's warranty for all manual valves and relief valves.
- C. Warranty period shall commence upon final acceptance by the Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Being listed herein as an acceptable manufacturer does not permit the manufacturer to provide standard manufactured equipment that does not comply with the performance and/or physical characteristic requirements of the Contract Documents.

- B. All substitutions must be identified in the Base Bid as a voluntary Deduct Alternate and must be accompanied by a Letter of Equivalency certifying the product's equivalency in all performance and physical characteristics to the products listed herein. The proposed substitutions shall be inclusive of all cost and physical implications throughout the project. Under no circumstances should the substitution result in added cost to the project. Should the substitution be approved neither the project specifications nor the Contract Documents will be revised to reflect the substitution.

- C. Ball Valves
 - 1. Apollo.
 - 2. Crane.
 - 3. Hammond.
 - 4. Jamesbury.
 - 5. Milwaukee.
 - 6. NIBCO.
 - 7. Stockham.
 - 8. Watts.

- D. Check Valves
 - 1. Crane.
 - 2. Hammond (I.B. Series only).
 - 3. Flomatic Corporation.
 - 4. Kennedy.
 - 5. Mueller Steam Specialty.
 - 6. Nibco.
 - 7. Val-Matic Valve & Manufacturing Corp.
 - 8. Walworth.

- E. Circuit Balancing Valves
 - 1. Armstrong.
 - 2. Bell & Gossett.
 - 3. Nibco.

2.02 GENERAL REQUIREMENTS

- A. All materials and equipment shall be new, in good condition and free from defect. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.

- B. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein are the minimum standards acceptable. The Engineer retains the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require the specified materials and equipment which conform to the requirements of the Contract Documents be furnished.
- C. Materials and equipment which are found to have factory defects shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Contractor shall be responsible for all costs associated with testing, replacement or repair, including but not limited to, all replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, re-commissioning of the equipment, etc.
- D. Shut-off valves, isolation valves, and check valves shall be provided as indicated on the Construction Documents or as required by the Authorities Having Jurisdiction on the drawings, required or directed.
- E. Valve pressure ratings shall not be less than indicated and as required for system pressures.
- F. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.
- G. Valves used in potable water systems and valves supplying water for potable use shall be compliant with the Reduction of Lead in Drinking Water Act (Federal Public Law 111-380) limiting the lead content of the wetted surfaces to a weighted average of 0.25% or less.
- H. Valves bodies shall be identified as lead-free by a symbol or letters "LF" casted into the body. Valve handles shall be distinctively identified by white handles with blue graphics.
- I. The use of NRS gate valves and butterfly valves shall be limited to shutoff services only and only where specifically permitted by the Engineer.
- J. Unless otherwise noted, all valves for shutoff and bypass service shall be ball valves, 3 in. (75 mm) and below, and gate or butterfly valves, 4 in. (100 mm) and above.
- K. All end connections shall be the same as are used for fittings for 3 in. (75 mm) and below. 4 in. (100 mm) and above, valves shall be flanged.

- L. Valve-End Connections
 - 1. Flanges on iron valves shall meet ASME B16.1.
 - 2. Flanges on steel valves shall meet ASME B16.5.
 - 3. Flanges on bronze and/or brass valves shall meet ASME B16.24.
 - 4. {Threaded ends shall meet ASME B1.20.1.
 - 5. Soldered lines double union ends with solder joints ASME B16.18.

- M. Valve Operators
 - 1. Provide lever handles on quarter-turn valves, (except plug valves) 4 in. (100 mm) and smaller.
 - 2. Handwheels shall be provided on valves other than quarter-turn types.
 - 3. Provide wrenches for plug valves 4 in. (100 mm) and smaller. Furnish one (1) wrench for every five (5) plug valves for each size plug-valve head.

- N. Valves in insulated piping shall be provide with 2 in. (50 mm) stem extensions having the following features:
 - 1. Extended operating handle of non-thermal-conductive material.
 - 2. Extended differential measuring ports.
 - 3. Protective sleeve that allow operation of valve and access to the measuring ports without breaking the vapor seal or disturbing insulation.
 - 4. Memory stops that are fully adjustable after insulation is applied.

2.03 BALL VALVES

- A. Ball valves shall be all brass or bronze construction with replaceable Teflon seat ring, two-piece union or three-piece bolted design as scheduled herein.
- B. Threaded valves used in brazed or soldered piping systems shall be fitted with adapters. When brazing, three-piece design shall be used and reinforced Teflon seats must be removed prior to brazing.
- C. Ball valves shall be two-piece type with adjustable stem packing using a threaded packing nut. Valves shall provide positive shutoff.

- D. Drain Valves (at Riser Heels and Low Points): Ball valves to be used as drain valves at all low points in water piping. Provide a 3/4 in. (19 mm) ball valve with male threaded nipple for hose connection with 3/4 in. (19 mm) hose cap to protect hose threads and chain Apollo 70LF-HC Series Nibco Model No. S-585-80-LF.
- E. Bronze ball valves shall be constructed as follows:

Body	Brass or bronze
Body Style	Two-piece or three-piece full port
Trim	316 stainless steel ball and stem
Seat	Reinforced Teflon (RTFE)
Body P/T Rating	600 psig (41.7 bar) at 250°F (120°C) minimum
Seat P/T Rating	300 psig (20.7 bar) at 100°F (38°C) minimum
WOG Rating	300 psig (20.7 bar) minimum

- F. Steel ball valves shall be constructed as follows:

Body	Cast steel
Body Style	Two-piece full port
Trim	316 stainless steel ball and stem
Seat	Reinforced Teflon (RTFE)
Body P/T Rating	600 psig (41.7 bar) at 250°F (120°C) minimum
Seat P/T Rating	300 psig (20.7 bar) at 100°F (38°C) minimum
WOG Rating	{300 (20.7 bar)} {400 (27.6 bar)} psig minimum

2.04 CHECK VALVES

- A. Provide check valves as required to prevent the reversal of water, air or gas flow in the plumbing systems as identified on the Construction Documents and required by the Authority Having Jurisdiction.
- B. Provide non-slam swing or spring-loaded center-guided check valves for the pump discharges of all water pumps, except pumps used in circulating systems.
- C. Provide swing check valves on circulating pump discharges.
- D. Provide ball check or swing check valves on the cold and hot water supplies to all lavatory and pantry faucets, shower valves and mixing valves where the backflow of hot or cold water can migrate across the supplies to the fixture.
- E. Provide non-slam lever weighted check valves or ball check valves on all sump and ejector discharges.

- F. Check valves shall be threaded, flanged or grooved ends suitable for the system, which it is being installed.
- G. Check valves shall be a horizontal swing check with renewable bronze seat and disc.
- H. Valve must be factory tested and certified to seat bubble tight.
- I. Spring loaded check valves shall be center guided globe type constructed as follows:

Body	Carbon steel/ductile iron
Body Style	Lug type/flanged
Trim	316 stainless steel
Spring	Stainless steel
Body P/T Rating Class 150	285 psig (19.6 bar) at 100°F (38°C) minimum
Body P/T Rating Class 300	740 psig (51 bar) at 100°F (38°C) minimum

Bronze swing check valves shall be constructed as follows:

Body	Bronze
Body Style	Y pattern horizontal flow
Disc	Bronze
Ends	Threaded or solder end
Body P/T Rating	600 psig (41.7 bar) at 250°F (120°C) minimum
Seat P/T Rating	300 psig (20.7 bar) at 100°F (38°C) minimum
WOG Rating	{400 (27.6 bar)} {600 (41.7 bar)} psig minimum

Class 150 cast steel swing check valves shall be constructed as follows:

Body	Carbon steel
Body Style	Bolted cover
Disc	Stainless steel
Seat	Steel/stellite facing
Trim	Carbon steel
Ends	Flanged
Body P/T Rating	ASME B 16.34
WOG Rating	150 psig (17 bar) minimum

Class 300 cast steel swing check valves shall be constructed as follows:

Body	Carbon steel
Body Style	Bolted cover
Disc	Stainless steel

Seat	Steel/stellite facing
Trim	Carbon steel
Ends	Flanged
Body P/T Rating	ASME B 16.34
WOG Rating	300 psig (20.7 bar) minimum

Class 600 cast steel swing check valves shall be constructed as follows:

Body	Carbon steel
Body Style	Bolted cover
Disc	Stainless steel
Seat	Steel/stellite facing
Trim	Carbon steel
Ends	Flanged
Body P/T Rating	ASME B 16.34
WOG Rating	600 psig (41.4 bar) minimum

2.05 CIRCUIT BALANCING VALVES

- A. Circuit balancing stations shall be provided on all hot water circulation risers, loops and circulating water systems as identified on the Construction Documents. Balancing stations shall consist of shut off valves, check valve and circuit balancing valve with metering port extensions as specified herein.
- B. Circuit balancing valves shall be used for flow balancing, measurement, and shutoff 1/2 in. (12.5 mm) to 3 in. (75 mm) with a flow range starting at 0.5 gpm minimum.
- C. Provide valves suitable for water temperatures to 180°F (82.2°C).
- D. Provide valves with integral metering test ports for connecting a portable differential pressure meter. Each meter connection shall have pressure/temperature readout points. Each valve shall have two (2) 1/4 in. (6.25 mm) NPT metering ports with integral check valves and gasketed caps located on both sides of valve seat.
- E. Valves are to be of the globe style and provide multi-turn, 3600 adjustment with a micrometer type indicator located on valve handwheel. Valve handwheel shall have hidden memory stop feature that shall provide a means for locking the valve position after the system is balanced. Quarter turn valves are not acceptable.
- F. Balancing valves 1/2 in. (12.5 mm) through 2 in. (50 mm) shall have valve body and stem that is dezincification resistant bronze or brass alloy with high strength resin handwheel and sleeve. Valves shall have minimum of four (4) full 360

degree handwheel turns and have $\pm 5\%$ accuracy scale from 25% open to 100% full open. Circuit balancing valves shall be Bell & Gossett Circuit Setter Plus CB-1SLF.

- G. Circuit balancing valves shall be installed at least five (5) pipe diameters downstream from any fitting and pumps. Two (2) pipe diameters downstream from the valve should be free of any fittings. When installed, easy and unobstructed access to the valve handwheel and metering ports for adjustment and measurement are to be provided. Mounting of valve in piping must prevent sediment build-up in metering ports.
- H. Provide a differential pressure test kit to be furnished to the owner. Test kit shall include standard tubing kit, tubing manifold, bypass flushing valve, isolation valves, pressure probes in a plastic carrying case for ease of storage at facility. Test kit shall be similar to Bell & Gossett Circuit Setter Plus Kit.

2.06 HOSE BIBBS AND HYDRANTS

- A. Hose Bibbs
 - 1. All interior single hose bibbs for use on hot and cold water service shall be Woodford Mfg. Model No. 24 with vacuum breaker and 3/4 in. (19 mm) hose end faucets with male pipe thread for connection to exposed piping or female threaded flanged connection for piping concealed in wall construction.
 - 2. For all locations requiring a freezeless single hose bibb for use on hot and cold water service, shall be Woodford Mfg. Model No. 16 freezeless wall faucet with vacuum breaker and 3/4 in. (19 mm) hose end faucets with male pipe thread for connection to exposed piping or female threaded flanged connection for piping concealed in wall construction.
- B. Non-Freeze Ground Hydrants: Freezeless ground hydrants shall be Woodford Mfg. "Anti-Siphon Freezeless Yard Hydrants" Model No. Y95, or as approved, cast brass, antisiphon, freezeless yard hydrant with Model 50H backflow preventer and tamper proof hinged door lock.
- C. Roof Hydrants: Freezeless roof hydrants shall be Woodford Mfg. "Freezeless Roof Hydrant" Model No. RHY2, or as approved, cast brass, automatic draining with integral backflow preventer, 3/4 in. (19 mm) hose connection, well seal and EPDM boot to cover well seal. Provide a 2 degree shim for installation on pitched roofs as needed.
- D. Wall Hydrants: Freezeless wall hydrants shall be Woodford Mfg. "Automatic Draining Freezeless Wall Faucet" Model No. 65, or as approved, cast brass,

antisiphon, nonfreeze wall hydrants with bronze sleeve, within custom enclosure as detailed by the Architect for the exterior Ground Floor locations shown on the drawings.

2.07 VALVE SCHEDULE

A. Provide valves for the plumbing systems as specified herein and in accordance with the schedule below.

Service	Size	Fig. #	Type	Material	
Hot and Cold Water	1/4 in. to 3 in.	Apollo 102TLF	NRS Gate, Threaded	Bronze B-62	
	1/4 in. to 3 in.	Apollo 102SLF	NRS Gate, Soldered	Bronze B-62	
	1/4 in. to 2 in.	Apollo 77CLF- 140 Series	Full Port Ball 2-Piece Style, Threaded	Bronze B-584	
	1/4 in. to 2 in.	Apollo 77CLF- 240 Series	Full Port Ball 2-Piece Style, Soldered	Bronze B-584	
	1-1/2 in. to 3 in.	Apollo 82LF- 140 Series	Full Port Ball 3 Piece Style, Threaded	Bronze B-584	
	1-1/2 in. to 3 in.	Apollo 82LF- 240	Full Port Ball 3 Piece Style, Soldered	Bronze B-584	
	1/2 in. to 3 in.	Apollo 161TLF	Swing Check, Threaded	Bronze, Bronze Disc	
	1/2 in. to 3 in.	Apollo 161SLF	Swing Check, Soldered	Bronze, Bronze Disc	
Sanitary and Storm Drainage	2 in. - 12 in.	Stockham G-931LW	Swing Check with Lever and Weight	IBBM	
Drain Valves	At system low points	Apollo 77LF- 140-HC	Ball with hose cap and chain	Bronze 584	

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and replaced by the manufacturer.

3.02 INSTALLATION

- A. Install shutoff valves, isolation valves and/or balancing at connections to each piece of equipment, arranged and installed with unions or flanges to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe in a position that allows full stem movement. Butterfly valves may be installed with stem horizontal to allow support for the disc and the cleaning action of the disc.
- D. All water piping connections to equipment shall include all necessary isolation valves, air vent valves, drain connections, balancing valves and the automatic valves arranged as detailed on the drawings.
- E. All valve installations shall be in accordance with the manufacturer's recommendations and the Authorities Having Jurisdiction.
- F. Valves in finished portions of the building, except in mechanical equipment rooms, or where otherwise indicated on the Drawings shall be concealed and provided with access doors.
- G. All piping shall be carefully graded so as to eliminate traps and pockets. Where water traps cannot be avoided, provide drain valves.
- H. All valves throughout the building shall be thoroughly and substantially supported with approved hangers and support devices.
- I. All valves shall be installed according to the Local Authority rules and an inspection certificate furnished.
- J. Install check valves for proper direction of flow and as follows:
 - 1. Swing Check Valves: In horizontal position with hinge pin level.
 - 2. Balanced Check Valves (center-guided): In horizontal or vertical position, with stem upright and plumb.

3.03 CLEANING

- A. Before final connections are made and before operation of all valves, clean and remove all accumulation of dirt, chips or other deleterious material. Leave all valves in condition suitable for finish painting, before final acceptance.

3.04 INSPECTION AND STARTUP SERVICE

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that material composition is suitable for service, and that it is free from defects and damage.

3.05 FIELD TESTS

- A. Integrated Test
 - 1. Verify that all valves have been properly lubricated and left ready for operation.
 - 2. All alarms (BMS, fire alarms, etc.) shall be tested to fulfill satisfactory operating conditions. Verify proper operation of electrical safety interlocks and limit switches.

3.06 ADJUSTING AND BALANCING

- A. Furnish and pay for all devices, materials, supplies, labor and power required in connection with tests. Make all tests in the presence and to the satisfaction of the Architect, Insurance Underwriters and City Inspectors Having Jurisdiction.
- B. Repair, or if required by the Architect replace, defective work with new work without extra charge to the Owner. Repeat tests as directed, until all work is proven satisfactory.
- C. Restore to its original condition any work damaged or disturbed by tests, engaging the original trades to do the work of restoration.

- D. Notify the Architect and Inspectors Having Jurisdiction at least 48 hours in advance of making the required tests, so that arrangements may be made for their presence to witness the tests.
- E. The building fire alarm system devices shall be properly adjusted and left in good working condition.
- F. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.
- G. Where required, adjust pressure setting of all relief valves and pressure-reducing valves as necessary prior to being put into service.
- H. Adjust valve stops to ensure positive shutoff.
- I. The Owner and/or the Owner's representatives will make final check of all systems only after the Contractor has completed and returned to the Owner or Owner's representatives all recorded test data, together with letter that his work is to the best of his knowledge 100% complete. Field performance tests will be required by the Owner and/or the Owner's representatives at this time to verify performance and workmanship, and to make final system component adjustments.
- J. After satisfactory passing of the field tests and after all necessary adjustments have been made, test the complete systems for a minimum of seven (7) days under regular operating conditions or as long as may be required to establish compliance with Contract Documents.

END OF SECTION 22 05 23

**SECTION 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING
PIPING AND EQUIPMENT**

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide all hangers, supports and anchors required for piping and equipment as indicated on and in accordance with the requirements of the Contract Documents.
- B. The Division 22 Subcontractor shall assume complete responsibility for the anchoring of the equipment, piping systems, specified hereinafter to the concrete foundation pads, to the concrete inertia bases, and to the supporting structural steel and concrete beams.
- C. Section includes:
 - 1. Pipe hangers and supports.
 - 2. Attachments to structure.
 - 3. Formed steel channel supports and accessories.
 - 4. Concrete pads for equipment.

1.02 RELATED SECTIONS

- A. Refer to Divisions 01, 21, 23, 26, and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.
- B. The following specification sections apply to all work herein:
 - 1. Section 22 00 00 - General Requirements for Plumbing
 - Section 22 05 00 - Common Work Results for Plumbing
 - 2. Section 22 07 00 - Plumbing Insulation
 - 3. Section 22 11 16 - Domestic Water Piping
 - 4. Section 22 13 16 - Sanitary Waste and Vent Piping
 - 5. Section 22 13 19 - Sanitary Waste Piping Specialties
 - 6. Section 22 14 13 - Facility Storm Drainage Piping

- 7. Section 22 14 26 - Facility Storm Drains
- 8. Section 22 14 29 - Sump Pumps

1.03 REFERENCES

- A. All hangers and supports, including all components shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:
 - 1. Codes: Perform all work in accordance with the latest applicable codes and standards for New York City.
 - a. New York City Building Code.
 - b. New York City Plumbing Code.
 - 2. Reference Standards: Perform all work in accordance with, but not limited to, the following standards:
 - a. American Society of Mechanical Engineers
 - 1) ASME B31.1: Power Piping.
 - 2) ASME B31.9: Building Services Piping.
 - b. ASTM International
 - 1) ASTM A 36: Standard Specification for Carbon Structural Steel.
 - 2) ASTM A 47: Standard Specification for Ferritic Malleable Iron Castings.
 - 3) ASTM A 48: Standard Specification for Gray Iron Castings.
 - 4) ASTM A 123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 5) ASTM A 240: Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - 6) ASTM A 283: Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

- 7) ASTM A 536: Standard Specification for Ductile Iron Castings.
 - 8) ASTM A 575: Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades.
 - 9) ASTM A 668: Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use.
 - 10) ASTM A 1011: Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 - 11) ASTM B 633: Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
 - 12) ASTM E 84: Test Method for Surface Burning Characteristics of Building Materials.
 - 13) ASTM E 119: Method for Fire Tests of Building Construction and Materials.
 - 14) ASTM E 814: Test Method of Fire Tests of Through Penetration Firestops.
 - 15) ASTM F 708: Standard Practice for Design and Installation of Rigid Pipe Hangers.
- c. American Welding Society
- 1) AWS D1.1: Structural Welding Code - Steel.
- d. FM Global
- 1) FM - Approval Guide, A Guide to Equipment, Materials & Services Approved by Factory Mutual Research for Property Conservation.
- e. Manufacturers Standardization Society of the Valve and Fittings Industry
- 1) MSS SP 58: Pipe Hangers and Supports - Materials, Design and Manufacturer.

- 2) MSS SP 77: Guidelines for Pipe Support Contractual Relationships.
- 3) MSS SP 89: Pipe Hangers and Supports - Fabrication and Installation Practices.
- 4) MSS SP 90: Guidelines on Terminology for Pipe Hangers and Supports.

1.04 SUBMITTALS

- A. The following submittal data shall be furnished according to the Conditions of the Contract, Division 01, and Section 22 00 00 and shall include, but not be limited to:
 1. Provide shop drawings indicating system layout with location showing critical dimensions, sizes, pipe hanger and support locations and detail of trapeze hangers.
 2. Method of attachment to and load imposed on building structures by hangers, anchors, supports, guides and supplemental steel shall be submitted for review and approved by the project Architect and Structural Engineer.
 3. Shop drawings indicating support methods, point loadings to the building structure and hanger locations shall be submitted for review sufficiently in advance of concrete pouring schedules to permit evaluation, critique and any necessary changes to hanging and support methods.
- B. Product Data: Submit manufacturer's literature including general assembly,
 1. Hangers and Supports: Submit manufacturer's catalog data including load capacity and sizing schedules specific to this project.
 2. Inserts: Submit manufacturer's catalog data including load capacity.
- C. Design Data: Indicate load-carrying capacity of trapeze, multiple pipe, and riser support hangers. Indicate calculations used to determine load-carrying capacity of trapeze, multiple pipe, and riser support hangers. Submit sizing methods and calculations sealed by a Professional Engineer licensed in *State of New York*
- D. Test Reports: Indicate procedures and results for specified factory and field acceptance testing and inspections.
- E. Manufacturer's Installation Instructions: Submit support details, installation instructions, connection requirements, for the system.

1. Hangers and Supports: Submit special procedures and assembly of components.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 22 00 00 shall apply to all work specified herein.
- B. All products and equipment specified herein shall be fabricated by companies whose primary business expertise is the manufacturing of commercial and industrial products and equipment with a minimum of ten (10) years documented experience.
- C. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- D. Make every effort to furnish all equipment of any equipment type from one manufacturer.
- E. Furnish all equipment, materials and accessories new and free from defects.

1.06 FACTORY TESTING

- A. All hangers, rods, supports and accessories shall be fully assembled and factory tested for full functionality at the manufacturer's factory prior to shipment.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer's rigging and installation instructions.
- C. Protect all components from physical damage, including effects of weather, water, and construction debris.

1.08 COORDINATION

- A. Coordinate with other trades to use common means of support. Submit for approval all pertinent design data relating to the support as well as verification of the responsibility for the support.

1.09 UNIT PRICES

- A. Reserved.

1.10 WARRANTY

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Furnish a five (5) year manufacturer's warranty for all pipe hangers and supports.
- C. Warranty period shall commence upon final acceptance by the Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Being listed herein as an acceptable manufacturer does not permit the manufacturer to provide standard manufactured equipment that does not comply with the performance and/or physical characteristic requirements of the Contract Documents.
- B. All substitutions must be identified in the Base Bid as a voluntary Deduct Alternate and must be accompanied by a Letter of Equivalency certifying the product's equivalency in all performance and physical characteristics to the products listed herein. The proposed substitutions shall be inclusive of all cost and physical implications throughout the project. Under no circumstances should the substitution result in added cost to the project. Should the substitution be approved neither the project specifications nor the Contract Documents will be revised to reflect the substitution.
- C. Anchors and Inserts (Undercut Wedge Type)
 - 1. Hilti.
 - 2. MKT Fastening, LLC.
 - 3. Simpson StrongTie.
- D. Formed Steel Channel Supports
 - 1. Anvil International.
 - 2. Cooper B-Line.
 - 3. Carpenter & Patterson.

4. Empire Industries, Inc.
 5. Erico - Caddy.
 6. Hilti.
 7. National Pipe Hanger Corporation.
 8. PHS Industries, Inc.
 9. Piping Technology and Products.
 10. Thomas & Betts - Kindorf.
 11. Tolco Inc.
- E. Pipe Hangers, Supports and Guides
1. Anvil International.
 2. Cooper - B-Line.
 3. Carpenter & Patterson.
 4. Empire Industries, Inc.
 5. Erico - Caddy.
 6. Hilti.
 7. National Pipe Hanger Corporation.
 8. PHS Industries, Inc.
 9. Piping Technology and Products.
 10. Thomas & Betts - Kindorf.
 11. Tolco Inc.
 12. Witch Co.

2.02 GENERAL REQUIREMENTS

- A. All materials and equipment shall be new, in good condition and free from defect. The commercially standard items of equipment and the specific names mentioned

herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.

- B. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein are the minimum standards acceptable. The Engineer retains the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require the specified materials and equipment which conform to the requirements of the Contract Documents be furnished.
- C. Materials and equipment which are found to have factory defects shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Contractor shall be responsible for all costs associated with testing, replacement or repair, including but not limited to, all replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, re-commissioning of the equipment, etc.

2.03 PIPE HANGERS AND SUPPORTS

- A. Provide suitable and substantial hangers and supports for all piping and equipment. Hangers and supports shall be of the type, size and spacing specified or as required by the Authority Having Jurisdiction.
- B. Comply with maximum load ratings with consideration for allowable stresses prescribed by ASME B31.1 or MSS SP-58.
- C. Pipe hangers, anchors, supports and guides shall be manufactured, selected, fabricated and installed in accordance with MSS SP-58, MSS SP-69 and MSS SP-89.
- D. Provide supports, guides and anchors that do not transmit unacceptable vibration to building structure.
- E. The support systems shall provide for, and control, the free or intended movement of the piping, including its movement in relation to that of connected equipment.
- F. In addition to the short-term frame shortening anticipated during the initial construction period, all systems shall be installed with provisions to accommodate long-term frame shortening equivalent to 1/16 in. (1.6 mm) per foot in addition to any expansion and/or contraction of the systems as a result of thermal changes.
- G. Provide for vertical adjustments after installation of supported material and during commissioning, where feasible, to ensure pipe is at design elevation and slope.

- H. Select hangers and supports to perform under all conditions of operation, allowing free expansion and contraction, and to prevent excessive stresses being introduced into piping system and connected equipment.
- I. Anchorage shall be provided to restrain drainage piping from axial movement. Piping sizes greater than 4 in. (100 mm), restraints shall be provided for drain pipes at all changes in direction and at all changes in diameter greater than two (2) pipe sizes. Braces, blocks, rodding and other suitable methods as specified by the coupling manufacturer shall be utilized.
- J. Piping subject to shock loads, such as thrust or water hammer, shall include shock absorbing and sway suppressing devices of approved design and construction.
- K. Provide drawings indicating pipe loads, including method of suspension and hanger location, and submit them for approval prior to proceeding with installation. Provide all the supplementary steel required to support, guide and anchor piping within shafts, Mechanical Equipment Rooms and all the other floors.
- L. Particular care shall be taken to support all pipes in a manner approved by the Architect, including the providing of supplementary steel, if required.
- M. Where insulation is provided, protect the insulation, the length of the sleeve with a galvanized 20 gauge shield (360 deg.).
- N. Support vertical risers from the building construction by means of pipe clamps at every floor. Provide channels of approved sizes where pipe clamps are too short to connect to the building construction.
- O. Provide rigid support sway bracing for all horizontal piping 4 in. (100 mm) and larger and piping which is supported greater than 2 ft. (610 mm) from the slab above, measured from the top of the pipe.
- P. Provide additional support for all sanitary and storm house drain offsets consisting of riser clamps and threaded rod to anchor all fittings in the horizontal offset. This method of anchoring and support shall be provided in addition to the sway bracing described in the paragraph above.
- Q. Finishes
 - 1. Hangers and clamps for uninsulated copper pipes shall be coated with copper-colored epoxy paint and an additional PVC coating.
 - 2. Hangers, anchors, inserts, supports and guides (swivel ring, split ring, roller, wrought pipe clamp, or adjustable wrought clevis-type hangers,

roller supports, floor stands, wall brackets, etc.) installed within the building shall be hot dipped galvanized in accordance with ASTM A123 or stainless steel.

3. All hangers, supports, inserts, etc., utilized to support piping below the slab on grade or buried shall be stainless steel.
4. Strut channels installed indoors shall be pre-galvanized in accordance with ASTM A653 SS Grade 33 G90.
5. Hangers, anchors, supports, guides and strut located outdoors shall be hot dip galvanized after fabrication in accordance with ASTM A123 or stainless steel. All hanger hardware shall be hot-dip galvanized or stainless steel. Zinc-plated hardware shall not be acceptable for outdoor or corrosive use.

R. Hangers

1. Pipes 2 in. (50 mm) and smaller shall be supported with one of the following:
 - a. Adjustable steel swivel ring (band type) hanger.
 - b. Malleable iron split ring hanger.
 - c. Adjustable steel clevis hanger.
2. Pipes 2-1/2 in. (63.5 mm) and larger shall be supported with one of the following:
 - a. Adjustable steel swivel ring (band type) hanger.
 - b. Adjustable steel clevis hanger.
3. Insulated pipes shall be supported adjustable steel clevis hangers and pre-insulated sheet metal insulation shields.

S. Trapeze Hangers

1. Shall be constructed of one of the following:
 - a. 12 gauge roll-formed 1-5/8 in. (40 mm) by 1-5/8 in. (40 mm) minimum structural steel channel.
 - b. Two (2) structural steel channels secured together with 1/2 in. (12.5 mm) or 3/4 in. (20 mm) steel pipe sections.

2. Pipes shall be secured to trapeze by one of the following methods:
 - a. Uninsulated Pipe: 2-piece pipe straps with thermoplastic elastomeric liner sized for outside diameter of pipe.
 - b. Insulated Pipe: 2-piece pipe straps sized for outside diameter of pipe and insulation using insulation shields.
- T. Accessories
 1. Pipe protection saddles shall be formed from carbon steel, 1/8 in. (3 mm) minimum thickness, sized for insulation thickness.
 2. Preinsulated shields shall be 180 degree, 18 gauge minimum galvanized sheet metal, minimum 12 in. (305 mm) long, with high density water-repellant Kaylo insulation, foam glass or high-density polyisocyanurate inserts minimum thickness to match outside diameter of the insulated pipe.

2.04 ATTACHMENTS TO STRUCTURE

- A. All piping shall be carried by pipe hangers and supports attached to building structure. All supports and restraints requiring connections to steel-plated building construction shall be welded to steel plating.
- B. Method of attachment to and load imposed on building structures by hangers, anchors, supports, guides and supplemental steel shall be submitted for review.
- C. In no case shall hangers be supported by means of vertical expansion bolts.
- D. Powder and power-actuated devices, grip nails, and/or expansion nails shall NOT be permitted.
- E. Structural Steel Attachments
 1. Center-loaded beam clamps or welded beam attachments shall be used where piping is to be suspended from building steel. Clamp shall be forged steel or malleable iron with cross bolts sized as required to fit beams and selected on the basis of load configuration and load to be supported.
 2. Where allowed by Structural Engineer, C-clamps with locknuts, cup point set screws and retaining straps shall be used. Top flange C-clamps shall be used when attaching a hanger rod to the top flange of structural shapes. Set screw torque shall be in accordance with manufacturer's recommendation.

F. Concrete Inserts

1. Cast-in-place continuous or spot concrete inserts shall be used where applicable.
2. Continuous inserts shall be made of 12 gauge, ASTM A1011 SS Grade 33 structural quality carbon steel, complete with styrofoam inserts and end caps with nail holes for attachment to forms. The continuous concrete insert shall have a load rating of 2,000 lbs./ft. in concrete.
3. Spot inserts shall be constructed of one of the following:
 - a. Malleable iron or pressed steel having a space for rods of all sizes. All inserts for pipes 3 in. (75 mm) and larger in size shall be installed with a reinforcing rod 5/8 in. (16 mm) in diameter, run through a slot in the insert specifically provided for this purpose.
 - b. Internally threaded machined steel insert with large, flanged heads suitable for installation on wood forms and/or formed metal decking.

G. Mechanical Anchors (After Sets)

1. If any pipe has to be hung in space where no inserts have been provided, drill a hole from below through concrete slabs, and provide a rod and hanger attached to an approved fishplate.
2. Mechanical anchors of the undercut type may be used in stone concrete slabs only. The carrying capacity and size of each mechanical anchor shall be calculated on the basis of the spacing indicated in the hanger spacing table hereinbelow.
3. Undercut wedge anchors for pipes 6 in. (150 mm) and smaller shall be Hilti "HDA" Undercut Anchor or Simpson StrongTie Strong-Bolt. For pipes 8 in. (200 mm) and over, provide two (2) undercut or wedge-type anchors with the corresponding rods and hangers fastened to the slab as specified above with a 2 in. x 2 in. (50 mm x 50 mm) angle or uni-strut to support the piping. Anchors shall not be smaller than 3/8 in. (10 mm.)
4. The rods on all hangers shall be of adequate size to support the load, which they carry. The minimum size shall be 3/8 in. (10 mm.)

2.05 FORMED STEEL CHANNEL SUPPORTS AND ACCESSORIES

- A. Formed steel channel supports shall be capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.3 and shall comply with NFPA 13 requirements.
- B. Channel shall be made of minimum 12-gauge ASTM A570 Grade 33 steel electro galvanized after fabrication. Channel sections may be formed by single or factory welded multiple sections of any of the following:
 - 1. 1-5/8 in. (41.25 mm) x 1-5/8 in. (41.25 mm) channel.
 - 2. 2-7/16 in. (62 mm) x 1-5/8 in. (41.25 mm) channel.
 - 3. 3-1/4 in. (82.5 mm) x 1-5/8 in. (41.25 mm) channel.
- C. Grip/Lock nuts shall be made of 3/8 in. (10 mm) thick case hardened mild steel bars electro galvanized after fabrication.
- D. All angle brackets connectors and washers shall be made of 1/4 in. (6.35 mm) steel plate electro galvanized after fabrication.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and replaced by the manufacturer.

3.02 INSTALLATION

- A. Hanger, rods, supports and accessories shall be installed in accordance with the manufacturer's recommendations and the Authorities Having Jurisdiction.
- B. Furnish and install all necessary supports for equipment furnished under this section. To meet the varying conditions in each case, these supports shall consist of pipestands, steel angle or strap hangers, saddles, brackets, as required for a complete installation.
- C. All such supports shall have substantial flanges bolted to floor construction; hangers shall be supported from the framing as described hereinabove. Supports shall be properly located with reference to any supporting pads, legs of the equipment carried and must be distributed as not to bring any undue strains to the equipment.

- D. All hanger and support details shall be submitted for review and approval.
- E. Guarantee that the work, as installed under this section of the specifications, will not result in the transmission of objectionable noise or vibration to any occupied parts of the building, and take full responsibility for any necessary modifications of this equipment, or of the foundations and supports for the same, necessary to secure this result.
- F. Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom beam flanges.
- G. Proper care and ventilation should be given when welding galvanized components.
- H. Clamps on Riser Piping
 - 1. Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.
 - 2. Bolt tightening torques shall be to industry standards.
 - 3. Cast Iron Pipes: Install clamp below joint.
 - 4. Steel Pipes: Clamp is fitted preferably below coupling or welded pipe lug.
 - 5. Clamps on riser piping shall maintain the insulation and vapor barrier as piping passes through the support.
- I. Support from Structural Members: Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.
- J. Field welding of supports should be done by qualified welders using qualified welding procedures.
- K. Support cast iron bell and spigot and No-Hub pipe and fittings with a minimum of two (2) hangers per each length of pipe. The maximum hanger spacing shall be in accordance with the hanger spacing schedule herein below. Hangers shall be installed on each side of joint. Where an excessive number of fittings are installed between hangers, provide additional hangers, channel supports or reinforcing as required. Securely anchor fittings to the building construction at changes of direction to eliminate all horizontal movement.
- L. Horizontal piping shall be supported in accordance with the following schedules:

SINGLE ROD SUPPORT - STEEL AND CAST IRON PIPE		
Pipe Size	Maximum Hanger Spacing	Rod Size
1 to 2 inches (25 mm to 50 mm)	10 feet 0 inches (3,048 mm)	3/8 inch (10 mm)
2-1/2 and 3 inches (63 mm to 75 mm)	12 feet 0 inches (3,658 mm)	1/2 inch (12.5 mm)
4 to 5 inches (100 mm to 125 mm)	12 feet 0 inches (3,658 mm)	5/8 inch (16 mm)
6 to 10 inches (150 mm to 250 mm)	12 feet 0 inches (3,658 mm)	3/4 inch (20 mm)
DOUBLE ROD SUPPORT		
Pipe Size	Maximum Hanger Spacing	Rod Size
6 to 8 inches (150 mm to 200 mm)	12 feet 0 inches (3,658 mm)	1/2 inch (12.5 mm)
10 to 12 inches (250 mm to 300 mm)	12 feet 0 inches (3,658 mm)	5/8 inch (16 mm)

SINGLE ROD SUPPORT - COPPER PIPE		
Pipe Size	Maximum Hanger Spacing	Rod Size
1 to 1-1/4 inches (25 mm to 32 mm)	7 feet 0 inches (2,133 mm)	3/8 inch (10 mm)
1-1/2 to 3 inches (37 mm to 75 mm)	8 feet 0 inches (2,438 mm)	1/2 inch (12.5 mm)

- M. Maximum hanger spacing may not be exceeded; however, actual installed spacing will depend on location of structural framing and floor slab construction. Where building construction does not permit the above spacing, provide additional steel supports.
- N. Install lock nuts at the bottom of all hanger rods.
- O. Vertical pipe risers shall be supported independently of connected horizontal piping.
- P. Support vertical risers from the building construction by means of pipe clamps, Grinnell Model No. 261, at every story height; however, the maximum spacing of supports for vertical copper piping shall not exceed 10 ft. 0 in. (3,048 mm).

- Q. Where hangers cannot be supported from building framing, they may be supported from concrete inserts, subject to the approval of the Structural Engineer. Furnish, locate and set such inserts and make sure that such inserts are in place when the concrete is poured.
- R. Set all inserts for all pipes in ample time to allow the work of the other trades to be performed on scheduled time.
- S. Smaller pipes may be suspended from cross-pieces of pipe or steel angles, which, in turn, shall be hung from building concrete construction by means of rods and inserts. The intention is to provide supports which, in each case, shall be amply strong and rigid for the load, but which shall not weaken or unduly stress the building construction.
- T. Provide approved roller supports, floor stands, wall brackets, etc., for all lines running near the floor or near walls, which can be properly supported or suspended by the floors or walls. Pipelines near walls may also be hung by hangers carried from approved wall brackets at a higher level than the pipe.
- U. No piping shall be hung from other piping or ductwork. In no case shall hangers be supported by means of vertical expansion bolts.
- V. Hangers for piping shall support the pipe without piercing the insulation. Pre-insulated pipe shields shall be used to protect the insulation on pipes. It is the intent that the insulation shields shall bear only on the insulation, which is of such density that the insulation will not be compressed, crushed or deformed.

3.03 CLEANING

- A. Before final adjustments are made and before operation of equipment, clean and remove all accumulation of dirt, chips or other deleterious material. Leave all hangers and supports in condition suitable for finish painting, before final acceptance.
- B. Touch up, repair or replace damaged products before Substantial Completion.

3.04 INSPECTION AND STARTUP SERVICE

- A. Inspect each hanger, rod and support for piping and equipment for proper installation according to the manufacturer's instructions.

3.05 FIELD TESTS

- A. Performance Test: All hanger and support devices and components shall be tested in accordance with the latest applicable industry standards.

3.06 ADJUSTING AND BALANCING

- A. Adjust all pipe hangers, miscellaneous supports and equipment supports to equalize load for the piping and equipment they carry and to ensure that rods are vertical under operating conditions.
- B. Hangers at equipment shall be adjusted to ensure that there are no loads imposed on the equipment by the piping connected to the equipment.
- C. Hangers and Supports
 - 1. Ensure that rod is vertical under operating conditions.
 - 2. Equalize loads for all piping and equipment supports.
- D. Adjustable Clevis
 - 1. Tighten hanger load nut securely to ensure proper hanger performance.
 - 2. Tighten upper nut after adjustment.
- E. Beam Clamps: Tighten all set screws and lock nuts.
- F. Riser Clamps
 - 1. Ensure all riser clamps are securely resting on the concrete slab or kindorf after system is tested and pressurized.
 - 2. Tighten riser clamp nuts after vertical adjustments are made.

END OF SECTION 22 05 29

**SECTION 22 05 53 - IDENTIFICATION FOR PLUMBING PIPING
AND EQUIPMENT**

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide all identification nameplates and tags required for equipment and piping as indicated on and in accordance with the requirements of the Contract Documents.
- B. Section includes:
 - 1. Charts.
 - 2. Equipment nameplates.
 - 3. Pipe identification.
 - 4. Signage.
 - 5. Valve tags.

1.02 RELATED SECTIONS

- A. Refer to Divisions 01, 21, 23, 26, and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.
- B. The following specification sections apply to all work herein:
 - 1. Section 22 00 00 - General Requirements for Plumbing
 - 2. Section 22 05 00 - Common Work Results for Plumbing
 - 3. Section 22 05 23 - General-Duty Valves for Plumbing Piping
 - 4. Section 22 05 76 - Facility Drainage Piping Cleanouts
 - 5. Section 22 07 00 - Plumbing Insulation
 - 6. Section 22 11 16 - Domestic Water Piping
 - 7. Section 22 13 16 - Sanitary Waste and Vent Piping
 - 8. Section 22 13 19 - Sanitary Waste Piping Specialties
 - 9. Section 22 14 13 - Facility Storm Drainage Piping
 - 10. Section 22 14 26 - Facility Storm Drains
 - 11. Section 22 14 29 - Sump Pumps

1.03 REFERENCES

- A. All nameplates, signs and valve tags shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:
1. Codes: Perform all work in accordance with the latest applicable codes and standards for New York City.
 - a. New York City Building Code.
 - b. New York City Plumbing Code.
 2. Reference Standards: Perform all work in accordance with, but not limited to, the following standards:
 - a. American Society of Mechanical Engineers
 - 1) ASME A13.1: Scheme for the Identification of Piping Systems.
 - b. American National Standards Institute
 - 1) ANSI Z535: Safety Color Code - Environmental Facility Safety Signs - Criteria for Safety Symbols - Product Safety Sign & Labels - Accident Prevention Tags.
 - c. ASTM International
 - 1) ASTM D 882: Standard Test Method for Tensile Properties of Thin Plastic Sheeting.

1.04 SUBMITTALS

- A. The following submittal data shall be furnished according to the Conditions of the Contract, Division 01, and Section 22 00 00 and shall include, but not be limited to:
1. Schedule of valve tags, including catalog cut, color, model number and diagrammatic charts.
 2. Schedule of nameplates for all equipment, including model number, reference name and diagrammatic charts.
 3. Catalog cuts of pipe markers.

4. Catalog cuts of nameplates for all equipment.
- B. Submit two (2) samples of each type of the following:
 1. Equipment labels.
 2. Tags, including colors and lettering styles.
 3. Piping markers.
 4. Tags for valves and controls.
 - C. Product Data: Submit manufacturer's literature for each product submitted.
 - D. Manufacturer's Installation Instructions: Submit support details, installation instructions and connection requirements for the system.
 - E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 22 00 00 shall apply to all work specified herein.
- B. All products and equipment specified herein shall be fabricated by companies whose primary business expertise is the manufacturing of commercial and industrial products and equipment with a minimum of ten (10) years documented experience.
- C. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- D. Furnish all equipment, materials and accessories new and free from defects.
- E. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories and ANSI Z535 - Safety Color Code - Environmental Facility Safety Signs - Criteria for Safety Symbols - Product Safety Sign & Labels - Accident Prevention Tags.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Division 01 and Section 22 00 00.

- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer's rigging and installation instructions.
- C. Protect all components from physical damage, including effects of weather, water, and construction debris.
- D. Store tapes, adhesives, mastics, and labeling materials in ambient conditions acceptable to and in accordance with the recommendations of the manufacturer.
- E. Labeling and markers which become damaged in the opinion of the Engineer may be rejected and shall be repaired or replaced by the Contractor at no additional expense to the Contract.

1.07 WARRANTY

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Furnish a one (1) year manufacturer's warranty for all system tags and nameplates.
- C. Warranty period shall commence upon final acceptance by the Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Being listed herein as an acceptable manufacturer does not permit the manufacturer to provide standard manufactured equipment that does not comply with the performance and/or physical characteristic requirements of the Contract Documents.
- B. All substitutions must be identified in the Base Bid as a voluntary Deduct Alternate and must be accompanied by a Letter of Equivalency certifying the product's equivalency in all performance and physical characteristics to the products listed herein. The proposed substitutions shall be inclusive of all cost and physical implications throughout the project. Under no circumstances should the substitution result in added cost to the project. Should the substitution be approved neither the project specifications nor the Contract Documents will be revised to reflect the substitution.
- C. Equipment Nameplates and Signage
 - 1. Brady Corporation.
 - 2. Brimar Industries Incorporated.
 - 3. Marking Services Incorporated.
 - 4. Seton Nameplate Corp.

- D. Pipe Identification
 - 1. Brady Corporation.
 - 2. Brimar Industries Incorporated.
 - 3. Marking Services Incorporated.
 - 4. Seton Nameplate Corp.

- E. Valve Tags
 - 1. Brady Corporation.
 - 2. Brimar Industries Incorporated.
 - 3. Marking Services Incorporated.
 - 4. Seton Nameplate Corp.

2.02 GENERAL REQUIREMENTS

- A. All materials and equipment shall be new, in good condition and free from defect. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.

- B. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein are the minimum standards acceptable. The Engineer retains the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require the specified materials and equipment, which conform to the requirements of the Contract Documents be furnished.

- C. Materials and equipment, which are found to have factory defects shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Contractor shall be responsible for all costs associated with testing, replacement or repair, including but not limited to, all replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, re-commissioning of the equipment, etc.

2.03 EQUIPMENT NAMEPLATES

- A. Mechanical equipment shall be identified by means of nameplates permanently attached to the equipment.

- B. Equipment nameplate designations shall correspond to the system identification on the Contract Drawings and "Record Drawings".

- C. Equipment nameplates shall conform to the following:

1. Equipment nameplates located within the building shall be made of laminated three-layer matte finish flexible acrylic sheet, with cap and core permanently fused together to form a break-resistant, stain-resistant, chip-proof and shatterproof product with black surface and white core engraved letters and numbers. Equipment nameplates shall have contact-type permanent adhesive backing and be pre-drilled or punched for attachment.
2. Equipment nameplates located outside of the building shall be 20 mil (0.5 mm) black enameled aluminum and pre-drilled or punched for attachment.
3. Equipment nameplates shall be a minimum of 3 in. (75 mm) long by 1 in. (25 mm) wide with white letters a minimum 1/4 in. (6.25 mm) high.

2.04 PIPING IDENTIFICATION

- A. All piping shall be identified as to type of use, service and direction of flow in accordance with ANSI A13.1.
- B. Pipe markers shall meet ANSI and OSHA requirements for identifying the service, direction of flow, system and zone, for the various piping systems.
- C. They shall be factory-fabricated, flexible, semi-rigid UV-resistant heavy-duty vinyl, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.
- D. Each marker shall consist of one (1) label with direction-of-flow arrows and the name of the service printed in black letters not less than 1 in. (25 mm) high for pipe 2-1/2 in. (60 mm) and smaller, 2 in. (50 mm) high for 3 in. (75 mm) pipe and larger. Markers shall have backgrounds of different colors for the various service groups.
- E. Locate markers at each valve, at each entry through walls, within access doors, on 20 foot (6,096 mm) centers for straight runs of pipe, and at least every story height traversed by risers.

2.05 VALVE TAGS

- A. Provide a valve tag for each valve.
- B. Each valve tag shall be 3 in. (75 mm) diameter, brass or aluminum, stamped with designating numbers, minimum 2 in. (50 mm) high, prefixed by the letters "P", painted with white enamel, and background painted with red enamel.
- C. Attach each valve tag to valve handle or spindle with a brass chain.

- D. All valves and controls shall be designated with corresponding numbers on the valve charts or diagrams.
- E. The nomenclature to be used on these tags shall be submitted to the Consulting Engineer for approval.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and replaced by the manufacturer.

3.02 INSTALLATION

- A. Valve tags and nameplates shall be installed in accordance with the manufacturer's recommendations and the Authorities Having Jurisdiction.
- B. Install nameplates with adhesive.
- C. Install valve tags with corrosion-resistant brass chain.

3.03 CLEANING

- A. Clean and remove all accumulation of dirt, chips or other deleterious material on equipment nameplates, valve tags and signage. Leave all valve tags and equipment nameplates in clean and legible condition before final acceptance.
- B. Touch up, repair or replace damaged tags and nameplates before final acceptance.

END OF SECTION 22 05 53

SECTION 22 05 76 - FACILITY DRAINAGE PIPING CLEANOUTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide all cleanouts required the drainage systems as indicated on and in accordance with the requirements of the Contract Documents.
- B. Section includes:
 - 1. Cleanouts.

1.02 RELATED SECTIONS

- A. Refer to Divisions 01, 14, 21, 23, 25, 26, 27 and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.
- B. The following specification sections apply to all work herein:
 - 1. Section 22 00 00 - General Requirements for Plumbing.
 - 2. Section 22 05 00 - Common Work Results for Plumbing
 - 3. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
 - 4. Section 22 07 00 - Plumbing Insulation.
 - 5. Section 22 13 16 - Sanitary Waste and Vent Piping.
 - 6. Section 22 13 19 - Sanitary Waste Piping Specialties.
 - 7. Section 22 14 13 - Facility Storm Drainage Piping.
 - 8. Section 22 14 26 - Facility Storm Drains.

1.03 REFERENCES

- A. Each cleanout shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:

1. Codes: Perform all work in accordance with the latest applicable codes and standards for New York City.
 - a. New York City Building Code.
 - b. New York City Plumbing Code.
2. Reference Standards: Perform all work in accordance with, but not limited to, the following standards:
 - a. American Society of Mechanical Engineers (ASME)
 - 1) ASME A112.36.2M: Cleanouts.
 - b. ASTM International
 - 1) ASTM A 74: Standard Specification for Cast Iron Soil Pipe and Fittings.

1.04 SUBMITTALS

- A. The following submittal data shall be furnished according to the Conditions of the Contract, Division 01, and Section 22 00 00 and shall include, but not be limited to:
 1. Schedule of cleanouts, including the catalog cut, finish, color and model number.
- B. Product Data: Submit manufacturer's literature including general assembly for each cleanout type submitted.
- C. Manufacturer's Installation Instructions: Submit support details, installation instructions, connection requirements, for the system.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 22 00 00 shall apply to all work specified herein.
- B. All products and equipment specified herein shall be fabricated by companies whose primary business expertise is the manufacturing of commercial and industrial products and equipment with a minimum of ten (10) years documented experience.

- C. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- D. Furnish all equipment, materials and accessories new and free from defects.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer's rigging and installation instructions.
- C. Protect all components from physical damage, including effects of weather, water, and construction debris.

1.07 COORDINATION

- A. Coordinate the installation of work in this section with the following sections:
 - 1. Division 04 - Masonry
 - 2. Division 06 - Wood, Plastics and Composites
 - 3. Division 09 - Finishes

1.08 WARRANTY

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Furnish a one (1) year manufacturer's warranty for all cleanouts installed in the drainage system.
- C. Warranty period shall commence upon final acceptance by the Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Being listed herein as an acceptable manufacturer does not permit the manufacturer to provide standard manufactured equipment that does not comply with the performance and/or physical characteristic requirements of the Contract Documents.
- B. All substitutions must be identified in the Base Bid as a voluntary Deduct Alternate and must be accompanied by a Letter of Equivalency certifying the

product's equivalency in all performance and physical characteristics to the products listed herein. The proposed substitutions shall be inclusive of all cost and physical implications throughout the project. Under no circumstances should the substitution result in added cost to the project. Should the substitution be approved neither the project specifications nor the Contract Documents will be revised to reflect the substitution.

- C. Cleanouts
 - 1. Josam.
 - 2. Jay R. Smith.
 - 3. Tyler.
 - 4. Wade.
 - 5. Zurn.

2.02 GENERAL REQUIREMENTS

- A. All materials and equipment shall be new, in good condition and free from defect. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- B. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein are the minimum standards acceptable. The Engineer retains the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require the specified materials and equipment, which conform to the requirements of the Contract Documents be furnished.
- C. Materials and equipment, which are found to have factory defects shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Contractor shall be responsible for all costs associated with testing, replacement or repair, including but not limited to, all replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, re-commissioning of the equipment, etc.

2.03 CLEANOUTS

- A. No-Hub Cast Iron Pipe Cleanouts: No-Hub cast iron cleanout plug or extra heavy brass screw plug in tapped cast iron fittings, with solid hexagonal nut or countersunk plug to suit.
- B. Steel Pipe Cleanouts: Extra heavy brass screw plug in drainage fitting.
- C. Cleanout plugs shall comply with the New York City Plumbing Code and shall be provided with standard pipe threads, installed with “Permacel” or approved Teflon tape applied to the male threads.
- D. Provide a cleanout in sanitary and storm drainage piping at each change of direction.
- E. Extend cleanouts to walls and floors utilizing long sweep ells or “y” and 1/8 bends.
- F. Each cleanout shall be provided with plugs and face or deck plates to conform to the architectural finish in the room. Where no definite finish is indicated on the architectural drawings all wall plates shall be bronze and all floor plates shall be bronze.
- G. All cleanouts installed in floors or roofs having a waterproof membrane shall be flashed with lead not less than 3 psf (0.00015 kg/sq.mm) or copper not less than 1/8 in. (3.25 mm) thick, built 6 in. (150 mm) into the waterproof membrane. Include an under-deck clamp and extension neck with weep holes for drainage as required by the roof and waterproofing furnished.
- H. Cleanouts and plates shall be as indicated utilizing Zurn Industries model numbers in the following table or as approved:

Type	Location	Piping
Z-1440-A		Exposed C.I. pipe
Z-1470-A		Exposed steel pipe
Z-1440-1	Wall	Concealed C.I. pipe
Z-1460-8	Wall	Concealed steel pipe
Z-1400	Concrete Floor	Steel or C.I.
Z-1454	Waterproofed Slab Floor	Steel or C.I.
Z-1400-X	Asphalt Tile Floor	Steel or C.I.
Z-1400-Z	Ceramic Tile Floor	Steel or C.I.
Z-1400-HD	Heavy Duty Traffic Floor	No-Hub
Z-1400-NH	Concrete Floor	No-Hub
Z-1400-K	Waterproofed Slab Floor	No-Hub
Z-1400-X	Asphalt Tile Floor	No-Hub
Z-1400-Z	Ceramic Tile Floor	No-Hub
Z-1410-HD	Heavy Duty Traffic Floor	No-Hub

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and replaced by the manufacturer.

3.02 INSTALLATION

- A. Cleanout installation shall be in accordance with the latest applicable industry standards, manufacturer's recommendations and the Authorities Having Jurisdiction.
- B. Provide a cleanout plug at the change of direction in drainage piping built with "Y" fittings and 45° ell's made flush with floor or wall.
- C. Provide a cleanout in all horizontal straight runs more than 50 feet (15,240 mm) provide at least one cleanout every 50 feet (15,240 mm) in total length.
- D. Where drainage piping is buried, cleanouts shall be brought up flush with the floor or grade unless otherwise shown on the Drawings.
- E. The locations of all cleanouts shall be verified with the Architect.

- F. All cleanouts shall be of the same size as the drainage pipe up to and including 4 in. (100 mm) in diameter. All cleanouts used for all drainage pipe larger than 4 in. (100 mm) shall be a minimum of 4 inch (100 mm) in diameter, unless otherwise noted on the Drawings.
- G. Provide access doors in general construction for clean-outs installed in concealed locations.

3.03 CLEANING

- A. Clean and remove all accumulation of dirt, chips or other deleterious material on cleanouts, plugs and access doors for cleanouts. Leave all cleanouts clearly identified in clean condition before final acceptance.
- B. Touch up, repair or replace damaged cleanouts, plugs and access doors for cleanouts before final acceptance.

3.04 FIELD TESTS

- A. Performance Test
 - 1. Subject all cleanouts inside the building to a water test, same as the drainage system for which it is installed.
 - 2. Refer to Section 22 13 16 - Sanitary Waste and Vent Piping for water testing requirements required on cleanouts installed in sanitary and vent piping systems.
 - 3. Refer to Section 22 14 13 - Facility Storm Drainage Piping for water testing requirements required on cleanouts installed in storm drainage systems.

3.05 ADJUSTING AND BALANCING

- A. Adjust all floor cleanouts to be level with the finished floor.
- B. Adjust all wall cleanouts to be flush with the inside of the finished wall or access panel for the cleanout.
- C. Tighten all cleanout plugs to ensure no leakage.
- D. Secure all cleanout deck and wall plates to ensure no gaps are left between the finished surface and the plate.

END OF SECTION 22 05 76

SECTION 22 07 00 - PLUMBING INSULATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Furnish and install all insulation required for piping and equipment as indicated on and in accordance with the requirements of the Contract Documents.
- B. Section includes:
 - 1. Accessories.
 - 2. Adhesives and sealants.
 - 3. Pipe insulation.

1.02 RELATED SECTIONS

- A. Refer to Divisions 01, 21, 23, 26, and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.
- B. The following specification sections apply to all work herein:
 - Section 22 00 00 - General Requirements for Plumbing
 - Section 22 05 00 - Common Work Results for Plumbing
 - Section 22 05 23 - General-Duty Valves for Plumbing Piping
 - Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
 - Section 22 05 53 - Identification for Plumbing Piping and Equipment
 - Section 22 11 16 - Domestic Water Piping
 - Section 22 14 13 - Facility Storm Drainage Piping
 - Section 22 14 26 - Facility Storm Drains

1.03 REFERENCES

- A. All insulating products and accessories shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:
 - 1. Codes: Perform all work in accordance with the latest applicable codes and standards for New York City.
 - 2. New York City Building Code.

3. New York City Plumbing Code.
 - a. Reference Standards: Perform all work in accordance with, but not limited to, the following standards:
 - b. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)
 - 1) ASHRAE 90.1: Energy Standard for Buildings Except Low-Rise Residential Buildings.
 - c. ASTM International
 - 1) ASTM B209: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 2) ASTM C335: Standard Test Method for Steady-state Heat Transfer Properties of Horizontal Pipe Insulation.
 - 3) ASTM C411: Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - 4) ASTM C533: Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
 - 5) ASTM C547: Standard Specification for Mineral Fiber Pipe Insulation.
 - 6) ASTM C552: Standard Specification for Cellular Glass Thermal Insulation.
 - 7) ASTM C585: Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing.
 - 8) ASTM C612: Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
 - 9) ASTM C871: Standard Test Methods for Chemical Analysis of Thermal Insulation Materials for Leachable Chloride, Fluoride, Silicate and Sodium Ions.
 - 10) ASTM C1136: Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.

- 11) ASTM E84: Standard Test Methods for Surface Burning Characteristics of Building Materials.
- 12) ASTM E96: Standard Test Methods for Water Vapor Transmission of Materials.
- d. Greenguard Environmental Institute.
- e. Manufacturers Standardization Society of the Valve and Fittings Industry
 - 1) MSS SP 69: Pipe Hangers and Supports - Selection and Application.
 - 2) MSS SP 89: Pipe Hangers and Supports - Fabrication and Installation Practices.
- f. National Fire Protection Association (NFPA)
 - 1) NFPA 255: Standard Method of Test of Surface Burning Characteristics of Building Materials.
- g. Underwriters Laboratories, Inc.
 - 1) UL 723: Standard for Test for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

- A. The following submittal data shall be furnished according to the Conditions of the Contract, Division 01, and Section 22 00 00 and shall include, but not be limited to:
 - 1. Schedule of materials indicating the type of system which it is installed, insulation type, insulation jacket, thickness for each pipe size and each type of equipment.
- B. Product Data: Submit manufacturer's literature including general assembly, for each type of product indicated. Include thermal conductivity, water-vapor permeance, thickness, and type of insulation jacket.
- C. Test Reports: Indicate procedures and results for specified factory and field acceptance testing and inspections.
- D. Manufacturer's Installation Instructions: Submit support details, installation instructions and connection requirements for the system.

1. In addition, provide detailed installation procedures for the following:
 - a. Application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - b. Application of insulation at elbows, fittings, specialties and flanges for each type of insulation.
 - c. Application of field-applied jackets.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 22 00 00 shall apply to all work specified herein.
- B. All products and equipment specified herein shall be fabricated by companies whose primary business expertise is the manufacturing of commercial and industrial products and equipment with a minimum of ten (10) years documented experience.
- C. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- D. Make every effort to furnish all equipment of any equipment type from one manufacturer.
- E. Furnish all equipment, materials and accessories new and free from defects.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer's rigging and installation instructions.
- C. Protect all components from physical damage, including effects of weather, water, and construction debris.
- D. Store tapes, adhesives, mastics, cements, and insulation materials in ambient conditions acceptable to and in accordance with the recommendations of the manufacturer.

- E. Store products and materials off floors on raised platforms to protect from water damage.
- F. Products and materials, which have been exposed to water damaged shall be replaced by the Contractor at no additional expense to the Contract.

1.07 WARRANTY

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Furnish a one (1) year manufacturer's warranty for all insulation products.
- C. Warranty period shall commence upon final acceptance by the Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Being listed herein as an acceptable manufacturer does not permit the manufacturer to provide standard manufactured equipment that does not comply with the performance and/or physical characteristic requirements of the Contract Documents.
- B. All substitutions must be identified in the Base Bid as a voluntary Deduct Alternate and must be accompanied by a Letter of Equivalency certifying the product's equivalency in all performance and physical characteristics to the products listed herein. The proposed substitutions shall be inclusive of all cost and physical implications throughout the project. Under no circumstances should the substitution result in added cost to the project. Should the substitution be approved neither the project specifications nor the Contract Documents will be revised to reflect the substitution.
- C. Accessories
 - 1. Buckaroos, Inc.
 - 2. Insul-Shield.
 - 3. Pipe Shields, Inc.
 - 4. Thermal Pipe Shields, Inc.
 - 5. Value Engineered Products, Inc.
- D. Adhesives and Sealants

1. Benjamin Foster Company.
 2. Centiva.
 3. Duro Dyne.
 4. Elgen.
 5. ITW TACC.
- E. Pipe Insulation and PVC Covers
1. Certain Teed Corp.
 2. Johns-Manville (Zeston).
 3. Knauf Insulation.
 4. Owens-Corning.
 5. Proto Corporation.
 6. Speedline Corporation.

2.02 GENERAL REQUIREMENTS

- A. All materials and equipment shall be new, in good condition and free from defect. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- B. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein are the minimum standards acceptable. The Engineer retains the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require the specified materials and equipment, which conform to the requirements of the Contract Documents be furnished.
- C. Materials and equipment, which are found to have factory defects shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Contractor shall be responsible for all costs associated with testing, replacement or repair, including but not limited to, all replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, re-commissioning of the equipment, etc.

- D. Insulation materials furnished shall meet the minimum thickness requirements of ASHRAE Standard 90.1 - Energy Efficient Design of New Buildings.
- E. All thermal and acoustical insulation jackets, facings, membrane, adhesives, mastics, coatings and accessory materials shall be tested in compliance with the latest versions of ASTM E-84, MSS SP-69, NFPA 255 and/or UL 723 procedures.
- F. All materials shall comply with the requirements of NFPA 90A and shall be listed and labeled by Underwriters Laboratories, Inc. for a fire hazard classification, not to exceed the following:
 - 1. Insulation installed indoors: Flame Spread 25, Smoke Developed 50.
 - 2. Insulation installed outdoors: Flame Spread 75, Smoke Developed 150.
- G. The rating for insulation with factory-applied jackets or facings shall be on a composite basis of insulation, jacket or facing, and the adhesive used to adhere the jacket or facing to the insulation.
- H. Materials and products required for work of this section shall not contain asbestos, formaldehyde, lead, mercury or mercury compounds, polychlorinated biphenyls (PCB's) or other hazardous materials.
- I. All insulation shall contain a minimum of 50% post-consumer recycled material.
- J. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 parts per million (ppm) when tested according to ASTM C 871.
- K. Insulation for fittings, valves, flanges, and accessories shall maintain the same thermal conductivity as the adjacent pipe insulation.
- L. Shipping containers for insulation and accessory materials shall be labeled to indicate conformance to the fire hazard classification.
- M. All vapor barriers shall be completely sealed against moisture penetration.

2.03 ACCESSORIES

- A. Pipe protection saddles shall be formed from carbon steel, 1/8 in. (3 mm) minimum thickness, sized for insulation thickness. Saddles for pipe sizes greater than 12 in. (305 mm) shall have a center support rib.
- B. Pre insulated shields shall be 180 degree, 18 gauge minimum galvanized sheet metal with high density water repellent Kaylo insulation, foam glass or high-

density polyisocyanurate inserts minimum thickness to match outside diameter of the insulated pipe.

- C. Pre insulated shields shall be no less than the following lengths:

Pipe Size	Shield Length
3/4 in. to 2-1/2 in. (63.5 mm to 19 mm)	10 in. (254 mm)
3 in. to 6 in. (150 mm to 75 mm)	12 in. (305 mm)
8 in. to 10 in. (254 mm to 203 mm)	16 in. (405 mm)
12 in. (305 mm) and over	22 in. (555 mm)

2.04 ADHESIVES AND SEALANTS

- A. Provide adhesives and sealants conforming to the requirements of ASTM C 916, ASTM E 84 and UL 273.
- B. Adhesives and sealants shall be listed and labeled by Underwriters Laboratories, Inc. for a fire hazard classification, not to exceed the following:

Flame Spread	25
Fuel Contribution	50
Smoke Developed	50

2.05 PIPE INSULATION

- A. Pipe insulation shall be molded fiber glass one-piece insulation with white Kraft, fiber glass reinforced, and aluminum foil laminated, All-Service Jacket (ASJ). Pipe insulation shall be capable of continuous service at a pipe temperature of 450°F (232° C) without oxidation or burnout of binders or the development of odors or smoke by any constituent of the material. Physical characteristics shall be as follows:
1. Minimum Density: 4 lbs/cu.ft. (64 kg/cu.m).
 2. Thermal Conductivity: 0.23 Btu-in./hr/ft² /°F (0.033 W/m at 24°C).
 3. Maximum Service Temperature: 850°F (454°C).
 4. Jacket Vapor Permeability: 0.02 perms.
 5. Jacket Puncture Resistance: 50 units (Beach).

- B. Pipe fittings and valves shall be insulated with pre-molded fiber glass sections and pre-molded thermoplastic covers for the sizes manufactured. For other types and sizes, fittings and valves shall be insulated with radially mitered segments of pipe covering secured in place with 16 gauge copper-plated, annealed steel wire. Pre-molded (PVC) fitting covers shall be suitable for same service temperature as pipe insulation.
- C. Install a vapor barrier on fittings, valves and flanges consisting of open weave glass cloth applied with BF 30-35 adhesive and finished with a flooding brush coat of the same adhesive.
- D. Insulation exposed to weather shall be provided with a weatherproof jacket of corrugated aluminum with a 3 in. lap that will shed water. Fittings, valves and flanges shall be weatherproofed with a weatherproof mastic reinforced with a glass cloth membrane and further coated with mastic.
- E. All lavatories, including, but not limited to, the Core Toilet Rooms, Break Rooms, Locker Rooms and other areas within the building, shall be provided with ADA-compliant under-sink pipe covers as manufactured by TRUEBRO Ips Corp. "Lav Guard 2 E-Z Series" waste and supply covers Model No. 102 E-Z or 402W "original" series.
- F. Insulation for piping systems shall be furnished and installed in accordance with the following schedule:

Service	Pipe Size	Temp	Thickness
Cold Water	1-1/4 in. (32 mm) and below	450°F (232°C)	1 in. (25 mm)
Cold Water	1-1/2 in. (38 mm) and above	450°F (232°C)	1-1/2 in. (38 mm)
Hot Water and Hot Water Circulation	1-1/4 in. (32 mm) and below	450°F (232°C)	1 in. (25 mm)
Hot Water and Hot Water Circulation	1-1/2 in. (38 mm) and above	450°F (232°C)	1-1/2 in. (38 mm)
Horizontal Storm Drains (including vertical stub to roof drains, including the entire roof drain body and trim to the underside of building structure)	All	450°F (232°C)	1 in. (25 mm)
Cold and Hot Water (Subject to Freezing)	All	450°F (232°C)	2 in. (50 mm)

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and replaced by the manufacturer.

3.02 INSTALLATION

- A. Installation of all insulation, pre-molded fiber glass insulation and thermoplastic covers for fittings and the use of adhesives and sealants shall be in accordance with the manufacturer's recommendations and the Authorities Having Jurisdiction.
- B. Before applying insulation, all surfaces shall be free of dust, grease and foreign matter. Insulation shall not be applied to any piping and equipment until required pressure testing has been completed and the system approved for tightness.
- C. Where a vapor seal must be maintained, insulation shall be applied with a continuous, unbroken moisture and vapor retarder.
- D. All pipe insulation shall be continuous through walls, ceiling and/or floor openings.
- E. Install multiple layers of insulation with longitudinal and circumferential joints staggered.
- F. Pipe Insulation
 - 1. Pipe insulation sections shall be firmly butted together at all joints with jacket laps and joint butt strips pulled tight and smooth. Longitudinal joints shall have a minimum 2 in. (50 mm) overlap. Butt joint strips shall be a minimum of 3 in. (75 mm) wide.
 - 2. Insulation for fittings, valves, flanges, and accessories shall maintain the same thermal conductivity as the adjacent pipe insulation.
 - 3. Valves, expansion joints and other specialties requiring periodic servicing or inspection shall be insulated with factory fabricated removable and reusable covers.
 - 4. Flanges shall be insulated with built-up sleeves of pipe covering overlapping the adjacent pipe insulation.

- G. Piping within mechanical equipment rooms, in addition to the insulation and jacket specified, all piping, including fittings, flanges and valves, shall be covered with a 30 mil (0.8 mm) thick thermoplastic jacket.
- H. Hot service piping shall be insulated in accordance with the following:
 - 1. Insulation jacket laps and joint butt strips shall be taped on 4 in. (100 mm) centers with flare-type staples and secured with aluminum bands on 18 in. (380 mm) centers with one band over each joint butt strip.
 - 2. Voids around fittings and valves and at flanges shall be filled with insulation and covered with premolded thermoplastic covers.
 - 3. Insulation on hot pipes smaller than 4 in. (100 mm) shall be supported on factory-assembled thermal protection shields.
- I. Cold service piping shall be insulated in accordance with the following:
 - 1. Insulation jacket laps and joint butt strip shall be sealed with lap-sealing adhesive. At all fittings, valves and at intervals of every 5 sections of straight run pipe insulation, apply a vapor barrier coating, 1/16 in. (1.7 mm) thick, to all butt joints and on the bore of the pipe insulation for a minimum of 2 in. (50 mm) from the joint. Position insulation and press firmly into place, making certain that a complete unbroken seal is obtained.
 - 2. Insulation shall be protected from hangers by a 180 degree galvanized steel shield on the outside of the insulation and vapor barrier. A half-section of waterproof, high-density insulation of the same thickness as the pipe insulation, and full length of the shield, shall be used to support the weight of the pipe at the shield. Factory-assembled thermal protection shields may also be used.

3.03 CLEANING

- A. Before final adjustments are made and before operation of equipment, clean and remove all accumulation of dirt, chips or other deleterious material. Leave all insulation in suitable condition, before final acceptance.
- B. Touch-up, repair or replace damaged insulation, insulation jackets and vapor barriers before final acceptance.

3.04 ADJUSTING AND BALANCING

- A. Upon completion of insulation, hangers for piping, and supports for equipment shall be adjusted to ensure that the loads are distributed evenly and that there are no loads imposed by the piping and equipment on the insulation that it is provided with.

END OF SECTION 22 07 00

SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Furnish and install all domestic water piping required for the project as indicated on and in accordance with the requirements of the Contract Documents.
- B. Section includes:
 - 1. Materials of piping systems.
 - 2. Miscellaneous accessories.
 - 3. Pipe joints and fittings.
 - 4. System material schedule.

1.02 RELATED SECTIONS

- A. Refer to Divisions 01, 21, 23, 26, and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.
- B. The following specification sections apply to all Work herein:
 - 1. Section 22 00 00 - General Requirements for Plumbing
 - 2. Section 22 05 00 - Common Work Results for Plumbing
 - 3. Section 22 05 23 - General-Duty Valves for Plumbing Piping
 - 4. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
 - 5. Section 22 05 53 - Identification for Plumbing Piping and Equipment
 - 6. Section 22 07 00 - Plumbing Insulation

1.03 REFERENCES

- A. All domestic water piping shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:
 - 1. Codes: Perform all work in accordance with the latest applicable codes and standards for New York City

- a. New York City Building Code.
 - b. New York City Plumbing Code.
2. Reference Standards: Perform all work in accordance with, but not limited to, the following standards:
- a. American Society of Mechanical Engineers
 - 1) ASME B16.15: Cast Bronze Threaded Fittings
 - 2) ASME B16.18: Cast Copper Alloy Solder Joint Pressure Fittings.
 - 3) ASME B16.22: Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - 4) ASME B16.23: Cast Copper Alloy Solder Joint Drainage Fittings DWV.
 - 5) ASME B16.26: Cast Copper Alloy Fittings for Flared Copper Tubes.
 - 6) ASME B16.29: Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings DWV.
 - 7) ASME B31.9: Building Services Piping.
 - b. American Society of Sanitary Engineers
 - 1) ASSE 1010: Performance Requirements for Water Hammer Arresters.
 - 2) ASSE 1018: Performance Requirements for Trap Seal Primer Valves - Potable Water Supplied.
 - c. ASTM International
 - 1) ASTM B42: Specification for Seamless Copper Pipe, Standard Sizes.
 - 2) ASTM B43: Specification for Seamless Red Brass Pipe, Standard Sizes.
 - 3) ASTM B75/B75M: Standard Specification for Seamless Copper Tube.

- 4) ASTM B88/B88M: Standard Specification for Seamless Copper Water Tube.
 - 5) ASTM B251: Specification for General Requirements for Wrought Seamless Copper and Copper Alloy Tube.
 - 6) ASTM B302: Specification for Threadless Copper Pipe, Standard Sizes.
 - 7) ASTM B447: Specification for Welded Copper Tube.
 - 8) ASTM B813: Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube.
 - 9) ASTM B828: Standard Specification for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.
 - 10) ASTM F1476: Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.
- d. American Water Works Association
- e. American Welding Society
- 1) AWS A5.8: Specification for Filler Metals for Brazing and Braze Welding.
- f. Manufacturers Standardization Society
- 1) MSS SP6: Contact Faces of Pipe Flanges and Connecting-end Flanges of Valves and Fittings.
 - 2) MSS SP9: Spot Facing for Bronze, Iron and Steel Flanges.
 - 3) MSS SP43: Wrought Stainless Steel Butt-welding Fittings.
 - 4) MSS SP44: Steel Pipe Line Flanges.
 - 5) MSS SP-73: Brazing Joints for Copper and Copper Alloy Pressure Fittings.
 - 6) MSS SP-83: Steel Pipe Unions Socket-Welding and Threaded.

- 7) MSS SP-97: Forged Carbon Steel Branch Outlet Fittings-
Socket Welding, Threaded and Butt-welding Ends.
 - 8) MSS SP104: Wrought Copper Solder Joint Pressure
Fittings.
 - 9) MSS SP106: Cast Copper Alloy Flanges and Flanged
Fittings (Class 125, 150 and 300).
 - 10) MSS SP 123: Non-Ferrous Threaded and Solder-Joint
Unions for Use with Copper Water Tube.
- g. National Sanitation Foundation
- 1) NSF Standard 61: Drinking Water System Components.
- h. Plumbing and Drainage Institute
- 1) PDI WH201: Water Hammer Arresters.

1.04 SUBMITTALS

- A. The following submittal data shall be furnished according to the Conditions of the Contract, Division 01, and Section 22 00 00 and shall include, but not be limited to:
1. Schedule of pipe and fitting materials, complete with typical mill reports.
 2. Schedule of pipe and fitting materials identifying the system and location, which the products are intended to be used.
 3. Pipe cleaning certification.
 4. Copper, brass, stainless steel and ductile iron pipe and fittings.
 5. Cut or roll grooved couplings and fittings.
 6. Threaded brass or bronze fittings.
 7. Copper, brass, and ductile iron pipe flanges and gaskets.
 8. Schedule of locations where water hammer arresters shall be installed.
 9. Schedule of locations where trap primer valves shall be installed.

- B. Product Data: Submit manufacturers literature including general assembly, for each type of product indicated. Include all piping, fittings, water hammer arresters, trap primer valves, mechanical couplings, flanges, solder, materials of construction and dimensional characteristics.
- C. Test Reports: Indicate procedures and results for specified factory and field acceptance testing and inspections.
- D. Manufacturer's Installation Instructions: Submit support details, installation instructions and connection requirements for all products submitted.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 22 00 00 shall apply to all work specified herein.
- B. All products and equipment specified herein shall be fabricated by companies whose primary business expertise is the manufacturing of commercial and industrial products and equipment with a minimum of ten (10) years documented experience.
- C. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- D. Make every effort to furnish all equipment of any equipment type from one manufacturer.
- E. After completion of installation, but prior to Final Completion, this Contractor shall certify in writing in a format acceptable to the Owner that products and materials installed, and processes used, do not contain asbestos, or polychlorinated biphenyls (PCB's) or other hazardous materials as determined by the Owner. A Materials Safety Data Sheet (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.
- F. To ensure uniformity and compatibility of piping components in grooved in piping system all grooved products and grooving tools must be the products of a single manufacturer.
- G. The manufacturer of grooved piping fittings shall provide on-site training for Contractor's field personnel by a factory trained representative in the proper use of grooving tools, application of groove, and product installation. In addition, the

manufacturer's representative shall periodically visit the job site and inspect installation. Contractor shall remove and replace any improperly installed products.

H. Furnish all equipment, materials and accessories new and free from defects.

1.06 FACTORY TESTING

- A. All piping, fittings, flanges, couplings and accessories shall be fully assembled and factory tested for full functionality at the manufacturer's factory prior to shipment as specified herein:
1. All pipe, fittings, mechanical couplings, flanges and accessories shall be tested in accordance with the latest applicable industry standards before accepting delivery at the jobsite.
 2. All water hammer arresters, trap primer valves and accessories shall be tested in accordance with the latest applicable industry standards before accepting delivery at the job site.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer's rigging and installation instructions.
- C. Protect all components from physical damage, including effects of weather, water and construction debris.
- D. Store all products and materials off floors on raised platforms to protect from water damage.
- E. Products and materials, which have been exposed to water damage shall be replaced by the Contractor at no additional expense to the Contract.

1.08 COORDINATION

- A. Certain materials will be furnished, installed, or furnished and installed, under other sections of the specifications. Examine the Construction Documents to ascertain these requirements.
- B. Carefully check space requirements with other trades to ensure that all material can be installed in the spaces allotted thereto. Finished suspended ceiling elevations are indicated on the general Construction Drawings.

- C. Transmit to trades doing work of other sections all information required for work to be provided under their respective sections (such as foundations, electric wiring, access doors, and the like) in ample time for installation.
- D. Set all inserts for all pipes in ample time to allow the work of the other trades to be performed on scheduled time.
- E. Furnish and set all sleeves for passage of pipes through structural masonry and concrete walls and floors and elsewhere as required for proper protection of each pipe passing through building surfaces. Coordinate this work with General Contractor in order to expedite and properly perform this work.
- F. Field drilling, cutting and/or reinforcing of holes in structural metal deck required for work under this section shall be coordinated through the General Contractor and must be approved by the Structural Engineer.
- G. Should the Contractor neglect to perform preliminary work and should cutting be required in order to install equipment, the expense of this cutting and restoring of surfaces to their original condition shall be borne by this Contractor.

Due to the type of the installation, a fixed sequence of operation is required to properly install the complete systems. It shall be the responsibility of this Contractor to coordinate, protect and schedule his work with other trades in accordance with the construction sequence.

- B. Architectural drawings shall be checked for ceiling height requirements.

1.09 WARRANTY

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Furnish a one (1) year manufacturer's warranty for the entire domestic water system.
- C. Warranty period shall commence upon final acceptance by the Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Being listed herein as an acceptable manufacturer does not permit the manufacturer to provide standard manufactured equipment that does not comply with the performance and/or physical characteristic requirements of the Contract Documents.

- B. All substitutions must be identified in the Base Bid as a voluntary Deduct Alternate and must be accompanied by a Letter of Equivalency certifying the product's equivalency in all performance and physical characteristics to the products listed herein. The proposed substitutions shall be inclusive of all cost and physical implications throughout the project. Under no circumstances should the substitution result in added cost to the project. Should the substitution be approved neither the project specifications nor the Contract Documents will be revised to reflect the substitution.
- C. Brass Pipe
1. American Brass Co.
 2. Bridgeport Brass Co.
 3. Lewin Matheis.
 4. Mueller Industries
 5. Phelps Dodge.
 6. Reading Tube Corp.
 7. Revere.
 8. Wolverine Tube Co.
- D. Brass and Bronze Fittings
1. American Brass Co.
 2. Bridgeport Brass.
 3. Chase Brass.
 4. Elkhart Products Corp.
 5. Lewin Matheis.
 6. Stockham Co.
 7. Walworth Co.
- E. Copper Pipe, Tube and Fittings
1. American Brass Co.
 2. Bridgeport Brass.
 3. Chase Brass.
 4. Elkhart Products Corp.
 5. Lewin Matheis.
 6. Mueller Industries
 7. Phelps Dodge.
 8. Reading Tube Corp.
 9. Revere.
 10. Wolverine Tube Co.
- F. Ductile Iron Pipe & Fittings

1. Charlotte Pipe & Foundry.
 2. Tyler Pipe.
 3. US Pipe.
- G. Mechanical Couplings & Grooved Fittings
1. Grinnell.
 2. Gruv-Lok.
 3. Victaulic.
- H. Trap Primer Valves
1. Precision Plumbing Products.
 2. Watts Regulator.
 3. Sioux Chief.
- I. Water Hammer Arresters
1. Precision Plumbing Products.
 2. Watts Regulator.
 3. Sioux Chief.

2.02 GENERAL REQUIREMENTS

- A. All materials and equipment shall be new, in good condition and free from defect. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- B. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein are the minimum standards acceptable. The Engineer retains the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require the specified materials and equipment, which conform to the requirements of the Contract Documents be furnished.
- C. Materials and equipment, which are found to have factory defects shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Contractor shall be responsible for all costs associated with testing, replacement or repair, including but not limited to, all replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, re-commissioning of the equipment, etc.

- D. All piping materials, fittings and couplings shall be of United States origin and manufactured in accordance with the latest applicable standards for its intended use.
- E. All trap primer valves and water hammer arresters shall be manufactured in accordance with the latest applicable standards for its intended use.

2.03 MATERIALS OF PIPING SYSTEMS

- A. Use the following materials in the various piping systems, in accordance with Article 2.7 - System Material Schedule and the Construction Documents.
- B. Pressure Copper Tubing (P.C.T.): Copper Tubing shall be seamless drawn or extruded tubing Type "L" or "K" as scheduled, hard temper in accordance with ASTM Specification B42 and or ASTM Specification B88/**B88M**.
- C. Ductile Iron Water Pipe (D.I.W.P.)
 - 1. Ductile iron pipe shall be Class 52, bell and spigot pipe with mechanical joints, equivalent to AWWA Specification C-151.
 - 2. Each length marked with Manufacturer's name, weight and class.
 - 3. Pipe shall be coated on the outside with a bituminous seal coat and lined on the inside with a hard smooth cement surface in accordance with AWWA Specification C-104.
- D. Red Brass Pipe (R.B.P.): Red brass pipe shall be seamless annealed drawn tubing, iron pipe size (I.P.S.), containing a mixture of not less than 85% copper, in accordance with ASTM Specification B43.

2.04 MISCELLANEOUS PIPING ACCESSORIES

- A. Trap Primers
 - 1. Furnish and install trap primer valves for all floor drains, which are subject to evaporation and as identified on the Construction Documents.
 - 2. Provide trap primer distribution unit in at least 5 feet (0.5 m) when supplying floor drains requiring trap priming.
 - 3. Interior trap primer piping shall be Type L copper tubing as scheduled.
 - 4. Buried piping below the slab on grade or encased in concrete shall be Type K copper tubing, insulated in rubber foam insulation or installed in split tile conduit as scheduled herein below.

5. Trap primer valves shall be manufactured by Precision Plumbing Products, Inc. as listed below:
 - a. Automatic Pressure Type Trap Primer for up to two (2) floor drains shall be Model No. PR-500 Prime Rite or PRO1-500.
 - b. Automatic Pressure Type Under-Lav Trap Primer shall be Model No. PRO1-ULP500.
 - c. Electronic TRAP PRIMER for four (4) to thirty (30) floor drains shall be Model No. PT Series Prime Time Electronic Trap Priming Manifold. The number of outlets shall be coordinated based on the number of floor drains served.
- B. Water Hammer Arresters
 1. The Contractor shall install sufficient water hammer arresters throughout the system to prevent pulsation, vibration and water hammer.
 2. Furnish and install water hammer arresters on the following:
 - a. Hot and cold domestic water branches to every fixture or group of fixtures with quick-closing valves.
 3. All water hammer arresters shall conform to ASSE 1010 and/or PDI WH201 specifications.
 4. Water hammer arresters shall be provided in accordance with the Authority Having Jurisdiction and in accordance with the Construction Documents.
 5. Water hammer arresters shall be sized and selected per ASSE 1010 and/or PDI Standard WH201 and shall have adequate displacement volume to dissipate the kinetic energy generated by the domestic water piping system.
 6. Install all water hammer arresters in the vertical position.

2.05 PIPE JOINTS AND FITTINGS

- A. All fittings shall be of a type, which maintains full wall thickness at all points, ample radius and fillets, and proper bevels or shoulders at ends.
- B. Use the following materials in the various piping systems, in accordance with Article 2.7 - System Material Schedule and the Construction Documents.

- C. Pressure Copper Tubing (P.C.T.)
1. Solder Fittings for Use with P.C.T. shall be wrought or cast brass fittings in accordance with ASME B16.18 or ASME B16.22.
 2. Soldered joints for copper tubing shall be made with 95-5 (tin and antimony) solder in accordance with ASTM Specification B32. No other solder is to be used for any purpose on the job.
 3. Solder must meet the requirements of the Federal Safe Drinking Water Act and NSF Standard 61.
 4. Fittings for P.C.T. or brass pipe where brazed joints are required shall be bronze fittings or wrought copper fittings designed for use with the scheduled pipe or tubing in accordance with ASME B16.18 and ASME B16.22.
- D. Ductile Iron Water Pipe (D.I.W.P.)
1. Fittings for Use with D.I.W.P. shall be Class 52 in accordance with AWWA Specifications C-110, C-115 or C-153.
 2. Fittings shall be “push-on” type or mechanical joint type in accordance with AWWA Specification C-111 as specified or scheduled.
 3. Fittings shall be coated and lined in accordance with AWWA Specifications C-104.
- E. Red Brass Pipe (R.B.P.)
1. Fittings for use with threaded R.B.P. shall be made with 125 lb. brass in accordance with ASME B16.15 and threads shall meet ASME B1.20.1.
 2. No plain-end couplings shall be permitted.
 3. Make joints in brass pipes without the use of lampwick or filler except “utility compound” or Permacel Teflon tape, applied to male threads only.
- F. Flanges and Flanged Fittings
1. The pressure-temperature rating of the pipe flanges shall match the pressure-temperature rating of the flanges on the equipment to which the piping connects.
 2. Copper piping flanges shall be Class 150, slip-on bronze flanges.

3. Flanged fittings for D.I.W.P. shall be in accordance with AWWA C-115.
4. Flanges and flanged fittings for bronze pipe shall be of the required working pressure, as scheduled.

G. Unions

1. Unions shall be permitted for pipe 2 in. (50 mm) and smaller.
2. Copper piping unions shall be Class 150, bronze unions with soldered or brazed joints. Soldered piping unions shall be American Brass No. 1733. Brazed piping unions shall be Flagg No. 5425.
3. Dielectric unions shall be galvanized or stainless steel threaded end, copper solder end, water-impervious isolation barrier.

H. Elbows

1. All elbows shall be of long radius pattern except where space conditions do not permit.
2. Welding elbows shall be 45 degree mill beveled or machine beveled.
3. Grooved-end elbows shall be the long radius type manufactured from standard wall pipe conforming to ASTM A53 with grooved ends.
4. Copper elbows shall be full-flow type wrought copper in accordance with ASTM B-75 alloy C12200. Fittings for 5 in. (125 mm) and 6 in. (150 mm) copper pipe shall be cast bronze in accordance with ASTM B-584-7 requirements.

I. Tees

1. Welding tees shall be 45 degree mill beveled or machine beveled.
2. In systems where outlet is two (2) pipe sizes smaller than the size of main welding, tees may be omitted and "Weld-o-lets", saddles or shaped cut end connections provided.
3. "Weld-o-lets" must be used on risers where horizontal branches tap into risers at each floor. Socket "Weld-o-lets" and/or socket tees shall not be permitted.
4. Portable tee forming machines and extruded tee connections to risers shall not be permitted in any system.

- J. Gaskets: Gaskets used in domestic cold, hot *and tepid* water systems shall be Grade “E” EPDM rated for a maximum temperature of 230°F (110°C) and maximum pressure of 400 psig (27.5 bar).

2.06 SYSTEM MATERIAL SCHEDULE

Service	Size	Pipe Type	Weight	Fitting Type
Domestic Hot and Cold Water Branches	All	Seamless Drawn Copper Tube	Type L	Wrought Copper - Soldered
Trap Primer Supply Piping (Interior)	All	Seamless Drawn Copper Tube	Type L	Wrought Copper - Soldered
Trap Primer Supply Piping (Buried)	All	Seamless Drawn Copper Tube	Type K	Wrought Copper - Brazed

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and replaced by the manufacturer.
- B. Verify existing conditions prior to starting work.
- C. Carefully check space requirements with other trades to ensure that all material can be installed in the spaces allotted thereto.
- D. Wherever this Contractor’s work interconnects with work of other Contractors, this Contractor shall coordinate his work with these Contractors to ensure that all Contractors have the information necessary to properly install all the necessary connections and equipment. Identify all work items in an approved manner in order that the Ceiling Trade may know where to install access doors and panels.

3.02 INSTALLATION

- A. All piping and materials shall be as specified herein and shall be installed in accordance with the latest industry standards, per the manufacturer’s recommendations, and as indicated on the drawings.

- B. Run and arrange piping approximately as indicated on the Construction Documents and as coordinated with other trades.
- C. Install piping as neatly spaced, straight and direct as possible, forming right angles or parallel lines with building walls and other pipes.
- D. Erect all risers plumb and true, parallel with walls and other pipes.
- E. Ream all pipe smooth before installation. Do not bend, split, flatten nor otherwise injure pipe.
- F. The Contractor shall provide all equipment and appurtenances necessary to complete the installation according to code requirements, whether indicated on the drawings or not.
- G. The Contractor shall provide all water hammer arresters necessary to complete the installation according to code requirements, whether indicated on the drawings or not.
- H. The Contractor shall provide all trap primers for floor drains necessary to complete the installation according to code requirements, whether indicated on the drawings or not.
- I. Do not install pipes or other apparatus in a manner, which interferes with the full swing of the doors.
- J. It is the responsibility of this Contractor for accurately laying out the work. Should it be found that any work is laid out so that interferences will occur, report that to the Architect before commencing work.
- K. No piping shall pass over high voltage (440V) electrical bus duct or switchgear equipment. Where required, provide protective pans under or over individual pipes and construct the pans of 16 gauge stainless steel with a 6 in. (150 mm) lip, the corners being welded to make the pans watertight. Give each pan three (3) coats of Rust-O-Leum paint and support with pipe hangers and drain clear of the equipment below.
- L. Route piping in an orderly manner parallel and perpendicular to walls maintaining gradient and headroom without interfering with use of space or taking more space than necessary. Whenever practical group piping at common elevations.
- M. Furnish and install sleeves for pipe passing through roofs, partitions, walls and floors. Piping penetrating roofs must maintain integrity of roof assembly.

- N. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- O. Provide clearance in hangers and from structure and other equipment for installation and access to water hammer arresters and trap primers.
- P. Install valves in accordance with the specifications and provide access where valves and fittings are not accessible. Coordinate size and location of access doors with valves.
- Q. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- R. All trap primers shall be of the sizes indicated and shall be routed as indicated on the drawings, or as required, to prevent trap evaporation of floor drains.
- S. All water hammer arresters shall be of the sizes indicated according to the manufacturer's requirements and shall be installed as required by the Authority Having Jurisdiction, as indicated on the drawings, or as required to avoid water hammer in the system due to quick-closing devices, equipment and solenoid valves.
- T. All piping shall be carefully graded so as to eliminate traps and pockets. Provide means for drainage by valved connections with pipe plugs for water traps.
- U. A gate or ball valve shall be installed on each domestic hot and/or cold water riser and for each branch off the riser.
- V. Piping exposed in all rooms shall be installed as nearly as possible parallel with or at right angles to the building walls. Install all pipe straight and true. Springing or forcing piping into place will not be permitted unless specifically called for. Install piping in such a manner as to prevent strain on equipment connections. Install piping in such a manner as to eliminate all static and dynamic conditions of loading on equipment connections.
- W. Piping in finished portions of the building, except in mechanical equipment rooms or where otherwise indicated on the Drawings, shall be concealed.
- X. All piping shall be of the sizes indicated and shall be routed as indicated on the Drawings, or as required, to serve all equipment and systems.
- Y. Provide valves and drain valves on branches to wall hydrants and sill cocks.
- Z. Pitch all piping to low points. Provide all low points and any pockets caused by changes in elevation required by structural or other interferences with 1/2 in. (13

mm) drain valve capped with a screwed nipple. Provide drain valves at the base of all risers.

- AA. Where hot and cold water supply pipes connect to a combination supply fitting with a shutoff valve on its discharge, or the combination supply fitting is equipped with manual or thermostatic mixing valve, equip each hot and cold water supply pipe with composition disc, swing check valve ahead of the supply fitting.
- BB. Install approved type of vacuum breakers and/or check valves or backflow preventers, as herein specified, on all equipment and fixture connections required by code, indicated on the drawings, as specified, or as required for the proper functioning of the equipment. Provide all hose threaded faucets and serrated tips with vacuum breakers.
- CC. Provide circuit balancing valve rigs after the last branch supply connection from circulated water systems, prior to connecting the end of the supply riser to the circulation main as specified under Section 22 05 23 - General Duty Valves for Plumbing Piping.
- DD. Brazed Piping
1. Filler metal shall conform with the requirements of the latest edition of ANSI/AWS A5.8 Specifications for Brazing Filler Metal with the following classifications: BCuP-2, BCuP-3, BCuP-4, BCuP-5, BAg-5 or BAg-7.
 2. Flux shall be compatible with the materials brazed and with the filler metal used and shall conform to the requirements of the latest edition of ANSI/AWS A5.31 Specifications for fluxes for Brazing and Braze Welding. All flux residue must be removed after joint is completed.
 3. Brazing shall be performed in accordance with the Copper Tube Handbook of the Copper Tube Development Association as well as the latest edition of ANSI/AWS B2.2 Standard for Brazing Procedure and Performance and ANSI/AWS C3.4 Specifications for Torch Brazing.
 4. All joints shall be made by personnel meeting the requirements of ASME Boiler Pressure Vessel Code, Section IX.
- EE. Soldered Piping
1. Filler metal shall conform with the requirements of the latest edition of ASTM B 32 Specifications for Solder Metal.

2. All joints, except for refrigerant piping, shall be made with 95% tin and 5% antimony solder, having a melting point of not less than 460°F (238°C). Refrigerant piping joints shall be made with silver solder.
3. All soldered joints shall be thoroughly cleaned before the application of the solder. Flux shall be compatible with the materials brazed and with the filler metal used and shall conform with the requirements of the latest edition of ASTM B 813 Specifications for Liquid and Paste Fluxes for Soldering Applications of Copper and Copper Tube. All flux residue must be removed after joint is completed.
4. Soldered joints shall be assembled in accordance with the Copper Tube Handbook of the Copper Tube Development Association and ASTM B 828 Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.
5. All soldered joints for tubing larger than 2 in. (50 mm) in size shall be made with the simultaneous application of two or three blow torches.

FF. Welded Piping

1. All welded joints (except pipe welded end-to-end) shall be made by the use of flanges, caps, nozzles, elbows, branch outlets and tees. Cut samples shall be submitted for approval if directed. All such fittings, etc., shall be of a type which maintains full wall thickness at all points, ample radius and fillets, and proper bevels or shoulders at ends. "Weld-o-lets" may be used where standard fittings of required sizes are not available and elsewhere as approved. All job welding shall be done by the electric arc welding process in accordance with the following:
 - a. Joints shall be 45 degree mill beveled or machine beveled.
 - b. All scale and oxide shall be removed with hammer, chisel, file and/or grinding wheel. Bevel shall be left smooth and clean.
 - c. Pipe lengths must be lined up straight with abutting pipe ends concentric.
 - d. Both conductors from the welding machine shall be extended to locations at which welding work is being done. The leads from welding machine to location of welding work shall be held together in an approved manner and then taped so as to prevent induced current in structural steel, in piping or in other metals within the building. The ground lead shall be connected to length of pipe with suitable clamp in such manner that welding current

will not flow through joints in pipe, structural steel of building or steel pipe supports.

- e. Weld metal must be thoroughly fused with base metal at all sections and must exhibit complete penetration to weld root. Welds shall be of sound metal, free from laps, slag inclusion or other defects.
- f. Welders shall be certified by the National Certified Pipe Welding Bureau of the Mechanical Contractors Association of America or by ASME Section 9. Welders shall possess and maintain current Procedure Qualification Records for the service for which they are employed and on which they work.
- g. All welds shall bear the identifying number, letter or symbol of the welder or welding operator.

GG. Grooved Piping

1. All grooved end components shall be the product of one manufacturer.
2. The manufacturer shall provide on-site training for Contractor's field personnel by a factory trained representative in the proper use of grooving tools, application of groove, and product installation. In addition, the manufacturer's representative shall periodically visit the job site and inspect installation. Contractor shall remove and replace any improperly installed products.
3. Piping shall have rolled or cut grooved-ends as appropriate to pipe material, wall thickness, pressures, size and method of joining. Pipe ends shall be grooved in accordance with coupling manufacturer's current listed standards.
4. Mechanical couplings for grooved pipe couplings shall be of the rigid type as required for the installation, with plated nuts and bolts to secure housing sections together and a synthetic rubber flush seal gasket of the cavity pressure responsive design.
5. Grooved piping systems shall be installed in accordance with the requirements of the manufacturer's latest published literature.
6. Flexible type couplings shall be installed at final connections to equipment and/or in locations where vibration attenuation and stress relief are required as determined by the Engineer.

7. Coupling housings shall be cast ductile iron conforming to ASTM A 536 (Grade 65-45-12), hot-dipped galvanized finished or Type 316 stainless steel conforming to ASTM A 351, A 743 or A 744.
8. Flange adapters shall be cast ductile iron, hot-dipped galvanized conforming to ASTM A 536 (Grade 65-45-12), or stainless steel constructed from corrosion resistant Grade CF8M (Type 316 equivalent). Flange adapters shall engage directly into roll-grooved stainless steel pipe and fittings and bolt directly to ANSI Class 125 cast iron and Class 150 steel flange components.
9. Gaskets for mechanical couplings and flange adapters shall be molded flush seal type conforming to the outside diameter of the steel pipe. Synthetic rubber or elastomers having properties as indicated in ASTM D 2000 shall be used. Gasket selection shall comply with the coupling manufacturer's standards, installation and design requirements and shall be suitable for the intended service and temperature range.
10. Gaskets for water service from -30°F to 230°F (-34°C to 110°C) shall be Grade "E" EPDM.
11. Bolts for mechanical couplings shall be zinc-plated (ASTM B 633) heat-treated carbon steel track head conforming to physical properties of ASTM A 183, minimum tensile strength 110,000 psi (7,585 bar).

3.03 CLEANING

- A. During construction, properly cap all lines, so as to prevent the entrance of sand, dirt, etc. Each system of piping shall be blown through after completion (for the purpose of removing grit, dirt, sand, etc., from coils and piping), for as long a time as required to thoroughly clean the apparatus.
- B. Before final adjustments are made and before operation of equipment, clean and remove all accumulation of dirt, chips or other deleterious material. Leave all domestic water piping and appurtenances in suitable condition, before final acceptance.
- C. Cover and protect all openings left in floor for passage of pipes. Protect pipes with suitable coverings as soon as set. Close all open ends of pipes with a plug fitting to prevent obstruction and damage.
- D. Protect the system against freezing in cold weather.
- E. The Contractor shall furnish all required pipe cleaning chemicals, chemical feed equipment, materials, and labor necessary to sterilize the domestic water piping as

herein specified. In addition, the Contractor shall permanently install necessary chemical injection fittings complete with stop valves, etc.

- F. After each hydrostatic leak testing procedure is complete, drain the system until empty. Liquid for hydrostatic testing of domestic water systems shall be clean domestic water from the municipal water supply.
- G. All domestic water piping and tanks shall be thoroughly flushed.
- H. Upon completion of the flushing operation, samples shall be tested by a Department of Health recognized laboratory. If samples show bacterial contamination, sterilize the potable water system in accordance with the New York City Plumbing Code, Chapter 6, Section PC610.
- I. Under no circumstances shall the Contractor permit the use of any portion of the domestic water system until it has been properly sterilized and certified same by the local water department or the Authorities Having Jurisdiction.
- J. A minimum of two (2) weeks' notice shall be given to the Engineer and Owner prior to testing and sterilization.

3.04 INSPECTION AND STARTUP SERVICE

- A. All inspections, examinations, and tests required by the authorities and/or agencies specified hereinbefore shall be arranged and paid for by this Subcontractor, as necessary to obtain complete and final acceptance of the system as installed.
- B. The certificates of inspection shall be provided in quadruplicate and shall be delivered to the Architect for distribution.
- C. Inspect all piping, hangers, rod and support for piping and equipment for proper installation according to the manufacturer's instructions.
- D. Inspect all water hammer arresters and trap primers for installation according to the manufacturer's instructions.
- E. Repair, or if required by the Architect replace, defective work with new work without extra charge to the Owner. Repeat tests as directed, until all work is proven satisfactory.
- F. Restore to its original condition any work damaged or disturbed by tests, engaging the original trades to do the work of restoration.

- G. Notify the Architect and Inspectors Having Jurisdiction at least 48 hours in advance of making the required tests, so that arrangements may be made for their presence to witness the tests.
- H. Test equipment in service and demonstrate that the equipment performs the work intended for it and that it complies with the requirements of these specifications for such equipment.

3.05 FIELD QUALITY CONTROL

- A. Soldering and Brazing Quality Control
 - 1. An independent testing agency shall observe the fitting up and making of soldered and brazed joints as prescribed in ASTM B 828 for soldered joints and in ANSI/AWS B2.2 and ANSI/AWS C3.4 for all brazed joints. The inspection and testing protocol requirements shall be as follows:
 - a. Both shop-made and field-made soldered and/or brazed joints in piping 1-1/2 in. and larger shall be subjected to random visual inspections during setup and at various stages of completion.
- B. Welding Quality Control
 - 1. An independent testing agency shall observe the fitting-up and making of welds as prescribed in ASME B31.1 and ASME B31.9. The inspection and testing protocol requirements shall be as follows:
 - a. Both shop-made welds and field-made welds shall be subjected to random visual inspections during setup and at various stages of completing the weld.

3.06 FIELD TESTS

- A. Performance Test
 - 1. Allow sufficient time to perform all tests, adjustments, necessary to place the various systems in final operation condition, verify performance requirements and check all safety devices. Labor and instruments, required for various tests shall be provided. See that all manufacturers' representatives necessary to check and adjust various systems are present with sufficient labor to perform all this work without delay. All test data shall be recorded on suitable forms and submitted to the Owner for approval.

2. A qualified representative of the equipment manufacturer shall be present at the test. The Engineer may witness tests, if he so desires. The Contractor shall notify the Engineer and Owner in writing, at least two (2) weeks prior to the day of the test.
 3. Test all systems before any paint is applied, piping is insulated, furred in or otherwise covered.
 4. Test all systems in full accordance with applicable Municipal requirements, but in no case shall the system be tested at less than 150 psig (10.5 bar) hydrostatic pressure or 50 psig (3.5 bar) above the normal operating pressure, whichever is greater. Apply the test for a minimum of two (2) consecutive hours with no loss in pressure. Prior to applying the hydrostatic test, the system shall be tested with 50 psig (3.5 bar) compressed air for a period of ten minutes with no loss in pressure.
 5. Furnish and pay for all devices, materials, supplies, labor and power required in connection with tests. Make all tests in the presence and to the satisfaction of the Architect, Insurance Underwriters and City Inspectors Having Jurisdiction.
- B. Final Acceptance Test
1. The Owner and/or the Owner's representatives will make final check of all systems only after the Contractor has completed and returned to the Owner or Owner's representatives all recorded test data, together with letter that his work is to the best of his knowledge 100% complete. Field performance tests will be required by the Owner and/or the Owner's representatives at this time to verify performance and workmanship, and to make final system component adjustments.
 2. Points and areas for recheck shall be selected by the Owner's representative.
 3. Measurements and tests shall be same as the original test procedures.
 4. After satisfactory passing of the field tests and after all necessary adjustments have been made, test the complete systems for a minimum of seven (7) days under regular operating conditions or as long as may be required to establish compliance with Contract Documents.
 5. The Contractor shall demonstrate to the Engineer and the Owner, prior to acceptance by the Owner, that all systems and/or equipment has been balanced and adjusted properly, and that the system and/or equipment is in compliance with the Contract Documents.

6. Test all trap primer valves for proper operation and filling of floor drain traps before final acceptance by the Owner.
 7. Test all water hammer arresters to ensure there is no pulsation or water hammer in the system due to equipment operation and other quick-closing devices before final acceptance by the Owner.
- C. Commissioning: Owner or Commissioning Agent shall witness all hydrostatic tests.

3.07 ADJUSTING AND BALANCING

- A. Upon completion of piping, hangers for piping and at equipment shall be adjusted to ensure that the loads are distributed evenly and that there are no loads imposed by the piping or the equipment that it is connected to.
- B. Securely tighten clevis hanger load nuts first to ensure proper hanger performance. Tighten top nut after adjustment.
- C. All equipment, valves, quick closing devices and the like shall be adjusted in accordance with manufacturers' recommendations to function properly with capacities required and/or specified.
- D. Adjust all fixture stops so that flush valves, faucets, equipment and other fixtures work quietly and efficiently before final acceptance by the Owner.
- E. Adjust circulating system balancing valves so that the system is properly balanced and design temperatures are maintained under closed system conditions, before final acceptance by the Owner.
- F. All equipment, solenoid valves, quick-closing devices and the like shall be adjusted in accordance with manufacturer recommendations to function properly without causing water hammer in the system and supplying the capacities required and/or specified.

END OF SECTION 22 11 16

SECTION 22 13 16 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Furnish and install all sanitary waste, vent and indirect waste piping required for the project as indicated on and in accordance with the requirements of the Contract Documents.
- B. Section includes:
 - 1. Material of piping systems.
 - 2. Pipe joints and fittings.
 - 3. Specialty pipe fittings.
 - 4. System material schedule.
 - 5. Traps.

1.02 RELATED SECTIONS

- A. Refer to Divisions 01, 21, 23, 26, and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.
- B. The following specification sections apply to all work herein:

Section 22 00 00	-	General Requirements for Plumbing
Section 22 05 00	-	Common Work Results for Plumbing
Section 22 05 23	-	General-Duty Valves for Plumbing Piping
Section 22 05 29	-	Hangers and Supports for Plumbing Piping and Equipment
Section 22 05 53	-	Identification for Plumbing Piping and Equipment
Section 22 05 76	-	Facility Drainage Piping Cleanouts
Section 22 42 00	-	Commercial Plumbing Fixtures

1.03 REFERENCES

- A. All sanitary waste, vent and indirect waste piping shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:

1. Codes: Perform all work in accordance with the latest applicable codes and standards for New York City.
 - a. New York City Building Code.
 - b. New York City Plumbing Code.
2. Reference Standards: Perform all work in accordance with, but not limited to, the following standards:
 - a. American Society of Mechanical Engineers
 - 1) ASME A112.3.1: Stainless Steel Drainage Systems for Sanitary DWV, Storm and Vacuum Applications, Above and Below Ground.
 - 2) ASME B16.1: Cast Iron Pipe Flanges and Flanged Fittings.
 - 3) ASME B16.3: Malleable Iron Threaded Fittings.
 - 4) ASME B16.4: Gray Iron Threaded Fittings.
 - 5) ASME B16.5: Pipe Flanges and Flanged Fittings.
 - 6) ASME B16.12: Cast Iron Threaded Drainage Fittings.
 - 7) ASME B16.15: Cast Bronze Threaded Fittings.
 - 8) ASME B16.18: Cast Copper Alloy Solder Joint Pressure Fittings.
 - 9) ASME B16.22: Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - 10) ASME B16.23: Cast Copper Alloy Solder Joint Drainage Fittings DWV.
 - 11) ASME B16.26: Cast Copper Alloy Fittings for Flared Copper Tubes.
 - 12) ASME B16.29: Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings DWV.
 - b. ASTM International

- 1) ASTM A53: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- 2) ASTM A74: Standard Specification for Cast Iron Soil Pipe and Fittings.
- 3) ASTM A888: Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary, Storm Drain, Waste and Vent Piping Applications.
- 4) ASTM B42: Specification for Seamless Copper Pipe, Standard Sizes.
- 5) ASTM B43: Specification for Seamless Red Brass Pipe, Standard Sizes.
- 6) ASTM B75/B75M: Standard Specification for Seamless Copper Tube.
- 7) ASTM B88/B88M: Standard Specification for Seamless Copper Water Tube.
- 8) ASTM B251: Specification for General Requirements for Wrought Seamless Copper and Copper Alloy Tube.
- 9) ASTM B302: Specification for Threadless Copper Pipe, Standard Sizes.
- 10) ASTM B306: Standard Specification for Copper Drainage Tube (DWV).
- 11) ASTM B813: Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube.
- 12) ASTM B828: Standard Specification for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.
- 13) ASTM C564: Standard Specification for Rubber Gaskets for Joining Cast Iron Soil Pipe and Fittings.
- 14) ASTM C1277: Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings.

- 15) ASTM C1540: Standard Specification for Heavy Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings.
- c. American Welding Society
- 1) AWS A5.8: Specification for Filler Metals for Brazing and Braze Welding.
 - 2) AWS D1.1: Structural Welding Code - Steel.
- d. Cast Iron Pipe Institute
- 1) CISPI 301: Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary, Storm Drain, Waste and Vent Piping Applications.
 - 2) CISPI 310: Standard Specification for Couplings in use with Hubless Cast Iron Soil Pipe and Fittings for Sanitary, Storm Drain, Waste and Vent Piping Applications.
- e. Manufacturers Standardization Society
- 1) MSS SP-6: Contact Faces of Pipe Flanges and Connecting-end Flanges of Valves and Fittings.
 - 2) MSS SP-9: Spot Facing for Bronze, Iron and Steel Flanges.
 - 3) MSS SP-43: Wrought Stainless Steel Butt-welding Fittings.
 - 4) MSS SP-44: Steel Pipe Line Flanges.
 - 5) MSS SP-73: Brazing Joints for Copper and Copper Alloy Pressure Fittings.
 - 6) MSS SP-83: Steel Pipe Unions Socket-Welding and Threaded.
 - 7) MSS SP-97: Forged Carbon Steel Branch Outlet Fittings- Socket Welding, Threaded and Butt-welding Ends.
 - 8) MSS SP-104: Wrought Copper Solder Joint Pressure Fittings.

- 9) MSS SP-106: Cast Copper Alloy Flanges and Flanged Fittings (Class 125, 150 and 300).
- 10) MSS SP-123: Non-Ferrous Threaded and Solder-Joint Unions for Use with Copper Water Tube.

1.04 SUBMITTALS

- A. The following submittal data shall be furnished according to the Conditions of the Contract, Division 01, and Section 22 00 00 and shall include, but not be limited to:
 1. Schedule of pipe and fitting materials, complete with typical mill reports.
 2. Schedule of pipe and fitting materials identifying the system and location, which the products are intended to be used.
 3. Copper, brass, and cast iron pipe and fittings.
 4. Heavy duty no-hub couplings and gaskets for cast iron soil pipe.
 5. Cut or roll-grooved couplings and fittings.
 6. Threaded brass or bronze fittings.
 7. Copper, brass, and cast iron pipe flanges and gaskets.
- B. Product Data: Submit manufacturer's literature including general assembly, for each type of product indicated. Include all piping, fittings, mechanical couplings, flanges, solder and dimensional characteristics.
- C. Test Reports: Indicate procedures and results for specified factory and field acceptance testing and inspections.
- D. Manufacturer's Installation Instructions: Submit support details, installation instructions and connection requirements for all products submitted.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 22 00 00 shall apply to all work specified herein.

All products and equipment specified herein shall be fabricated by companies whose primary business expertise is the manufacturing of commercial and industrial products and equipment with a minimum of ten (10) years documented experience.

- C. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- D. Make every effort to furnish all piping material from one manufacturer.
- E. After completion of installation, but prior to Final Completion, this Contractor shall certify in writing in a format acceptable to the Owner that products and materials installed, and processes used, do not contain asbestos, or polychlorinated biphenyls (PCB's) or other hazardous materials as determined by the Owner. A Materials Safety Data Sheet (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.
- F. To ensure uniformity and compatibility of piping components in grooved in piping system all grooved products and grooving tools must be the products of a single manufacturer.
- G. The manufacturer of grooved piping fittings shall provide on-site training for Contractor's field personnel by a factory trained representative in the proper use of grooving tools, application of groove, and product installation. In addition, the manufacturer's representative shall periodically visit the job site and inspect installation. Contractor shall remove and replace any improperly installed products.
- H. Furnish all equipment, materials and accessories new and free from defects.

1.06 FACTORY TESTING

- A. All piping, fittings, flanges, couplings and accessories shall be fully assembled and factory tested for full functionality at the manufacturer's factory prior to shipment as specified herein:
 - 1. All pipe, fittings, mechanical couplings, flanges and accessories shall be tested in accordance with the latest applicable industry standards before accepting delivery at the jobsite.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Division 01 and Section 22 00 00.

- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer's rigging and installation instructions.
- C. Protect all components from physical damage, including effects of weather, water, and construction debris.
- D. Store all products and materials off floors on raised platforms to protect from water damage.
- E. Products and materials, which have been exposed to water damage shall be replaced by the Contractor at no additional expense to the Contract.

1.08 COORDINATION

- A. Certain materials will be furnished, installed, or furnished and installed, under other sections of the specifications. Examine the Construction Documents to ascertain these requirements.
- B. Carefully check space requirements with other trades to ensure that all material can be installed in the spaces allotted thereto. Finished suspended ceiling elevations are indicated on the general construction drawings.
- C. Transmit to trades doing work of other sections all information required for work to be provided under their respective sections (such as foundations, electric wiring, access doors, and the like) in ample time for installation.
- D. Set all inserts for all pipes in ample time to allow the work of the other trades to be performed on scheduled time.
- E. Furnish and set all sleeves for passage of pipes through structural masonry and concrete walls and floors and elsewhere as required for proper protection of each pipe passing through building surfaces. Coordinate this work with General Contractor in order to expedite and properly perform this work.
- F. Field drilling, cutting and/or reinforcing of holes in structural metal deck required for work under this section shall be coordinated through the General Contractor and must be approved by the Structural Engineer.
- G. Should the Contractor neglect to perform preliminary work and should cutting be required in order to install equipment, the expense of this cutting and restoring of surfaces to their original condition shall be borne by this Contractor.
- H. Due to the type of the installation, a fixed sequence of operation is required to properly install the complete systems. It shall be the responsibility of this

Contractor to coordinate, protect and schedule his work with other trades in accordance with the construction sequence.

- I. Architectural drawings shall be checked for ceiling height requirements.

1.09 WARRANTY

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Furnish a one (1) year manufacturer's warranty for the entire sanitary waste, drainage and venting system.
- C. Warranty period shall commence upon final acceptance by the Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Being listed herein as an acceptable manufacturer does not permit the manufacturer to provide standard manufactured equipment that does not comply with the performance and/or physical characteristic requirements of the Contract Documents.
- B. All substitutions must be identified in the Base Bid as a voluntary Deduct Alternate and must be accompanied by a Letter of Equivalency certifying the product's equivalency in all performance and physical characteristics to the products listed herein. The proposed substitutions shall be inclusive of all cost and physical implications throughout the project. Under no circumstances should the substitution result in added cost to the project. Should the substitution be approved neither the project specifications nor the Contract Documents will be revised to reflect the substitution.
- C. Brass Pipe
 - 1. American Brass Co.
 - 2. Bridgeport Brass Co.
 - 3. Lewin Matheis.
 - 4. Mueller Industries.
 - 5. Phelps Dodge.
 - 6. Reading Tube Corp.

7. Revere.
 8. Wolverine Tube Co.
- D. Brass and Bronze Fittings
1. American Brass Co.
 2. Bridgeport Brass.
 3. Chase Brass.
 4. Elkhart Products Corp.
 5. Lewin Matheis.
 6. Stockham Co.
 7. Walworth Co.
- E. Copper Pipe, Tube and Fittings
1. American Brass Co.
 2. Bridgeport Brass.
 3. Chase Brass.
 4. Elkhart Products Corp.
 5. Lewin Matheis.
 6. Mueller Industries.
 7. Phelps Dodge.
 8. Reading Tube Corp.
 9. Revere.
 10. Wolverine Tube Co.
- F. Cast Iron Pipe and Fittings
1. ABI Foundry Company.
 2. Charlotte Pipe & Foundry.

3. Tyler Pipe & Foundry.
- G. No-Hub Heavy Duty Couplings
1. Husky Heavy Duty Couplings.
 2. Mission Heavy Weight Couplings.

2.02 GENERAL REQUIREMENTS

- A. All materials and equipment shall be new, in good condition and free from defect. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the Work.
- B. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein are the minimum standards acceptable. The Engineer retains the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require the specified materials and equipment, which conform to the requirements of the Contract Documents be furnished.
- C. Materials and equipment, which are found to have factory defects shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Contractor shall be responsible for all costs associated with testing, replacement or repair, including but not limited to, all replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, re-commissioning of the equipment, etc.
- D. All pipe material shall be as specified herein and shall be installed as specified. The Contractor shall submit to the Engineer for review a list of the proposed manufacturers of pipe and fittings.
- E. All piping materials, fittings and couplings shall be of Unites States origin and manufactured in accordance with the latest applicable standards for its intended use.

2.03 MATERIALS OF PIPING SYSTEMS

- A. Use the following materials in the various piping systems, in accordance with Article 2.7 - System Material Schedule and the Construction Documents.
- B. Cast Iron No-Hub (C.I.N.H.)

1. Cast Iron Hubless Pipe shall be standard weight coated cast iron hubless pipe manufactured from gray cast iron with a tensile strength not less than 21,000 psi, in accordance with ASTM Specification A74 and CISPI 301.
 2. Each length shall be marked with the size, weight per foot and manufacturer's name clearly cast or stamped on each length.
 3. Pipe shall be manufactured by a member of the Cast Iron Soil Pipe Institute (CISPI).
- C. Cast Iron Soil Pipe (C.I.S.P.)
1. Cast Iron Soil Pipe shall be service weight coated cast iron soil pipe, hub and spigot type manufactured from gray cast iron with a tensile strength not less than 21,000 psi, in accordance with ASTM Specification A74.
 2. Each length shall be marked with the size, weight per foot and manufacturer's name clearly cast or stamped on each length.
 3. Pipe shall be manufactured by a member of the Cast Iron Soil Pipe Institute (CISPI).
- D. Extra Heavy Cast Iron (E.H.C.I.)
1. Extra-heavy coated cast iron soil pipe shall be heavy weight, bell and spigot pipe manufactured from gray cast iron with a tensile strength not less than 21,000 psi, in accordance with ASTM Specification A74.
 2. Each length shall be marked with the size, weight per foot and manufacturer's name clearly cast or stamped on each length.
 3. Pipe shall be manufactured by a member of the Cast Iron Soil Pipe Institute (CISPI).
- E. Galvanized Steel Pipe (G.S.P.)
1. Galvanized steel pipe shall be seamless or welded in accordance with the latest issue of ASTM Standard A53.
 2. Pipe shall be Schedule 40, galvanized steel as scheduled.
 3. Each length shall be hydrostatically tested at the mill and the producer's certification of said tests shall be furnished.
 4. Pipe working pressures, test pressures and finish shall be as scheduled or as indicated on the construction documents.

- F. Non-Pressure Copper Tubing (N.P.C.T.)
 - 1. Indirect waste copper tubing shall be seamless drawn or extruded tubing Type “L” or “K” as scheduled or hard temper DWV copper drainage tubing.
 - 2. Seamless drawn or extruded tubing shall be in accordance with ASTM Specification B42 and or ASTM Specification B88/B88M.
 - 3. Non-pressure hard temper Type DWV copper drainage tubing shall be furnished in 20 foot straight lengths, in accordance with ASTM Specification B306.
- G. Red Brass Pipe (R.B.P.): Red brass pipe shall be seamless annealed drawn tubing, iron pipe size (I.P.S.), containing a mixture of not less than 85% copper, in accordance with ASTM Specification B43.

2.04 PIPE JOINTS AND FITTINGS

- A. All fittings shall be of a type, which maintains full wall thickness at all points, ample radius and fillets, and proper bevels or shoulders at ends.
- B. Use the following materials in the various piping systems, in accordance with construction documents.
- C. Cast Iron No-Hub (C.I.N.H.)
 - 1. Cast iron no-hub fittings shall be standard weight coated cast iron hubless drainage fittings manufactured from gray cast iron with a tensile strength not less than 21,000 psi, in accordance with ASTM Specification A74 and CISPI 301.
 - 2. Cast iron no-hub fittings shall be joined with “Heavy Duty” no-hub couplings constructed of a shielded coupling.
 - 3. Couplings shall be constructed of Type 304 stainless steel with 305 stainless steel worm drive screws and comply with ASTM Specification C1540.
 - 4. The gasket material shall be neoprene and conform to ASTM Specification C564,
 - 5. The coupling assembly shall be torqued to manufacturer’s specified requirements.

6. Heavy duty no-hub couplings shall be Husky “Heavy Duty” {SD4000} {SD2000} coupling.
- D. Cast Iron Soil Pipe (C.I.S.P.)
1. Cast iron soil pipe fittings shall be service weight, coated cast iron bell and spigot type manufactured from gray cast iron with a tensile strength not less than 21,000 psi, in accordance with ASTM Specification A74.
 2. Cast iron soil fittings shall be joined by elastomeric compression gaskets.
 3. Gaskets shall be Tyler “TY-Seal” neoprene elastomeric compression type gaskets conforming to ASTM Standard C564.
- E. Galvanized Steel (G.S.P.)
1. Joints between lengths of galvanized steel piping shall be threaded, flanged, grooved or welded as scheduled herein below or on the Construction documents.
 2. Make screwed joints without the use of lampwick or filler, except “utility compound” or Permacel Teflon tape applied to male threads only.
 3. Mechanical couplings may be used in lieu of threaded galvanized steel fittings.
 4. Mechanical couplings shall consist of two (2) pieces of hot dipped galvanized ductile iron housings conforming to ASTM Specification A536, grade 65-45-12, with angled pads.
 5. Coupling gaskets shall be Grade “E” EPDM synthetic rubber.
 6. Coupling bolts and nuts shall be heat-treated carbon steel, trackhead design conforming to physical properties of ASTM Specification A183.
 7. All mechanical couplings for galvanized steel pipe shall be Zero-Flex Rigid Coupling Style 07 with galvanized finish as manufactured by Victaulic Company of America.
 8. Installation of mechanical couplings shall be per manufacturer’s latest recommendations.
 9. Supply grooved full-flow standard radius fittings with roll-grooved ends.
- F. Extra Heavy Cast Iron (E.H.C.I.)

1. Extra-heavy coated cast iron soil fittings shall be heavy weight, bell and spigot type manufactured from gray cast iron with a tensile strength not less than 21,000 psi, in accordance with ASTM Specification A74.
 2. Extra-heavy cast iron soil fittings shall be joined by elastomeric compression gaskets.
 3. Gaskets shall be Tyler "TY-Seal" neoprene elastomeric compression type gaskets conforming to ASTM Standard C564.
- G. Non-Pressure Copper Tubing (N.P.C.T.)
1. Solder Fittings for Use with N.P.C.T. shall be wrought, cast brass or DWV drainage fittings in accordance with ASME B16.18, ASME B16.22, ASME B16.23 or ASME B16.29.
 2. Soldered joints for copper tubing shall be made with 95-5 (tin and antimony) solder in accordance with ASTM Specification B32. No other solder is to be used for any purpose on the job.
 3. Fittings for N.P.C.T. or brass pipe where brazed joints are required shall be bronze fittings or wrought copper fittings designed for use with the scheduled pipe or tubing in accordance with ASME B16.18, ASME B16.22, ASME B16.23 or ASME B16.29.
- H. Red Brass Pipe (R.B.P.)
1. Fittings for use with threaded R.B.P. shall be made with 125lb brass in accordance with ASME B16.15 and threads shall meet ASME B1.20.1.
 2. No plain-end couplings shall be permitted.
 3. Make joints in brass pipes without the use of lampwick or filler except "utility compound" or Permacel Teflon tape, applied to male threads only.
- I. Flanges and Flanged Fittings
1. The pressure-temperature rating of the pipe flanges shall match the pressure-temperature rating of the flanges on the equipment to which the piping connects.
 2. Copper piping flanges shall be Class 150, slip-on bronze flanges.
 3. Flanges and flanged fittings for bronze pipe shall be of the required working pressure, as scheduled.

4. Do not use cast iron screw-on flanges in pump discharge piping. For this service, use cast steel, ductile iron or copper flanges.

J. Elbows

1. All elbows shall be of long radius pattern except where space conditions do not permit.
2. Welding elbows shall be 45 degree mill beveled or machine beveled.
3. Grooved-end elbows shall be the long radius type manufactured from standard wall pipe conforming with the material of the system which it is installed.
4. Copper elbows shall be full-flow type wrought copper in accordance with ASTM B-75 alloy C12200. Fittings for 5 in. (125 mm) and 6 in. (150 mm) copper pipe shall be cast bronze in accordance with ASTM B-584-7 requirements.

- K. Gaskets:** Gaskets used in sanitary drainage systems shall be Grade “E” EPDM rated for a maximum temperature of 230°F (110°C) and maximum pressure of 400 psig (27.5 bar).

SYSTEM MATERIAL SCHEDULE

Service	Size	Pipe Type	Weight	Fitting Type
Sanitary and Vent Branch Piping	2 in. (50 mm) through 10 in. (250 mm)	Cast Iron No-Hub	Service Weight	Heavy Duty No-Hub Couplings
Indirect Waste Branches (DWV)	All	Seamless Drawn Copper Tube	Type L	Wrought Copper - Soldered
Sanitary and Vent Piping (Buried)	All	Cast Iron Soil Pipe	Service Weight	Gasketed Bell & Spigot
Ejector Discharge Piping	All	Grooved Galvanized Steel	Schedule 40	Grooved with Mechanical Couplings

TRAPS

A. Sanitary Systems

1. Traps greater than 2 in. (50 mm) used in the sanitary system shall be cast brass, cast iron and/or galvanized cast iron, one-piece pattern, 3 in. (75

mm) minimum seal, of the same material and coating and/or finish as the piping system in which they are installed.

2. All traps buried in earth shall be cast iron, one-piece pattern with a 3 in. (75 mm) minimum seal.
3. Traps less than 2 in. (50 mm), not buried in earth shall be cast brass.
4. Fixture traps shall be cast brass one-piece "P" traps with 2 in. (50 mm) minimum trap seal and gasketed cleanout plugs made of machined bar stock.
5. Locate traps per code requirements.
6. Floor drain traps for use with pressurized waste discharge shall be cast iron and/or galvanized cast iron, one-piece pattern, 3 in. (75 mm) minimum seal, of the same material and coating and/or finish as the piping system in which they are installed. Each trap shall be provided with additional support consisting of unistrut or kindorf, two (2) hanger rods, and be supported from the slab above.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and replaced by the manufacturer.
- B. Verify existing conditions prior to starting work.
- C. Carefully check space requirements with other trades to ensure that all material can be installed in the spaces allotted thereto.
- D. Wherever this Contractor's work interconnects with work of other Contractors, this Contractor shall coordinate his work with these Contractors to ensure that all Contractors have the information necessary so that they may properly install all the necessary connections and equipment. Identify all work items in an approved manner in order that the Ceiling Trade may know where to install access doors and panels.
- E. The General Contractor will provide benchmarks, monuments, and other reference points on the job, which will be available for this Contractor's use.

- F. Maintain all existing benchmarks, monuments and other reference points and perform all field engineering required to ensure that work under this section shall conform with grades, elevations and lines required.

3.02 INSTALLATION

- A. All piping and materials shall be as specified herein and shall be installed in accordance with the latest industry standards, per the manufacturer's recommendations, and as indicated on the drawings.
- B. Run and arrange piping approximately as indicated on the construction documents and as coordinated with other trades.
- C. Install piping as neatly spaced, straight and direct as possible, forming right angles or parallel lines with building walls and other pipes.
- D. Erect all risers plumb and true, parallel with walls and other pipes.
- E. Ream all pipe smooth before installation. Do not bend, split, flatten nor otherwise injure pipe.
- F. The Contractor shall provide all equipment and appurtenances necessary to complete the installation according to code requirements, whether indicated on the drawings or not.
- G. Do not install pipes or other apparatus in a manner, which interferes with the full swing of the doors.
- H. It is the responsibility of this Contractor for accurately laying out the work. Should it be found that any work is laid out so that interferences will occur, report that to the Architect before commencing work.
- I. No piping shall pass over high voltage (440V) electrical bus duct or switchgear equipment. Where required, provide protective pans under or over individual pipes and construct the pans of 16 gauge stainless steel with a 6 in. (150 mm) lip, the corners being welded to make the pans watertight. Give each pan three (3) coats of Rust-O-Leum paint and support with pipe hangers and drain clear of the equipment below.
- J. Route piping in an orderly manner parallel and perpendicular to walls maintaining gradient and headroom without interfering with use of space or taking more space than necessary. Whenever practical group piping at common elevations.
- K. Furnish and install sleeves for pipe passing through roofs, partitions, walls and floors. Piping penetrating roofs must maintain integrity of roof assembly.

- L. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- M. Do not install underground piping when bedding is wet or frozen.
- N. All piping shall be carefully sloped so as to eliminate traps and pockets.
- O. Piping exposed in all rooms shall be installed as nearly as possible parallel with or at right angles to the building walls. Install all pipe straight and true. Springing or forcing piping into place will not be permitted unless specifically called for. Install piping in such a manner as to prevent strain on equipment connections. Install piping in such a manner as to eliminate all static and dynamic conditions of loading on equipment connections.
- P. Piping in finished portions of the building, except in mechanical equipment rooms or where otherwise indicated on the Drawings, shall be concealed.
- Q. All piping shall be of the sizes indicated and shall be routed as indicated on the Drawings, or as required, to serve all equipment and systems.
- R. Fixtures shall be vented as indicated on the drawings and as required by local codes.
- S. In each change of direction of soil and waste piping, provide a clean-out plug connected to same with Y fittings and 45° ell made flush with floor or wall.
- T. In all horizontal straight runs more than 50 feet (15.25 m) of length, provide at least one clean-out for each 50 feet (15.25 m) of length.
- U. Where pipe is buried, cleanouts shall be brought up flush with floor or grade unless otherwise shown on the drawings. The locations of all clean-outs shall be verified with the Architect.
- V. All cleanouts shall be of the same size as the pipe up to and including pipe 4 inches in diameter. See Section 22 05 76 - Facility Drainage Piping Cleanouts, for cleanout specifications.
- W. Provide access doors in general construction for clean-outs installed in concealed locations.
- X. All back vents shall be taken off as near traps as possible and permitted by code.
- Y. All drainage lines shall have at least the minimum slope toward the main sewer as required by the local plumbing code. Pipe must be so laid that the slope will be continuous. Permission shall be secured from the engineer before proceeding

with any work where existing conditions prevent the installation at the minimum grade specified.

- Z. The sewage and drainage work shall be complete and ready for use including all reducers, increases, special flanges and fittings, where required between the piping work and fixtures.
- AA. All horizontal pipe throughout the building, including that in pipe spaces and attics, shall be thoroughly and substantially supported from the building construction by means of approved expansion ring hangers or clevis hangers at each joint. Hangers shall be spaced in accordance with Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment.
- BB. All pipe shall be straight and have uniform fall.
- CC. All vertical pipes shall be substantially supported at each floor level with approved steel or iron riser clamps.
- DD. Provide sway bracing for all sanitary house drain piping which is supported greater than 2 ft. (0.6 m) from the slab above, measured from the top of the pipe.
- EE. Provide additional rod and banding at each joint for all sanitary house drain offsets consisting of riser clamps and threaded rod to anchor all fittings in the horizontal offset. This method of anchoring and support shall be provided in addition to the sway bracing described in the paragraph above.
- FF. Bell and Spigot Piping
 1. Bell and spigot piping shall be joined with elastomeric compression gaskets as specified.
 2. Joints shall be cleaned free from dirt, mud, sand, gravel or foreign materials.
 3. The gasket shall be folded and inserted into the hub completely, with the flange of the gasket remaining outside of the hub.
 4. Lubricate the joint and compress the piping into the joint so the spigot end of the pipe bottoms out in the hub.
- GG. Hubless Cast Iron Piping
 1. Hubless cast iron piping shall be joined with heavy duty no-hub couplings as specified.

2. Joints shall be cleaned free from dirt, mud, sand, gravel or foreign materials.
3. The gasket shall be installed on one end of the pipe or fitting and the stainless steel clamp and shield on the other end.
4. Firmly seat the pipe or fitting ends against the center stop of the gasket and slide the shield into position over the gasket.
5. The stainless steel bands shall be tightened using a calibrated torque wrench set to the manufacturer's recommended settings. Bands shall be in sequence according to the manufacturer's recommendations.

3.03 CLEANING

- A. During construction, properly cap all lines, so as to prevent the entrance of sand, dirt, etc. Each system of piping shall be blown through after completion for as long a time as required to thoroughly clean the apparatus.
- B. Before final adjustments are made and before operation of equipment, clean and remove all accumulation of dirt, chips or other deleterious material. Leave all sanitary piping and appurtenances in suitable condition, before final acceptance.
- C. Cover and protect all openings left in floor for passage of pipes. Protect pipes with suitable coverings as soon as set. Close all open ends of pipes with a plug fitting to prevent obstruction and damage.
- D. Protect the system against freezing in cold weather.

After each hydrostatic leak testing procedure is complete, drain the system until empty. Liquid for hydrostatic testing of sanitary systems shall be clean domestic water from the municipal water supply.

3.04 INSPECTION AND STARTUP SERVICE

- A. All inspections, examinations, and tests required by the authorities and/or agencies specified hereinbefore shall be arranged and paid for by this Subcontractor, as necessary to obtain complete and final acceptance of the system as installed.
- B. The certificates of inspection shall be provided in quadruplicate and shall be delivered to the Architect for distribution.
- C. Inspect all piping, hangers, rod and support for piping and equipment for proper installation according to the manufacturer's instructions.

- D. Repair, or if required by the Architect replace, defective work with new work without extra charge to the Owner. Repeat tests as directed, until all work is proven satisfactory.
- E. Restore to its original condition any work damaged or disturbed by tests, engaging the original trades to do the work of restoration.
- F. Notify the Architect and Inspectors having jurisdiction at least 48 hours in advance of making the required tests, so that arrangements may be made for their presence to witness the tests.
- G. Test equipment in service and demonstrate that the equipment performs the work intended for it and that it complies with the requirements of these Specifications for such equipment.

3.05 FIELD TESTS

- A. Performance Test
 - 1. Allow sufficient time to perform all tests, adjustments, necessary to place the various systems in final operation condition, verify performance requirements and check all safety devices. Labor and instruments, required for various tests shall be provided. See that all manufacturers' representatives necessary to check and adjust various systems are present with sufficient labor to perform all this work without delay. All test data shall be recorded on suitable forms and submitted to the Owner for approval.
 - 2. A qualified representative of the equipment manufacturer shall be present at the test. The Engineer may witness tests, if he so desires. The Contractor shall notify the Engineer and Owner in writing, at least two (2) weeks prior to the day of the test.
 - 3. Test all systems before any paint is applied, piping is insulated, furred in or otherwise covered.
 - 4. Furnish and pay for all devices, materials, supplies, labor and power required in connection with tests. Make all tests in the presence and to the satisfaction of the Architect, Insurance Underwriters and City Inspectors having jurisdiction.
 - 5. Hubless Cast Iron and Bell and Spigot Cast Iron

- a. Subject the drains, waste, and vent piping inside the building to a water test. The water test shall include the entire system from the lowest point to the highest pipe above the roof.
 - b. Water test shall be made in accordance with all local requirements.
 - c. The system shall be tested to a hydrostatic pressure equivalent to at least a 10 foot (3 m) head of water.
 - d. After filling, shut off water supply and allow it to stand two (2) hours, under test, during which time there shall be no loss or leakage.
 - e. Drainage Piping with Mechanical or Welded Joints
 - f. Subject the drainage piping to a hydrostatic test, but in no case shall the system be tested at less than 150 psig (10.5 bar) hydrostatic pressure where mechanical or welded joints are installed.
 - g. Apply the test for a minimum of two (2) consecutive hours with no loss in pressure.
 - h. Prior to applying the hydrostatic test, the system shall be tested with 50 psig (3.5 bar) compressed air for a period of ten minutes with no loss in pressure.
- B. Final Acceptance Test
1. The Owner and/or the Owner's representatives will make final check of all systems only after the Contractor has completed and returned to the Owner or Owner's representatives all recorded test data, together with letter that his work is to the best of his knowledge 100% complete. Field performance tests will be required by the Owner and/or the Owner's representatives at this time to verify performance and workmanship, and to make final system component adjustments.
 2. Points and areas for recheck shall be selected by the Owner's representative.
 3. Measurements and tests shall be same as the original test procedures.
 4. After satisfactory passing of the field tests and after all necessary adjustments have been made, test the complete systems for a minimum of

seven (7) days under regular operating conditions or as long as may be required to establish compliance with Contract Documents.

The Contractor shall demonstrate to the Engineer and the Owner, prior to acceptance by the Owner, that all systems and/or equipment has been balanced and adjusted properly, and that the system and/or equipment is in compliance with the Contract Documents.

- C. Commissioning: Owner or Commissioning Agent shall witness all hydrostatic tests.

ADJUSTING AND BALANCING

- A. Upon completion of piping, hangers for piping and at equipment shall be adjusted to ensure that the loads are distributed evenly and that there are no loads imposed by the piping or the equipment that it is connected to.
- B. Securely tighten clevis hanger load nuts first to ensure proper hanger performance. Tighten top nut after adjustment.

END OF SECTION 22 13 16

SECTION 22 13 19 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide all sanitary waste piping specialties required for equipment as indicated on and in accordance with the requirements of the Contract Documents.
- B. Section includes:
 - 1. Drains.
 - 2. Drain flashing.
 - 3. RELATED SECTIONS
- C. Refer to Divisions 01, 21, 23, 26, and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.

- D. The following specification sections apply to all work herein:

Section 22 00 00	-	General Requirements for Plumbing
Section 22 05 00	-	Common Work Results for Plumbing
Section 22 05 23	-	General-Duty Valves for Plumbing Piping
Section 22 05 29 and Equipment	-	Hangers and Supports for Plumbing Piping
Section 22 05 53 Equipment	-	Identification for Plumbing Piping and
Section 22 05 76	-	Facility Drainage Piping Cleanouts
Section 22 13 16	-	Sanitary Waste and Vent Piping

1.02 REFERENCES

- A. Each product and all associated components shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:

1. Codes: Perform all work in accordance with the latest applicable codes and standards for New York City.
 - a. New York City Building Code.
 - b. New York City Plumbing Code.
2. Reference Standards: Perform all work in accordance with, but not limited to, the following standards:
 - a. American Society of Mechanical Engineers
 - 1) ASME A112.3.1: Stainless Steel Drainage Systems for Sanitary DWV, Storm and Vacuum Applications, Above and Below Ground.
 - 2) ASME A112.6.3: Floor and Trench Drains.
 - 3) ASME A112.6.7: Enameled and Epoxy Coated Cast Iron and PVC Plastic Sanitary Floor Sinks.
 - 4) ASME B16.3: Malleable Iron Threaded Fittings.
 - 5) ASME B16.4: Gray Iron Threaded Fittings.
 - 6) ASME B16.12: Cast Iron Threaded Drainage Fittings.
 - b. ASTM International
 - 1) ASTM A48: Standard Specification for Gray Iron Castings.
 - 2) ASTM A74: Standard Specification for Cast Iron Soil Pipe and Fittings.
 - 3) ASTM A239: Standard Practice for Locating the Thinnest Spot in a Galvanized Coating on Iron or Steel Articles.
 - 4) ASTM A536-84: Standard Specification for Ductile Iron Castings.
 - 5) ASTM A888: Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary, Storm Drain, Waste and Vent Piping Applications.

- 6) ASTM B584: Standard Specification for Copper Alloy Castings for General Applications.
 - 7) ASTM C564: Standard Specification for Rubber Gaskets for Joining Cast Iron Soil Pipe and Fittings.
 - 8) ASTM C1277: Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings.
 - 9) ASTM C1540: Standard Specification for Heavy Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings.
- c. Cast Iron Pipe Institute
- 1) CISPI 301: Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary, Storm Drain, Waste and Vent Piping Applications.
 - 2) CISPI 310: Standard Specification for Couplings in use with Hubless Cast Iron Soil Pipe and Fittings for Sanitary, Storm Drain, Waste and Vent Piping Applications.

1.03 SUBMITTALS

- A. The following submittal data shall be furnished according to the Conditions of the Contract, Division 01, and Section 22 00 00 and shall include, but not be limited to:
 1. Schedule of drains including drain sizes, finishes, materials of construction and location where each drain will be installed.
- B. Product Data: Submit manufacturer's literature including general assembly, for each type of product indicated. Include all support details, installation procedures and warranties.
- C. Test Reports: Indicate procedures and results for specified factory and field acceptance testing and inspections.
- D. Manufacturer's Installation Instructions: Submit support details, installation instructions and connection requirements for the system.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.04 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 22 00 00 shall apply to all work specified herein.
- B. All products and equipment specified herein shall be fabricated by companies whose primary business expertise is the manufacturing of commercial and industrial products and equipment with a minimum of ten (10) years documented experience.
- C. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- D. Make every effort to furnish all equipment of any equipment type from one manufacturer.
- E. Furnish all equipment, materials and accessories new and free from defects.

1.05 FACTORY TESTING

- A. All products and associated accessories shall be fully assembled and factory tested for full functionality at the manufacturer's factory prior to shipment as specified herein:
 - 1. All floor drains shall be tested in accordance with the latest applicable industry standards before accepting delivery at the jobsite.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer's rigging and installation instructions.
- C. Protect all components from physical damage, including effects of weather, water, and construction debris.
- D. Store all products off floors on raised platforms to protect from water damage.
- E. Products and materials, which have been exposed to water damage shall be replaced by the Contractor at no additional expense to the Contract.

1.07 WARRANTY

- A. Comply with the requirements of Division 01 and Section 22 00 00.

- B. Furnish a *five (5)* year manufacturer's warranty for each floor drain.
- C. Warranty period shall commence upon final acceptance by the Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Being listed herein as an acceptable manufacturer does not permit the manufacturer to provide standard manufactured equipment that does not comply with the performance and/or physical characteristic requirements of the Contract Documents.
- B. All substitutions must be identified in the Base Bid as a voluntary Deduct Alternate and must be accompanied by a Letter of Equivalency certifying the product's equivalency in all performance and physical characteristics to the products listed herein. The proposed substitutions shall be inclusive of all cost and physical implications throughout the project. Under no circumstances should the substitution result in added cost to the project. Should the substitution be approved neither the project specifications nor the Contract Documents will be revised to reflect the substitution.
- C. Floor Drains
 - 1. Jay R. Smith.
 - 2. Josam.
 - 3. Wade Mfg.
 - 4. Zurn Industries.

2.02 GENERAL REQUIREMENTS

- A. All materials and equipment shall be new, in good condition and free from defect. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- B. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein are the minimum standards acceptable. The Engineer retains the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require the specified materials and equipment, which conform to the requirements of the Contract Documents be furnished.

- C. Materials and equipment, which are found to have factory defects shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Contractor shall be responsible for all costs associated with testing, replacement or repair, including but not limited to, all replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, re-commissioning of the equipment, etc.

2.03 DRAINS

- A. All floor drains indicated on the floor plans have been given lettered type designations corresponding to the letters listed in the “Drain Schedule” on the construction documents.
- B. The drains have been listed with Zurn figure numbers, for illustrative purposes. The drains shall be the same design and have the same design options of the model indicated in the schedule.

2.04 DRAIN FLASHING

- A. Provide flashing for all floor drains where waterproofing is required.
- B. All floor drains, installed in floors having waterproof membrane flashing shall be flashed with lead not less than 3 lbs/sq.ft. or 16 oz. copper flashing built 6 in. (150 mm) into the waterproof membrane.
- C. Include underdeck clamps and extensions as scheduled, with the drain if required to properly seal the drain to the floor and waterproofing furnished.
- D. Where drains are installed in nonmembrane waterproofed floors with fill, provide 3 ft. (1 m) x 3 ft. (1 m) square 16 oz. copper flashing at each drain.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and replaced by the manufacturer.
- B. Verify existing conditions prior to starting work.
- C. Carefully check space requirements with other trades to ensure that all material can be installed in the spaces allotted thereto.
- D. Wherever this Contractor’s work interconnects with work of other Contractors, this Contractor shall coordinate his work with these Contractors to ensure that all

Contractors have the information necessary so that they may properly install all the necessary connections and equipment. Identify all work items in an approved manner in order that the Ceiling Trade may know where to install access doors and panels.

- E. The General Contractor will provide benchmarks, monuments, and other reference points on the job, which will be available for this Contractor's use.
- F. Maintain all existing benchmarks, monuments and other reference points and perform all field engineering required to ensure that work under this section shall conform with grades, elevations and lines required.

3.02 INSTALLATION

- A. All equipment shall be as specified herein and shall be installed in accordance with the latest industry standards, per the manufacturer's recommendations, and as indicated on the Drawings.
- B. Run and arrange piping approximately as indicated on the construction documents and as coordinated with other trades.
- C. Install piping as neatly spaced, straight and direct as possible, forming right angles or parallel lines with building walls and other pipes.
- D. The Contractor shall provide all equipment and appurtenances necessary to complete the installation according to code requirements, whether indicated on the drawings or not.
- E. It is the responsibility of this Contractor for accurately laying out the work. Should it be found that any work is laid out so that interferences will occur, report that to the Architect before commencing work.
- F. Protect systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- G. All piping shall be carefully sloped so as to eliminate traps and pockets.
- H. All drains shall be vented as indicated on the drawings and as required by local codes.
- I. All pipe shall be straight and have uniform fall.
- J. All *grease interceptors and oil separators* shall be sufficiently supported by the building structure.

3.03 CLEANING

- A. During construction, properly protect all equipment, so as to prevent the entrance of sand and dirt. Each drain, interceptor and separator shall be thoroughly cleaned after completion for as long a time as required to thoroughly clean the apparatus.
- B. Before final adjustments are made and before operation of equipment, clean and remove all accumulation of dirt, chips or other deleterious material. Leave all drains in suitable condition for operation, before final acceptance.
- C. Protect the system against freezing in cold weather.
- D. After each hydrostatic leak testing procedure is complete, drain the system until empty. Liquid for hydrostatic testing of sanitary systems shall be clean domestic water from the municipal water supply.

3.04 INSPECTION AND STARTUP SERVICE

- A. Inspect all floor drains drains verifying there are no obstructions and the gratings are installed as specified.

3.05 FIELD TESTS

- A. Performance Test: All floor drains, drains, shall be subjected to a water test as part of the sanitary system water test specified in Section 22 13 16 - Sanitary Waste and Vent Piping.

3.06 ADJUSTING AND BALANCING

- A. Upon completion of the piping, hangers for piping and at equipment shall be adjusted to ensure that the loads are distributed evenly and that there are no loads imposed by the piping or the equipment that it is connected to.
- B. Securely tighten clevis hanger load nuts first to ensure proper hanger performance. Tighten top nut after adjustment.
- C. Securely tighten all floor drain gratings tight to floor or drain body. Raised grates posing tripping hazards shall not be acceptable.

END OF SECTION 22 13 19

SECTION 22 14 13 - FACILITY STORM DRAINAGE PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Furnish and install all storm drainage piping required for the project as indicated on and in accordance with the requirements of the Contract Documents.
- B. Section includes:
 - 1. Material of piping systems.
 - 2. Pipe joints and fittings.
 - 3. Specialty pipe fittings.
 - 4. System material schedule.
 - 5. Traps.

1.02 RELATED SECTIONS

- A. Refer to Divisions 01, 21, 23, 26, and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.
- B. The following specification sections apply to all work herein:

Section 22 00 00	-	General Requirements for Plumbing
Section 22 05 00	-	Common Work Results for Plumbing
Section 22 05 23	-	General-Duty Valves for Plumbing Piping
Section 22 05 29	-	Hangers and Supports for Plumbing Piping and Equipment
Section 22 05 53	-	Identification for Plumbing Piping and Equipment
Section 22 05 76	-	Facility Drainage Piping Cleanouts
Section 22 07 00	-	Plumbing Insulation
Section 22 14 26	-	Facility Storm Drains
Section 22 14 29	-	Sump Pumps

1.03 REFERENCES

- A. All storm drainage piping shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:

1. Codes: Perform all work in accordance with the latest applicable codes and standards for New York City.
 - a. New York City Building Code.
 - b. New York City Plumbing Code.
2. Reference Standards: Perform all work in accordance with, but not limited to, the following standards:
 - a. American Society of Mechanical Engineers
 - 1) ASME B16.1: Cast Iron Pipe Flanges and Flanged Fittings.
 - 2) ASME B16.3: Malleable Iron Threaded Fittings.
 - 3) ASME B16.4: Gray Iron Threaded Fittings.
 - 4) ASME B16.5: Pipe Flanges and Flanged Fittings.
 - 5) ASME B16.12: Cast Iron Threaded Drainage Fittings.
 - 6) ASME B31.9: Building Services Piping.
 - b. ASTM International
 - 1) ASTM A 53: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 2) ASTM A74: Standard Specification for Cast Iron Soil Pipe and Fittings.
 - 3) ASTM A888: Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary, Storm Drain, Waste and Vent Piping Applications.
 - 4) ASTM C564: Standard Specification for Rubber Gaskets for Joining Cast Iron Soil Pipe and Fittings.
 - 5) ASTM C1277: Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings.
 - 6) ASTM C1540: Standard Specification for Heavy Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings.

- 7) ASTM F1476: Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.
- c. American Water Works Association
- 1) AWWA C606: Standard for Grooved and Shouldered End Joints.
- d. Cast Iron Pipe Institute
- 1) CISPI 301: Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary, Storm Drain, Waste and Vent Piping Applications.
 - 2) CISPI 310: Standard Specification for Couplings in use with Hubless Cast Iron Soil Pipe and Fittings for Sanitary, Storm Drain, Waste and Vent Piping Applications.

1.04 SUBMITTALS

- A. The following submittal data shall be furnished according to the Conditions of the Contract, Division 01, and Section 22 00 00 and shall include, but not be limited to:
1. Schedule of pipe and fitting materials, complete with typical mill reports.
 2. Schedule of pipe and fitting materials identifying the system and location, which the products are intended to be used.
 3. cast iron pipe and fittings.
 4. Heavy duty no-hub couplings and gaskets for cast iron soil pipe.
- B. Product Data: Submit manufacturer's literature including general assembly, for each type of product indicated. Include all piping, fittings, mechanical couplings, flanges and dimensional characteristics.
- C. Test Reports: Indicate procedures and results for specified factory and field acceptance testing and inspections.
- D. Manufacturer's Installation Instructions: Submit support details, installation instructions, connection requirements, for all products submitted.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 22 00 00 shall apply to all work specified herein.

All products and equipment specified herein shall be fabricated by companies whose primary business expertise is the manufacturing of commercial and industrial products and equipment with a minimum of ten (10) years documented experience.

- C. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- D. Make every effort to furnish all piping material from one manufacturer.
- E. After completion of installation, but prior to Final Completion, this Contractor shall certify in writing in a format acceptable to the Owner that products and materials installed, and processes used, do not contain asbestos, or polychlorinated biphenyls (PCB's) or other hazardous materials as determined by the Owner. A Materials Safety Data Sheet (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.
- F. Furnish all equipment, materials and accessories new and free from defects.

1.06 FACTORY TESTING

- A. All piping, fittings, flanges, couplings and accessories shall be fully assembled and factory tested for full functionality at the manufacturer's factory prior to shipment as specified herein:
1. All pipe, fittings, mechanical couplings, flanges and accessories shall be tested in accordance with the latest applicable industry standards before accepting delivery at the jobsite.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer's rigging and installation instructions.
- C. Protect all components from physical damage, including effects of weather, water, and construction debris.

- D. Store all products and materials off floors on raised platforms to protect from water damage.
- E. Products and materials, which have been exposed to water damage shall be replaced by the Contractor at no additional expense to the Contract.

1.08 COORDINATION

- A. Certain materials will be furnished, installed, or furnished and installed, under other sections of the specifications. Examine the Construction Documents to ascertain these requirements.
- B. Carefully check space requirements with other trades to ensure that all material can be installed in the spaces allotted thereto. Finished suspended ceiling elevations are indicated on the general construction drawings.
- C. Transmit to trades doing work of other sections all information required for work to be provided under their respective sections (such as foundations, electric wiring, access doors, and the like) in ample time for installation.
- D. Set all inserts for all pipes in ample time to allow the work of the other trades to be performed on scheduled time.
- E. Furnish and set all sleeves for passage of pipes through structural masonry and concrete walls and floors and elsewhere as required for proper protection of each pipe passing through building surfaces. Coordinate this work with General Contractor in order to expedite and properly perform this work.
- F. Field drilling, cutting and/or reinforcing of holes in structural metal deck required for work under this section shall be coordinated through the General Contractor and must be approved by the Structural Engineer.
- G. Should the Contractor neglect to perform preliminary work and should cutting be required in order to install equipment, the expense of this cutting and restoring of surfaces to their original condition shall be borne by this Contractor.
- H. Due to the type of the installation, a fixed sequence of operation is required to properly install the complete systems. It shall be the responsibility of this Contractor to coordinate, protect and schedule his work with other trades in accordance with the construction sequence.
- I. Architectural drawings shall be checked for ceiling height requirements.

1.09 WARRANTY

- A. Comply with the requirements of Division 01 and Section 22 00 00.

- B. Furnish a one (1) year manufacturer's warranty for the entire storm water drainage system.
- C. Warranty period shall commence upon final acceptance by the Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Being listed herein as an acceptable manufacturer does not permit the manufacturer to provide standard manufactured equipment that does not comply with the performance and/or physical characteristic requirements of the Contract Documents.
- B. All substitutions must be identified in the Base Bid as a voluntary Deduct Alternate and must be accompanied by a Letter of Equivalency certifying the product's equivalency in all performance and physical characteristics to the products listed herein. The proposed substitutions shall be inclusive of all cost and physical implications throughout the project. Under no circumstances should the substitution result in added cost to the project. Should the substitution be approved neither the project specifications nor the Contract Documents will be revised to reflect the substitution.
- C. Cast Iron Pipe and Fittings
 - 1. ABI Foundry Company.
 - 2. Charlotte Pipe & Foundry.
 - 3. Tyler Pipe & Foundry.
- D. No-Hub Heavy-Duty Couplings
 - 1. Husky Heavy Duty Couplings.
 - 2. Mission Heavy Weight Couplings.
- E. Polyvinyl Chloride (P.V.C.) Pipe and Fittings
 - 1. Charlotte Pipe & Foundry.
 - 2. Harvel Plastics Inc.
 - 3. Lasco Fittings Inc.
 - 4. Orion Fittings Inc.
- F. Specialty Fittings
 - 1. Dresser Coupling.

2.02 GENERAL REQUIREMENTS

- A. All materials and equipment shall be new, in good condition and free from defect. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- B. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein are the minimum standards acceptable. The Engineer retains the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require the specified materials and equipment, which conform to the requirements of the Contract Documents be furnished.
- C. Materials and equipment, which are found to have factory defects shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Contractor shall be responsible for all costs associated with testing, replacement or repair, including but not limited to, all replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, re-commissioning of the equipment, etc.
- D. All pipe material shall be as specified herein and shall be installed as specified. The Contractor shall submit to the Engineer for review a list of the proposed manufacturers of pipe and fittings.
- E. All piping materials, fittings and couplings shall be of United States origin and manufactured in accordance with the latest applicable standards for its intended use.

2.03 MATERIALS OF PIPING SYSTEMS

- A. Use the following materials in the various piping systems, in accordance with the Construction Documents.
- B. Cast Iron No-Hub (C.I.N.H.)
 - 1. Cast iron hubless pipe shall be standard weight coated cast iron hubless pipe manufactured from gray cast iron with a tensile strength not less than 21,000 psi, in accordance with ASTM Specification A74 and CISPI 301.
 - 2. Each length shall be marked with the size, weight per foot and manufacturer's name clearly cast or stamped on each length.

3. Pipe shall be manufactured by a member of the Cast Iron Soil Pipe Institute (CISPI).
- C. Cast Iron Soil Pipe (C.I.S.P.)
1. Cast iron soil pipe shall be service weight coated cast iron soil pipe, hub and spigot type manufactured from gray cast iron with a tensile strength not less than 21,000 psi, in accordance with ASTM Specification A74.
 2. Each length shall be marked with the size, weight per foot and manufacturer's name clearly cast or stamped on each length.
 3. Pipe shall be manufactured by a member of the Cast Iron Soil Pipe Institute (CISPI).
- D. Extra Heavy Cast Iron (E.H.C.I.)
1. Extra-heavy coated cast iron soil pipe shall be heavy weight, bell and spigot pipe manufactured from gray cast iron with a tensile strength not less than 21,000 psi, in accordance with ASTM Specification A74.
 2. Each length shall be marked with the size, weight per foot and manufacturer's name clearly cast or stamped on each length.
 3. Pipe shall be manufactured by a member of the Cast Iron Soil Pipe Institute (CISPI).

2.04 PIPE JOINTS AND FITTINGS

- A. All fittings shall be of a type, which maintains full wall thickness at all points, ample radius and fillets, and proper bevels or shoulders at ends.
- B. Use the following materials in the various piping systems, in accordance with the construction documents.
- C. Cast Iron No-Hub (C.I.N.H.)
1. Cast iron no-hub fittings shall be standard weight coated cast iron hubless drainage fittings manufactured from gray cast iron with a tensile strength not less than 21,000 psi, in accordance with ASTM Specification A74 and CISPI 301.
 2. Cast iron no-hub fittings shall be joined with "Heavy Duty" no-hub couplings constructed of a shielded coupling.

3. Couplings shall be constructed of Type 304 stainless steel with 305 stainless steel worm drive screws and comply with ASTM Specification C1540.
 4. The gasket material shall be neoprene and conform to ASTM Specification C564,
 5. The coupling assembly shall be torqued to manufacturer's specified requirements.
 6. Heavy duty no-hub couplings shall be Husky "Heavy Duty" {SD4000} {SD2000} coupling.
- D. Cast Iron Soil Pipe (C.I.S.P.)
1. Cast iron soil pipe fittings shall be service weight, coated cast iron bell and spigot type manufactured from gray cast iron with a tensile strength not less than 21,000 psi, in accordance with ASTM Specification A74.
 2. Cast iron soil fittings shall be joined by elastomeric compression gaskets.
 3. Gaskets shall be Tyler "TY-Seal" neoprene elastomeric compression type gaskets conforming to ASTM Standard C564.
- E. Extra Heavy Cast Iron (E.H.C.I.)
1. Extra-heavy coated cast iron soil fittings shall be heavy weight, bell and spigot type manufactured from gray cast iron with a tensile strength not less than 21,000 psi, in accordance with ASTM Specification A74.
 2. Extra-heavy cast iron soil fittings shall be joined by elastomeric compression gaskets.
 3. Gaskets shall be Tyler "TY-Seal" neoprene elastomeric compression type gaskets conforming to ASTM Standard C564.
- F. Elbows
1. All elbows shall be of long radius pattern except where space conditions do not permit.
 2. Welding elbows shall be 45 degree mill beveled or machine beveled.
 3. Grooved-end elbows shall be the long radius type manufactured from standard wall pipe conforming with the material of the system which it is installed.

- G. Gaskets: Gaskets used in sanitary drainage systems shall be Grade “E” EPDM rated for a maximum temperature of 230°F (110°C) and maximum pressure of 400 psig (27.5 bar).

2.05 SYSTEM MATERIAL SCHEDULE

Service	Size	Pipe Type	Weight	Fitting Type
Storm Drainage Risers (Stacks) 2nd Floor and Below	2 in. (50 mm) through 10 in. (250 mm)	Cast Iron No-Hub Cast Iron Soil Pipe	Service Weight}	Heavy Duty No-Hub Couplings Gasketed Bell & Spigot
Storm Drainage Branch Piping	2 in. (50 mm) through 10 in. (250 mm)	Cast Iron No-Hub Cast Iron Soil Pipe	Service Weight	Heavy Duty No-Hub Couplings Gasketed Bell & Spigot
Storm Drainage Piping (Buried)	All	Cast Iron Soil Pipe	Service Weight	Gasketed Bell & Spigot
Sump Pump Discharge Piping	All	Grooved Galvanized Steel	Schedule 40	Grooved with Mechanical Couplings

2.06 TRAPS

- A. Storm Systems
1. Traps 3 in. (75 mm) and greater used in the storm system shall be cast iron and/or galvanized cast iron, one-piece pattern, 3 in. (75 mm) minimum seal, of the same material and coating and/or finish as the piping system in which they are installed.
 2. All traps buried in earth shall be cast iron, one-piece pattern with a 3 in. (75 mm) minimum seal.
 3. Locate traps per code requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and replaced by the manufacturer.
- B. Verify existing conditions prior to starting work.

- C. Carefully check space requirements with other trades to ensure that all material can be installed in the spaces allotted thereto.
- D. Wherever this Contractor's work interconnects with work of other Contractors, this Contractor shall coordinate his work with these Contractors to ensure that all Contractors have the information necessary so that they may properly install all the necessary connections and equipment. Identify all work items in an approved manner in order that the Ceiling Trade may know where to install access doors and panels.
- E. The General Contractor will provide benchmarks, monuments, and other reference points on the job, which will be available for this Contractor's use.
- F. Maintain all existing benchmarks, monuments and other reference points and perform all field engineering required to ensure that work under this section shall conform with grades, elevations and lines required.
- G. Verify excavations are to required grade, dry, and not over-excavated.
- H. Verify trenches are ready to receive piping.

3.02 INSTALLATION

- A. All piping and materials shall be as specified herein and shall be installed in accordance with the latest industry standards, per the manufacturer's recommendations, and as indicated on the drawings.
- B. Run and arrange piping approximately as indicated on the Construction Documents and as coordinated with other trades.
- C. Install piping as neatly spaced, straight and direct as possible, forming right angles or parallel lines with building walls and other pipes.
- D. Erect all risers plumb and true, parallel with walls and other pipes.
- E. Ream all pipe smooth before installation. Do not bend, split, flatten nor otherwise injure pipe.
- F. The Contractor shall provide all equipment and appurtenances necessary to complete the installation according to code requirements, whether indicated on the drawings or not.
- G. Do not install pipes or other apparatus in a manner, which interferes with the full swing of the doors.

- H. It is the responsibility of this Contractor for accurately laying out the work. Should it be found that any work is laid out so that interferences will occur, report that to the Architect before commencing work.
- I. No piping shall pass over high voltage (440V) electrical bus duct or switchgear equipment.
- J. Route piping in an orderly manner parallel and perpendicular to walls maintaining gradient and headroom without interfering with use of space or taking more space than necessary. Whenever practical group piping at common elevations.
- K. Furnish and install sleeves for pipe passing through roofs, partitions, walls and floors. Piping penetrating roofs must maintain integrity of roof assembly.
- L. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- M. Do not install underground piping when bedding is wet or frozen.
- N. All piping shall be carefully sloped so as to eliminate traps and pockets.
- O. Piping exposed in all rooms shall be installed as nearly as possible parallel with or at right angles to the building walls. Install all pipe straight and true. Springing or forcing piping into place will not be permitted unless specifically called for. Install piping in such a manner as to prevent strain on equipment connections. Install piping in such a manner as to eliminate all static and dynamic conditions of loading on equipment connections.
- P. Piping in finished portions of the building, except in mechanical equipment rooms or where otherwise indicated on the Drawings, shall be concealed.
- Q. All piping shall be of the sizes indicated and shall be routed as indicated on the Drawings, or as required, to serve all equipment and systems.
- R. In each change of direction of storm drainage piping, provide a clean-out plug connected to same with Y fittings and 45° ell made flush with floor or wall.
- S. In all horizontal straight runs more than 50 feet (15.25 m) of length, provide at least one clean-out for each 50 feet (15.25 m) of length.
- T. Where pipe is buried, cleanouts shall be brought up flush with floor or grade unless otherwise shown on the drawings. The locations of all clean-outs shall be verified with the Architect.

- U. All clean-outs shall be of the same size as the pipe up to and including pipe 4 inches in diameter. See Section 22 05 76 - Facility Drainage Piping Cleanouts for cleanout specifications.
- V. Provide access doors in general construction for clean-outs installed in concealed locations.
- W. All drainage lines shall have at least the minimum slope toward the main sewer as required by the local plumbing code. Pipe must be so laid that the slope will be continuous. Permission shall be secured from the engineer before proceeding with any work where existing conditions prevent the installation at the minimum grade specified.
- X. All horizontal pipe throughout the building, including that in pipe spaces and attics, shall be thoroughly and substantially supported from the building construction by means of approved expansion ring hangers or clevis hangers at each joint. Hangers shall be spaced in accordance with Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment.
- Y. All pipe shall be straight and have uniform fall.
- Z. All vertical pipes shall be substantially supported at each floor level with approved steel or iron riser clamps.
- AA. Provide sway bracing for all storm house drain piping which is supported greater than 2 ft. (0.6 m) from the slab above, measured from the top of the pipe
- BB. Bell and Spigot Piping
 1. Bell and spigot piping shall be joined with elastomeric compression gaskets as specified.
 2. Joints shall be cleaned free from dirt, mud, sand, gravel or foreign materials.
 3. The gasket shall be folded and inserted into the hub completely, with the flange of the gasket remaining outside of the hub.
 4. Lubricate the joint and compress the piping into the joint so the spigot end of the pipe bottoms out in the hub.
- CC. Hubless Cast Iron Piping
 1. Hubless cast iron piping shall be joined with heavy duty no-hub couplings as specified.

2. Joints shall be cleaned free from dirt, mud, sand, gravel or foreign materials.
3. The gasket shall be installed on one end of the pipe or fitting and the stainless steel clamp and shield on the other end.
4. Firmly seat the pipe or fitting ends against the center stop of the gasket and slide the shield into position over the gasket.
5. The stainless steel bands shall be tightened using a calibrated torque wrench set to the manufacturer's recommended settings. Bands shall be in sequence according to the manufacturer's recommendations.

3.03 CLEANING

- A. During construction, properly cap all lines, so as to prevent the entrance of sand, dirt, etc. Each system of piping shall be blown through after completion for as long a time as required to thoroughly clean the apparatus.
- B. Before final adjustments are made and before operation of equipment, clean and remove all accumulation of dirt, chips or other deleterious material. Leave all storm piping and appurtenances in suitable condition, before final acceptance.
- C. Cover and protect all openings left in floor for passage of pipes. Protect pipes with suitable coverings as soon as set. Close all open ends of pipes with a plug fitting to prevent obstruction and damage.
- D. Protect the system against freezing in cold weather.

After each hydrostatic leak testing procedure is complete, drain the system until empty. Liquid for hydrostatic testing of storm systems shall be clean domestic water from the municipal water supply.

Protect polyvinyl chloride plumbing piping exposed to sunlight.

3.04 INSPECTION AND START UP SERVICE

- A. All inspections, examinations, and tests required by the authorities and/or agencies specified hereinbefore shall be arranged and paid for by this Subcontractor, as necessary to obtain complete and final acceptance of the system as installed.
- B. The certificates of inspection shall be provided in quadruplicate and shall be delivered to the Architect for distribution.

- C. Inspect all piping, hangers, rod and support for piping and equipment for proper installation according to the manufacturer's instructions.
- D. Repair, or if required by the Architect replace, defective work with new work without extra charge to the Owner. Repeat tests as directed, until all work is proven satisfactory.
- E. Restore to its original condition any work damaged or disturbed by tests, engaging the original trades to do the work of restoration.
- F. Notify the Architect and Inspectors Having Jurisdiction at least 48 hours in advance of making the required tests, so that arrangements may be made for their presence to witness the tests.
- G. Test equipment in service and demonstrate that the equipment performs the work intended for it and that it complies with the requirements of these specifications for such equipment.

3.05 FIELD TESTS

- A. Performance Test
 - 1. Allow sufficient time to perform all tests, adjustments, necessary to place the various systems in final operation condition, verify performance requirements and check all safety devices. Labor and instruments, required for various tests shall be provided. See that all manufacturers' representatives necessary to check and adjust various systems are present with sufficient labor to perform all this work without delay. All test data shall be recorded on suitable forms and submitted to the Owner for approval.
 - 2. A qualified representative of the equipment manufacturer shall be present at the test. The Engineer may witness tests, if he so desires. The Contractor shall notify the Engineer and Owner in writing, at least two (2) weeks prior to the day of the test.
 - 3. Test all systems before any paint is applied, piping is insulated, furred in or otherwise covered.

4. Furnish and pay for all devices, materials, supplies, labor and power required in connection with tests. Make all tests in the presence and to the satisfaction of the Architect, Insurance Underwriters and City Inspectors Having Jurisdiction.
 5. Hubless Cast Iron and Bell and Spigot Cast Iron:
 - a. Subject the drains and storm piping inside the building to a water test. The water test shall include the entire system from the lowest point to the highest pipe above the roof.
 - b. Water test shall be made in accordance with all local requirements.
 - c. The system shall be tested to a hydrostatic pressure equivalent to at least a 10 foot (3 m) head of water.
 - d. After filling, shut off water supply and allow it to stand two (2) hours, under test, during which time there shall be no loss or leakage.
 6. Sump Pump Discharge Piping with Mechanical, Threaded
 - a. Subject the sump pump discharge piping to a hydrostatic test, but in no case shall the system be tested at less than 5 psig (0.35 bar) hydrostatic pressure greater than the pump shut-off rating.
 - b. Apply the test for a minimum of fifteen (15) minutes with no loss in pressure.
 - c. Prior to applying the hydrostatic test, the system shall be tested with 5 psig (0.35 bar) compressed air for a period of ten minutes with no loss in pressure.
- B. Final Acceptance Test**
1. The Owner and/or the Owner's representatives will make final check of all systems only after the Contractor has completed and returned to the Owner or Owner's representatives all recorded test data, together with letter that his work is to the best of his knowledge 100% complete. Field performance tests will be required by the Owner and/or the Owner's representatives at this time to verify performance and workmanship, and to make final system component adjustments.
 2. Points and areas for recheck shall be selected by the Owner's representative.

3. Measurements and tests shall be same as the original test procedures.
4. After satisfactory passing of the field tests and after all necessary adjustments have been made, test the complete systems for a minimum of seven (7) days under regular operating conditions or as long as may be required to establish compliance with Contract Documents.
5. The Contractor shall demonstrate to the Engineer and the Owner, prior to acceptance by the Owner, that all systems and/or equipment has been balanced and adjusted properly, and that the system and/or equipment is in compliance with the Contract Documents.
6. Commissioning: Owner or Commissioning Agent shall witness all hydrostatic tests.

3.06 ADJUSTING AND BALANCING

- A. Upon completion of insulation, hangers for piping and at equipment shall be adjusted to ensure that the loads are distributed evenly and that there are no loads imposed by the piping or the equipment that it is connected to.
- B. Securely tighten clevis hanger load nuts first to ensure proper hanger performance. Tighten top nut after adjustment.

END OF SECTION 22 14 13

SECTION 22 14 26 - FACILITY STORM DRAINS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide all roof, area and other storm drains required for equipment as indicated on and in accordance with the requirements of the Contract Documents.
- B. Section includes:
 - 1. Drains.
 - 2. Drain flashing.

1.02 RELATED SECTIONS

- A. Refer to Divisions 01, 21, 23, 26, and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.
- B. The following specification sections apply to all work herein:
 - 1. Section 22 00 00 - General Requirements for Plumbing
 - Section 22 05 00 - Common Work Results for Plumbing
 - 2.
 - 3. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
 - 4. Section 22 05 53 - Identification for Plumbing Piping and Equipment
 - 5. Section 22 05 76 - Facility Drainage Piping Cleanouts
 - Section 22 07 00 - Plumbing Insulation
 - Section 22 14 13 - Facility Storm Drainage Piping
 - Section 22 14 29 - Sump Pumps

1.03 REFERENCES

- A. Each drain and all associated components shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:
 - 1. Codes: Perform all work in accordance with the latest applicable codes and standards for New York City
 - a. New York City Building Code.

- b. New York City Plumbing Code.
2. Reference Standards: Perform all work in accordance with, but not limited to, the following standards:
- a. American Society of Mechanical Engineers
 - 1) ASME A112.21.2M: Roof Drains.
 - 2) ASME B16.3: Malleable Iron Threaded Fittings.
 - 3) ASME B16.4: Gray Iron Threaded Fittings.
 - 4) ASME B16.12: Cast Iron Threaded Drainage Fittings.
 - b. ASTM International
 - 1) ASTM A48: Standard Specification for Gray Iron Castings.
 - 2) ASTM A74: Standard Specification for Cast Iron Soil Pipe and Fittings.
 - 3) ASTM A239: Standard Practice for Locating the Thinnest Spot in a Galvanized Coating on Iron or Steel Articles.
 - 4) ASTM A536-84: Standard Specification for Ductile Iron Castings.
 - 5) ASTM A888: Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary, Storm Drain, Waste and Vent Piping Applications.
 - 6) ASTM C564: Standard Specification for Rubber Gaskets for Joining Cast Iron Soil Pipe and Fittings.
 - 7) ASTM C1277: Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings.
 - 8) ASTM C1540: Standard Specification for Heavy Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings.
 - c. Cast Iron Pipe Institute

- 1) CISPI 301: Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary, Storm Drain, Waste and Vent Piping Applications.
- 2) CISPI 310: Standard Specification for Couplings in use with Hubless Cast Iron Soil Pipe and Fittings for Sanitary, Storm Drain, Waste and Vent Piping Applications.

1.04 SUBMITTALS

- A. The following submittal data shall be furnished according to the Conditions of the Contract, Division 01, and Section 22 00 00 and shall include, but not be limited to:
 1. Schedule of drains including drain sizes, finishes, materials of construction and location where each drain will be installed.
 2. Submit drain flashing with schedule of weights and materials of construction.
- B. Product Data: Submit manufacturer's literature including general assembly, for each type of drain indicated. Include all support details, installation procedures and warranties.
- C. Test Reports: Indicate procedures and results for specified factory and field acceptance testing and inspections.
- D. Manufacturer's Installation Instructions: Submit support details, installation instructions, connection requirements, for the system.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 22 00 00 shall apply to all work specified herein.
- B. All products and equipment specified herein shall be fabricated by companies whose primary business expertise is the manufacturing of commercial and industrial products and equipment with a minimum of ten (10) years documented experience.
- C. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.

- D. Make every effort to furnish all equipment of any equipment type from one manufacturer.
- E. Furnish all equipment, materials and accessories new and free from defects.

1.06 FACTORY TESTING

- A. All products and associated accessories shall be fully assembled and factory tested for full functionality at the manufacturer's factory prior to shipment as specified herein:
 - 1. All roof and area drains shall be tested in accordance with the latest applicable industry standards before accepting delivery at the jobsite.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer's rigging and installation instructions.
- C. Protect all components from physical damage, including effects of weather, water, and construction debris.
- D. Store all products off floors on raised platforms to protect from water damage.
- E. Products and materials, which have been exposed to water damage shall be replaced by the Contractor at no additional expense to the Contract.

1.08 COORDINATION

- A. Reserved.

1.09 WARRANTY

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Furnish a five (5) year manufacturer's warranty for each roof and area drain.
- C. Warranty period shall commence upon final acceptance by the Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Being listed herein as an acceptable manufacturer does not permit the manufacturer to provide standard manufactured equipment that does not comply with the performance and/or physical characteristic requirements of the Contract Documents.

- B. All substitutions must be identified in the Base Bid as a voluntary Deduct Alternate and must be accompanied by a Letter of Equivalency certifying the product's equivalency in all performance and physical characteristics to the products listed herein. The proposed substitutions shall be inclusive of all cost and physical implications throughout the project. Under no circumstances should the substitution result in added cost to the project. Should the substitution be approved neither the project specifications nor the Contract Documents will be revised to reflect the substitution.

- C. Area and Roof Drains
 - 1. Jay R. Smith.
 - 2. Josam.
 - 3. Wade Mfg.
 - 4. Zurn Industries.

2.02 GENERAL REQUIREMENTS

- A. All materials and equipment shall be new, in good condition and free from defect. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the Work.

- B. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein are the minimum standards acceptable. The Engineer retains the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require the specified materials and equipment, which conform to the requirements of the Contract Documents be furnished.

- C. Materials and equipment, which are found to have factory defects shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Contractor shall be responsible for all costs associated with testing, replacement or repair, including but not limited to, all

replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, re-commissioning of the equipment, etc.

2.03 DRAINS

- A. All roof, area and trench drains indicated on the floor plans have been given lettered type designations corresponding to the letters listed in the “Drain Schedule” on the construction documents.
- B. The drains have been listed with Zurn figure numbers, for illustrative purposes. The drains shall be the same design and have the same design options of the model indicated in the schedule.
- C. All roof, area and trench drains used shall be cast iron body with grating material, loading and finish as scheduled. Roof drains shall be designed and manufactured in accordance with ASME A112.21.2M.
- D. Special purpose drains shall be as specified below and on the Construction Documents.

2.04 DRAIN FLASHING

- A. Provide flashing for all roof and area drains where waterproofing is required.
- B. All roof, area and trench drains, installed in floors or roofs having waterproof membrane flashing shall be flashed with lead not less than 3 lbs/sq.ft. or 16 oz. copper flashing built 6 in. (150 mm) into the waterproof membrane.
- C. Include underdeck clamps and perforated extension as scheduled, with the drain if required to properly seal the drain to the roof and waterproofing furnished.
- D. Where drains are installed in nonmembrane waterproofed floors with fill, provide 3 ft. (1 m) x 3 ft. (1 m) square 16 oz. copper flashing at each drain.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and replaced by the manufacturer.
- B. Verify existing conditions prior to starting work.
- C. Carefully check space requirements with other trades to ensure that all material can be installed in the spaces allotted thereto.

- D. Wherever this Contractor's work interconnects with work of other Contractors, this Contractor shall coordinate his work with these Contractors to ensure that all Contractors have the information necessary so that they may properly install all the necessary connections and equipment. Identify all work items in an approved manner in order that the Ceiling Trade may know where to install access doors and panels.
- E. The General Contractor will provide benchmarks, monuments and other reference points on the job, which will be available for this Contractor's use.
- F. Maintain all existing benchmarks, monuments and other reference points and perform all field engineering required to ensure that work under this section shall conform with grades, elevations and lines required.

3.02 INSTALLATION

- A. All drains shall be as specified herein and shall be installed in accordance with the latest industry standards, per the manufacturer's recommendations, and as indicated on the Drawings.
- B. Run and arrange piping approximately as indicated on the construction documents and as coordinated with other trades.
- C. Install piping as neatly spaced, straight and direct as possible, forming right angles or parallel lines with building walls and other pipes.
- D. The Contractor shall provide all equipment and appurtenances necessary to complete the installation according to code requirements, whether indicated on the drawings or not.
- E. It is the responsibility of this Contractor for accurately laying out the work. Should it be found that any work is laid out so that interferences will occur, report that to the Architect before commencing work.
- F. Protect systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.
- G. All piping shall be carefully sloped so as to eliminate traps and pockets.
- H. All pipe shall be straight and have uniform fall.

3.03 CLEANING

- A. During construction, properly protect all equipment, so as to prevent the entrance of sand and dirt. Each drain shall be thoroughly cleaned after completion for as long a time as required to thoroughly clean the apparatus.

- B. Before final adjustments are made and before operation of equipment, clean and remove all accumulation of dirt, chips or other deleterious material. Leave all drains in suitable condition for operation, before final acceptance.
- C. Protect the system against freezing in cold weather.
- D. After each hydrostatic leak testing procedure is complete, drain the system until empty. Liquid for hydrostatic testing of sanitary systems shall be clean domestic water from the municipal water supply.

3.04 INSPECTION AND STARTUP SERVICE

- A. Inspect all roof and area drains verifying there are no obstructions and the gratings are installed as specified.

3.05 FIELD TESTS

- A. Performance Test: All roof, area and trench drains shall be subjected to a water test as part of the sanitary system water test specified in Section 22 14 13 - Facility Storm Drainage Piping.

3.06 ADJUSTING AND BALANCING

- A. Upon completion of the piping, hangers for piping and at equipment shall be adjusted to ensure that the loads are distributed evenly and that there are no loads imposed by the piping or the equipment that it is connected to.
- B. Securely tighten clevis hanger load nuts first to ensure proper hanger performance. Tighten top nut after adjustment.
- C. Securely tighten all roof, area and trench drain gratings tight to floor or drain body. Raised grates posing tripping hazards shall not be acceptable.

END OF SECTION 22 14 26

SECTION 22 14 29 - SUMP PUMPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide all sump pumps required for the project as indicated on and in accordance with the requirements of the Contract Documents.
- B. Section includes:
 - 1. Alarm devices.
 - 2. Basin.
 - 3. Controls.
 - 4. Materials of piping systems.
 - 5. Joints and fittings.
 - 6. Pit covers.
 - 7. Submersible elevator sump pumps.

1.2 RELATED SECTIONS

- A. Refer to Divisions 01, 21, 23, 26, and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.
- B. The following specification sections apply to all work herein:
 - 1. Section 22 00 00 - General Requirements for Plumbing
 - 2. Section 22 05 00 - Common Work Results for Plumbing
 - 3. Section 22 05 23 - General-Duty Valves for Plumbing Piping
 - 4. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment
 - 5. Section 22 05 53 - Identification for Plumbing Piping and Equipment
 - 6. Section 22 05 76 - Facility Drainage Piping Cleanouts

7. Section 22 14 13 - Facility Storm Drainage Piping

1.3 REFERENCES

- A. Each sump pump and all associated components shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:
1. Codes: Perform all work in accordance with the latest applicable codes and standards for New York City.
 - a. New York City Building Code.
 - b. New York City Electrical Code.
 - c. New York City Plumbing Code.
 2. Reference Standards: Perform all work in accordance with, but not limited to, the following standards:
 - a. American Bearing Manufacturing Association (ABMA)
 - 1) ABMA - 4: Tolerance Definitions and Gaging Practices for Ball Bearings and Roller Bearings.
 - 2) ABMA - 9: Load Ratings and Fatigue Life for Ball Bearings.
 - b. American National Standards Institute (ANSI)
 - 1) ANSI - 63.12: Electromagnetic Compatibility Limits - Recommended Practices.
 - c. American Society of Mechanical Engineers (ASME)
 - 1) ASME A17.1: Safety Code for Elevators and Escalators.
 - 2) ASME B16.1: Cast Iron Pipe Flanges and Flanged Fittings.
 - 3) ASME B16.3: Malleable Iron Threaded Fittings.
 - 4) ASME B16.4: Gray Iron Threaded Fittings.
 - 5) ASME B16.5: Pipe Flanges and Flanged Fittings.

- 6) ASME B16.12: Cast Iron Threaded Drainage Fittings.
- 7) ASME B31.9: Building Services Piping.
- d. ASTM International
 - 1) ASTM A53: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 2) ASTM F1476: Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.
- e. American Water Works Association (AWWA)
 - 1) AWWA C606: Standard for Grooved and Shouldered End Joints.
- f. American Welding Society (AWS)
 - 1) AWS D1.1: Structural Welding Code - Steel.
- g. Institute of Electrical and Electronics Engineers (IEEE)
 - 1) IEEE Standard 112: Standard Test Procedures for Polyphase Induction Motors and Generators.
- h. International Code Council Evaluation Services (ICC ES)
 - 1) ICC ES: Acceptance Criteria 156.
- i. International Electrical Testing Association (NETA)
 - 1) NETA Standard for Acceptance Testing Specifications.
- j. National Electrical Manufacturers Association (NEMA)
 - 1) NEMA MG 1: Motors and Generators.
 - 2) NEMA 250: Enclosures for Electrical Equipment.
- k. National Fire Protection Association (NFPA)
 - 1) NFPA 70: National Electrical Code.
- l. Underwriters Laboratories (UL)

- 1) UL 508: Industrial Control Equipment.
- 2) UL674: Standard for Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations.
- 3) UL60947-41A: Low-Voltage Switchgear and Control-Gear - Part 4-1: Contactors and Motor-Starters - Electromechanical Contactors and Motor-Starters.
- 4) UL 778: Standard for Motor-Operated Water Pumps.

1.4 SUBMITTALS

- A. The following submittal data shall be furnished according to the conditions of the Contract, Division 01 and Section 22 00 00 and shall include, but not be limited to:
1. Pumps, electric motors, motor starters and controllers for all equipment included under this section.
 2. Shop drawings shall state the pump manufacturer, rated flow rate and pressure, horsepower, rpm, voltage, frequency, full load amps, power factor and efficiency standards compliance, electrical ratings and characteristics, mechanical performance data, physical dimensions, weights and support points.
 3. Mounting details and mounting requirements, as well as limitation details and any other special requirements, shall be listed on these drawings.
 4. Starters and Controls: Shop drawings shall state the starter manufacturer name, circuiting diagram, voltage, special options, enclosure details, transfer switches and any other special requirements listed herein.
 5. Motor Controllers: Shop drawings shall state the controller manufacturer name, circuiting diagram, voltage, special options, enclosure details, transfer switches and any other special requirements listed herein.
 6. Pit Frames and Covers: Provide a detailed drawing identifying the pit frame size and cover, load rating of each and dimensional drawings showing access hatches and hardware.
 7. Lifting and support hardware details for pump removal from the pits.
 8. Schedule of pipe and fitting materials, identifying the system, location and its intended use.

9. Cut and/or roll grooved couplings and fittings.
- B. Product Data: Submit manufacturer's literature including general assembly, pump operating curves as well as system curves showing performance characteristics with pump and the system, operating point indicated, controls, wiring diagrams and service connections.
- C. Test Reports: Indicate procedures and results for specified factory and field acceptance testing and inspection.
- D. Manufacturer's Installation Instructions: Submit support details, installation instructions and connection requirements for the system.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 22 00 00 shall apply to all work specified herein.
- B. All products and equipment specified herein shall be fabricated by companies whose primary business expertise is the manufacturing of commercial and industrial products and equipment with a minimum of ten (10) years documented experience.
- C. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- D. Make every effort to furnish all equipment of any equipment type from one manufacturer.
- E. Certify that pump, motor selection and the performance of each have been coordinated with the equipment that is being supplied for the project.
- F. To ensure uniformity and compatibility of piping components in grooved in piping system all grooved products and grooving tools must be the product of a single manufacturer.
- G. The manufacturer of grooved piping fittings shall provide on-site training for Contractor's field personnel by a factory trained representative in the proper use of grooving tools, application of groove, and product installation. In addition, the manufacturer's representative shall periodically visit the job site and inspect

installation. Contractor shall remove and replace any improperly installed products.

H. Furnish all equipment, materials and accessories new and free from defects.

1.6 FACTORY TESTING

- A. All sump pumps shall be fully assembled and factory tested for full functionality at the manufacturer's factory prior to shipment.
- B. Prior to shipment, the pump manufacturer shall perform quality assurance tests to include checks for compliance with the specifications, operation of the pumps submerged in water and verification of the integrity of the motor and cable insulation.
- C. Provide factory test reports for each electric motor indicating rpm, torque, electrical characteristics, motor efficiency, full load amperage and load factor.
- D. Provide factory test reports for all motor starters in accordance with the manufacturer's requirements.
- E. All piping, fittings, flanges, couplings and accessories shall be fully assembled and factory tested for full functionality at the manufacturer's factory prior to shipment in accordance with the latest applicable industry standards.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer's rigging and installation instructions.
- C. Protect all components from physical damage, including effects of weather, water, and construction debris.
- D. Store all products and materials off floors on raised platforms to protect from water damage.
- E. Products and materials, which have been exposed to water damage shall be replaced by the Contractor at no additional expense to the Contract.

1.8 WARRANTY

- A. Comply with the requirements of Division 01 and Section 22 00 00.

- B. Furnish a five (5) year manufacturer's warranty for the entire main building sump pumping system.
- C. Furnish a one (1) year manufacturer's warranty for each elevator sump pump.
- D. Furnish a twenty (20) year manufacturer's warranty for the main building sump pump motors.
- E. Furnish a five (5) year non-clog guarantee in normal sump pump service. This excludes construction debris, which must be removed from the pit prior to startup.
- F. Warranty period shall commence upon final acceptance by the Owner.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Being listed herein as an acceptable manufacturer does not permit the manufacturer to provide standard manufactured equipment that does not comply with the performance and/or physical characteristic requirements of the Contract Documents.
- B. All substitutions must be identified in the Base Bid as a voluntary Deduct Alternate and must be accompanied by a Letter of Equivalency certifying the product's equivalency in all performance and physical characteristics to the products listed herein. The proposed substitutions shall be inclusive of all cost and physical implications throughout the project. Under no circumstances should the substitution result in added cost to the project. Should the substitution be approved neither the project specifications nor the Contract Documents will be revised to reflect the substitution.
- C. Basin
 - 1. Federal Pump Co.
 - 2. Flygt Pump Co.
- D. Controls
 - 1. Fleetway.
 - 2. Multitrode.
- E. Joints and Fittings
 - 1. Mechanical Couplings and Grooved Fittings

- a. Grinnell.
 - b. Gruv-Lok.
 - c. Victaulic.
- F. Materials of Piping Systems
- 1. Steel Pipe and Fittings
 - a. Allied Pipe & Tube.
 - b. Anvil International.
 - c. U.S. Steel
 - d. Wheatland Pipe.
- G. Pit Covers
- 1. Federal Pump Co.
 - 2. Flygt Pump Co.
 - 3. G.A. Fleet.
 - 4. Leonard Powers.
- H. Submersible Elevator Sump Pumps
- 1. Grundfos Pump Co.
 - 2. Stancor Pump Co.
- I. Valves
- 1. Crane.
 - 2. Flygt Pump Co.
 - 3. Stockham.
 - 4. Victaulic.

2.2 SUBMERSIBLE ELEVATOR SUMP PUMPS

- A. Provide simplex submersible elevator sump pumps in concrete pits built under the specifications of another trade, as specified herein and scheduled on the Construction Documents.
- B. Provide a steel grate with openings as required to conform with the pit size as indicated on the construction documents. This Contractor shall provide and deliver to the Contractor an angle iron frame with anchor clips and welded stops for mounting the cover flush with the finished floor.
- C. Provide check and gate valves on the discharge of each pump and complete the discharge piping as indicated on the construction documents.
- D. The power supply including conduit and wiring shall be furnished and installed in accordance with Division 26 Specifications by the Electrical Contractor under supervision of this Contractor, who shall be responsible for the complete sump pump installation.
- E. Elevator sump pump systems shall automatically prevent the discharge of oil and alarm in the event of a high liquid level condition in the sump pit.
- F. Each unit shall be of close tolerance construction, hermetically sealed for operation completely submerged, with sealed ball bearings, stainless steel shaft, bladeless bronze non-clog impeller and screwed union connection.
- G. The pump casing shall be of cast iron construction with cast iron volute having machined surface where both parts join together.
- H. Motors shall be vertical, 1/2 hp, 1 phase, 60 hertz, 120 volt, 3,600 rpm, capacitor type hermetically sealed within the pump casing.
- I. The control system shall include a pump control panel, junction box, self-cleaning stainless steel oil-sensing probe, and dual floats for automatic pump operation and level alarm.
- J. The controls shall be factory-assembled as a complete, ready-to-use system and shall be tested and approved to UL 508 standards.
- K. The pump control panel and junction box shall each be a NEMA 4X, watertight, dust-tight, corrosion-resistant, gasketed enclosure with an 8-pin twist-lock electrical receptacle.
- L. The control panel shall include dual oil sensing relays with variable sensitivity settings, magnetic contactor with separate overcurrent relay, audio-visual alarm

station with light, horn, alarm silencing switch, auxiliary contact for common trouble alarm, and clearly marked terminal board.

- M. The control system shall provide for fully automatic pump operation and alarm activation in the event of:
 - 1. Oil present in the elevator sump pit.
 - 2. High liquid level in the elevator sump pit.
 - 3. High motor amps or a locked rotor.

- N. All connecting cables shall be provided by the manufacturer as follows:
 - 1. Sump Pit to Junction Box: Pump power and float cables, 16 ft. (4.9 m) each.
 - 2. Junction Box to Pump Control Panel: 25 ft. (7.6 m) multi-conductor cable with 8-pin twist-lock electrical connections.
 - 3. Pump Control Panel to 2 Electrical Power Supply: 8 ft. (2.4 m) long power cord.

- O. The simplex submersible elevator sump pumps shall be Stancor Pump Company Model SE50 with “Oil Minder Control System”.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and replaced by the manufacturer.

- B. Examine existing roughing and pit installation to verify that the pits or basins are sufficient for the pumps provided for the project.

3.2 INSTALLATION

- A. The submersible pump installation and mounting shall be in accordance with the manufacturer’s recommendations.

- B. Excavating, trenching, and backfilling are specified under sections of another trade.

- C. Set submersible pumps on pit floors and make direct connections to the drainage piping.
- D. Anchor guide-rail supports to pit bottoms and covers.
- E. Install pumps so pump and discharge pipe disconnecting flanges make positive seals when pumps are lowered into place.
- F. Set pit curb frame recessed in and anchored to concrete. Fasten pit cover to pit curb flange and install cover so top surface is flush with finished floor.
- G. Place and secure anchorage devices using setting drawings, templates, diagrams, instructions, and directions furnished by the pump manufacturer.
- H. Install anchor bolts to elevations required for proper attachment to supported equipment.
- I. Provide a clean-out plug connected to the same with Y fittings and 45° ell fittings in the pump discharge piping.
- J. In all horizontal straight runs more than 50 feet (15.25 m) of length, provide at least one clean-out for each 50 feet (15.25 m) of length.
- K. All drainage lines shall have at least the minimum slope toward the main sewer as required by the local plumbing code. Pipe must be so laid that the slope will be continuous. Permission shall be secured from the engineer before proceeding with any work where existing conditions prevent the installation at the minimum grade specified.
- L. The drainage work shall be complete and ready for use including all reducers, increases, special flanges and fittings, where required between the piping work and fixtures.
- M. All horizontal pipe throughout the building, including that in pipe spaces shall be thoroughly and substantially supported from the building construction by means of approved expansion ring hangers or clevis hangers at each joint. Hangers shall be spaced in accordance with Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment.
- N. All pipe shall be straight and have uniform fall.
- O. All vertical pipes shall be substantially supported at each floor level with approved steel or iron riser clamps.
- P. Provide sway bracing for all pump discharge piping which is supported greater than 2 ft. (0.6 m) from the slab above, measured from the top of the pipe.

- Q. Grooved Piping
1. All grooved end components shall be the product of one manufacturer.
 2. The manufacturer shall provide on-site training for Contractor's field personnel by a factory trained representative in the proper use of grooving tools, application of groove, and product installation. In addition, the manufacturer's representative shall periodically visit the job site and inspect installation. Contractor shall remove and replace any improperly installed products.
 3. Piping shall have rolled or cut grooved-ends as appropriate to pipe material, wall thickness, pressures, size and method of joining. Pipe ends shall be grooved in accordance with coupling manufacturer's current listed standards.
 4. Mechanical couplings for grooved pipe couplings shall be of the rigid type as required for the installation, with plated nuts and bolts to secure housing sections together and a synthetic rubber flush seal gasket of the cavity pressure-responsive design.
 5. Grooved piping systems shall be installed in accordance with the requirements of the manufacturer's latest published literature.
 6. Flexible type couplings shall be installed at final connections to equipment and/or in locations where vibration attenuation and stress relief are required as determined by the Engineer.
 7. Coupling housings shall be cast ductile iron conforming to ASTM A 536 (Grade 65-45-12), hot-dipped galvanized finished or Type 316 stainless steel conforming to ASTM A 351, A 743 or A 744.
 8. Flange adapters shall be cast ductile iron, hot-dipped galvanized conforming to ASTM A 536 (Grade 65-45-12), or stainless steel constructed from corrosion resistant Grade CF8M (Type 316 equivalent). Flange adapters shall engage directly into roll grooved stainless steel pipe and fittings and bolt directly to ANSI Class 125 cast iron and Class 150 steel flange components.
 9. Gaskets for mechanical couplings and flange adapters shall be molded flush seal type conforming to the outside diameter of the steel pipe. Synthetic rubber or elastomers having properties as indicated in ASTM D 2000 shall be used. Gasket selection shall comply with the coupling manufacturer's standards, installation and design requirements and shall be suitable for the intended service and temperature range.

10. Gaskets for water service from -30°F (-34°C) to 230°F (110°C) shall be Grade “E” EPDM.
11. Bolts for mechanical couplings shall be zinc plated (ASTM B 633) heat treated carbon steel track head conforming to physical properties of ASTM A 183, minimum tensile strength 110,000 psi (7,585 bar).

3.3 CLEANING

- A. During construction, properly cap all lines, so as to prevent the entrance of sand, dirt, etc. Each system of piping shall be blown through after completion for as long a time as required to thoroughly clean the apparatus.
- B. Before final adjustments are made and before operation of equipment, clean and remove all accumulation of dirt, chips or other deleterious material from the pit and/or basin. Leave all piping and appurtenances in suitable condition, before final acceptance.
- C. Cover and protect all openings left in floor for passage of pipes. Protect all equipment and pipes with suitable coverings as soon as set. Close all open ends of pipes with a plug fitting to prevent obstruction and damage.
- D. Protect the system against freezing in cold weather.
- E. After each hydrostatic leak testing procedure is complete, drain the system until empty. Liquid for hydrostatic testing of drainage systems shall be clean domestic water from the municipal water supply.

3.4 INSPECTION AND STARTUP SERVICE

- A. All inspections, examinations and tests required by the authorities and/or agencies specified hereinbefore shall be arranged and paid for by this Subcontractor, as necessary to obtain complete and final acceptance of the system as installed.
- B. The certificates of inspection shall be provided in quadruplicate and shall be delivered to the Architect for distribution.
- C. A factory-authorized service representative shall inspect and perform the final alignment and adjustments of all pumps to assure proper installation and operation of each system.
- D. Verify the following prior to starting pumps:
 1. All blocking and bracing have been removed from bases.

2. The pumps have been leveled, the grouting has been performed correctly, and the pump and motor assembly have been properly installed.
 3. Pumps have been primed and pits are full of water.
 4. Piping, pits and basins are clean and free of debris.
- E. Inspect all piping, hangers, rod and support for piping and equipment for proper installation according to the manufacturer's instructions.
- F. Repair, or if required by the Architect replace, defective work with new work without extra charge to the Owner. Repeat tests as directed, until all work is proven satisfactory.
- G. Restore to its original condition any work damaged or disturbed by tests, engaging the original trades to do the work of restoration.
- H. Notify the Architect and Inspectors Having Jurisdiction at least 48 hours in advance of making the required tests, so that arrangements may be made for their presence to witness the tests.
- I. Test equipment in service and demonstrate that the equipment performs the work intended for it and that it complies with the requirements of these specifications for such equipment.

3.5 FIELD QUALITY CONTROL

- A. Grooved Piping Installation Certification: A factory inspector shall inspect the installation of all grooved piping products to ensure that the installation has been made in accordance with the manufacturer's installation instructions as follows:
1. Inspector shall perform periodic observations of coupling installations in accordance with the latest revisions of the coupling manufacturer's installation instructions. The frequency of the observations shall be adjusted with the pace of the project to ensure that no less than ten percent (10%) of the installation is observed at each stage of completion.
 2. The inspector shall have the authority to randomly select which fittings will be inspected. The Installing Contractor must provide access to all fittings.
 3. The inspector's observations shall be recorded and all deficiencies noted in the installation shall be tagged for remediation.
 4. At the conclusion of each day's observations the inspector shall issue a report of their findings referencing the specific systems examined and

describing any deficiencies requiring corrective action to the Engineer of record and the Installing Contractor.

5. Based on the results of the observation reports a determination of the extent of the subsequent testing beyond the minimum shall be established by the Engineer.
6. Upon conclusion of the required inspections and confirmation that any and all deficiencies have been corrected the manufacturer shall provide a report to the Engineer and Installing Contractor certifying that the entire installation is in compliance with the manufacturer's requirements.
7. All costs for additional testing above and beyond the protocol requirements listed above and all costs associated with repair, replacement, schedule impacts, etc., shall be borne by the Contractor.

3.6 FIELD TESTS

A. Performance Test

1. Allow sufficient time to perform all tests, adjustments, necessary to place the various systems in final operation condition, verify performance requirements and check all safety devices. Labor and instruments, required for various tests shall be provided. See that all manufacturers' representatives necessary to check and adjust various systems are present with sufficient labor to perform all this work without delay. All test data shall be recorded on suitable forms and submitted to the Owner for approval.
2. A qualified representative of the equipment manufacturer shall be present at the test. The Engineer may witness tests, if he so desires. The Contractor shall notify the Engineer and Owner in writing, at least two (2) weeks prior to the day of the test.
3. Test all systems before any paint is applied, piping is insulated, furred in or otherwise covered.
4. Furnish and pay for all devices, materials, supplies, labor and power required in connection with tests. Make all tests in the presence and to the satisfaction of the Architect, Insurance Underwriters and City Inspectors Having Jurisdiction.
5. Test motor amperage and voltage on each phase at operating conditions.

6. Perform a complete test of each pump and pump controller to verify functionality, alarms and communication between the controller and building management system.
 7. Sump Pump Discharge Piping with Mechanical, Threaded or Welded Joints
 - a. Subject the sump pump discharge piping to a hydrostatic test, but in no case shall the system be tested at less than 5 psig (0.35 bar) hydrostatic pressure greater than the pump shut-off rating.
 - b. Apply the test for a minimum of fifteen (15) minutes with no loss in pressure.
 - c. Prior to applying the hydrostatic test, the system shall be tested with 5 psig (0.35 bar) compressed air for a period of ten minutes with no loss in pressure.
- B. Integrated Test
1. Test the communication between pump controllers and the building management systems. Verify that alarms are fully functional prior to final acceptance testing.
 2. Verify that overload heaters installed in motor starters are properly sized and adjusted for the motors they serve.
 3. Verify that all motors have been properly lubricated and left ready for operation.
 4. All alarms (BMS, fire alarms, etc.) shall be tested to fulfill satisfactory operating conditions. Verify proper operation of electrical safety interlocks and limit switches.
- C. Final Acceptance Test
1. The Owner and/or the Owner's representatives will make final check of all systems only after the Contractor has completed and returned to the Owner or Owner's representatives all recorded test data, together with letter that his work is to the best of his knowledge 100% complete. Field performance tests will be required by the Owner and/or the Owner's representatives at this time to verify performance and workmanship, and to make final system component adjustments.

2. Points and areas for recheck shall be selected by the Owner's representative.
 3. Measurements and tests shall be same as the original test procedures.
 4. The Contractor shall demonstrate to the Engineer and the Owner, prior to acceptance by the Owner, that all systems and/or equipment has been balanced and adjusted properly, and that the system and/or equipment is in compliance with the Contract Documents.
 5. Schedule test to be witnessed by the Authority Having Jurisdiction, Owner's insurance underwriter, Owner's representative, Commissioning Agent and/or Engineer.
 6. Test each motor, pump, pump controller and all associated alarms to ensure proper operation.
 7. The Contractor shall perform a full functional test of each pump, pump controller and starter prior to final acceptance by the Owner.
- D. Commissioning: Owner or Commissioning Agent shall witness all hydrostatic and functional operating tests.

3.7 ADJUSTING AND BALANCING

- A. Upon completion of the sump pump system and piping, hangers for piping and at equipment shall be adjusted to ensure that the loads are distributed evenly and that there are no loads imposed by the piping or the equipment that it is connected to.
- B. Securely tighten clevis hanger load nuts first to ensure proper hanger performance. Tighten top nut after adjustment.
- C. Repair, or if required by the Architect replace, defective work with new work without extra charge to the Owner. Repeat tests as directed, until all work is proven satisfactory.
- D. Restore to its original condition any work damaged or disturbed by tests, engaging the original trades to do the work of restoration.
- E. The BMS system devices shall be properly adjusted and left in good working condition.
- F. Adjust motor overload protection devices.

- G. Unless otherwise specified, equipment shall be adjusted in accordance with manufacturer's recommendations to function properly with capacities required and/or specified.
- H. The Owner and/or the Owner's representatives will make final check of all systems only after the Contractor has completed and returned to the Owner or Owner's representatives all recorded test data, together with letter that his work is to the best of his knowledge 100% complete. Field performance tests will be required by the Owner and/or the Owner's representatives at this time to verify performance and workmanship, and to make final system component adjustments.
- I. After satisfactory passing of the field tests and after all necessary adjustments have been made, test the complete systems for a minimum of seven (7) days under regular operating conditions or as long as may be required to establish compliance with Contract Documents.

END OF SECTION 22 14 29

SECTION 22 42 00 - COMMERCIAL PLUMBING FIXTURES

PART 1 - GENERAL

1.01 SUMMARY

- A. Furnish and install all plumbing fixtures and accessories herein specified and as indicated on the drawings, complete with all appurtenances required for a complete and operating fixture performance in accordance with the requirements of the Contract Documents.
- B. Section includes:
 - 1. Fixture supports.
 - 2. Lavatories.
 - 3. Sinks.
 - 4. Water closets.

1.02 RELATED SECTIONS

- A. Refer to Divisions 01, 21, 23, 26, and 28 for the scope of work furnished and installed under those divisions on which work in this division may be dependent.
- B. The following specification sections apply to all work herein:
 - 1. Section 22 00 00 - General Requirements for Plumbing
 - 2. Section 22 05 00 - Common Work Results for Plumbing
 - 3. Section 22 05 23 - General-Duty Valves for Plumbing Piping
 - 4. Section 22 05 29 - Hangers and Supports for Plumbing Piping
and Equipment
 - 5. Section 22 11 16 - Domestic Water Piping
 - 6. Section 22 13 16 - Sanitary Waste and Vent Piping
 - 7. Section 22 13 19 - Sanitary Waste Piping Specialties

1.03 REFERENCES

- A. All plumbing fixtures and accessories shall be designed, manufactured, tested and installed in accordance with the latest applicable codes and reference standards including, but not limited to, the following:
1. Codes: Perform all work in accordance with the latest applicable codes and standards for New York City.
 - a. New York City Building Code.
 - b. New York City Plumbing Code.
 2. Reference Standards: Perform all work in accordance with, but not limited to, the following standards:
 - a. American National Standards Institute (ANSI)
 - 1) A117.1: Accessible and Usable Buildings and Facilities.
 - b. American Society of Mechanical Engineers (ASME)
 - 1) A112.6.1M: Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use.
 - 2) A112.18.1: Plumbing Fixture Fittings.
 - 3) A112.18.2: Plumbing Waste Fittings.
 - 4) A112.18.3: Performance Requirements for Backflow Prevention Devices and Systems in Plumbing Fixture Fittings.
 - 5) A112.19.1: Enamelled Cast Iron and Enamelled Steel Plumbing Fixtures.
 - 6) A112.19.2: Vitreous China Plumbing Fixtures.
 - 7) A112.19.3: Stainless Steel Plumbing Fixtures.
 - 8) A112.19.4: Porcelain Enameled Formed Steel Plumbing Fixtures.
 - 9) A112.19.5: Trim for Water-Closet Bowls, Tanks, and Urinals.

- 10) A112.19.6: Hydraulic Performance Requirements for Water Closets and Urinals.
 - 11) A112.19.9: Non-vitreous Ceramic Plumbing Fixtures.
 - 12) A112 19.10: Dual Flush Devices for Water Closets.
 - 13) A112.19.14: Six Liter Water Closets Equipped with a Dual Flushing Device.
 - 14) A112.19.16: Terrazzo Plumbing Fixtures.
- c. American Society of Sanitary Engineers (ASSE)
- 1) ASSE 1001: Performance Requirements for Atmospheric Type Vacuum Breakers.
 - 2) ASSE 1010: Performance Requirements for Water Hammer Arresters.
 - 3) ASSE 1011: Performance Requirements for Hose Connection Vacuum Breakers.
 - 4) ASSE 1016: Performance Requirements for Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations.
 - 5) ASSE 1017: Performance Requirements for Temperature Actuated Mixing Valves for Hot Water Distribution Systems.
 - 6) ASSE 1037: Performance Requirements for Pressurized Flushing Devices (Flushometers) for Plumbing Fixtures.
 - 7) ASSE 1069: Performance Requirements for Automatic Temperature Control Mixing Valves.
 - 8) ASSE 1070: Performance Requirements for Temperature Limiting Devices.
- d. American Society of Sanitary Engineers (ASTM)
- 1) ASTM B152: Standard Specification for Copper Sheet, Strip, Plate and Rolled Bar.

- 2) ASTM D4068: Standard Specification for Chlorinated Polyethylene (CPE) Sheeting for Concealed Water Containment Membrane.
 - 3) ASTM D4551: Standard Specification for Polyvinyl Chloride (PVC) Plastic Flexible Concealed Water Containment Membrane.
- e. Americans With Disabilities Act (ADA)
- 1) ADA Standard 28 CFR 35.151: New Construction and Alterations.
 - 2) ADA Standard 28 CFR 36 Subpart D: New Construction and Alterations.
- f. National Sanitation Foundation
- 1) NSF/ANSI Standard 61: Drinking Water System Components.

1.04 SUBMITTALS

- A. The following submittal data shall be furnished according to the conditions of the Contract, Division 01, and Section 22 00 00 and shall include, but not be limited to:
1. Product Data: Submit catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim and finishes.
 2. Test Reports: Indicate procedures and results for specified factory and field acceptance testing and inspections.
 3. Manufacturer's Installation Instructions: Submit installation methods and procedures, support details and connection requirements for the system.
 4. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
 5. Mounting details and mounting requirements, as well as limitation details and any other special requirements, shall be listed on these drawings.
 6. Operation and maintenance manuals, including replacement and spare parts lists and maintenance procedures.

1.05 QUALITY ASSURANCE

- A. The quality assurance requirements of Division 01 and Section 22 00 00 shall apply to all work specified herein.

All products and equipment specified herein shall be fabricated by companies whose primary business expertise is the manufacturing of commercial and industrial products and equipment with a minimum of ten (10) years' documented experience.

- B. Each submittal shall be provided with documentation certifying that all materials, products, components and test reports are in compliance with the design requirements for this project.
- C. Make every effort to furnish all plumbing fixtures, faucets and accessories from one manufacturer.
1. If fixtures, faucets or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.
- D. Furnish all equipment, materials and accessories new and free from defects.
- E. Electrical components and devices shall be listed as defined in NFPA 70, by a testing agency acceptable to the authorities having jurisdiction and shall be marked for intended use.
- F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible and free from defects.

1.06 FACTORY TESTING

- A. All plumbing fixtures shall be fully assembled, and factory tested for full functionality at the manufacturer's factory prior to shipment.
- B. Prior to shipment, plumbing fixture manufacturer shall perform quality assurance tests to include checks for compliance with the specifications and applicable reference standards.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Division 01 and Section 22 00 00.
- B. Accept all material and equipment on site in factory packing. Inspect for damage. Comply with the manufacturer's rigging and installation instructions.

- C. Protect all components from physical damage, including effects of weather, water, and construction debris.
- D. Store all plumbing fixtures and associated components off floors on raised platforms to protect from water damage.
- E. Plumbing fixtures and associated components that have been exposed to water damage shall be replaced by the Contractor at no additional expense to the Contract.

1.08 COORDINATION

- A. Coordinate the installation of work in this section with the following sections:
 - 1. Division 04 - Masonry
 - 2. Division 09 - Finishes

1.09 WARRANTY

- A. Comply with the requirements of Division 01 and Section 22 00 00 - Common Work Results for Plumbing.

Furnish a one (1) year manufacturer's warranty for each and all fixtures.
- B. Warranty period shall commence upon final acceptance by the Owner.

PART 2 - PRODUCTS

2.01

See Plumbing Fixture schedule on the drawings.

2.02 GENERAL REQUIREMENTS

- A. All plumbing fixtures shall be new, in good condition and free from defect. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper function of the work.
- B. Since manufacturing methods vary, reasonable minor variations are expected; however, performance and material requirements specified herein are the minimum standards acceptable. The Engineer retains the sole right to judge the equality of equipment that deviates from the Contract Documents, to reject any alternative submitted by the Contractor, and to require the specified materials and

equipment, which conform to the requirements of the Contract Documents be furnished.

- C. Plumbing fixtures that are found to have factory defects shall be replaced or repaired in a manner acceptable to the Owner and Engineer at no additional cost to the Owner. The Contractor shall be responsible for all costs associated with testing, replacement or repair including, but not limited to, all replacement or repair costs, preparations prior to testing, all testing costs, extended warranties, recommissioning of the equipment, etc.
- D. All fixtures shall be free from imperfections, true as to line, angles, curves and color, smooth, watertight, and complete in every respect.
- E. All fixtures specified shall be of the best quality, nonabsorbent and discolored. Warped or otherwise imperfect fixtures shall not be accepted.
- F. All fixtures shall be furnished by one (1) manufacturer unless otherwise specified.
- G. All fixtures shall be certified to NSF 61 standards for drinking water system components.
- H. Fixtures shall meet ADA requirements for their intended use where identified on the Construction Documents and in accordance with the New York City Building Code.
- I. All exposed fittings shall be chrome-plated cast brass with set screw escutcheons. Escutcheons shall be brass, chrome-plated over nickel plate with brushed chrome finish. Any hanger nuts visible shall likewise be chrome-plated over nickel plate.
- J. Provide chrome-plated cast brass traps with cleanout plugs, unless otherwise noted.
- K. All toilet accessories will be furnished under the Division 01, but this Contractor shall review the list of accessories and furnish all labor and incidental material required to install those items considered "plumber's work" by local unions.

2.03 FIXTURE SUPPORTS

- A. Support all of the specified plumbing fixtures securely in a neat workmanlike manner on approved carriers or supports.
- B. The method of support for each fixture shall be as listed hereinbelow, except where fixture designations on the drawings indicate modifications.

- C. The figure space numbers used hereinafter are those of Zurn Industries Inc. unless otherwise noted, and are used as identification of the types, quality and features desired.
- D. Zurn Industries, Inc. model numbers have been used to designate the type and quality of the fixture supports required. Equivalent supports may be substituted as manufactured by others
- E. Lavatories
 - 1. Support lavatories on Zurn Industries Series Z1231 concealed arm chair carrier, single or double as required, with block base supports bolted to slab, steel pipe uprights, adjustable sleeves to receive arms and adjustable alignment truss.
 - 2. Concealed arms shall be provided with leveling screws, locking device and shall be designed to receive cast brass chrome-plated threaded escutcheons.
 - 3. Slab-type lavatories shall be furnished with extra-heavy cast brass chrome-plated threaded escutcheons between the fixture and the wall. The escutcheon shall be screwed on the adjustable sleeve or arm.
 - 4. Where required or identified on the Construction Documents, substitute the basic lavatory installation with Zurn Industries Series Z1253 wall-mounted carrier for single lavatory installation. Carrier shall have individual back plates and adjustable front plate and in all other respects shall be as hereinbefore specified.
- F. Water Closets
 - 1. Wall-hung water closets shall be supported by a concealed metal carrier that is attached to the building structural members so that strain is not transmitted to the closet connector or any other part of the plumbing system. The carrier shall conform to ASME A112.6.1M or ASME A112.6.2.
 - 2. Support water closets on Zurn Industries Series Z1203 horizontal combined chair carrier and adjustable wall closet fittings. The basic installation shall be horizontal unless otherwise note on the Construction Documents.
 - 3. The carrier shall include a corrosion-resistant pipe nipple and adjustable nosepiece with closet gasket, studs, hardware and chrome-plated cap nuts necessary to secure the fixture to the support.

4. The carrier shall have a monolithic faceplate with removable incremented sections at bottom and fitted with adjustable, reversible feet, bolted to the slab, so the carrier shall not depend on the wall construction for support.
5. The fittings shall be cast iron with a 2 inch vent connection, single or double, left or right hand as required for the location in which it is installed.
6. The combined carrier fitting shall allow 4 inches of vertical adjustment.
7. Where required or identified on the construction documents substitute the basic horizontal water closet installation with a vertical, single or double, chair carrier Zurn Ind. Series Z1204. The vertical installation shall include all requirements of the basic installation specified herein above.
8. Where back-spud water closets with concealed flush valves are installed, additional bracing shall be provided on the flush valve tailpiece to resist movement at the spud connection to the water closet. Additional bracing shall be provided in the following manner:
 - a. Provide a split ring hanger with threaded rod and foot bracket within 1 inch of the flush valve base elbow secured to the chase wall and/or supplemental bracing.
 - b. The foot bracket shall be secured to the chase wall and/or supplemental bracing by use of dry wall/concrete anchors or similar hardware.
 - c. Each end of the rod shall be provided with threaded nuts and lock washers tightened against the foot and split ring hanger to prevent loosening.
 - d. The bracing shall be installed and secured in place prior to closure of the walls and access for inspection by the Architect and Engineer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Accept all materials and equipment in factory packaging and examine for visible damage. All damaged material and equipment shall be removed from the job site and replaced by the manufacturer.
- B. Verify walls and floor finishes are prepared and ready for installation of fixtures.

- C. Verify electric power is available and of correct characteristics.
- D. Confirm millwork is constructed with adequate provision for installation of countertop lavatories and sinks.
- E. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.
- F. Verify cabinets and counters for suitable conditions where fixtures shall be installed.

3.02 INSTALLATION

- A. Install work in accordance with the New York City Building Code, ADA and other applicable standards in accordance with the Authorities Having Jurisdiction.
- B. Install each fixture with trap, easily removable for servicing and cleaning.
- C. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.
- D. Provide chrome-plated rigid supplies to fixtures with loose key stops, reducers and escutcheons.
- E. Install supply lines and fittings for every plumbing fixture so as to prevent backflow.
- F. Install all plumbing fixtures and associated components level and plumb.
- G. Install and secure fixtures in place with wall supports, wall carriers and bolts.
- H. Seal fixtures to wall and floor surfaces with sealant or grout as specified, color to match fixture.
- I. Refer to architectural drawings for special mounting heights and fixture spacing.
- J. After final installation of plumbing fixtures and trim, clean fixtures and trim, adjust trim, and ensure that fixtures and trim are operational. Replace trim that does not perform satisfactorily.
- K. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons, if required, to conceal protruding fittings.
- L. Fixtures shall be set level and in proper alignment with reference to adjacent walls.

- M. A water closet, or lavatory shall not be set closer than 15 inches (381 mm) from its center to any side wall, partition, vanity or other obstruction, or closer than 30 inches (762 mm) center-to-center between water closets or adjacent fixtures.
- N. There shall be at least a 21 inch (533 mm) clearance in front of the water closet to any wall, fixture or door. Water closet compartments shall not be less than 30 inches (762 mm) wide or 60 inches (1,524 mm) deep. There shall be at least a 21 inch (533 mm) clearance in front of a lavatory to any wall, fixture or door.

3.03 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of plumbing fixtures used for temporary facilities for permanent use unless approved in writing by the Owner.

3.04 CLEANING

- A. During construction, properly protect all plumbing fixtures so as to prevent the entrance of sand, dirt, etc. Each plumbing fixture shall be thoroughly cleaned after completion (for the purpose of removing grit, dirt, sand, etc., from coils and piping), for as long a time as required to thoroughly clean the fixtures.
- B. Before final adjustments are made and before operation of equipment, clean and remove all accumulation of dirt, chips or other deleterious material. Leave all plumbing fixtures appurtenances in suitable condition, before final acceptance.
- C. Remove faucet spouts, strainers, remove sediment and debris, and reinstall strainers and spouts.
- D. Remove sediment and debris from drains.
- E. Plumbing fixtures shall be installed so as to afford easy access for cleaning both the fixture and the area around the fixture.
- F. Under no circumstances shall the Contractor permit the use of plumbing fixture until it has been properly cleaned and the system certified same by the local water department or the Authorities Having Jurisdiction.
- G. A minimum of two (2) weeks' notice shall be given to the Engineer and Owner prior to testing and sterilization.

3.05 INSPECTION AND STARTUP SERVICE

- A. All inspections, examinations and tests required by the authorities and/or agencies specified hereinbefore shall be arranged and paid for by this Subcontractor, as necessary to obtain complete and final acceptance of the system as installed.
- B. The certificates of inspection shall be provided in quadruplicate and shall be delivered to the Architect for distribution.
- C. Inspect all plumbing fixtures and accessories for proper installation according to the manufacturer's instructions.
- D. Repair or, if required by the Architect, replace defective work with new work without extra charge to the Owner. Repeat tests as directed until all work is proven satisfactory.
- E. Restore to its original condition any work damaged or disturbed by tests, engaging the original trades to do the work of restoration.
- F. Notify the Architect and Inspectors Having Jurisdiction at least 48 hours in advance of making the required tests, so that arrangements may be made for their presence to witness the tests.
- G. Test equipment in service and demonstrate that the equipment performs the work intended for it and that it complies with the requirements of these specifications for such equipment.

3.06 FIELD TESTING

- A. Performance Test
 - 1. Allow sufficient time to perform all tests and adjustments necessary to place the various systems in final operation condition and verify performance requirements. Labor and instruments required for various tests shall be provided. See that all manufacturers' representatives necessary to check and adjust various systems are present with sufficient labor to perform all this work without delay. All test data shall be recorded on suitable forms and submitted to the Owner for approval.
 - 2. Test all plumbing fixtures to confirm the fixture performs in accordance with the manufacturer's data sheet.
- B. Final Acceptance Test
 - 1. The Owner and/or the Owner's representatives will make final check of all systems only after the Contractor has completed and returned to the

Owner or Owner's representatives all recorded test data, together with a letter that his work is 100% complete to the best of his knowledge. Field performance tests shall be required by the Owner and/or the Owner's representatives at this time to verify performance and workmanship, and to make final system component adjustments.

2. Points and areas for recheck shall be selected by the Owner's representative.
 3. Measurements and tests shall be same as the original test procedures.
 4. After satisfactory passing of the field tests and after all necessary adjustments have been made, test the complete systems for a minimum of seven (7) days under regular operating conditions or as long as may be required to establish compliance with Contract Documents.
 5. The Contractor shall demonstrate to the Engineer and the Owner, prior to acceptance by the Owner, that all systems and/or equipment has been balanced and adjusted properly, and that the system and/or equipment is in compliance with the Contract Documents.
- C. Commissioning: Owner or Commissioning Agent shall witness all hydrostatic tests.

3.07 ADJUSTING AND BALANCING

- A. Upon completion of fixture installation, each fixture shall be adjusted to ensure proper operation.
- B. All equipment, valves, quick-closing devices and the like shall be adjusted in accordance with manufacturers' recommendations to function properly with capacities required and/or specified.
- C. Adjust stops or valves for intended water flow rate for proper flow without splashing, noise or overflow.
- D. Replace washers and seals of leaking and dripping spouts and stops.

END OF SECTION 22 42 00

SECTION 23 05 12 - GENERAL PROVISIONS FOR HVAC WORK

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinated with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.

1.02 DESCRIPTION OF WORK INCLUDED

- A. Work Included:
 - 1. The work includes providing all labor, materials, equipment, accessories, services and tests necessary to complete and make ready for operation by the Owner, all Heating, Ventilating and Air Conditioning Work as shown on the Drawings and hereinafter specified, including, but not limited to the following:
 - a. All motor starters and controllers for equipment furnished by this Contractor. Packaged type units shall be furnished completely prewired with panels mounted on the units as specified. All other motor starters and controllers will be turned over to the Electrical Contractor for installation and wiring.
 - b. Heat recovery reclaim coils, pumps and controls.Fans.
 - c. Cabinet and unit heaters, finned tube radiation and convectors.
 - d. Provide isolation valves where tying new piping into the existing system. Refer to the valves specifications for the proper valve type for the service. Refer to the Drawings for the pipe/valve size. In addition to the isolation valves at the tie-in points, also provide a balancing valve on the supply side for chilled water, chilled glycol/brine, condenser water and heating/reheat hot water system tie-ins.
 - e. Piping, fittings, and valves.
 - f. Sheet metal ductwork and accessories such as dampers, access doors, etc.
 - g. Registers, grilles and diffusers.
 - h. Fire dampers and smoke dampers.
 - i. Installation of smoke detectors in ductwork.
 - j. Acoustical duct lining.
 - k. Pipe, duct and equipment insulation.
 - l. Temperature Control: A complete system of temperature control shall be installed in connection with the HVAC systems, including all thermostats, control valves, damper motors and dampers for the outdoor air intakes and fan discharges. All control wiring for automatic temperature controls, including interlocking wiring for fans, chillers, pumps, etc. by this Contractor.

- m. Painting and pipe, duct and equipment identification for all work by this Contractor is previously specified under "Special Requirements for Mechanical and Electrical Work".
- n. Test and balancing.
- o. Sleeves, pipe inserts and anchor bolts, escutcheons, prefabricated roof curbs, etc., as hereinafter specified.
- p. Identification, name plates, tags and charts.
- q. Cutting and rough patching.
- r. Furnishing and setting of electric motors.
- s. Furnishing of starters, motor control centers and motor control devices as specified under "Special Requirements for Mechanical and Electrical Work".
- t. Removal, relocation and/or demolition of existing HVAC work in conjunction with the existing buildings in order to erect the new buildings as indicated on the Contract Drawings.
- u. Concrete pads for all HVAC work.
- v. All demolition work associated with HVAC systems.
- w. Installation of fire and smoke dampers in the existing ductwork and fan systems.

1.03 WORK INCLUDED UNDER OTHER SECTIONS OF THE SPECIFICATIONS

- A. The following work is included under other Sections of the Specifications:
 - 1. Framed openings as shown on the Drawings.
 - 2. Trenches and covers.
 - 3. Valved water supply outlets within 5'-0" of the various pieces of the HVAC equipment will be left by the Plumbing Contractor. Final connections to HVAC equipment shall be made by this Contractor. Gas supply shall be within 5'-0" of equipment.
 - 4. Floor and funnel drains adjacent to equipment requiring same will be furnished and installed by the Plumbing Contractor.
 - 5. Outside air inlets, exhaust outlets, louvers and screens through walls, and elsewhere as noted on the Drawings. Motorized dampers furnished and installed under this Contract.
 - 6. Power wiring for all motors except where otherwise noted.
 - 7. Setting of access doors furnished by this Contractor.
 - 8. All motor disconnect switches, except where in combination starters and where otherwise noted.
 - 9. Finish painting.
 - 10. Access doors in ceiling and walls.
 - 11. Finish patching.
 - 12. Fan shutdown system.
 - 13. Mounting of all starters, motor control centers, starter panelboards, and motor control devices: Division 26.
 - 14. Electric radiant panels: Division 26.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with quality established in Section 01 31 46 "Special Requirements for Mechanical and Electrical Work", and hereinafter specified. All work performed shall comply with local codes.

1.05 SUBMITTALS

- A. Submit shop drawings covering the following items:
1. Coordination drawings.
 2. Internal cleaning and treating of piping.
 3. Sleeve and ductwork penetration drawings.
 4. Identification schedule and samples.
 5. Air diffusers, registers, and grilles.
 6. Schedule of ductwork, joints, gauges, supports, flexible connections, fire dampers, access doors, etc.
 7. Utility fans, centrifugal fans, and power roof ventilators and propeller fans.
 8. Sheet metal fabrication drawings.
 9. Schedule of piping and fitting materials.
 10. Piping shop drawings.
 11. Schedule of valves, strainers, vacuum breakers.
 12. Thermometers and pressure gauges.
 13. Schedule of pipe and ductwork supports, including inserts, escutcheons, etc.
 14. Heating systems, including unit heaters, cabinet heaters, fin tube radiation convectors, etc., as specified.
 15. Outside air supply unit including coils, filters, draft gauges, etc.
 16. All motor starters, motor control devices and motor control centers.
 17. Schedule of insulation types and samples of each type.
 18. Acoustic material.
 19. Automatic Temperature Control System.
 20. Concrete pad locations and sizes.
- B. All shop drawings being submitted that include electrical work shall be submitted with all internal and external wiring diagrams.
- C. The previously listed items are major equipment and do not limit this Division's responsibility to submit shop drawings for all equipment and accessories which are to be provided under this Division of the Specifications.

PART 2 - PRODUCTS

2.01 SPARE PARTS

- A. Chilled water, condenser water, condensate return pumps and hot water pumps - For each pump listed, unless otherwise specified:
1. One set of wearing rings.

2. One set of bearings.
 3. One set of packing glands complete with rings, nuts and bolts.
 4. Three gaskets for casing joint.
 5. Sufficient stuffing box packing for four packings.
Where pump specifications do not require packing glands of stuffing boxes, items #3 & 5 shall be omitted. Inline pumps w/stuffing box design, item #1 & 2 shall be omitted. Inline pumps w/standard mechanical seal spaces listed above except item #4 shall be omitted.
- B. Filters:
1. The Contractor shall furnish a minimum of two complete spare filter sets for the filters for all air handling and package AC units. Provide 40 spare filters for fan coil units.
- C. Spare Lamps:
1. Furnish ten (10) spare lamps for each size and type of lamp on instrument panels.
- D. Miscellaneous Spare Parts:
1. Water column glasses shall be provided for each tank utilizing one.
 2. One complete set of gaskets shall be provided for each of the following pieces of equipment:
 - a. All manhole and handhole openings for the expansion tank and blow-down tank.
 - b. Converters (oil and hot water).
 3. Furnish one complete set of V-belts for each belt driven unit installed.
 4. Electrical equipment - two spare starter fuses identified for each type and size for all starters including pumps, supply, return and exhaust fan.
 5. One set of bearings properly identified for each type and size supply, return and exhaust fan.
 6. For each type and size pump furnished under this section of the contract, furnish as applicable for each type and size of pump, one set of wearing rings, one set of mechanical seals, one set of bearings, one set of shaft sleeves, one set of stuffing box bushings, one set of packing glands with rings, nuts and bolts and sufficient stuffing box packing for four packings.
- E. Furnish tools required for equipment as follows:
1. One set of high grade tools as recommended and approved by the respective manufacturer for pumps, fans, refrigeration equipment and other equipment. Tools shall be furnished in a suitable hardwood or other approved container with lock and two (2) keys. Pasted on the inside cover shall be a list of all tools provided in container.
 2. One pressure grease gun of approved design and size, complete with necessary adaptors to fit all lubricating fittings on installed equipment.
 3. One pitot tube, complete with required manometers, to read static pressure and velocity pressure simultaneously. Provide 6'-0" of rubber tubing.

2.02 LIST OF MANUFACTURERS

- A. The manufacturer's name appearing first on this list is the manufacturer the project design was based upon. However, the additional manufacturers listed herein are also acceptable with the provision that they meet the requirements of these Specifications, ratings, and/or space allocations listed in the Specifications or shown on the Drawings.
1. Air Filters
 - a. American Air Filter
 - b. Camfill Farr
 - c. Cambridge
 - d. or approved equal
 2. Draft Gauges
 - a. Dwyer
 - b. or approved equal
 3. Centrifugal Fans and Utility Sets
 - a. Cook
 - b. Greenheck
 - c. Buffalo
 - d. ACME
 - e. New York Blower
 - f. Twin Cities
 - g. or approved equal
 4. Fan Coils
 - a. Tituss
 - b. Greenheck
 - c. ACME
 - d. or approved equal
 5. Cabinet & Unit Heaters/Air curtain
 - a. Frico
 - b. Trane
 - c. Modine
 - d. Sterling
 - e. or approved equal
 6. Finned Tube Radiation/Baseboard Heater
 - a. Stelpro
 - b. Trane
 - c. Sterling
 - d. or approved equal
 7. Louvers & Dampers
 - a. Arlan Damper Corp. (631-589-7431)
 - b. Greenheck
 - c. Ruskin
 - d. Titus
 - e. or approved equal

NOTE TO SPEC WRITER: SPENCE IS NOT EQUIVALENT TO LESLIE. USE SPENCE AND SARCO CO. FOR SELF-CONTAINED TYPE.

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8. Thermometers & Pressure Gauges
 - a. Ashcroft
 - b. Weiss Instruments
 - c. or as specified in Section 23 05 80
9. Motors
 - a. General Electric
 - b. Westinghouse
 - c. Allis Chalmers
 - d. or approved equal
10. Starters, Motor Control Centers, Switches
 - a. Allen Bradley / Rockwell
 - b. Square D
 - c. General Electric
 - d. Westinghouse
 - e. Cutler-Hammer
 - f. or approved equal
11. Diffusers, Registers & Grilles
 - a. Titus
 - b. Price
 - c. Anemostat
 - d. Acutherm
 - e. Nailor
12. Valves
 - a. Milwaukee Valve
 - b. Crane
 - c. Hammond Valve
 - d. or as specified under paragraph on "Valves".
13. Insulation and Acoustic Lining
 - a. Owens-Corning Fiberglass Corp.
 - b. CSG Snap-on
 - c. Johns Manville
 - d. or approved equal
14. Vibration Isolation
 - a. VMC East
 - b. Mason Industries
 - c. Korfund Corp
 - d. or approved equal
15. Automatic Temperature Controls
 - a. Distech Controls
16. Product Refrigeration
 - a. Dunham-Bush
 - b. or approved equal
17. Internal Cleaning & Treating of Piping
 - a. Heating Economy Services Co., Inc.
 - b. Tower Water Management
 - c. The Metro Group, Inc.

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- d. Drew Chemical Co.
- 18. Electric Heating Elements
 - a. Stelpro
 - b. Frisco
 - c. Indeeco
- 19. Ductless Split DX Air Conditioning Units
 - a. Daikin
 - b. Panasonic
 - c. Samsung

PART 3 - EXECUTION

NOT USED

END OF SECTION 23 05 12

SECTION 23 05 23 - VALVES FOR HVAC

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.
- C. Section 23 20 00 – Piping for HVAC.

1.02 DESCRIPTION OF WORK

- A. The work includes the providing of all labor, materials, equipment, accessories, services and tests necessary to complete and make ready for operation by the Owner, all Valves as shown on the drawings and hereinafter specified.

1.03 QUALITY ASSURANCE

- A. "Manufacturers" - Firms regularly engaged in manufacture of valves, whose products have been in satisfactory use in similar service for not less than 10 years.
- B. Provide valves produced by the manufacturers, which are listed in Section 23 05 12, "Approved Manufacturer's List".
- C. Provide valves whose performance under specified conditions, is certified by the manufacturer.
- D. To assure uniformity and compatibility, all grooved end valves and adjoining couplings shall be supplied by a single manufacturer.

1.04 SUBMITTALS

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work and submit shop drawings.

1.05 GUARANTEE

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

PART 2 - PRODUCTS

2.01 VALVES

- A. Valves- General: All valves shall be of a design which the manufacturer lists for the service and shall be of materials allowed by the latest edition of the ASME Code for pressure piping for the pressure and temperature contemplated unless a higher grade or quality is herein specified. All valves of the same type shall be of the same manufacturer, except for special applications.
- B. The system shall be supplied with valves in all branch mains and risers, at all pumps, tanks, reducing and control valves, heating and cooling surfaces and at all apparatus; so located, arranged and operated as to give complete shut-off. Except where flanged valves are used, each connection to equipment shall be made with screwed unions, flanged unions, or grooved couplings on the equipment or discharge side of the valve.
- C. All valves shall be installed and arranged so that they are easily accessible.
- D. Each valve shall have the maker's name or brand, the figure or list number and the guaranteed working pressure cast on the body or stamped on the bonnet or shall be provided with other means of easy identification.
- E. Provide valve steam handle extensions on all ball valves and/or butterfly valves, where insulated, when insulation thickness would otherwise cause the insulation to be damaged as a result of the 90 degree handle movement.
- F. Check valves installed in the horizontal position shall be swing checks; valves installed in the vertical position shall be silent checks for 2½" and above, and lift check for 2" and smaller, except that all check valves in pump discharges shall be silent checks.
- G. Provide isolation valves where tying new piping into the existing system. Refer to the valves specifications for the proper valve type for the service. Refer to the Drawings for the pipe/valve size. In addition to the isolation valves at the tie-in points, also provide a balancing valve on the supply side for chilled water, chilled glycol/brine, condenser water and heating/reheat hot water system tie-ins.
- H. Provide capped blow-off valves at all strainers, and where shown on the Drawings.
- I. Provide valve operating chain on all gate, globe, butterfly and plug valves in Mechanical Equipment Rooms - 4" and larger, which are more than 7'-0" above the operating floor. Unit shall be complete with adjustable sprocket, chain and guide (Crane "Babbit" type). Provide hook to keep chain out of the way.
- J. Generally, all valves are to be of the gate type, except that globe valves shall be used for balancing service, throttling services and on traps, and pressure reducing and control valve bypasses. Globe valves used on bypasses shall have monel metal mountings.

Pumps shall have globe type balancing flow measuring & shut off valves on discharge piping.

- K. All valves 2 inches in diameter and smaller shall be all bronze with bronze bodies. Valves 2½ inches in diameter and larger shall have iron bodies with bronze mountings (except where otherwise noted).
- L. All flanged-end valves shall have renewable metal seat rings and discs. On gate valves these parts shall be of bronze, on all globe valves they shall be of bronze and suitable for throttling service.
- M. Grooved-end valves may be used in lieu of threaded, flanged, lug or wafer valves, if and where grooved end piping is used. All grooved-end valves shall be complete with grooved ends for use with mechanical couplings of the same manufacturer. Valve sealing elastomer shall be of the same composition as the adjoining coupling gaskets.
 - 1. Grooved End Butterfly Valves:
 - a. 2"-12": ASTM A395 and A536 ductile iron body and disc, with integrally cast stem. Disc shall be nickel-plated. Body coated with Black enamel. Victaulic Vic-300 MasterSeal™.
 - b. 14"-24": ASTM A395 and A536 ductile iron body and disc. Disc and body PPS coated. Mounted elastomer seal with stainless steel stem. Victaulic Series-Victaulic Vic-300 AGS (300 psi max).
 - c. 2-1/2"-6": Copper tube dimensioned bronze body, EPDM encapsulated ductile iron disc, integrally cast stem. Victaulic Series 608.
 - 2. Grooved end check valves shall be ASTM A395 and A536 ductile iron body, with stainless steel spring and shaft. Victaulic Series 716H and 716.
 - a. 2" - 3": Ductile iron body with stainless steel disc, mounted elastomer seal, and nickel-plated seat.
 - b. 4"-12": Black enamel coated ductile iron body, elastomer encapsulated ductile iron disc, with welded-in nickel seat.
 - c. 14"-24": ASTM A395 ductile iron body, stainless steel disc, spring, and shaft, EPDM seat bonded to the valve body, AGS grooved ends. Victaulic Series W715.
- N. All screwed-end globe valves shall be of the union bonnet type with renewable teflon discs.
- O. All valves shall have their bonnets back-seated to provide for packing under pressure. All gate valves shall be of the solid tapered wedge type.
- P. Drain valves shall be provided on tanks, receivers, risers and where they may be required or necessary, for draining the lines and equipment. Drain valves or plug cocks shall be provided at the low points for proper drainage. Cocks and valves shall be provided with threaded ends for those connections.

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- Q. All valves up to 2 inches in diameter shall have screw ends, 2½ inches in diameter and over shall have flanged ends. Valves 2½" and larger which are non-rising stem, shall have position indicators.
- R. All bronze and iron valves shall be furnished with Teflon impregnated packing.
- S. All handwheels shall be of malleable iron.
- T. No Asbestos shall be used in construction of valves including the gaskets.
- U. All valves shall be of type and number as specified below: For all services, except as otherwise noted.

<u>TYPE</u>	<u>SIZE</u>	<u>NIBCO NO.</u>	<u>CRAN E NO.</u>	<u>VICTAU LIC NO.</u>	<u>HAMMO ND NO</u>	<u>MILWAU KEE NO.</u>	<u>ABZ No.</u>	<u>REMARKS</u>
Gate Valve	2" & Smaller	T-134	428UB		IB629	1151		150 lb. WSP, Bronze
	2 ½" & Larger	F-617-O	465 ½		IR1140H I	F2885M		Rising Stem 125 lb. WSP, Bronze Trimmed, Iron Body, OS&Y
Globe Valve	2" & Smaller	T-275Y (Teflon) T275-B (Steam) T276-AP (SS Full-Plug)	14 ½ P	786 787 78K	IB444	572 593A		300 lb WSP, Bronze
	2 ½" & Larger	F-718B	351	788 789	IR116	F2981M		125 lb, WSP, Bronze Trimmed, Iron Body OS&Y
Angle Valve	2" & Smaller	T375-Y (Teflon) T375-B (Steam) T376-AP (SS Full-Plug)	16 ½		IB454T	582		300 lb. WSP, Bronze

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<u>TYPE</u>	<u>SIZE</u>	<u>NIBCO NO.</u>	<u>CRAN E NO.</u>	<u>VICTAU LIC NO.</u>	<u>HAMMO ND NO</u>	<u>MILWAU KEE NO.</u>	<u>ABZ No.</u>	<u>REMARKS</u>
	2 ½" & Larger	F-818-B	353					125 lb. WSP, Bronze Trimmed, Iron Body, OS&Y
Butterfly Valve (High Performance)	2 ½" & Larger	LCS-6822 LCS-7822		Vic-300 MasterSeal Vic-300 AGS	HP1LCS 4212 HP1LCS 4213	HP1LCS4 212 HP1LCS4 213	400 Series	300 psi Grooved DI, EPDM 285 psi Lug, DI, SS Disc, EPDM
Swing Check	2" & Smaller	T-433-Y	137	789	IB946	515	900	150 lb WSP, Bronze
	2 ½" & Larger	F-918-B	373	712	IR1124HI	F2974M	900	125 lb WSP, Bronze Trimmed, Iron Body
Silent Check	All Sizes	F-910 / w-910 (CI) G-920-W (DI)	-----	716 716H W715	IR9253 IR9354	1400 1800	900	Williams-Hager Fig. 636, 125 WSP Semi-steel.
Drain Valves	2" & Smaller	T-113-HC	451					200 lb. OWG, Non-rising stem, Hose end, Bronze with Bronze Cap & Chain
Blow-Off Valves	2" & Smaller	T-585-70-HC (Ball)	----		8501H (Ball)	BA100H (Ball)		300 lb. WSP, Bronze Y-Type
		T-174-A (Gate)			IB652 (Gate)	1182 (Gate)		
Strainers	2" & Smaller	T-221/222-A						125 lb, WSP, Bronze
	2 ½" & Larger	T-751-A F-721-A		730 W730 732 W732				250 lb, WSP, Iron Body, 125 lb, WSP, Iron Body

VALVES IN COPPER TUBING

V. Except where otherwise noted, all valves for use with copper tubing shall be as follows

<u>TYPE</u>	<u>SIZE</u>	<u>NIBC</u> <u>O</u> <u>NO</u>	<u>CRANE</u> <u>NO</u>	<u>VICTAU</u> <u>LIC</u> <u>NO</u>	<u>HAMMO</u> <u>ND NO</u>	<u>MILWAU</u> <u>KEE</u> <u>NO</u>	<u>REMARKS</u>
Gate Valve	2" & Smaller	S-111	1320	----	IB635	149	125 lb. WSP, Bronze
	3" & Smaller	S-134	----	----	IB648	1169	300 lb. Non-Shock
	2 ½" & Larger	F-617-O	428	----	IR1140HI	F2885M	125 lb, WSP, Bronze trimmed, iron body, OS&Y
Globe Valve	2" & Smaller	S-211-Y	1310	----	IB418	1502	125 lb WSP, bronze
	3" & Smaller	S-235-Y	----	----	IB423	1590T	300 lb. Non-shock CW Bronze with solder joint adapter
	2 ½" & Larger	F-718-B	14 ½ P	----	IR116HI	F2981M	125 lb. WSP, bronze trimmed, iron body OS&Y
Angle Valve	2" & Smaller	S-311-Y	1311	----	IB463	504	125 lb WSP, Bronze with solder joint adapter
	3" & Smaller	S-335-Y	----	----	IB454T	595T	300 lb. Non-shock CW Bronze with solder joint adapter
	2 ½" & Larger	F-818-B	16 ½ P	----			125 lb WSP, bronze trimmed, iron body OS&Y
Swing Check	2" & Smaller	S-413-B	1303	----	IB912	1509	125 lb WSP, Bronze
	3" & Smaller	S-433-B	----	----	IB945	1515	300 lb Non-shock CW Bronze with solder joint adapter
	2 ½" & Larger	F-918-B	34	----	IR1124HI	F2974M	125 lb WSP, bronze trimmed, iron body
Balancing Valves	½" to 2"		Tour and Anderson	786 787 78K			125 lb, WSP, bronze body, globe style, integral test, point, thrd or swt.
	2 ½" to 12"						125 lb. WSP, iron body, non-rising stem, flg or grv

2.02 REFRIGERANT VALVES

- A. All refrigerant valves shall be silver brazed joint as follows:
1. Globe Valves - 1½" O.D. and smaller: packless, Henry type 626; 1¾" O.D. and larger: packed, wing cap, Henry type 203.
 2. Angle Valves - 1½" O.D. and smaller: packless, Henry type 647 and 642; 1¾" O.D. and larger: packed, wing cap, Henry type 216.
 3. Check Valves - ¾" O.D. and smaller: brass, Henry type 116A; 1½" O.D. and larger: bronze, Henry type 205.
 4. Charging and Purging Valves - Line valve, Henry type 623; angle valve, Henry type 643.
 5. Relief Valves - Angle type, brass, Henry type 52.
 6. Gate Valves - All sizes: Globe Valves.

2.03 LUBRICATED PLUG VALVES

- A. Full port opening tapered plug suitable for lubrication under service pressure with plug in any position.
- B. Lubricating Guns:
1. One for every 10 valves.
 2. Extra heavy, lever type, hydraulic handgun.
 3. 15,000 psi gauge and 12" long connection hose.
- C. Lubricant:
1. Manufacturer's recommendations.
 2. One year supply, each valve.
- D. Operators:
1. 4" with wrench, except as noted.
 2. Wrench set for each size valve.
 3. Wrench for every 10 valves, each size
 4. 6" and larger: gear operated.
 5. Permanently installed handwheel.

2.04 VALVE CONSTRUCTION

- A. Piping less than 100 psi: 200# WOG Class, cast iron body.
- B. Piping 100 psi to 250 psi: ANSI Class 150, carbon steel.
1. 4" and larger: flanged, ANSI Class 150 rated.
- C. Piping over 250 psi: ANSI Class 300, carbon steel body.
1. Up to 2": screwed
 2. 2½" and larger: flanged, ANSI Class 300 rated.

2.05 BALANCING VALVES

- A. All balancing valves shall be combination balancing, flow measuring and shut off valves. Valves shall be globe style design and shall have a position indicator and memory stop or locking device so that the valve can be closed without disturbing the setting and returned to the balanced position without further adjustment.
- B. Valves shall be as manufactured by Tour and Andersson, Inc. or approved equal.
- C. Nominal working pressure for the valves shall be 250 psig or greater at 250F.
- D. Provide portable flow measuring instruments which shall be turned over to the Owner at the completion of work.
- E. Butterfly valves can be used for only shutoff valves and shall not be used for balancing.
- F. Coil Hook-Up Assembly: Install with Tour & Andersson balancing valves 2" and smaller, Victaulic Series 799 or 79V Koil-Kit™ to complete terminal hookup at coil outlet and to reduce space requirements. Assembly shall consist of Victaulic Series 78U union port fitting, Series 78Y strainer/ball valve or Series 78T union/ball valve combination and flexible hoses.

2.06 BALL VALVES

- A. Ball Valves up to 2½" may be used for all water services as an alternate to gate valves.
- B. Ball valves shall be bronze body, bronze ball and stem, Teflon seats and seals threaded ends, 400 psig cold W.O.G. Worchester No. 411T-SE or equal. "APOLLO" 70 - 100 Series.
- C. Provide valve stem handle extensions per para. 2.01.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Contractor shall examine location where valves are to be installed and determine space conditions and notify architect in writing of conditions determined to proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install valves where shown or specified, in accordance with manufacturer's written instructions, and with recognized industry practices, to ensure that valves comply with requirements and serve intended purposes.
- B. Install a manually operated bypass globe valve around all control valves (motorized or self-contained regulators).¹
- C. Contractor is responsible for final valve orientation. Valves shall be installed in such a manner to avoid leakage through their stem seals, while still orienting valve handles to provide suitable accessibility and operability. Valve orientation shall be in compliance with the valve manufacturer's installation instructions. Valve handle orientation shall be indicated on the piping shop drawings. Valves orientation and handles not shown on the piping shop drawings will be subject to possible removal and reorientation in the field based on the Engineer's observations following the completion of construction.
- D. Provide chain operators on all isolation valves located in mechanical rooms where valve is more than 7 feet above the operating floor. Provide hook on nearest wall or column to tie back chain.
- E. Coordinate with other work as necessary to prevent interference of valves with other components of systems.

3.03 FIELD QUALITY CONTROL

- A. Upon completion of installation of valves, test valves to demonstrate compliance with requirements. When possible, field correct malfunctioning valves, then retest to demonstrate compliance. Replace units which cannot be satisfactorily corrected.

END OF SECTION 23 05 23

SECTION 23 05 48 - VIBRATION ISOLATION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.

1.02 DESCRIPTION OF WORK

- A. The Work includes providing all labor, materials, equipment, accessories, services and tests to complete and make ready for operation by the Owner, all vibration isolations as shown on the Drawings and hereinafter specified.

1.03 QUALITY ASSURANCE

- A. Firms regularly engaged in manufacture of this equipment with characteristics and capacities required, whose products have been in satisfactory use in similar service for not less than ten (10) years.
- B. Provide products produced by the manufacturers which are listed in Section 23 05 12, "Approved Manufacturer's List".
- C. Provide equipment whose performance under specified conditions is certified by the manufacturer.

1.04 SUBMITTALS

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work and submit shop drawings.

1.05 COORDINATION

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

1.06 GUARANTEE

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

1.07 TECHNICAL REQUIREMENTS

- A. All mechanical equipment shall be mounted in accordance with the specifications below and for the specific requirements shown in the equipment schedule.

- B. The isolation manufacturer shall supply all unit isolators, complete rails, fan and motor bases and structural steel forms for concrete inertia blocks, where called for and shall be responsible for the selection of all vibration eliminators and shall guarantee to meet the requirements of these Specifications.
- C. Wherever rotational speed is mentioned as the disturbing frequency, the lowest such speed in the system shall be used. All isolation devices shall be selected for uniform static deflections according to distribution of weight. Lateral motion of all isolators shall be ¼" maximum during start-up and shut-down.
- D. All metal parts and hardware on outdoor isolators shall be constructed of Type 304 stainless steel. Galvanized, zinc-coated and painted steel will be rejected.
- E. Isolators shall be equipped with limit stops to resist wind velocity.
- F. All fan units and air handling units (except fans with wheels under 27") shall be isolated as follows:
 - 1. Up to 450 RPM: 75% efficiency (3½" maximum deflection)
 - 2. 450 RPM to 850 RPM: 90%
 - 3. 850 RPM and over: 95%
- G. Submittals shall show disturbing frequency, required efficiency, designed deflection and outside diameter of springs, when pertinent.
- H. Weight of concrete inertia blocks shall be as follows:
 - 1. Fans and air handling units (up to 5" s.p.) driven by 75 HP and larger motors: 1½ times weight of equipment.
 - 2. High pressure fans and air handling units (5" s.p. and over) driven by 30 HP motors: 1½ times weight of equipment.
 - 3. High pressure fans (5" s.p. and over) driven by 75 HP and larger motors: 2 times weight of equipment.
- I. All horizontal pipe runs within the mechanical equipment room area, but not less than 50 feet from connected equipment shall be isolated from building structure by means of units designed for insertion in rods.

PART 2 - PRODUCTS

2.01 VIBRATION ISOLATION

- A. Mountings:
 - 1. Type A:
 - a. Double deflection neoprene mountings shall have a minimum static deflection of 0.35. All metal surfaces shall be neoprene covered to avoid corrosion and have friction pads both top and bottom, so they need not be bolted to the floor.

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- b. Bolt holes shall be provided for those areas where bolting is required. On equipment such as small vent sets and close coupled pumps, steel rails shall be used above the mounts to compensate for the overhang.
 - c. Manufacturer/Type:
 - Mason Industries, Inc.: ND or Rails RND
 - Vibration Eliminator Co.: T44 or D-Rails
2. Type B:
- a. Spring isolators shall be free-standing and laterally stable without any housing and complete with 3" neoprene acoustical friction pads between the base plate and the support. All mountings shall have leveling bolts that must be rigidly bolted to the equipment.
 - b. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection.
 - c. Submittals shall include spring diameters, deflections, compressed spring height and solid spring height.
 - d. Manufacturer/Type:
 - Mason Industries, Inc.: SLFH, on rails type ICS
 - Vibration Eliminator Co. OSK
3. Type C:
- a. Equipment with operating weight different from the installed weight such as chillers, boilers, etc., and equipment exposed to the wind such as cooling towers, shall be mounted on spring mountings as described under Type "B" of this paragraph, but a housing shall be used that includes vertical resilient limit stops to prevent spring extension when weight is removed. The housings shall serve as blocking during erection and cooling tower mounts shall be located between the supporting steel and roof or the grillage and dunnage. The installed and operating heights shall be the same. A minimum clearance of ½" shall be maintained around restraining bolts and between the housing and the spring so as not to interfere with the spring action. Limit stops shall be out of contact during normal operation. Mountings used out of doors shall be hot dipped galvanized.
 - b. Manufacturer/Type:
 - Mason Industries, Inc. SLR
 - Vibration Eliminator Co. KW
4. Type D:
- a. Vibration hangers shall contain a steel spring and a double deflection neoprene element in series. Neoprene elements shall have a minimum deflection 0.35". The neoprene element shall be molded with a rod isolation bushing that passes through the hanger box. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection and be seated in a neoprene cup with an integral molded bushing that passes through the lower hanger box.
 - b. Manufacturer/Type:
 - Mason Industries, Inc. DNHS
 - Vibration Eliminator Co. SNRC

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5. Type E:
 - a. Vibration hangers shall be as described under Type "D" of this paragraph, but they shall be pre-compressed to the rated deflection so as to keep the piping or equipment at a fixed elevation during installation. The hangers shall be designed with a release mechanism to free the spring after installation is complete and the hanger subjected to its full load. Deflection shall be clearly indicated by means of a scale. Submittals shall include an isolation layout hanger drawing showing the proper location of each isolator, tagging its actual loading.
 - b. Manufacturer/Type:

Mason Industries, Inc.	PCDNHS
Vibration Eliminator Co.	PR
 6. Type F:
 - a. Vibration hangers shall contain a double deflection neoprene element manufactured as an integral part of the element design to prevent short circuiting of the rod as it penetrates the housing body. Minimum static deflection shall be .35".
 - b. Manufacturer/Type:

Mason Industries, Inc.	HD
Vibration Eliminator Co.	SNC
 7. Type DE:
 - a. Elastomer hanger rod isolators shall incorporate the following:
 - 1) Molded unit type neoprene elements with projecting bushing, lining rod clearance hole.
 - 2) Neoprene element to be minimum 1¾" thick.
 - 3) Steel retainer box encasing neoprene mounting.
 - 4) Clearance between mounting hanger rod and neoprene bushing shall be minimum of 1/8".
 - 5) Minimum static deflection of 0.35".
 - b. Mason Type HD or approved equal.
- B. Bases:
1. Type G:
 - a. Vibration isolator manufacturer shall furnish integral structural steel bases for both driver and driven machines.
 - b. Bases shall be rectangular in shape for all equipment other than centrifugal refrigeration machines and pump bases which may be "tee" or "L" shaped. Pump bases for split case pumps shall include supports for suction and discharge base ells. All perimeter members shall be WF beams with a minimum depth equal to 1/10th of the longest dimension of the base. Beam depth need not exceed 14" provided that the deflection and misalignment is kept within acceptable limits as determined by the manufacturer. Height saving brackets shall be employed in all mounting locations to provide a base clearance of one inch.
 - c. Bases shall be WF bases as manufactured by Mason Industries, Inc. or approved equal.

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2. Type H:
 - a. Vibration isolator manufacturer shall provide steel members welded to height-saving brackets to cradle machines having legs or bases that do not require a complete supplementary base.
 - b. Members shall be sufficiently rigid to prevent strains in the equipment.
 - c. Inverted saddles shall be ICS as manufactured by Mason Industries, Inc. or approved equal.
3. Type J:
 - a. Vibration isolator manufacturer shall furnish structural channel concrete forms for floating foundations.
 - b. Bases for split case pumps shall be large enough to provide support for suction and discharge base ells. The base depth shall be a minimum of 1/10th of the longest span, but not less than 6" or greater than 14". Forms shall include minimum concrete reinforcement consisting of ½ on 6" centers running both ways and a layer 1½" above the bottom and a top layer of reinforcing steel as above for all bases exceeding 120" in one direction. Isolators shall be set into pocket housings which are an integral part of the base construction and set at the proper height to maintain a 1" clearance below the base. Bases shall be furnished with templates and anchor bolt sleeves as part of this system.
 - c. Manufacturer/Type:

Mason Industries, Inc.	KIPWF
Vibration Eliminator Co.	SN Frames
4. Type Y:
 - a. Rooftop packaged air handling units shall be installed on a spring supported isolation curb which shall combine the manufacturer's curb and the isolation base into one assembly. The system shall be designed with 1", 2" or 3" static deflection steel springs which are both adjustable, removable and interchangeable after the rooftop unit has been installed. The system shall maintain the same operating and installed height both with and without the equipment load and shall be fully restrained during wind load conditions allowing no more than ¼" motion in any direction. The isolation curb shall be designed to accept and utilize outer placement of standard 2" roof insulation to act as a sound attenuation system for the inside of the curb. The entire unit shall become an integral part of the membrane waterproofing. The entire assembly shall be dry galvanized or PVC coated. The isolation curb shall be model P-6000 as manufactured by Mason Berger East. Options for the system include an elevation kit model EK-1 and a sound barrier pack framing kit complete with offset plenum for lightweight roof deck areas model SBC-3. Note: Where this option is utilized, General Contractor is to furnish and install sound barrier material.
 - b. Manufacturer/Type:

Mason Industries, Inc.:	Model P-6000
Vibration Eliminator Co.:	
5. Type R:

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- a. Rooftop fans, condensing units, exterior ducted air handling units, etc. shall be installed on continuous equipment support piers which shall combine a regular equipment support and an isolation system into one assembly. The system shall be designed with 1", 2" or 3" static deflection steel springs which are both adjustable, removable and interchangeable after equipment has been installed. The system shall maintain the same operating and installed height both with and without the equipment load and shall be fully restrained during wind load conditions allowing no more than 1/4" motion in any direction. The isolation pier shall be designed to accept 2" rigid insulation and to be an integral part of the membrane waterproofing. The entire assembly shall be dry galvanized or plastic coated. The isolation rail pier system shall be model R-7000 as manufactured by Mason Berger East, Inc.
- b. Manufacturer/Type:
Mason Industries, Inc. R-7000
Vibration Eliminator Co.

C. ISOLATION SCHEDULE:

Vibration Eliminator Specification Type for Equipment Location:		
Type of Equipment	With No Occupied or Unoccupied Spaces Below	Above Occupied or Unoccupied Spaces
Self-Contained Air Conditioning Units	Type A (0.4" deflection)	Type B (1.0" deflection)
Air Cooled Condensers (Roof Mounted)		Type R (2.0" deflection)
Refrigeration Reciprocating Compressors, Condensing Units or Chillers	Type A (0.4" deflection)	Type B (1.0" deflection)
Heat Pumps (ceiling mounted)	Type D (1.0" deflection)	
Factory Assembled, Air Handling Equipment:		
Suspended Units	Type D (1.5" deflection)	Type D (2.0" deflection above 600 rpm)
Floor Mounted Units	Type B (1.0" deflection)	Type B (2.0" deflection above 600 rpm)
		Type B-H (2.5" deflection below 600 rpm)
Class I Fans (Arrangement 1 & 3)		
Floor Mounted:	Type B-G (1.0" deflection)	Type B-G (2.0" deflection above 600 rpm)

Vibration Eliminator Specification		
Type for Equipment Location:		
Type of Equipment	With No Occupied or Unoccupied Spaces Below	Above Occupied or Unoccupied Spaces
		(3.0" deflection below 600 rpm)
		(4.0" deflection below 400 rpm)
Suspended:	Type F (1.5" deflection)	Type F (2.0" deflection)
Class I Fans (Arrangement 9)		
Floor Mounted:	Type B (1.0" deflection)	Type B (2.0" deflection)
Suspended:	Type F (1.5" deflection)	Type F (2.0" deflection)
Class II and III Fans	Type B-J (1.0" deflection)	Type B-J (2.0" deflection above 600 rpm)
		(3.0" deflection below 600 rpm)
		(4.0" deflection below 400 rpm)
Outdoor Fan (Arrangement 9 & 10)		
Utility Fans:		Type R (2.0" deflection)

2.02 FLEXIBLE CONNECTIONS

- A. Provide a flexible pipe connector at fans and other vibrating equipment.
- B. Flexible connector shall be:
 1. Manufacturer of nylon tire cord and EPDM, both molded and cured with hydraulic presses.
 2. Straight connectors to have two spheres reinforced with a mold-in external ductile iron ring between spheres.
 3. Elbow shall be long radius reducing type.
 4. Rated 250 psi at 170°F. Dropping in straight line to 170 psi at 250°F for sizes 1½" to 12". Elbows shall be rated no less than 90% of straight connections.
 5. Sizes 10" and 12" to employ control cables with neoprene end fittings isolated from anchor plates by means of ½" bridge bearing neoprene bushings.
 6. Minimum safety factor, 4 to 1 at maximum pressure ratings.
 7. Submittals to include test reports.
 8. Mason Type MFTNC Superflex, or approved equal.

3.01 INSPECTION AND COORDINATION

- A. Contractor shall examine location where this equipment is to be installed and determine space conditions and notify Architect in writing of conditions detrimental to proper and timely completion of the Work.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected.
- C. Coordinate work with other trades to avoid rigid contact with the building. Inform other trades following work, such as plastering or electrical, to avoid any contact which would reduce the vibration isolation.
- D. Bring to the Architect's attention, prior to installation, any conflicts with other trades which may result in unavoidable rigid contact with equipment or piping as described herein, due to inadequate space or other unforeseen conditions. Corrective work necessitated by conflicts after installation shall be at the responsible Contractor's expense.
- E. Bring to the Architect's attention, any discrepancies between the Specifications and field conditions or changes required due to specific equipment selection, prior to installation. Corrective work necessitated by discrepancies after installation shall be at the Contractor's expense.

3.02 INSTALLATION

- A. Mount floor-mounted equipment on 4" concrete housekeeping pads over complete floor area of equipment. Mount vibration isolating devices and related inertia blocks on concrete pad.
- B. Each fan and motor assembly shall be supported on a single structural steel frame. Flexible duct connections shall be provided at inlet and discharge ducts.
- C. The machine to be isolated shall be supported by a structural steel frame or concrete inertial base.
- D. Brackets shall be provided to accommodate the isolator. The vertical position and size of the bracket shall be specified by the isolator manufacturer.
- E. The minimum operating clearance between the equipment frame or rigid steel base frame and the housekeeping pad or floor shall be 1". Minimum operating clearance between concrete inertia base and housekeeping pad or floor shall be 2".
- F. The equipment structural steel or concrete inertia base shall be placed in position and supported temporarily by blocks or shims, as appropriate, prior to the installation of the machine or isolators.
- G. The isolators shall be installed without raising the machine and frame assembly.

- H. After the entire installation is complete and under full operational load, the isolators shall be adjusted so that the load is transferred from the blocks to the isolators. When all isolators are properly adjusted, the blocks or shims shall be barely free and shall be removed.
- I. Isolation mounting deflection shall be (minimum) as specified or scheduled.
- J. Install equipment with flexibility in wiring connection.
- K. Verify that all installed isolator and mounting systems permit equipment motion in all directions. Adjust or provide additional resilient restraints to flexibly limit start-up equipment lateral motion to ¼".
- L. Prior to start-up, clean out all foreign matter between bases and equipment. Verify that there are no isolation short circuits in the base isolators or seismic restraints.
- M. All piping and ductwork to be isolated shall freely pass-through walls and floors without rigid connections. Penetration points shall be sleeved or otherwise formed to allow passage of piping or ductwork and maintain ¾" to 1¼" clearance around the outside surfaces. This clearance space shall be tightly packed with firestopping or fiberglass and caulked airtight after installation of piping or duct ductwork.
- N. No rigid connections between equipment and building structure shall be made that degrades the noise and vibration isolation system herein specified.
- O. The contractor shall not install any equipment, piping or conduit which makes rigid contact with the "building" unless permitted in this Specification. Building includes, but is not limited to, slabs, beams, columns, studs and walls.
- P. Obtain inspection and approval of any installation to be covered or enclosed, prior to such closure.
- Q. Diagonal thrust restraint shall be as described for Type D hanger with the same deflection as specified for the spring mountings. The spring element shall be designed so it can be pre-set for thrust and adjusted to allow for maximum of ¼" movement at start and stop. Diagonal restraints shall be attached at the centerline of thrust. Restraint shall be Mason Type WB or approved equal.

3.03 PIPING ISOLATOR INSTALLATION

- A. The isolators shall be installed with the isolator hanger box attached to, or hung as close as possible to, the structure.
- B. The isolators shall be suspended from substantial structural members only.
- C. Hanger rods shall be aligned to clear the hanger box.

- D. Horizontal suspended pipe 2" and smaller and all steam piping shall be suspended by Type DE isolator with a minimum 3/8" deflection. Water pipe larger than 2" shall be supported by Type E isolator with minimum 1" or same static deflection as isolated equipment to which pipe connects, whichever is greater.
- E. Horizontal pipe floor supported at slab shall be supported via Type B, with a minimum static deflection of 1" or same deflection as isolated equipment to which pipe connects, whichever is greater.
- F. Vertical riser pipe supports shall utilize neoprene elements.
- G. Vertical riser guides, if required, shall avoid direct contact of piping with building.
- H. Pipe sway braces, where required shall utilize two (2) neoprene elements.

3.04 FIELD QUALITY CONTROL

- A. Obtain inspection and approval of any installation to be covered or enclosed, prior to such closure.
- B. Upon completion of installation of all vibration isolation devices herein specified, the local representative of the isolation materials manufacturer shall inspect the completed system and report, in writing, any installation error, improperly selected isolation devices, or other faults in the system that could affect the performance of the system. Contractor shall submit a report to the Architect, including the manufacturer's representatives final report, indicating all isolation reported as improperly installed or requiring correction, and include a report by the Contractor on steps taken to properly complete the isolation work.

END OF SECTION 23 05 48

SECTION 23 05 67 - DUCT CLEANING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.

1.02 DESCRIPTION OF WORK

- A. The work includes the providing of all labor, materials, equipment, accessories, services, and tests necessary to clean all existing ductwork to remain and be reused.
- B. Cleaning of ductwork must be performed prior to leak testing ductwork.

1.03 QUALITY ASSURANCE

- A. Membership: The HVAC system cleaning contractor shall be a certified member of the National Air Duct Cleaners Association (NADCA) or shall maintain membership in a nationally recognized non-profit industry organization dedicated to the cleaning of HVAC systems.
- B. Certification: The HVAC system cleaning contractor shall have a minimum of one (1) Air System Cleaning Specialist (ASCS) certified by NADCA on a full-time basis or shall have staff certified by a nationally recognized certification program and organization dedicated to the cleaning of HVAC systems.
- C. Supervisor Qualifications: A person certified as an ASCS by NADCA or maintaining an equivalent certification by a nationally recognized program and organization, shall be responsible for the total work herein specified.
- D. Experience: The HVAC system cleaning contractor shall submit records of experience in the field of HVAC system cleaning as requested by the owner. Bids shall only be considered from firms which are regularly engaged in HVAC system maintenance with an emphasis on HVAC system cleaning and decontamination.
- E. Equipment, Materials and Labor: The HVAC system cleaning contractor shall possess and furnish all necessary equipment, materials and labor to adequately perform the specified services.
 - 1. The contractor shall assure that its employees have received safety equipment training, medical surveillance programs, individual health protection measures, and manufacturer's product and material safety data sheets (MSDS) as required for the

work by the U.S. Occupational Safety and Health Administration, and as described by this specification. For work performed in countries outside of the U.S.A., contractors should comply with applicable national safety codes and standards.

2. The contractor shall maintain a copy of all current MSDS documentation and safety certifications at the site at all times, as well as comply with all other site documentation requirements of applicable OSHA programs and this specification
3. Contractor shall submit to the owner all Material Safety Data Sheets (MSDS) for all chemical products proposed to be used in the cleaning process.

- F. Licensing: The HVAC system cleaning contractor shall provide proof of maintaining the proper license(s), if any, as required to do work in this state. Contractor shall comply with all Federal, state and local rules, regulations, and licensing requirements.

1.04 STANDARDS

- A. NADCA Standards: The HVAC system cleaning contractor shall perform the services specified here in accordance with the current published standards of the National Air Duct Cleaners Association (NADCA).
1. All terms in this specification shall have their meaning defined as stated in the NADCA Standards.
 2. NADCA Standards must be followed with no modifications or deviations being allowed.

1.05 DOCUMENTS

- A. Mechanical Drawings: The mechanical contractor shall provide the HVAC system cleaning contractor with one copy of the following documents:
1. Project drawings and specifications
 2. Approved construction revisions pertaining to the HVAC system
 3. Any existing indoor air quality (IAQ) assessments or environmental reports prepared for the facility.

1.06 PRE-QUALIFIED CLEANING CONTRACTORS

- A. Pre-qualified acceptable firms include the following:
1. G&G Duct Cleaning, (718) 786-6401.
 2. Duct Dusters, (914) 776-5700.
 3. Scientific Environmental Services, Co. (718) 389-3260.
 4. Fire Proofing Corp. of America, (212) 254-6340.

1.07 SUBMITTALS

- A. Refer to Section 01 31 46 - Special Requirements for Work and submit shop drawings.
- B. Submit list of references for at least five (5) projects of size similar for which the firm has provided duct cleaning services successfully. Lists shall include:
1. Name and address of the project.

2. A description of the project and the services provided.
 3. Name and telephone number of references.
- C. Submit a detailed description of how the duct cleaning will be carried out. The description should be specific to this project, identifying and describing equipment and procedures to be used.
- D. Catalog cuts for equipment to be used shall be submitted.
- E. Fiber-optic borescope pictures of the pre-cleaned conditions as required in paragraph 3.3. Do not start cleaning until these pictures have been submitted and approved.
- F. Fiber-optic borescope pictures of the post-cleaned conditions.
- G. Provide a detailed schedule for when cleaning work which will be carried out. Coordinate with other work under this contract.

1.08 COORDINATION

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

1.09 GUARANTEE

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

PART 2 - HVAC SYSTEM CLEANING SPECIFICATIONS AND REQUIREMENTS

2.01 SCOPE OF WORK

- A. Scope: This section defines the *minimum* requirements necessary to render HVAC components clean, and to verify the cleanliness through inspection and/or testing in accordance with items specified herein and applicable NADCA Standards.

The Contractor shall be responsible for the removal of visible surface contaminants and deposits from within the HVAC system in strict accordance with these specifications.

The HVAC system includes any interior surface of the facility's air distribution system for conditioned spaces and/or occupied zones. This includes the entire heating, air conditioning and ventilation system from the points where the air enters the system to the points where the air is discharged from the system. The return air grilles, return air ducts (except ceiling plenums and mechanical room) to the air handling unit (AHU), the interior surfaces of the AHU, mixing box, coil compartment, condensate drain pans, humidifiers and dehumidifiers, supply air ducts, fans, fan housing, fan blades, air wash systems, spray eliminators, turning vanes, filters, filter housings, reheat coils, and supply diffusers are all considered part of the HVAC system and is shown on mechanical drawings to remain.

2.02 HVAC SYSTEM INSPECTIONS AND SITE PREPARATIONS

- A. HVAC System Evaluation: Prior to the commencement of any cleaning work, the HVAC system cleaning contractor shall perform a visual inspection of the HVAC system to determine appropriate methods, tools, and equipment required to satisfactorily complete this project.
 - 1. Damaged system components found during the inspection shall be documented and brought to the attention of the owner.
- B. Site Evaluation and Preparations: Contractor shall conduct a site evaluation, and establish a specific, coordinated plan which details how each area of the building will be protected during the various phases of the project.

2.03 GENERAL HVAC SYSTEM CLEANING REQUIREMENTS

- A. Containment: Debris removed during cleaning shall be collected and precautions must be taken to ensure that Debris is not otherwise dispersed outside the HVAC system during the cleaning process.
- B. Particulate Collection: Where the Particulate Collection Equipment is exhausting inside the building, HEPA filtration with 99.97% collection efficiency for 0.3-micron size (or greater) particles shall be used. When the Particulate Collection Equipment is exhausting outside the building, Mechanical Cleaning operations shall be undertaken only with Particulate Collection Equipment in place, including adequate filtration to contain Debris removed from the HVAC system. When the Particulate Collection Equipment is exhausting outside the building, precautions shall be taken to locate the equipment down wind and away from all air intakes and other points of entry into the building.
- C. Controlling Odors: All reasonable measures shall be taken to control offensive odors and/or mist vapors during the cleaning process.
- D. Component Cleaning: Cleaning methods shall be employed such that all HVAC system components must be Visibly Clean as defined in applicable standards (see NADCA Standards). Upon completion, all components must be returned to those settings recorded just prior to cleaning operations.
- E. Air-Volume Control Devices: Dampers and any air-directional mechanical devices inside the HVAC system must have their position marked prior to cleaning and, upon completion, must be restored to their marked position.
- F. Service Openings: The contractor shall utilize service openings, as required for proper cleaning, at various points of the HVAC system for physical and mechanical entry, and inspection.
 - 1. Contractor shall utilize the existing service openings already installed in the HVAC system where possible.
 - 2. Other openings shall be created where needed and they must be created so they can be sealed in accordance with industry codes and standards.

3. Closures must not significantly hinder, restrict, or alter the air-flow within the system.
 4. Closures must be properly insulated to prevent heat loss/gain or condensation on surfaces within the system.
 5. Openings must not compromise the structural integrity of the system.
 6. Construction techniques used in the creation of openings should conform to requirements of applicable building and fire codes, and applicable NFPA, SMACNA and NADCA Standards.
 7. Cutting service openings into flexible duct is not permitted. Flexible duct shall be disconnected at the ends as needed for proper cleaning and inspection.
 8. Rigid fiber glass ductboard duct systems shall be resealed in accordance with NAIMA recommended practices. Only closure techniques which comply *with* UL Standard 181 or UL Standard 181 a are suitable for fiber glass duct system closures.
 9. All service openings capable of being re-opened for future inspection or remediation shall be clearly marked and shall have their location reported to the owner in project report documents.
- G. Ceiling sections (tile): The contractor may remove and reinstall ceiling sections to gain access to HVAC systems during the cleaning process.
- H. Shaft walls (CHV): The Contractor may create openings to gain access to HVAC risers during the cleaning process.
- I. Duct Systems: Contractor shall:
1. Create service openings in the system as necessary in order to accommodate cleaning of otherwise inaccessible areas.
 2. Mechanically clean all duct systems to remove all visible contaminants, such that the systems are capable of passing Cleaning Verification Testings (see NADCA Standards).

2.04 HEALTH AND SAFETY

- A. Safety Standards: Cleaning contractors shall comply with all applicable federal, state, and local requirements for protecting the safety of the contractors' employees, building occupants, and the environment. In particular, all applicable standards of the Occupational Safety and Health Administration (OSHA) shall be followed when working in accordance with this specification.
- B. Occupant Safety: No processes or materials shall be employed in such a manner that they will introduce additional hazards into occupied spaces.
- C. Disposal of Debris. All Debris removed from the HVAC System shall be disposed of in accordance with applicable federal, state and local requirements.

2.05 MECHANICAL CLEANING METHODOLOGY

- A. Source Removal Cleaning Methods: the HVAC system shall be cleaned using Source Removal mechanical cleaning methods designed to extract contaminants from within the HVAC system and safely remove contaminants from the facility. It is the contractor's responsibility to select Source Removal methods which will render the HVAC system Visibly Clean and capable of passing cleaning verification methods (See applicable NADCA Standards) and other specified tests, in accordance with all general requirements. No cleaning method, or combination of methods, shall be used which could potentially damage components of the HVAC system or negatively alter the integrity of the system.
1. All methods used shall incorporate the use of vacuum collection devices that are operated continuously during cleaning. A vacuum device shall be connected to the downstream end of the section being cleaned through a predetermined opening. The vacuum collection device must be of sufficient power to render all areas being cleaned under negative pressure, such that containment of debris and the protection of the indoor environment is assured.
 2. All vacuum devices exhausting air inside the building shall be equipped with HEPA filters (minimum efficiency), including hand-held vacuums and wet vacuums.
 3. All vacuum devices exhausting air outside the facility shall be equipped with Particulate Collection including adequate filtration to contain Debris removed from the HVAC system. Such devices shall exhaust in a manner that *will* not allow contaminants to re-enter the facility. Release of debris outdoors must not violate any outdoor environmental standards, codes or regulations.
 4. All methods require mechanical agitation devices to dislodge debris adhered to interior HVAC system surfaces, such that debris may be safely conveyed to vacuum collection devices. Acceptable methods will include those which will not potentially damage the integrity of the ductwork, nor damage porous surface materials such as liners inside the ductwork or system components.
- B. Methods of Cleaning Fibrous Glass Insulated Components:
1. Fibrous glass thermal or acoustical insulation elements present in any equipment or ductwork shall be thoroughly cleaned with HEPA vacuuming equipment, while the HVAC system is under constant negative pressure, and not permitted to get wet in accordance with applicable NADCA and NAIMA standards and recommendations.
 2. Cleaning methods used shall not cause damage to fibrous glass components and will render the system capable of passing Cleaning Verification Tests (see NADCA Standards).
- C. Damaged Fibrous Glass Material
1. If there is any evidence of damage, deterioration, delamination, friable material, mold or fungus growth, or moisture such that fibrous glass materials cannot be restored by cleaning or resurfacing with an acceptable insulation repair coating, they shall be identified for replacement.
 2. When requested or specified, Contractor must be capable of remediating exposed damaged insulation in air handlers and/or ductwork requiring replacement.

3. Replacement material: In the event fiber glass materials must be replaced, all materials shall conform to applicable industry codes and standards, including those of UL and SMACNA.
 4. Replacement of damaged insulation is not covered by this specification.
- D. Biocidal Agents and Coatings
1. Biocidal agents shall only be applied if active fungal growth is reasonably suspected, or where unacceptable levels of fungal contamination have been verified through testing.
 2. Application of any biocidal agents used to control the growth of fungal or bacteriological contaminants shall be performed after the removal of surface deposits and debris.
 3. Only biocidal agents registered by the U.S. Environmental Protection Agency (EPA) specifically for use within HVAC system shall be used.
 4. Biocidal agents shall be applied in strict accordance with manufacturer's instructions.
 5. Biocidal coating products for both porous and non-porous surfaces shall be EPA registered, water soluble solutions with supporting efficacy data and MSDS records.
 6. Biocidal coatings shall be applied according to manufacturer's instructions. Coatings shall be sprayed directly onto interior ductwork surfaces, rather than 'fogged' downstream onto surfaces. A continuous film must be achieved on the surface to be treated by the coating application. Application of any biocidal coatings shall be in strict accordance with manufacturer's minimum millage surface application rate standards for effectiveness.

2.06 CLEANLINESS VERIFICATION

- A. General: Verification of HVAC System cleanliness will be determined after mechanical cleaning and before the application of any treatment or introduction of any treatment-related substance to the HVAC system, including biocidal agents and coatings.
- B. Visual Inspection: the HVAC system shall be inspected visually to ensure that no visible contaminants are present.
1. If no contaminants are evident through visual inspection, the HVAC system shall be considered clean; however, the owner reserves the right to further verify system cleanliness through gravimetric or wipe testing analysis testing as specified herein.
 2. If visible contaminants are evident through visual inspection, those portions of the system where contaminants are visible shall be re-cleaned and subjected to re-inspection for cleanliness.
- C. Gravimetric Analysis: At the discretion and expense of the owner, sections of the HVAC system may be tested for cleanliness using the NADCA Vacuum Test (gravimetric analysis) as specified in applicable NADCA Standards. Levels of debris collected shall be equal to or less than acceptable levels defined in applicable NADCA Standards.

1. If gravimetric analysis determines that levels of debris are equal to or lower than those levels specified in applicable NADCA standards, the system shall be considered clean and shall have passed cleanliness verification.
2. If gravimetric analysis determines that levels of debris exceed those specified in applicable NADCA standards, the system shall not be considered clean and those sections of the system which failed cleanliness verification shall be re-cleaned at the expense of the HVAC system cleaning contractor.
3. Gravimetric analysis shall be performed by a qualified third party experienced in testing of this nature.
4. Cleanliness verification shall be performed immediately after mechanical cleaning and before the HVAC system is restored to normal operation.

2.07 POST-PROJECT REPORT

- A. At the conclusion of the project, the Contractor shall provide a report to the owner indicating the following:
 1. Success of the cleaning project, as verified through visual inspection and/or gravimetric analysis.
 2. Areas of the system found to be damaged and/or in need of repair.

2.08 APPLICABLE STANDARDS AND PUBLICATIONS

The following current standards and publications of the issues currently in effect form a part of this specification to the extent indicated by any reference thereto:

- A. National Air Duct Cleaners Association, ACR-2013, "The Standard for the Assessment, Cleaning and Restoration of HVAC Systems."
- B. Underwriters' Laboratories UL Standard 181
- C. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE): Standard 62, "Ventilation for Acceptable Indoor Air Quality"
- D. Environmental Protection Agency EPA: "Building Air Quality" December 1991
- E. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): "HVAC Duct Construction Standards - Metal and Flexible," Third Edition, 2005.
- F. North American Insulation Manufacturers Association, Cleaning Fiberglass Insulated Air Duct Systems." 2007.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Contractor shall examine location where this work is to be performed and determine space conditions and notify Engineer in writing of conditions detrimental to proper and timely completion of the work.

- B. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 PERFORMANCE OF WORK

- A. Coordinate with other work as necessary to interface with other work being performed.
- B. Protect all areas and equipment in the areas in which work is to be done, by providing drop cloths and other means.

3.03 FIELD QUALITY CONTROL

- A. Upon completion of duct cleaning, demonstrate compliance with specification requirements. Provide a pre-cleaning and post-cleaning inspection of ductwork interior conditions with fiber-optic borescope through 1" holes in the duct. Provide no less than two (2) photographs, one (1) before and one (1) after, for each approximately 25 ft. of ductwork. Plug holes after pictures are taken. Submit pictures in report form along with sketches and/or drawings identifying locations where pictures were taken.

END OF SECTION 23 05 67

SECTION 23 05 71 - STEAM SPECIALTIES

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.

1.02 DESCRIPTION OF WORK

- A. The work includes the providing of all labor, materials, equipment, accessories, services and tests necessary to complete and made ready for operation by the Owner, all steam specialties as shown on the drawings and hereinafter specified.

1.03 QUALITY ASSURANCE

- A. Firms regularly engaged in manufacture of this material with characteristics and capacities required, whose products have been in satisfactory use in similar service for not less than 10 years.
- B. Provide product produced by the manufacturers, which are listed in Section 23 05 12 "Approved Manufacturer's List".
- C. Provide equipment whose performance, under specified conditions, is certified by the manufacturer.

1.04 SUBMITTALS

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work and submit shop drawings.

1.05 COORDINATION

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

1.06 GUARANTEE

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

2.01 STEAM TRAPS

- A. Furnish and install steam traps of approved types and capacities for proper venting and draining of all piping and of all pieces of equipment, including traps required at all ends of mains, heels of risers, and any other point where condensate and/or air may collect, such as ahead of pressure and temperature regulating valves, lifts and drops in steam mains, etc.
- B. All traps shall be designed for the steam pressure and service for which they are to be used and shall pass all condensate and air automatically, without passing any steam. Traps shall be of the types as specified hereafter, as may be required for satisfactory operation. All steam traps shall be warranted to have been tested in the manufacturer's plant under steam to insure tight closure and satisfactory operation.
- C. All steam traps shall be sized for a minimum capacity of 300% of the steam loads indicated on the drawings, and at a maximum pressure drop of ½ psi for low pressure systems and 2 psi for medium pressure systems and 5 psi for high pressure systems, when continuously handling air and condensate. Ratings shall be in accordance with the standards of the Steam Heating Equipment Manufacturers Association.
- D. Traps for heat exchangers shall be sized for 400% steam capacity.
- E. It shall be this Contractor's responsibility to install the entire system of return line piping so that all condensates will be returned without water hammer.
- F. Each heating unit, regardless of type, shall be installed with shut-off valve at inlet. Each radiator or convector shall have at its supply inlet, a bronze body valve of packless quick-opening type which shall pass sufficient steam when fully opened to fully heat the radiator surface with the lowest pressure carried in the mains.
- G. The following schedule of trap types shall apply:

Schedule of Steam Trap Types
Sarco as Standard

Drips for Low Pressure mains and risers	FT
Drips for Low Pressure risers under 2 inches	FT
Drips for High Pressure mains and risers	B
Radiators, convectors, fin-tube radiators	T
Air heating, blast coils, preheaters and reheaters.....	FT
Heating equipment requiring temperature control	FT
Hot water heaters	FT
Tank heaters	FT
Unit heaters	FT
Flash Tank Discharge	F
Heat Exchangers	FT
Steam Absorption Refrigeration Machines.....	FT

CODE:

FT - Float and Thermostatic Trap

B - Inverted Bucket Trap

T - Thermostatic Trap

F - Float traps without thermostatic vent

H. All traps up to and including 2½" size shall be provided with threaded connections. Traps over 2½" size shall be provided with welded flanged connection.

I. Traps 1" size or less shall be provided with union connections.

2.02 THERMOSTATIC STEAM TRAPS

A. Traps shall be Sarco or approved equal. Thermostatic traps shall be of the corrugated-bellows, balanced pressure type, with a bellows made of high grade red brass or phosphor bronze. Regardless of working pressure traps shall have a minimum working pressure of 125 psi. All steam traps to be sized on condensate at steam temperature.

B. The bellows shall be either of Phosphor Bronze (with high temperature solder and brass sleeve protection) or Monel metal, properly brazed.

C. Low pressure (0-25 psi) and medium pressure (0-65 psi) thermostatic traps shall have cast brass or forged brass bodies suitable for 125 psi pressure and shall be provided with a union connection at the inlet. Self-aligning valve heads and seats for the low pressure traps shall be of a suitable, non-corrosive material. Seats shall be removable. Sarco type H or other approved equal shall be acceptable.

D. Valve heads and seats for medium pressure (0-65 psi) traps shall be removable and shall be of stainless steel. The solder used for the bellows shall be suitable for the higher temperature of medium pressure steam. Sarco type S-65 or other approved equal shall be acceptable.

E. High pressure thermostatic traps with union connection (0-125 psi) shall have brass bodies suitable for 200 psi pressure and bellows of phosphorbronze with a brass protective sleeve. The solder udder for the bellows must be high temperature type. Valve heads and seats to be of stainless steel and removable. Sarco N-100 or approved equal shall be acceptable. The bodies shall be suitable for pressures at least 50% higher than the pressure for which the traps are rated.

F. The 0-125 psi and 0-225 psi traps shall have either semisteel or brass bodies, with female screwed connections. The 0-300 psi traps shall have cast steel bodies with female screwed connections.

1. 0-125 psi Sarco 9-125 (semi-steel body) or approved equal.

2. 0-225 psi Sarco 9-225 (semi-steel body) or approved equal.

2.03 COMBINATION FLOAT AND THERMOSTATIC STEAM TRAPS

- A. Combination float and thermostatic traps shall have a valve mechanism, the position of which is controlled by a closed, stainless steel ball float. The seat of the valve will be watertight at all times. The action of this type of trap must be gradual and modulating, it must discharge the condensate as soon as it enters the trap and its rate of discharge must be proportionate to the rate of the flow of condensate to the trap. A gate valve and strainer shall be installed ahead of all float and thermostatic traps.
- B. The traps shall be provided with an automatic, thermostatic air bypass of the balanced pressure, multiple bellows type.
- C. All working parts shall be of non-corrosive metal (hard bronze, monel or stainless steel) and shall be removable without disconnecting the piping. Floats shall be of stainless steel.
- D. Body and cover shall be of high grade cast iron suitable for 125 psi pressure for the 0-15 psi line. Traps shall be Sarco FT-15 or approved equal.
- E. 0-30 psi traps - all bodies and covers shall be designed for 125 psi steam pressure.
- F. The general arrangement (for 0-75 and 0-125 psig) float and thermostatic traps shall be similar to that of the low pressure float and thermostatic traps with the following exceptions:
 - 1. Valve heads and seats shall be of stainless steel.
 - 2. Air bypasses must be built to the standard of high pressure thermostatic traps, i.e., corrugated phosphor bronze bellows, high temperature solder and stainless steels head and seat.
 - 3. Body and cover shall be designed for 200 psig steam.
 - 4. Sarco FT-75 and FTB series for pressures of 0-75 psi or approved equal shall be acceptable.
 - 5. Sarco FT-125 and FTS series for pressures of 0-125 psi or approved equal shall be acceptable.
- G. General arrangement for high pressure float traps (125-200 psig) shall be as given for medium pressure traps, except that body and covers of semi-steel are designed to withstand 250 psi steam and that exterior air vent is of Thermo-Dynamic type as manufactured by Sarco or other approved manufacturer.
 - 1. Sarco FTN for pressures of 0-150 psi or approved equal.
 - 2. Sarco FTQ for pressures of 0-200 psi or approved equal.

2.04 HIGH-CAPACITY FLOAT TRAPS

- A. For high capacity, float traps with double ported, closely balanced stainless steel valves shall be used. These traps shall not require change of seat size with varying pressures. Thermostatic air vents shall be located on outside of trap body. Provide Sarco FT-20 or approved equal.

2.05 INVERTED BUCKET TRAPS

- A. Inverted bucket traps for pressures from 1 to 250 psig, shall have semi-steel body; valve and valve mechanism are to be of stainless steel and shall be of "camlift action" for extra capacity. Up to 75 psi traps shall have 125 psi rating. Above 75 psi the rating shall be 250 psi.
- B. An open inverted bucket with a vent-hole in its top shall activate the valve mechanism.
- C. Inverted bucket shall be either of brass or of stainless steel.
- D. Traps shall have bi-metallic vent. All traps shall be equipped with built-in removable strainer. Same is to be of perforated sheet brass or stainless steel. Traps to be "Sarco Type B" or approved equal and shall be designed as follows:

<u>SIZE</u>	<u>VENT</u>	<u>WITH BIMETAL AIR</u>
1/2"		B12-X
3/4"		B22
1"		B32
1 1/2"		B42
2"		B52

2.06 PRESSURE REDUCING VALVE STATIONS

- A. Pressure Reducing Valves (Based on Sarco): The steam pressure reducing station shall consist of two pressure reducing valves installed in parallel with a by-pass globe valve. On increase in load, the smaller control valve (sized for 25) shall gradually open to its full position and a further increase in load shall close the smaller valve and open the larger control valve (sized for 75%). Finally, above 75% load, both valves shall open. The converse shall occur on sufficient load decrease.
 - 1. Each valve shall be iron body, single seated with stainless steel trim and hardened stainless steel heads and seats. Valves shall be capable of both throttling and shutting off tight against the full primary pressure. Valves shall be Sarco type 25P series or approved equal.
- B. Pressure Reducing Valve shall be of the pilot-actuated, diaphragm-operated type. The main valve diaphragm shall be located below the main valve, in a relatively cool area. The pilot shall be mounted above the main valve and be connected directly to the main valve body without the use of pipe nipples. Pilot assembly must be equipped with protective cover to protect pilot assembly against dirt and soot accumulation. The main valve stem shall be fitted with a "deflector seal" to prevent pressure build-up in the upper diaphragm chamber. The diaphragm shall be of two-ply phosphor bronze. The main valve head shall be constructed to permit removal from the top of the valve without draining the valve body or removing fastening devices during servicing. The pressure reducing valve shall maintain an accuracy of regulation of not more than 1 psi regardless of the initial pressure. There shall be no hunting, chatter or whistle through the entire capacity range from zero flow to full rating.

- C. Pressure Reducing Valves (Based on Spence): Furnish and install, as shown on the plans, pressure reducing valves of the self-operated, external pilot type, single seated, metal diaphragm actuated - Spence Type ED pressure regulators, or approved equal. These valves shall regulate accurately throughout the range of pressure and flow conditions scheduled. They shall function quietly and shut tight on a dead end shutoff.
1. Bodies shall be cast iron; sizes 2½" and larger shall have flanged ends. Seats and discs shall be of Seco metal, stems of stainless steel and diaphragms or bronze. There shall be no springs in the path of the steam and no stuffing boxes. All parts must be easily accessible without removal of the valve from the line.
 2. The pilot valve shall be separate from the main valve and connected to it by unions. A strainer screen shall be built in the pilot inlet. Pilots shall be interchangeable with all sizes of main valves.
 3. Sound pressure level readings in the area of the reducing station three feet from pipe surface are three feet downstream of station shall not exceed 65 dba. Provide noise suppressor with ASTM stamp and muffling orifice plate.
- D. Steam Pressure Reducing Valves (Based on Aerco)
1. Steam pressure reducing valves shall be of the steam pilot actuated type, with either piston, or phosphor bronze diaphragm operation. Bodies shall be 250# cast iron or semi-steel with screwed or flanged ends as specified. Trim shall be stainless steel; main seats shall be single, stellited, or stainless steel with Teflon seals. Pilots, seats and all operating parts must be easily removable without removing the valve from the line. Valves shall be Aerco or approved.
 2. Valves shall control final steam pressure within 1 psi of setting; there shall be no hunting, chatter or whistle through the entire capacity range from zero flow to full rating. Valves shall be factory tested with steam or compressed air.
 3. For pressure reductions of 100 psi or more, two valves shall be set in series. Valve size shall not exceed 3". For valve sizes 3" and above, provide two parallel valves or valve sets. For single stations, three valve by-passes shall be installed. For parallel stations, if each steam pass is 60% of the full load, the by-pass may be omitted. Distance between series valves shall meet manufacturer's standards.
- E. Safety devices shall consist of one or more of the following: (Not more than two.)
1. Safety relief valve of adequate size, with discharge to the atmosphere at a suitable location.
 2. Series safety if recommended by the manufacturer, with both series valves sensing the final pressure, thereby serving as safeties for each other.

2.07 SAFETY VALVES

- A. Steam safety valves shall be the semi-nozzle type, having extra heavy cast iron bodies and bronze trim. Safety valves shall have two separately adjustable controls; one to control "pop" action and the other to control blow-down. Adjusting spring shall be enclosed. A plain lifting level shall be furnished with each valve.

- B. Valves shall be sized in accordance with ASME Power Boiler Code where applicable and shall be ASME approved where necessary. Safety valves for unfired pressure vessels shall be in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code.
- C. Safety valves for use with PRV's shall be sized to handle the specified capacity of the PRV on a maximum capacity basis with no more than 10% accumulation. Unless otherwise shown on plans or specifications, safety valves shall be set 5 psig above delivery pressure of PRV when delivery pressure is 50 psig and less, and 10 psig above delivery pressure for delivery pressures exceeding 50 psig.
- D. Safety valves shall be Lonergan 11W or 41W series, Kunkle Fig. 83 or 250 or approved equal.
- E. Cast iron drip-pan elbow shall be furnished for each safety valve when discharge is piped and safety valve outlet is 2½" or larger. Drip-pan elbow shall be Lonergan DPE Series, or Kunkle Fig. 299 or approved equal.

2.08 STRAINERS FOR STEAM AND CONDENSATE

- A. There shall be approved strainers in the inlet connections to each coil, steam trap, and each diaphragm valve, and where else indicated on the drawings. The intention is to protect by strainers, all apparatus of an automatic character, whose proper functioning would be interfered with by dirt on the seat, or by scoring of the seat.
- B. All strainers in steam lines, shall be Y-pattern, set in a horizontal (or vertical downward) run of the pipe. Where this is not feasible, strainers may be of enlarged-cross-section type. Strainers shall be so arranged as not to "trap" pipes, and to facilitate disconnection and opening-up for cleaning. Unless otherwise indicated, strainers shall be line size.
- C. All strainers, 2½" and above, shall have cast iron bodies and 2" and below shall have bronze bodies of ample strength for the pressure to which they shall be subjected, removable cylindrical or conical screens of monel or stainless steel and suitable flanges or tappings to connect with the piping they serve. They shall be of such a design as to allow blowing out of accumulated dirt, and to facilitate removal and replacement of a strainer screen, without disconnections of the main piping.
- D. Strainer screen perforations shall be 1/32" for steam and mixture of steam and condensate. Strainers of the "Y" type similar to Sarco Bulletin 1220 type IF and AF or approved equal. Strainers smaller than 2" shall be Sarco type "BT".
- E. Provide approved valved dirt blow-out connections for each strainer (with the valve located 6" to 1'-0" below strainer, or as directed). The blow-out connection shall terminate with a valve, nipple and cap. Blowoff shall be 4 pipe sizes smaller than straight pipe, ¾" minimum size and shall be suitable for a hose connection with cap.
- F. All strainers shall be provided with flanged covers for screen removal in lieu of screwed covers wherever obtainable.

- G. All strainer screens 8" and above shall be reinforced for the operating conditions.

2.09 STEAM AIR VENTS

- A. Provide steam air valves on all convectors with maximum operating pressure of 2 lbs.
1. Air valves shall be No. 1A or No. 1B Vari-Vent as may be the Dole Valve Co. or approved equal.
- B. Provide steam air valves on steam mains, returns, and unit heaters. Air vents shall be No. 5 air valve as made by the Dole Valve Co. or approved equal.

2.10 VACUUM VALVES

- A. Provide vacuum valve on all convectors. Vacuum valves shall be No. 2B or No. 103 Vari-Vent as made by Dole Valve Co. or approved equal.
- B. Provide vacuum valve on return line. Vacuum valve shall be No. 6B as made by Dole Valve Co. or approved equal.

2.11 VACUUM BREAKERS

- A. Provide vacuum breakers for jacketed kettles, closed tanks, hot water generator coils and heat exchangers.
1. Vacuum breakers shall be Johnson ¾" VB-75-SS-T, or approved equal. Vacuum breaker shall have stainless steel body with threaded outlet connections.
- B. Provide vacuum breakers on piping to steam heating coils. Vacuum breakers shall be Johnson, Durable check valve or approved equal.

2.12 EXPANSION JOINTS

- A. All piping shall be installed in such a manner as to allow for thermal expansion and contraction without strain to connections at equipment or interconnections piping. While it is preferred that pipe flexibility be utilized to the greatest extent, either through directional changes or pipe loops, expansion joints shall be installed where shown on the plans and shall comply with the following requirements:
- B. Expansion joints in 3" size and over shall be of the stainless steel bellows type, being hydraulically formed from a tube having only longitudinal seam welds. The weld bead of the seam shall be of the same thickness as the parent metal without grinding to avoid areas of stress concentration.
- C. Expansion joints shall be flanged with drilling to meet 150 lb. ASS standards except where so noted. All components shall be suitable for 150 psig service and the traverse indicated on the plans or schedule.
- D. Expansion joints shall be of the self-equalizing type, being furnished with equalizing rings designed to distribute the movement equally among the corrugations while

supporting the roots and side walls of the corrugated element against internal pressure. The end reinforcing skirt flange assembly shall be made entirely of steel and welded into one integral unit. Acceptable manufacturers: Zallea Brothers, ADSCO and Flexonics Division of Calumet & Hella, Inc.

- E. Expansion joints in sizes 2½” or less than be of the "Compensator" type and suitable for 1-¾” compression plus ¼” extension while at 150 psig internal pressure. Compensators shall be internally guided by a positive anti-torque device to prevent twisting on installation. For all high pressure system and expansion joints on main and branch piping compensation shall be Zallea Series H. Expansion joint on radiation shall be Zallea Series L. Acceptable manufacturers: Zallea Brothers, Flexonics.
- F. All piping shall be properly anchored and guided in accordance with the Standards of the Expansion Joint Manufacturers Association. The Contractor shall furnish drawings showing proposed expansion joint, anchor and pipe guide locations as well as details of construction of such piping system components not otherwise shown on plans and specifications.
 - 1. If more than a few expansion joints are illustrated on the drawings, it is generally best if these are shown by identifying number with additional details shown on a Schedule of Expansion Joints. Such schedule should include: Location, pipe size, service, amount of traverse in compression or extension as calculated and such other requirements such as internal sleeves, external covers, pantographic linkage assemblies, etc.
 - 2. Internal sleeves should be specified for all expansion joints, regardless of the metal of the bellows in the following cases:
 - a. For all high temperature applications.
 - b. When flow velocities are high. Lines should be specified for steam lines where the velocity exceeds 1000 fpm per inch of diameter in lines up to 6" size and where the velocity exceeds 6000 fpm in larger sizes.

2.13 FLASH TANKS

- A. Furnish and install where indicated, on plans, all welded steel flash tanks, fabricated of black steel, thickness not less than ¾".
- B. Tanks shall be of sizes as indicated on the drawings and to have tapplings and connections as shown on plans and shall be constructed in accordance with the ASME Code for Unfired Pressure Vessels.
- C. Condensate connection from tank shall be provided with a loop seal and float trap as shown, and thence to the condenser pump receiver.
- D. Flash steam vent connection from tank shall be connected to atmospheric vent line above boiler room roof as noted on the drawings.
- E. Tanks shall be securely supported as required.

- F. Tanks shall be shop tested at 250 psig hydrostatic pressure and given shop coats of red lead and oil pain.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Contractor shall examine location where steam specialties are to be installed and determine space conditions and notify Architect in writing of conditions detrimental to proper and timely completion of the work.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install steam specialties where shown, in accordance with manufacturer's written instructions and with recognized industry practices, to ensure that equipment comply with requirements and serve intended purposes.
- B. Coordinate with other work as necessary to interface installation of steam specialties with other components.

END OF SECTION 23 05 71

SECTION 23 05 80 - HVAC SPECIALTIES

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.

1.02 DESCRIPTION OF WORK

- A. The work includes the providing of all labor, materials, equipment, accessories, services and tests necessary to complete and make ready for operation by the Owner, all HVAC Specialties as shown on the Drawings and hereinafter specified.

1.03 QUALITY ASSURANCE

- A. Firms regularly engaged in manufacturer of this equipment with characteristics and capacities required, whose products have been in satisfactory use in similar service for not less than ten (10) years.
- B. Provide products produced by the manufacturers, which are listed in Section 23 05 12, entitled "Approved Manufacturers List".
- C. Provide equipment whose performance under specified conditions is certified by the manufacturer.

1.04 SUBMITTALS

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work and submit shop drawings.

1.05 COORDINATION

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

1.06 GUARANTEE

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

PART 2 - PRODUCTS

2.01 THERMOMETERS

- A. Furnish and install, where indicated on the Drawings and where specified herein, separable well-type dial or 9" mercury adjustable angle type in glass stem, thermometers, Model 50 EI60E as manufactured by Ashcroft or approved equal.
- B. All thermometers shall be installed in such a manner as to cause a minimum of restriction to flow in the pipes and so that they can easily be read from the floor.
- C. Dial thermometers shall be 5 inch hermetically sealed, bimetal with stainless steel cases, antiparallax dials with raised jet-black figures, stainless steel stems, and separable sockets (wells) unless otherwise specified.
- D. Thermometers for duct mounting shall have union connections in lieu of separable wells.
- E. Separable wells shall be stainless steel for use in steel pipe and brass for use in copper pipe. Separable wells shall be standard type for uninsulated pipe and lagging extension type of proper length for insulated pipe. Stem shall extend a minimum of 3½" into the fluid, or 75% of inside clear diameter for smaller size pipes.
- F. The accuracy of all thermometers shall be within 1% of the full-scale range.
- G. All instrument wells for controls and indicators furnished by the temperature control manufacturer shall be installed under this Section.
- H. Where conditions are such that thermometers would not be readable from the floor, remote bulb dial thermometers shall be mounted on panelboards. The thermometers shall be 5 inch dials and shall be vapor actuated. The thermometers shall have separable wells. Panel mounted thermometers shall be provided with an engraved nameplate mounted below each thermometer to identify its service. The nameplates shall be chrome plated with black filled letters.
- I. A thermometer shall be installed in the hot water inlet and outlet of each heat exchanger. A thermometer shall be installed in the chilled water and condenser water inlet and outlet of each refrigeration machine. Additional thermometers shall be installed where indicated on the Drawings.
- J. The scale range for the thermometers shall be as follows:

Service	Temperature Range		Remarks
Hot Water	30 deg. F to 300 deg. F		
Condenser Water	0 deg. F to 120 deg. F		
Dual Temperature Water	30 deg. F to 300 deg. F		

2.02 PRESSURE GAUGES

- A. Furnish and install where indicated on the Drawings and where specified herein, 4½” Model 1279 pressure gauges with phenolic casings as manufactured by Ashcroft. Process connection shall be ½” MNPT. Acceptable equals include Weiss Model 4UGY1 or Noshok Model 660.
- B. Gauges shall be liquid filled for systems under 150°F (chilled water, condenser water, fuel oil, etc.) and shall be dry for all heating systems (hot water, steam, condensate, etc.).
- C. All gauges shall have black phenolic casings. The gauges shall have white faces with black filled engraved numerals and adjustable pointer. The diameter of the dial shall be 4½ inches. Gauges shall have brass bronzed brushed rotary type movement.
- D. The accuracy of all gauges shall be within ½% of the scale range.
- E. All gauges on water lines shall be fitted with filter type pressure snubbers consisting of ¾" dia. x ⅛" thick, micro metallic stainless steel filter, as manufactured by Operating and Maintenance Specialties or approved equal. All gauges on steam lines shall be fitted with siphon tubes.
- F. A stainless steel bar stock block-and-bleed type needle valve shall be installed on the fluid side of each gauge, similar to Noshok Model Series 704MFS (size ½”). A stainless steel bar stock block-and-bleed type needle valve with a siphon tube shall be installed on the system side of each steam and HTHW gauge.
- G. All gauges shall be installed so as to be easily readable from the floor. Where conditions are such that gauges on piping would not be readable from the floor, the gauges shall be installed on panelboards.
- H. Panel mounted gauges shall be designed for flush mounting with back connections and shall be provided with an engraved nameplate mounted below each gauge to identify its service. The nameplates shall be chrome plated with black filled letters.
- I. Differential pressure switches, pressure sensing pipe taps, furnished by temperature control manufacturers shall be installed under this Section.
- J. Pressure gauges shall be installed in the suction and discharge of each hot water, chilled water, condenser water, condensate return, boiler feed and fuel oil pump. A pressure gauge shall be installed in the chilled water and condenser water inlet and outlet of each refrigeration machine. A pressure gauge shall be installed in the inlet and outlet of each heat exchanger and each air handler coil. A pressure gauge shall be installed at the inlet and outlet of each water, steam or fuel oil strainer. Additional pressure gauges shall be installed where indicated on the Drawings.
- K. The scale range of pressure gauges shall be as follows:

Service	Pressure Range
Hot Water	0 to 100 PSIG
Discharge Side of Water Pressure Reducing Valve	0 to 100 PSIG

- L. All other pressure gauges shall have a range at least twice the working pressure, but in no case less than 0 to 30 PSIG.

2.03 MACHINERY GUARDS

- A. Moving parts of machinery exposed to contact by personnel shall be guarded by barrier type which complies with OSHA.
- B. Exposed moving parts such as belts and couplings shall have not less than 3/4" No. 16 gauge steel guards with all edges rounded and gauge, material and construction shall be in accordance with OSHA standards - paragraphs 7173.3, 7173.5 and 7174.1. Guards shall have 1/4" x 1/4" x 1/8" angle iron frame properly supported.
- C. All machinery guards covering the ends of motor or equipment shafts shall have openings for the insertion of a tachometer. Machinery guards shall be painted with two coats of machinery orange enamel.

2.04 V-BELT DRIVES

- A. All V-belt drives furnished under this Section shall be Gates Rubber Co., Woods, or approved equal. ¹Drives shall be designed with an overload factor of twice the fan brake horsepower but in no case less than 125% of motor horsepower rating. Machined cast iron pulleys shall be used. Manufacturer's shop drawings shall state actual transmission capacity of each drive. Provide companion sheaves for adjustable sheave drives. Companion sheaves shall be selected such that the individual belts shall not exceed a two degree misalignment of the groove center lines between the driving and driven sheaves. Sheaves shall be complete with flanges and locking devices. All sheaves shall be selected with a 1.5 minimum service factor.
- B. All motors up to 2½ HP shall have variable speed drives.
- C. All motors 10 HP to 25 HP for speeds below 1000 RPM shall have variable speed drives.
- D. Provide fixed drives above 1000 RPM for 10 to 25 HP and for all units above 25 HP.

2.05 STRAINERS FOR WATER SYSTEM

- A. Furnish and install a full-size Y-pattern strainer on the inlet of each control valve and each water pump, and where indicated on the Drawings. For pumps, the Contractor shall

install either a Y-strainer or a suction diffuser with internal screened basket. Contractor shall not install both a Y-strainer and a suction diffuser.

- B. The strainers shall be as manufactured by Spence, Sarco, Barnes and Jones, Elliott, Crane or Mueller.
- C. All strainers, except where otherwise noted, shall have bronze body up to 2½", semi-steel above 2½", rated at 125 psig for all systems with 50 psig max. pressure and 250 psig for all others. Strainers 2-inch diameter and smaller shall have screwed ends. Strainers 2½ inch diameter and larger shall have flanged ends.
- D. All strainers shall have removable cylindrical or conical screens of brass construction. They shall be designed to allow blowing out of accumulated sediment and to facilitate removal and replacement of the screen without disconnecting the main piping.
- E. Screens for water 1/16" for 3" inclusive, 1/8" for 4" and above.
- F. An approved blow-out connection with gate valve shall be made to each strainer. The valves shall be located not higher than 8 feet above the floor. All drain connections shall be piped to floor drains.

2.06 REFRIGERATION ACCESSORIES

- A. Refrigerant Filter-Dryer: Provide, refrigerant filter-dryers. Refrigerant filter-dryers shall be replaceable core "Catch All" type, as manufactured by Sporlan Valve Company.
- B. Moisture and Liquid Indicator: Provide combination liquid and moisture indicators type "See All", as manufactured by Sporlan Valve Company.
- C. Refrigerant Strainers: Provide Refrigerant Strainers. Strainers shall be as manufactured by Henry Valve Company, Type 895.
- D. Thermal Expansion Valves: Provide Thermal Expansion Valves. Thermal expansion valves shall be Type "MVE-G", as manufactured by Sporlan Valve Company, or approved equal, with external equalizer and remote bulb.
 - 1. The Contractor shall submit manufacturer rating tables and/or selection charts for approval.
- E. Liquid Line Solenoid Valves: Provide Liquid Line Solenoid Valves. Valves to have stainless steel diaphragm-welded and lead-proof construction, replaceable thermostatic element and tight seating. Valve shall be as manufactured by Sporlan Valve Company or approved equal.
- F. Flexible Pipe Connections: Provide flexible pipe connections. Flexible pipe connectors to be all bronze construction, metal braided type suitable for the Refrigerant.

2.07 EVACUATION OF REFRIGERATION PIPING

- A. When testing of refrigerant piping is completed as specified hereinafter, blow off the pressure in the system to atmosphere and provide final evacuation. Provide a vacuum pump capable of pulling vacuum of at least 1 mm Hg. absolute. Use a Zimmerli gauge to read vacuum. Remove all moisture from the system. Operate the vacuum pump until a vacuum of 2.5 mm Hg. is achieved.
- B. When the system is evacuated, break the vacuum with oil pumped, dry nitrogen, open the compressor suction and discharge service valves and re-evacuate the system to 2.5 mm Hg. absolute. Stop vacuum pump and allow system to stand under a vacuum a minimum of 12 hours. If no noticeable rise in pressure has taken place after 12 hours, the system shall be charged.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Contractor shall examine location where these specialties are to be installed and determine space conditions and notify Architect in writing of conditions detrimental to proper and timely completion of the work.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install HVAC Specialties where shown, in accordance with manufacturer's written instructions and with recognized industry practices, to ensure that HVAC Specialties comply with requirements and serve intended purposes.
- B. Coordinate with other work as necessary to interface installation of HVAC Specialties with other components of systems.

3.03 FIELD QUALITY CONTROL

- A. Upon completion of installation of HVAC Specialties, test HVAC Specialties to demonstrate compliance with requirements. When possible, field correct malfunctioning units, then retest to demonstrate compliance. Replace units which cannot be satisfactorily corrected.

END OF SECTION 23 05 80

SECTION 23 05 93 - TESTING AND BALANCING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.

1.02 DESCRIPTION OF WORK

- A. All piping and equipment shall be tested. Labor including standby electrician, materials, instruments and power required for testing shall be furnished unless otherwise indicated under the particular Section of the Specification.
- B. Tests shall be performed in the presence of and to the satisfaction of the Architect and such other parties as may have legal jurisdiction.
- C. In no case shall piping, equipment, or accessories be subjected to pressure exceeding their ratings.
- D. All defective work shall be promptly repaired or replaced and the tests shall be repeated until the particular system and component parts thereof receive the approval of the Architects.
- E. Any damage resulting from tests to any and all trades shall be repaired and damaged materials replaced, all to the satisfaction of the Architect.
- F. The duration of tests shall be as determined by all authorities having jurisdiction, but in no case less than the time prescribed below.
- G. Equipment and systems which normally operate during certain seasons of the year shall be tested during the appropriate season. Tests shall be performed on individual equipment, systems, and their controls. Whenever the equipment or system under test is interrelated and depends upon the operation of other equipment, systems and controls for proper operation, functioning and performance, the latter shall be operated simultaneously with the equipment or system being tested.
- H. All fans and duct systems shall be completely balanced by the adjustment of sheaves, dampers, registers and other volume and diverting control devices, to obtain the air quantities indicated on the design drawings. Replace sheaves if required to meet design conditions.

- I. All pumps and piping systems shall be completely balanced by the adjustment of plug cocks, globe valves or other control devices, to obtain flow quantities indicated on the design drawings.
- J. Tests shall be performed in presence and to satisfaction of Architect, and such other parties as may have legal jurisdiction. Submit completed reports for approval. If air and water balancing cannot be verified in two, four-hour tests (total of eight hours) the Contractor shall pay the Architect or his representative for any additional time spent to balance the system.
- K. Upon completion of the work, a test shall be conducted in the presence and under the direction of a NYS Licensed Professional Engineer, retained by the Contractor, and qualified to conduct such tests. The tests shall show compliance with the code requirements for ventilation and the proper functioning of operating devices, before the system is approved. Tests shall also be conducted under the direction of the same Licensed Professional Engineer to demonstrate that all installed fire and fire smoke dampers operate properly. The Contractor shall submit a letter signed and sealed by the Licensed Professional Engineer indicating that such testing has been successfully conducted and shall make all associated controlled Special Inspections and other submissions to the Authority Having Jurisdiction (AHJ).

1.03 QUALITY ASSURANCE

- A. Prior to installation of the mechanical systems, engage the services of an independent air and water balancing firm that shall be subject to the approval of the Architect. The firm shall have no affiliation with a mechanical contracting or sheetmetal company. Balancing and testing company shall be a member of the Associated Air Balance Council (AABC), National Environmental Balance Bureau (NEBB) or Testing, Adjusting and Balancing Bureau (TABB). The balancing firm shall have at least one member of its full-time staff who is a licensed professional engineer who shall supervise the balancing work. Prior to balancing, a list of instruments to be used shall be submitted to the Architect. All instruments shall be calibrated within six months before tests.
- B. Prior to installation of the mechanical systems, the licensed Professional Engineer for the Balancing and Testing Company shall review the contract documents to confirm that all balancing devices are provided to allow for complete balancing of the air and water systems for the project. The Balancing and Testing Company shall submit a letter confirming that they have performed this review and identifying any issues.

After the mechanical systems are installed and before the systems are enclosed behind walls and ceilings, the PE for the Balancing and Testing Company shall perform a review of the installation to verify that the required balancing devices have been installed and that the systems are ready for balancing. The Balancing and Testing Company shall submit a letter confirming that the inspection has been performed and that the system is ready for balancing.

Both letters shall be signed and sealed by the Balancing and Testing Company's Professional Engineer.

- C. When all specified testing and balancing procedures have been completed, a written report shall be submitted to the Architect for review. The report shall be tabulated in standard AABC/TABB format. As part of the Architect's review process, the accuracy of the balancing report shall be field spot checked on a random basis, with the assistance of the balancing firm's project supervisor. The HVAC Contractor shall reimburse the Architect for all time spent in excess of eight working hours, to demonstrate the accuracy of the balancing report.

1.04 SUBMITTALS

- A. Refer to Section 01 31 46 "Special Requirements for Mechanical and Electrical Work". Submit all test and balancing reports as described hereinafter.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 FIELD TEST OF PIPING

- A. During construction properly cap or plug all lines to prevent the entrance of sand, dirt, etc. The system of piping shall be blown through wherever necessary after completion (for the purpose of removing grit, dirt, sand, etc., from all equipment and piping), for as long a time as is required to thoroughly clean the apparatus.
- B. Use anti-freeze solution for piping to be tested in winter.
- C. All piping shall be tested as hereinafter specified. Tests shall be made after erection and before covering is applied or piping painted or concealed, and as sections of mains and groups of risers are completed. The extent of the work completed before pressure tests are made shall be determined by the Architect.
- D. All piping, unless otherwise specified, shall be tested to a hydrostatic pressure at least 1-1/2 times the maximum designed working pressure (but not less than 50 lbs. per square inch) for a sufficiently long time to detect all leaks and defects; and after testing shall be made tight in the most approved manner. Tests shall be repeated once after leaks and defects have been repaired. When automatic control valves, equipment and similar devices which are incapable of withstanding test pressures applied to piping, such devices shall be removed, or otherwise protected during tests. After approval of such tests, devices shall be installed and tested with operating medium to operating pressures. The following shall be tested for four consecutive hours and proved tight. Leaks shall be remedied by replacing defective work.

Hydrostatic

<u>Item</u>	<u>Field Test</u>
Overflow and drain	50 psi
Cold Water (domestic)	100 psi

Dual temperature water

100 psi

- E. Leaks appearing during the various pressure tests shall be corrected by replacing all defective materials or welds and subsequent tests shall be made until the piping is found perfect. Caulking of screwed joints or pending of welds is prohibited. Wherever it is necessary to cut out a weld and the ends of the pipe cannot be conveniently brought together, then a short piece of pipe shall be fitted in and welded as approved by the Architect.
- F. Provide all other tests required by the Building Department, Fire Department and all other Authorities Having Jurisdiction (AHJ).

3.02 RUNNING TEST OF PIPING SYSTEMS

- A. When directed, any section of the work, after it has been completed and otherwise satisfactorily tested, shall be put in actual operation and operated for a period of two (2) days of 24 hours each, during which time any defects which may appear shall be remedied and any adjustment which may be necessary shall be made.
- B. During the time of the tests, repack all valves, make all adjustments and otherwise put the apparatus in perfect condition for operation, and instruct the Owner's representative in the use and management of the apparatus.

3.03 TESTING, EVACUATION AND CHARGING OF REFRIGERATION PIPING

- A. The Contractor shall notify the owner 24 hours in advance of any test so that the owner and/or manufacturer's representative may be present for the test if desired.
- B. When the refrigeration connections have been completed, the system shall be tested at 240 psig on the low pressure side and 430 psig on the high pressure side or in accordance with the recommendation of the refrigerant equipment manufacturer. Liquid refrigerant shall be charged into the system to raise the pressure to 35 psig, and dry nitrogen added to obtain the desired test pressure. Leak testing shall be performed with an electronic leak detector. Refrigeration piping will not be acceptable unless it is gas tight. If any leaks are found, isolate the defective area, discharge the gas and repair the leaks, and then repeat the test.
- C. The system shall be evacuated with a vacuum pump specifically manufactured for vacuum duty, having a capability of pulling a vacuum of 50 microns or less. The pump should be connected to both the low and the high side evacuation valves with copper or high vacuum hoses. The compressor service valves should remain closed. A high vacuum gauge capable of registering pressure in microns should be attached to the system for pressure readings. To check the system pressure, a hand valve must be provided between the pressure gauge and the vacuum pump which can be closed to isolate the system and check the pressure.

- D. Evacuate each system to an absolute pressure not exceeding 1,500 microns. Break the vacuum to 2 psig with the refrigerant to be used in the system. Repeat the evacuation process, again breaking the vacuum with refrigerant. Install a drier of the required size in the liquid line, open the compressor suction and discharge valves, and evacuate to an absolute pressure not exceeding 500 microns. Leave the vacuum pump running for not less than two hours without interruption. Raise the system pressure to 2 psig with refrigerant and remove the vacuum pump.
- E. Refrigerant shall be charged directly from the original drums through a combination filter-drier each drier may be used for a maximum of three cylinders of refrigerant, and then must be replaced with a fresh drier charge the system by means of a charging fitting in the liquid line. Weight the refrigerant drum before charging so that an accurate record can be kept of the weight of refrigerant put in the system. If refrigerant is added to the system through the suction side of the compressor charge in vapor form only.
- F. Condensing units will be delivered to the job with sufficient oil for the average installation. Check all compressors for proper oil level, and if necessary add sufficient oil to bring the level to the center of the crankcase sight glass. Use only the refrigeration oil recommended by the condensing unit manufacturer all oil must be delivered to the job in factory sealed, unopened containers.
- G. Refrigeration piping shall be tested in accordance with the recommendations of the refrigeration equipment manufacturer or in the following sequence in the absence of manufacturer requirements, for a period of 24 hours.
 - High Side - Nitrogen at 300 psi
 - Low Side - Nitrogen at 150 psi
 - Entire System - Refrigerant at 5 psi
- H. No visible leaks, losses in pressure or increase in vacuum occur during test period.

3.04 EQUIPMENT TEST

- A. Demonstrate that all equipment and apparatus fulfill the requirements of the Specifications and that all equipment shall be operated and tested for rated capacities and specified characteristics. Voltage and amperage readings shall be taken on all electric motors.
- B. Operate air handlers and fans for 40 hours and demonstrate fans operating at maximum capacity, with all variable volume dampers to be at the full open position.

3.05 FIRE DAMPER AND FIRE SMOKE DAMPER TEST (REQUIRED FOR NYC PROJECTS)

- A. Under this section test each and every fire damper by removing the fusible link to demonstrate that the damper properly closed.

- B. Under this section test each and every fire smoke damper by removing the fusible link or alternately applying heat to the heat detector for dampers utilizing heat detectors) to demonstrate full closure. Also demonstrate that the damper opens and closes properly under automatic control through the operator.
- C. After the successful completion of such tests reinstall fusible links and reset heat detectors.
- D. All such tests shall be conducted under direction of a NYS Professional Engineer retained by the Contractor.

3.06 TEST PREPARATION AND PROCEDURE

- A. On initial startup, prior to any tests, check the rotation and running amperage of all fan and pump motors to prevent damage to equipment by overload.
- B. Final balancing must be done with all systems completely installed and operating, and after the automatic temperature controls have had their final adjustment.
- C. New, clean filters must be installed in all supply systems prior to balancing.
- D. All water systems shall be completely filled and vented, and all strainers cleaned prior to balancing. Inspect expansion tanks for proper water level and operating of makeup water valves.
- E. All main supply air ducts shall be traversed, using a pitot tube and manometer. The manometer shall be calibrated to read two significant figures in all velocity pressure ranges. Duct traverses shall be conducted using the log-Tchebycheff method. The equal area method is not acceptable.
- F. A main duct is defined as either of the following:
 - 1. A duct serving five or more outlets.
 - 2. A duct serving two or more branch ducts.
 - 3. A duct serving a reheat coil.
 - 4. A zone duct from a multi-zone unit.
 - 5. A duct emanating from a fan discharge or plenum and terminating at one or more outlets.
- G. The intent of this operation is to measure by traverse the total air quantity supplied by the fan and to verify the distribution of air to zones.
- H. Submit data in support of all supply fan deliveries by the following four methods:
 - 1. By summation of the air quantity readings at all outlets.
 - 2. By duct traverse of main supply ducts and directly at the air handler or fan discharge.
 - 3. By a rotating vane traverse across a filter or coil bank.
 - 4. By plotting RPM and static pressure readings on the fan curve. Air density corrections must be indicated.

- I. For return air and exhaust fans, the rotating vane traverse is not required.
- J. Inspect all fan scrolls and remove objects or debris. Inspect all coils and remove debris or obstructions. Verify that all fire dampers are open.
- K. The supply air systems shall be completely balanced prior to the final balancing of the water systems.
- L. Upon completion of all air and water balancing, all duct dampers, plug valves and other throttling devices shall be permanently marked in the final adjusted position.

3.07 AIR BALANCE

- A. Record the following design requirements for all fans and fan motors from the approved shop drawings.
 - 1. Air quantities - CFM
 - 2. Approximate fan speed - RPM
 - 3. Fan static pressure (total or external) - inches of water.
 - 4. Maximum tip speed - FPM
 - 5. Outlet velocity - FPM
 - 6. Fan brake horsepower
 - 7. Motor horsepower
 - 8. Volts, phases, cycles and amps at design conditions.
- B. Record the following data from all fans and fan motors installed at the project:
 - 1. Manufacturer, model and size
 - 2. Motor horsepower, service factor and RPM
 - 3. Volts, phases, cycles and full load amps
 - 4. Motor starter and heaters size
 - 5. Equipment location
- C. All fans and duct systems shall be completely balanced by the adjustment of sheaves, dampers, registers and other volume and diverting control devices, to obtain the air quantities indicated on the Drawings. Outside air and return air modulating dampers shall be adjusted to admit the specified quantities of air under all cycles of operation. All final adjusted air quantities shall be within 10% of the design requirements while adhering to positive or negative pressure roof design conditions. Replace sheaves if required to meet design conditions.
- D. Record the following test data for all fans and motors installed at the Project at final balanced conditions:
 - 1. Fan speed RPM.
 - 2. Fan static pressure (external and total) inches of water.
 - 3. Static pressure drop across all filters, dampers, coils and other items in the supply fan casings.
 - 4. Motor operating amps. (Measure, record and report all motor amps at minimum outside air volume and at maximum outside air volume.) This requirement applies

- to both constant volume and variable air volume systems where economizers are present.
5. Actual voltage
 6. Fan CFM
 7. Calculated brake horsepower.
- E. Submit single line diagrams of all duct systems indicating all terminal outlets identified by number. Data sheets shall list all such outlets denoted by the same numbers, including the outlet's size, "K" factor, location, CFM and jet velocity.
- F. Submit this data for all supply, return and exhaust air systems.
- G. Adjust the outside air, relief air and return air dampers to admit the required amounts of outside air. Record and submit outside air flow measurement and the outside, return and mixed air temperatures for both cycles after final adjustments.
- H. Air balancing shall be performed with filters partially blocked to simulate a pressure drop across the filters equal to that midway between the clean and the dirty condition.

3.08 ADDITIONAL REQUIREMENTS

- A. Replacement of adjustable pulleys, additional balancing dampers, additional fan belts, pressure taps and fittings, hydronic balancing valves and any other devices or equipment required to effect proper testing, adjusting and balancing shall be provided at no additional cost to the Owner.

END OF SECTION 23 05 93

SECTION 23 07 00 - INSULATION FOR HVAC WORK

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.

1.02 DESCRIPTION OF WORK

- A. The work includes furnishing and installing all labor, materials, equipment, accessories and services necessary to provide Piping, Ductwork and Equipment Insulation installation, which is complete in every respect and of the composition and quality as shown on the Drawings and hereinafter specified.

1.03 PIPE INSULATION

- A. The following pipes shall not be insulated. Insulate all other piping:
 - 1. Unions.
 - 2. Drain pipes embedded in concrete.
 - 3. Refrigerant liquid and outdoor portions of refrigerant hot gas piping except where otherwise noted.

1.04 DUCTWORK INSULATION

- A. Insulate all ductwork except the following portions of ductwork:
 - 1. Ducts provided with sound absorptive lining (except where humidifier is installed and except where located outdoors) may have external insulation thickness decreased provided overall insulation R-value internal plus external complies with R-value specified herein.
 - 2. All exhaust ductwork, except where otherwise noted.
 - 3. Return air ductwork passing through air-conditioned space and/or hung ceiling of air-conditioned space, except in single story buildings and ducts in ceiling of uppermost floor or in attic space, where all return air ducts must be insulated.
 - 4. Return air ductwork for heating and ventilating systems, where return air ducts pass through heated areas.
 - 5. Supply ducts above hung ceilings where space above hung ceilings is used for return air plenum, except below roof.
 - 6. Exposed supply and return air ducts in air-conditioned spaces if same supply air duct serves that area only.
 - 7. Exposed supply air duct in ventilated spaces, if same duct serves that area only.

1.05 QUALITY ASSURANCE

- A. "Installer": A firm with at least ten 10 years successful installation experience on projects with piping and ductwork insulation similar to that required for this project.
- B. All insulation shall have composite (including insulation jacket or facing and adhesive) fire and smoke hazard ratings as tested by procedure ASTM E-84, NFPA 255 and UL 723 not exceeding:
 - 1. Flame Spread 25
 - 2. Smoke Developed 50
 - 3. Fuel Contributed 50
- C. Accessories such as adhesives, mastics, cements, tapes and cloths for fittings shall have component ratings as listed above. All products shall bear UL labels indicating the above are not exceeded.
- D. Provide certifications or other data as necessary to show compliance with these Specifications and governing regulations. Include proof of compliance for test of products for fire rating, corrosiveness, and compressive strength.
- E. Provide products produced by the manufacturers which are listed in Section 23 05 12, "Approved Manufacturers List"
- F. Insulation Materials: Insulating materials manufacturing facilities must be certified and registered with an approved registrar for conformance with ISO9000 quality standard.

1.06 SUBMITTALS

- A. Refer to Section 01 31 46 - "Special Requirements for Mechanical and Electrical Work" and submit shop drawings and samples.

1.07 GUARANTEE

- A. Refer to Section 01 31 46 - "Special Requirements for Mechanical and Electrical Work".

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect insulation against dirt, water, chemical and mechanical damage. Do not install damaged insulation; remove from project site.
- B. Deliver insulation, coverings, cements, adhesives and coatings to the site in factory-fabricated containers with the manufacturer's stamp, or label, affixed showing fire hazard ratings of the products.
- C. Store insulation in original wrappings and protect from weather and construction traffic.

2.01 COLD AND DUAL TEMPERATURE PIPING INSULATION

- A. The following piping shall be covered with fiberglass insulation with vapor barrier:
- | <u>Service</u> | <u>Thickness</u> |
|----------------|------------------|
|----------------|------------------|

Hot-Chilled (Dual Temperature)

Water Supply & Return

Up to 1¼ "	1½"
------------	-----

1½" and above	2"
---------------	----

Refrigerant Suction

All pipe diameters	1½"
--------------------	-----

Cold Water Make-Up and Air Conditioning

Condensate Drain Piping from Cooling Coil Drain Pans

All sizes	1"
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- B. Insulation on any piping, fitting, flange and valve located in areas exposed to freezing (in unheated areas, at cooling towers and where noted on the Drawings as to provide "Frost Insulation") shall be increased by one inch with the same finish as specified for the particular service when not subject to freezing. Insulation shall always be a minimum of 2½" inches in thickness.
- C. Insulation shall be glass fiber complying with ASTM C547, Type I with a maximum K factor of 0.23 BTU in/hr ft² F at 75 degrees F. mean temperature with factory-applied all service vapor barrier jacket with self-seal lap meeting the requirement of ASTM C-1136 Type I.
- D. Insulation shall be heavy density fiberglass sectional pipe insulation as made by Owens-Corning Fiberglass Corp. or Johns-Manville Micro-Lok fiberglass insulation.
- E. Ends of pipe insulation shall be sealed off at all flanges, fittings, valves and at intervals of 21 feet on continuous runs of pipe, with Foster fire-resistant vapor barrier coating Foster 30-65 or Childers CP-34 or equal.
- F. All fittings, valves and flanges for pipe sizes smaller than 4" shall be insulated with molded fiberglass fittings of same thickness as the adjoining pipe insulation, secured with No. 20 gauge galvanized annealed steel wire and covered with Zeston 2000 25/50 PVC as made by Johns Manville, applied per manufacturer's recommendation, except as specified in 2.01 H.
- G. All fittings, valves and flanges for pipe sizes 4" and larger shall be insulated with fabricated mitered segments of pipe insulation of same thickness as the adjoining pipe insulation, secured with No. 20 gauge galvanized annealed steel wire and covered with Zeston 2000 25/50 PVC fitting covers as made by Johns Manville installed per manufacturer's recommendation, except as specified in 2.01 H.
- H. Finish for Exposed Pipe Insulation:

1. The term “exposed” is hereby defined as any place outdoors, as well as any place indoors in Mechanical Rooms, Storage Rooms, Janitor’s Closets, etc., where located within 7 feet of floor or access platforms.
 2. All exposed pipe, valve and fittings insulation shall have 0.016 inch thick corrugated aluminum jacket banded with ½" s.s. bands spaced 12” o.c. Piping, fittings and valves exposed in building, within seven feet of the floor or access platform, shall have 0.016" thick aluminum jacket banded with ½" aluminum bands spaced 12" o.c. or two bands per section. Joints and jacket shall provide complete weatherproof protection either by mechanical contact or by use of Foster 95-44 or Childers CP-76 metal jacketing sealant (gallon cans only; no tubes).
 3. All calcium silicate pipe insulation, all insulated condenser water piping exposed to weather and all other insulated pipe exposed to weather shall have 0.016 inch thick aluminum jacket banded with ½” s.s. bands spaced 12" o.c. This shall include pipe, fittings and valves.
- I. All below ambient, coated molded fittings and mitered segments shall be vapor sealed with a layer of open weave glass fabric embedded between two 1/16" thick coats of Foster 30-65 or Childers CP-34 vapor barrier coating and lap seal at least 1" for molded type and 2" for mitered type on itself and adjoining insulation.
- J. Direct contact between pipe and hanger shall be avoided. Hanger shall pass outside of a metal saddle which shall support a section of high density insulation equal thickness to adjacent insulation (such as calcium silicate) and of sufficient length to support pipe without crushing insulation. (See table below.) Hangers shall not pierce insulation and all vapor barriers shall be unbroken and continuous.

Pipe Size	Saddle & Insert Length
1½”- 2"	10" Long
3"-6"	12" Long
8"-10"	16" Long
12" & over	22" Long

- K. At pipe supports, insulation shield protection saddles and matching hanger shall be used.
- L. All strainers for chilled water and insulated condenser water piping shall be insulated and boxed in with galvanized sheet metal cover. The insulated metal covers shall be segmented and shall be made removable.
- M. As an alternative to fiberglass insulation, on cold pipes, elastomeric closed-cell insulation may be used.
1. Insulation material shall be a flexible, closed-cell elastomeric insulation in tubular or sheet form: AP Armaflex, AP Armaflex W, AP Armaflex SS, or AP Armaflex SA. These products meet the requirements as defined in ASTM C 534, “Specification for preformed elastomeric cellular thermal insulation in sheet and tubular form.”
 2. Insulation materials shall have a closed-cell structure to prevent moisture from wicking which makes it an efficient insulation.

3. Insulation material shall be manufactured without the use of CFC's, HFC's or HCFC's. It is also formaldehyde free, low VOC's, fiber free, dust free and resists mold and mildew.
4. The insulation material shall contain MICOBAN Antimicrobial additive to aid in the prevention of mold and mildew.
5. Materials shall have a flame spread index of less than 25 and a smoke-developed index of less than 50 when tested in accordance with ASTM E 84, latest revision. In addition, the product, when tested, shall not melt or drip flaming particles, the flame shall not be progressive and all materials shall pass simulated end-use fire tests.
6. Materials shall have a maximum thermal conductivity of 0.25 Btu-in./h-ft²- °F at a 75°F mean temperature when tested in accordance with ASTM C 177 or ASTM C 518, latest revisions.
7. Materials shall have a maximum water vapor transmission of 0.05 perm-inches when tested in accordance with ASTM E 96, Procedure A, latest revision.
8. The material shall be manufactured under an independent third-party supervision testing program covering the properties of fire performance, thermal conductivity and water vapor transmission.
9. Valves, Flanges and Fittings:
 - a. Armacell Fabricated Fittings can be used on all fittings. 2 and 3 Pieces 90s, 45s, Ts, P traps and couplings along with grooved fittings are available.
 - b. All fittings shall be insulated with the same insulation thickness as the adjacent piping. All seam and mitered joints shall be adhered with Armaflex 520, 520 BLV or 520 Black Adhesive. Screwed fittings shall be sleeved and adhered with a minimum 1" overlap onto the adjacent insulation. Armaflex HT 625 Adhesive shall be used with UT Solaflex.
 - c. Valves, flanges, strainers, and Grooved couplings shall be insulated using Armaflex donuts that shall then be covered with sheet or oversized tubular insulation.
10. Adhesives and Finishes
 - a. Adhesive shall be the insulation manufacturer's recommended contact adhesive: Armaflex 520, Armaflex 520 BLV, Armaflex 520 Black, Low VOC Spray Adhesive or Armaflex HT 625 Adhesive.
 - b. Insulation finish shall be the insulation manufacturer's recommended finish: Armaflex WB Finish.
 - c. Accessories such as adhesives, mastics and cements shall have the same properties as listed above and shall not detract from any of the system ratings as specified above.

2.02 PVC INSULATED FITTING COVERS

- A. The Contractor shall use Zeston 2000 25/50 rated PVC covers as made by Johns Manville or approved equal, for concealed piping.
- B. Hot Systems: Fittings shall be insulated by applying the proper factory precut Hi-Lo Temp insulation insert to the pipe fitting. The ends of the Ho-Lo Temp insulation insert shall be tucked snugly into the throat of the fitting and the edges adjacent to the pipe

covering tufted and tucked in, fully insulating the pipe fitting. PVC fitting cover is then applied and shall be secured by tack fastening, banding or taping the ends to the adjacent pipe covering.

- C. On fittings where the operating temperature exceeds 250 deg. F, 2 or more layers of the Hi-Lo Temp insulation inserts shall be applied prior to the installation of the PVC fitting cover. The first layer shall be applied with a few wrappings of fiber glass yarn to eliminate voids or hot spots.
- D. Cold Systems: Fittings shall be insulated by applying the proper factory precut Hi-Lo Temp insulation insert to the pipe fitting. The ends of the Hi-Lo Temp insulation insert shall be tucked snugly into the throat of the fitting and the edges adjacent to the pipe covering tufted and tucked in, fully insulating the pipe fitting. All fittings and elbows shall be coated with vapor barrier coating and reinforcing mesh before PVC covers are applied.
- E. A vapor barrier mastic compatible with the PVC shall be applied around the edges of the adjoining pipe insulation and on the fitting cover throat overlap seam. The PVC fitting cover is then applied and shall be secured with pressure sensitive pearl-gray Z-Tape along the circumferential edges. The tape shall extend over the adjacent pipe insulation and have an overlap on itself at least 2" on the downward side.
- F. 2 or more layers of the Hi-Lo Temp insulation inserts shall be applied with the first layer being secured with a few wrappings of fiberglass yarn.
- G. Refrigerant systems and cold systems located outdoors: Fittings shall be insulated to a full thickness the same as the adjacent pipe insulation, with insulation which has been mitered. An intermediate vapor barrier shall be applied, completely sealing the insulation and on the fitting cover overlap seam. 0.016" aluminum cladding shall be applied and shall be secured with pressure sensitive pearl-gray Z-Tape along the throat seam and the circumferential edges overlapping itself 2" on the downward side with aluminum bands on 12" intervals.
- H. Qualifications for Using Insulation: When the pipe insulation thickness is greater than 1½" or the pipe temperature is greater than 250°F or less than 45°F, additional insulation inserts should be used. Use one Hi-Lo Temp insert for each additional 1" of pipe insulation.
- I. Fitting cover: The temperature of the PVC fitting cover must be kept below 150°F by the use of proper thickness of insulation and by keeping the PVC cover away from contact with, or exposure to, sources of direct or radiant heat.
- J. Where insulated piping is exposed (indoors up to 7 feet above the floor or platform) or any place outdoors, the PVC covers shall be omitted since the use of 0.016" thick aluminum cladding is required on all piping, fittings and valves.

2.03 INSULATION OF PIPING IN FAN COIL UNITS

- A. The Contractor shall have the option to use ¾" thick AP Armaflex pipe insulation in lieu of fiberglass hereinbefore specified for chilled and hot water piping insulation in fan coil units. Refer to paragraph 2.01 L.

2.04 PIPING EXPOSED TO FREEZING

- A. Insulation on any piping, fitting, flange and valve located in areas exposed to freezing (in unheated areas, at cooling towers and where noted on the Drawings as to provide "Frost Insulation") shall, in addition to above covering, be increased by one inch with the same finish as specified for the particular service when not subject to freezing. Insulation shall always be a minimum of 2½" inches in thickness.
- B. Weatherproofing of Piping:
 - 1. Weatherproof all insulated outdoor piping.
 - 2. Where weatherproofing is required, in addition to insulation and finishes specified for frostproofing, cover with Tedlar Film Jackets as made by ALPHA Assoc, Inc. (Woodbridge N.J.).
 - 3. Fittings insulation shall be heavily coat with Childers CP-10/11 or Foster 46-50 weather barrier mastic for hot piping; Childers CP-34 or Foster 30-65 vapor barrier coating for cold piping. Embed into the wet coat a layer of open weave glass cloth and finish with a second coat of same mastic over entire surface.
 - 4. In addition to insulation and finishes specified for frostproof, cover all piping, including fittings and valves, with corrugated aluminum sheet cladding, 0.016 inch thick with lock seams at longitudinal seams, and preformed straps at transverse joints at 12" intervals. Joints and jacket shall provide complete weatherproof protection either by mechanical contact or by use of Foster 95-44 or Childers CP-76 metal jacketing sealant (gallon cans only; no tubes).

2.05 FIRE STOPPING

- A. Packing of openings, where ducts and pipes penetrate fire barriers, shall be done with Rockwool insulation as made by United States Gypsum, Co.
- B. Insulation shall comply with Fed. Spec. HH-1-558, Form A, Class 4, K=0.24, melting point 2000 degrees F.
- C. An acceptable alternative to rockwool insulation shall be 3M Product Caulk CP25 or approved equal.

2.06 DUCTWORK INSULATION

- A. Insulation for Concealed Duct
 - 1. Except where otherwise noted, all concealed rectangular and round ductwork shall be covered with flexible duct insulation with or without vapor barrier complying with ASTM C553, Types I and II and of the thickness and densities indicated below.

<u>Service</u>	<u>R Value</u>	<u>With</u>
Cold and Hot Air Supply Ducts	6	Vapor Barrier
Return Air Ducts (only where required)	6	Vapor Barrier
Hot Supply Ducts	6	---
Flexible connections to Mixing Boxes, Induction Units, Lighting Troffers	6	Vapor Barrier
Outside Air Duct	6	Vapor Barrier
Sound traps	6	Vapor Barrier
Within 5'-0" downstream and upstream of Humidifier in ducts	6	Vapor Barrier

- B. Flexible duct insulation with vapor barrier shall be 1 lb. per cu. ft. density glass fiber with a maximum K factor of 0.29 at 75 deg. F. mean temperature, with reinforced foil-faced, flame resistant kraft vapor barrier (facing to comply with ASTM C1136, Type II).
- C. Insulation with vapor barrier shall be duct wrap insulation FRK-25, type 100 as made by Owens-Corning or Johns Manville Microlite Type 100 with FSK vapor barrier facing or standard 1 lb./cf duct insulation as made by CGG with FSK facing.
- D. Flexible duct insulation without vapor barrier shall be 1 lb. per cu. ft. density glass fiber with a maximum K factor of 0.29 at 75 deg. F. mean temperature and shall be Owens Corning Fiberglass Type 75P, Johns Manville Microlite Type 100 or approved equal.
- E. Adhere insulation to duct with Foster fire resistant adhesive 85-60 or Childers CP-127 or approved equal, applied in 4 inch wide transverse strips at 8 inch intervals. Insulation shall be butted with facing overlapping all joints at least 2 inches and sealed with Foster fire resistant adhesive 85-60 or Childers CP-127 or equal. For insulation with vapor barrier use Foster fire resistant vapor barrier adhesive or approved equal and joints without tabs shall be firmly sealed with aluminum foil tape adhered with same adhesive. Secure insulation with 18 gauge corrosion resistant wire spaced not more than 18 inches on center. Coat all duct taped seams, punctures and breaks with Foster 30-65 or Childers CP-34 vapor barrier coating.
- F. Additionally, secure insulation to bottom of rectangular ducts over 24" wide with welded pins or stick clips on 18" centers. Cut off excess pins and seal as above.
- G. Insulation for Exposed Rectangular Duct
 - 1. Except where otherwise noted, all exposed rectangular ductwork and plenums shall be covered with rigid duct insulation complying with ASTM C612 Types IA and IB and of the thickness and densities indicated below.

<u>Service</u>	<u>R Value</u>	<u>With</u>
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PROJECT #C1536

Cold and Hot Air Supply Ducts in Mechanical Equipment Rooms	6	Vapor Barrier
Return Air Ducts in Mechanical Equipment Room	6	Vapor Barrier
Cold and Hot Air Supply Ducts Except where otherwise noted	6	Vapor Barrier
Cold and Hot Air Return Air Ducts Except where otherwise noted	6	_____
Outside Air Intake Ducts & plenums	6	Vapor Barrier
Sound Traps		6 Vapor Barrier
Combustion Air Ducts & plenums	6	Vapor Barrier
Within 5'-0" downstream and upstream of Humidifier in Ducts	6	Vapor Barrier
Outside and Return Mixed Air Duct	6	Vapor Barrier
Hot Supply Duct	6	
Exhaust Air Plenum or Duct Behind Louver up to Automatic damper	6	Vapor Barrier
Exhaust Ducts connected to penthouse louvers or goosenecks up to damper		6 Vapor Barrier
Unused portion of Louvers	6	in 20 gauge sheetmetal sandwich.
Supply and Return ducts located outdoors	8	

2. Rigid duct insulation with vapor barrier shall be 6 lbs. per cu. ft. density glass fiber with maximum K factor of 0.22 at 75 deg. F mean temperature with fire retardant

- vapor barrier facing all service jacket complying with ASTM C1136 Type I (white finish).
3. Rigid duct insulation with vapor barrier shall be Fiberglass Type 705 by Owens-Corning or Johns Manville, No. 817 spin-glass w/ASJ or approved equal.
 4. Rigid duct insulation without vapor barrier shall be 6 lbs. per. cu. ft. density glass fiber with maximum K factor of 0.22 at 75 deg. F mean temperature with fire retardant facing foil reinforced draft. (all service jacket).
 5. Rigid duct insulation without vapor barrier shall be Fiberglass type 705 by Owens-Corning, Johns Manville, No. 817 spin glass w/ASJ or approved equal.
 6. Insulation shall be fastened to duct with 12 gauge welded pins and washers, or equivalent as approved. Fasteners shall be spaced 12 to 18 inches on center, a minimum of two rows per side of duct. Secure insulation in place with washers firmly embedded in insulation or push a self-locking cap over pin after coating with fitting mastic type C by Owens-Corning or approved equal.
 7. Seal all joints, breaks and impressions with Foster fire resistant vapor barrier coating Foster 30-65 or Childers CP-34, or equal, and apply 5" wide joint sealing tape to all joints. All surfaces must be clean and dry before applying tape.
- H. As an alternative to fiberglass insulation on ducts, elastomeric closed-cell insulation may be used.
1. Insulation material shall be a flexible, closed-cell or conformable elastomeric insulation in sheet form: AP Armaflex, and AP Armaflex SA. These products meet the requirements as defined in ASTM C 534, "Specification for preformed elastomeric cellular thermal insulation in sheet and tubular form."
 2. Insulation material shall be manufactured without the use of CFC's, HFC's or HCFC's. It is also formaldehyde free, low VOC's, fiber free, dust free and resists mold and mildew.
 3. The insulation material shall contain MICOBAN Antimicrobial additive to aid in the prevention of mold and mildew.
 4. Materials shall have a flame spread index of less than 25 and a smoke-developed index of less than 50 when tested in accordance with ASTM E 84, latest revision. In addition, the product, when tested, shall not melt or drip flaming particles, the flame shall not be progressive and all materials shall pass simulated end-use fire tests.
 5. Materials shall have a maximum thermal conductivity of 0.25 Btu-in./h-ft²- °F at a 75°F mean temperature when tested in accordance with ASTM C 177 or ASTM C 518, latest revisions.
 6. Materials shall have a maximum water vapor transmission of 0.05 perm-inches when tested in accordance with ASTM E 96, Procedure A, latest revision. (other than conformable elastomeric)
 7. The material shall be manufactured under an independent third-party supervision testing program covering the properties of fire performance, thermal conductivity and water vapor transmission.
 8. Adhesives and Finishes

- a. Adhesive shall be the insulation manufacturer's recommended contact adhesive: Armaflex 520, Armaflex 520 BLV, Armaflex 520 Black, Low VOC Spray Adhesive or Armaflex HT 625 Adhesive.
- b. Insulation finish shall be the insulation manufacturer's recommended finish: Armaflex WB Finish.
- c. Accessories such as adhesives, mastics and cements shall have the same properties as listed above and shall not detract from any of the system ratings as specified above.

I. Insulation for Exposed Round Duct

- 1. Insulation for exposed round ductwork shall be of material as specified for concealed ductwork and shall be covered with glass cloth or all service jacket smoothly adhered with Foster 85-60/85-20 or Childers CP-82 (5 gallons cans only) adhesive. Seal joints with 5" wide tape.

<u>Service</u>	<u>R Value</u>
Cold and Hot Air Supply Ducts in Mechanical Equipment Rooms	6 with vapor barrier
Air Conditioning Return Air Ducts in Mechanical Equipment Rooms	6 with vapor barrier
Cold and Hot Air Supply Ducts Except where otherwise noted	6 with vapor barrier
Hot Supply Duct	6
** Flexible Duct Connection to Mixing Boxes, Induction Units, Lighting Troffers	6 with vapor barrier
Return Air Fan for Air Conditioning Units.	6 with vapor barrier

- 2. The Contractor shall have the option to use the following material: Insulation for round ducts shall be of thickness noted above and shall be fiberglass pipe and tank insulation having a factory applied ASJ vapor barrier jacket secured with staples and ASJ pressure sensitive tape. Pipe and tank insulation is a 3.00 p.c.f. board cut into strips, fibers oriented perpendicularly to the facing it is adhered to and it must have a UL label.
- 3. Transition ductwork at sound traps shall be insulated with fibrous glass board with reinforced aluminum vapor barrier, Owens-Corning #705, Johns Manville 817 spin glass, or approved equal. Fasten insulation in place with welded pins and washers or equivalent mechanical fastening method, as approved. Seal all joints with vapor

barrier coating to provide continuous vapor barrier. All edges, corners and joints, reinforced with 4" wide tape. Tape, of type, and applied in strict conformance with manufacturer's recommendations. Over the insulation apply a flood coat of Foster 30-65 or Childers CP-34 or equal vapor barrier coating. Provide fiberglass fitting tape or glass cloth smoothly adhered with Foster 85-60/85-20 or Childers CP-82 (5 gallon cans only) adhesive.

4. Transition piece at stack and ductwork for high temperature hot water generators shall be insulated with 2" thickness calcium silicate block insulation, applied over a 1" "V" ribbed lath to provide a 1" air space under insulation. Firmly attach "V" ribbed lath to surfaces to be insulated by tack welding clip angles to breeching, ductwork and transition piece at a spacing of not greater than 12" centers vertically and horizontally. Lath shall be tack welded or wired to clip angles. Insulation shall be covered with 1" galvanized hexagonal wire mesh, #18 gage minimum and two 3 inch thick coats of Portland asbestos cement plaster. First coat to be rough or scratch coat. The second coat shall be trowelled to a smooth and even finish. Access doors and expansion joints shall be not covered. Access door shall be double wall construction with 2" insulation.

J. Weatherproofing Finishes for Outdoor Duct Insulation

1. Outdoor duct shall be finished with 0.016 Aluminum Jacketing with factory applied moisture barrier as manufactured by the Pabco-Childers Metals, smooth finish with PSMR, or approved.
2. Heavy duty 0.016 inch thick aluminum with poly-moisture barrier shall be used. All metal jacketing laps shall be sealed with 1/8" bead of Foster 95-44 or Childers CP-76 metal jacketing sealant.
3. Jacketing shall be applied with minimum 2-inch overlaps facing down from the weather and the jacketing shall be secured with aluminum bands 1/2 inch by 0.020 inches and aluminum wing seals applied on 12 inch centers, with bands applied directly over butt overlaps or with Pli-Grip Rivets. Where jacketing is cut out or abuts an uninsulated surfaces, the joint shall be sealed with Foster 95-44, Childers CP-76 or Insul-Cooustic Sure-Joint 405 (gallon cans only; no tubes).
4. Fittings, valves and other irregular surfaces shall be protected with two coats of Foster 30-65, Childers CP-34, Marathon Vi-AC Mastic, I-C 551, with Foster Mast-a-Fab, Childers Chil Glas #10 or Vi-AC open weave glass cloth membrane between the coats. The total thickness of the coats shall be .32 mils when dry.
5. Outdoor rectangular ductwork aluminum cladding shall be formed with a high point located along the top longitudinal centerline in order to ensure rainwater runoff and so that no water accumulation will occur.

2.07 EQUIPMENT INSULATION

- A. Chilled and dual temperature water pump casings shall be constructed by utilizing a frame of 2" wide 0.05" thick galvanized sheet metal corner angles assembled with pop rivets or welded. This frame shall encompass the lower half of the pump and shall have a split removable cover frame for the top sections of the pump. Entire top of bottom frame shall be closed with 18 gauge galvanized sheet metal either by spot welding or structural screws. Provide 2" thick 1 lb. density fiberglass blanket lining for top and bottom half of

the frame. Frame sidings shall be cut for pipes, flanges, pump shaft and instrumentation/gauges. The innermost layer shall be aluminum in order to protect the insulation from damage.

- B. The chilled water header of refrigeration machines shall be insulated in the field with not less than 2" thick, 1 lb. density fiberglass blanket insulation and boxed in four sections with removable and replaceable, 20 gauge aluminum metal cover. The four sections shall be bolted together with ¼" bolts on 6" centers through an outstanding flange.
- C. Chilled water expansion tank, chilled water air separator and chemical treatment tanks other than condenser water tank shall be covered with 2" thick fiberglass U.L. labeled pipe and tank insulation with vapor barrier. Finish shall be 0.016" aluminum cladding as described above for equipment and piping insulation cladding.
- D. Insulation for single inlet return air fans shall be of material as specified for concealed ductwork and shall be covered with glass cloth or all service jacket smoothly adhered with Foster 85-60/85-20 or Childers CP-82/CP-127 adhesive. Seal joints with 5" wide tape. The Contractor shall have the option to use the following material: Insulation for the fans shall be of thickness noted above and shall be fiberglass pipe and tank insulation having a factory applied fire retardant vapor barrier jacket and shall be provided with pre-sized glass cloth smoothly adhered with Foster 85-60/85.20 or Childers CP-82/CP-127 adhesive. Pipe and tank insulation is a 3.00 p.c.f. board cut into strips, and fiber perpendicularly oriented and adhered to jacket. Finish shall be Insulating Cement or approved equal applied 3" thick in one coat, trowelled to a smooth finish. Same option of pipe and tank insulation with ASJ shall apply.
- E. Sound traps shall be insulated same as the connecting ductwork.
- F. Kitchen Type I hood exhaust ductwork: Insulate with Thermo-12 Gold calcium silicate block 2" thick, wired on, finished with 3" hard coat of fire retardant cement applied over 1 inch hexagonal mesh wire. See ductwork section of this specification for alternative installation options.
- G. Ductwork directly connected to Ovens shall be insulated same as "Breeching". Ductwork outside of the building shall have weatherproof cover. Fan located inside or outside of the building shall have insulation similar to return air fans. If fan located outside of the building, provide weatherproofing.
- H. Duct insulation installed within 18" of a Type I hood shall be non-combustible or shall be listed for the application.

3.01 INSPECTION

- A. Contractor shall examine location where this insulation is to be installed and determine space conditions and notify Architect in writing of conditions detrimental to proper and timely completion of the work.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install insulation in accordance with manufacturer's written instructions, and with recognized industry practices, to ensure that insulation complies with requirements and serves intended purposes.
- B. Coordinate with other work as necessary to interface installation of insulation with other components of systems.
- C. All insulating materials shall be applied only by experienced workmen, in accordance with the best covering practice. All piping, duct or equipment shall be blown out, cleaned, tested and painted prior to the application of any covering. Adhesives, sealers and mastics shall not be applied, when the ambient temperature is below 40°F, or surfaces that are wet.
- D. Insulation for factory-fabricated air handling units, furnished as part of units.
- E. At all openings in insulation and acoustical duct lining, insulate edges neatly and protect with sheet metal nosing. Use sealant as well.
- F. All items described in general indicate the type of covering required, however, all piping, ductwork or equipment that transmits heat or will form condensation shall be insulated.
- G. Finish for Concealed Pipe Insulation:
 - 1. Factory ASJ (All service jacket) secured in place with Bostich staples 4" o.c. or ASJ with self-sealing lap as made by Johns Manville, Owens-Corning or approved equal. All fittings shall be covered with Zeston PVC covers.
- H. All piping and ductwork insulation shall be continuous through non-fire rated ceiling openings and sleeves passing through non-fire rated walls or floors. Sleeves shall be packed with mineral wool or thermofiber. Discontinue insulation as it passes through fire-rated wall or floor and use mineral wool or thermofiber packing instead. Specific mastics, adhesives and coating shall be applied in strict accordance with Manufacturer's instruction, including recommended coverages.
- I. Where packaged type units are called for in the Specifications, or as scheduled on the Drawings, the insulation shall be as herein specified for the specific system.

- J. All valved and capped outlets left for future work shall be insulated as herein specified for the specific systems with a removable section of insulation over caps.
- K. Where insulation on existing piping, equipment, etc., has been cut, removed or damaged, this Contractor shall reinsulate as herein specified.
- L. All insulation of access doors shall be set in sheet metal double-pan construction.
- M. All ductwork shall be insulated in the field, following complete installation of the ductwork. Installation of insulation on the ductwork in the shop (prior to delivery and installation of the ductwork) is prohibited.
- N. For installation of elastomeric closed-cell insulation:
 - 1. Piping:
 - a. Install pipe insulation by slitting tubular sections and applying onto piping or tubing. Alternately, whenever possible, slide unslit sections over the open ends of piping or tubing. All seams and butt joints shall be adhered and sealed using Armaflex 520, 520 BLV or 520 Black Adhesive. When using AP Armaflex SS, only the butt joints shall be adhered using Armaflex 520, 520 BLV or 520 Black Adhesive. Armaflex HT 625 Adhesive shall be used with UT Solaflex.
 - b. Insulation shall be pushed onto the pipe, never pulled. Stretching of insulation may result in open seams and joints.
 - c. Tape the ends of the copper tubing before slipping the Armaflex insulation over the new pipes to prevent dust from entering the pipe.
 - d. All edges shall be clean cut. Rough or jagged edges of the insulation shall not be permitted. Proper tools such as sharp non-serrated knives must be used.
 - e. On cold piping, insulation shall be adhered directly to the piping at the high end of the run and every 18 feet, using a two-inch strip of Armaflex 520, 520 BLV or 520 Black Adhesive on the ID of the insulation and on the pipe. All exposed end cuts of the insulation shall be coated with Armaflex 520, 520 BLV, or 520 Black Adhesive. All penetrations through the insulation and termination points must be adhered to the substrate to prevent condensation migration.
 - f. Sheet insulation shall be used on all pipes larger than 8" IPS. Insulation shall not be stretched around the pipe. On pipes larger than 12" IPS, adhere insulation directly to the pipe on the lower 1/3 of the pipe. On pipes greater than 24" IPS, complete adhesion is recommended.
 - g. Seams shall be staggered when applying multiple layers of insulation.
 - 2. Hangers:
 - a. Support piping system using high density inserts with sufficient compressive strength. The pipe support insulation shall be elastomeric foam with the same or greater thickness than the pipe insulation. All joints shall be sealed with Armaflex 520, 520 BLV or 520 Black adhesive.
 - b. Standard and split hangers -- Piping supported by ring hangers shall have hangers insulated with the same insulation thickness as the adjacent pipe. All seams and butt joints shall be sealed with Armaflex 520, 520 BLV or 520

- Black Adhesive. Armaflex HT 625 Adhesive shall be used with UT Solaflex. Ring hangers may be sleeved using oversized tubular insulation. On cold piping, insulation shall extend up the hanger rod a distance equal to four times the insulation thickness. Insulation tape may be used to a thickness equal to the adjacent insulation thickness.
- c. Clevis hangers or other pipe support systems -- Saddles shall be installed under all insulated lines at unistrut clamps, clevis hangers, or locations where the insulation may be compressed due to the weight of the pipe. All piping shall have wooden dowels or blocks of a thickness equal to the insulation inserted and adhered to the insulation between the pipe and the saddle. It is highly recommended for continuous insulation protection to use hanger sizes equal to the outer diameter of the pipe plus insulation thickness.
 - d. Armafix IPH or Armafix NPH can be used to prevent compression of insulation at standard split, clevis hangers or other pipe support systems. To minimize the movement of Armafix, it is recommended that a pair of non-skid pads be adhered to the clamps. In addition, to prevent loosening of the clamps, use of an anti-vibratory fastener, such as a nylon-locking nut, is also recommended.
3. Square and Rectangular Ductwork:
- a. The top of the ductwork must be sloped to prevent “ponding” of water. The recommendation is at least a 2° angle to the outer side.
 - b. Armaflex Sheet Insulation shall be adhered directly to clean, oil-free surfaces with a full coverage of Armaflex 520, 520 Black or Low VOC Spray Adhesive. Armaflex HT 625 Adhesive shall be used with UT Solaflex. AP Armaflex SA shall be adhered directly to clean, oil-free surfaces.
 - c. The duct insulation shall be constructed from the bottom up, with the top insulation sized to extend over the side insulation. This will form a watershed.
 - d. Butt-edge seams shall be adhered using Armaflex 520, 520 Black, or HT 625 Adhesive by the compression fit method to allow for expansion/contraction. Leave a 1/2”-wide uncoated border at the butt-edge seams on the duct surface and the insulation surface. Overlap the insulation 1/4” at the butt-edges and compress the edges into place. Apply Armaflex 520, 520 Black or HT 625 Adhesive to the butt-edges of the insulation.
 - e. Standing metal duct seams shall be insulated with the same insulation thickness as installed on the duct surface. Seams may be covered using strips of Armaflex Sheet Insulation or half sections of tubular pipe insulation with miter-cut ends. Standing seams shall be adhered using Armaflex 520, 520 Black or HT 625 Adhesive.
 - f. Insulation seams shall be staggered when applying multiple layers of insulation.
4. Round Ductwork:
- a. AP Armaflex Sheet and Roll Insulation, UT Solaflex Roll Insulation, or NH Armaflex Sheet and Roll Insulation shall be used on all round ductwork. Insulation shall be wrapped not stretched around the duct. On ductwork larger than 12” in diameter, the insulation shall be adhered to the duct surface on the lower one third. On ductwork greater than 24” in diameter, the insulation

- shall be completely adhered to the duct surface. Longitudinal seams shall be located on the lower half of any round ductwork.
- b. Butt-edge seams shall be adhered using Armaflex 520, 520 Black or HT 625 Adhesive by the compression fit method to allow for expansion/contraction. Leave a 1/2" wide uncoated border at the butt-edge seams on the duct surface and the insulation surface. Overlap the insulation 1/4" at the butt-edges and compress the edges into place. Apply Armaflex 520, 520 Black, or HT 625 Adhesive to the butt-edges of the insulation.
 - c. Insulation seams shall be staggered when applying multiple layers of insulation.
5. Exposed Outdoor Duct:
- a. All outdoor exposed ductwork shall be finished using one of the following applications: For all the application methods described below it is very important that the exterior horizontal surfaces shall be sloped to prevent ponding on the top surface of the coated insulation. If the substrate is not sloped make the necessary adjustments to provide for a slope. **DO NOT** compromise the Armaflex insulation thickness to achieve the necessary slope.
6. Armaflex WB Finish
- a. All outdoor ductwork shall be finished with a minimum requirement of two coats of Armaflex WB Finish.
 - 1) Rectangular ductwork
 - a) The surface of the insulation must be clean and dry.
 - b) Apply first coat of Armaflex WB Finish at a rate of 400 square feet per gallon.
 - c) Allow to dry at least four hours.
 - d) Apply second coat at a rate of 400 square feet per gallon.
- O. Finish for Exposed Insulation:
1. The term "exposed" is hereby defined as any place outdoors, as well as any place indoors in Mechanical Rooms, Storage Rooms, Janitor's Closets, etc., where located within 7 feet of floor or access platforms.
 2. All exposed pipe, valve and fittings insulation shall have 0.016 inch thick corrugated aluminum jacket banded with 1/2" s.s. bands spaced 12" o.c. Piping, fittings and valves exposed in building, within seven feet of the floor or access platform, shall have 0.016" thick aluminum jacket banded with 1/2" aluminum bands spaced 12" o.c. or two bands per section. Joints and jacket shall provide complete weatherproof protection either by mechanical contact or by use of Foster 95-44 or Childers CP-76 metal jacketing sealant (gallon cans only; no tubes).
 3. All calcium silicate pipe insulation, all insulated condenser water piping exposed to weather and all other insulated pipe exposed to weather shall have 0.016 inch thick aluminum jacket banded with 1/2" s.s. bands spaced 12" o.c. This shall include pipe, fittings and valves.
 4. As an alternative to the use of 0.016" aluminum cladding on outdoor duct insulation, if AP Armaflex insulation is used, the ArmaTuff laminated sheet and roll insulation may be used. ArmaTuff laminated Armaflex sheet and roll

insulations may be used for insulating exterior applications such as duct, tanks, vessels and large pipes. Refer to section 3.06 for further installation details. ArmaTuff is a laminate of white polymeric material on Armaflex insulations, which offers durability and resistance to weathering, ultraviolet, acid rain and chemicals. The laminate is 0.013 inches (13 mils) thick. The seams must be installed in compression and sealed with Armaflex 520, or 520 Black contact adhesive. Cover the seams using ArmaTuff 6” Seal Tape.

3.03 PROTECTION

- A. The installer of the insulation shall advise the Contractor of required protection for the insulation work during the remainder of the construction period, to avoid damage and deterioration.

END OF SECTION 23 07 00

SECTION 23 08 00 - COMMISSIONING OF HVAC SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. The purpose of this section is to specify the Division 23 responsibilities and participation in the commissioning process.
- B. Work under this contract shall conform to requirements of Division 01, General Requirements, Conditions of the contract, and Supplementary Conditions. This specification covers commissioning of HVAC mechanical systems which are part of this project.
- C. Commissioning work shall be a team effort to ensure that all HVAC mechanical equipment and systems have been completely and properly installed, function together correctly to meet the design intent, and contract document system performance parameters for fine tuning of control sequences and operational procedures. Commissioning shall coordinate system documentation, equipment start-up, control system calibration, testing and balancing, and verification and performance testing.
- D. The trades represented on the commissioning team shall include, but not be limited to, sheet metal, piping and fitting, controls, test and balance, and electrical. The lead person for each trade who will actually perform or supervise the work is to be designated as the representative to the commissioning team. Responsibility for various steps of the commissioning process shall be divided among the members of the commissioning team, as described in this section.
- E. The Commissioning Authority shall have responsibility for coordinating and directing each step of the commissioning process.
- F. HVAC Mechanical system installation, Start-up and checkout testing, balancing, preparation of O&M manuals, and operator training are the responsibility of the Division 23 Contractors, with coordination, observation, verification and commissioning the responsibility of Division 1, Section 01 91 13. The 01 91 13 commissioning process does not relieve Division 23 from the obligations to complete all portions of work in a satisfactory and fully operational manner.
- G. Start-up and Checkout procedures/tests shall be those listed or detailed in other sections of the Specifications, to be performed by the Contractors or equipment manufacturer representatives. These procedures/tests shall be completely independent from the procedures and checklists (Verification and Functional Performance) called for in this Section.
- H. The following are common abbreviations used in the Specifications
 - 1. CA: Commissioning Authority.

2. A: Architect of Record.
3. E: Engineer of Record (Mechanical Design Professional).
4. TAB: Test, Adjust and Balance.
5. O&M: Operation and Maintenance.
6. O: Owner
7. MC: Mechanical Contractor.
8. EC: Electrical Contractor.
9. DDC: Direct Digital Controls
10. AC: Automatic Controls System Contractor
11. CM: Construction Manager

1.02 RELATED SECTIONS:

- A. Commissioning - General Requirements Section 01 91 13
- B. Verification Test Check Lists -HVAC Commissioning
- C. Functional Test Checklist and Procedures - HVAC Commissioning

1.03 CITED STANDARDS:

- A. ASHRAE Guideline 4-1993

1.04 SCOPE OF WORK:

- A. Commissioning work of Division 23 shall include, but not be limited to:
 1. Providing documentation of the Start-up and Checkout procedures and tests of the equipment.
 2. Providing testing, adjusting and balancing of systems to be commissioned.
 3. Cooperation with the Commissioning Authority.
 4. Providing qualified personnel for participation in commissioning tests, including seasonal testing required after the initial testing.
 5. Providing equipment, materials, and labor as necessary to correct construction and/or equipment deficiencies found during the commissioning process.
 6. Providing operation and maintenance manuals, and as-built drawings for the equipment/system to be commissioned to the Commissioning Authority for verification.
 7. Providing training and demonstrations for the systems specified in this Division.
- B. The work included in the commissioning process involves a complete and thorough evaluation of the operation and performance of the following components, systems, and sub-systems:
 1. Ductless Split DX system
 2. VFD
 3. Fans
 4. Fan coil
 5. Fin Tube Radiation

6. Piping System
 7. Ductwork System
 8. TAB
 9. Controls
- C. Timely and accurate documentation is essential for the commissioning process to be effective. Documentation required as part of the commissioning process shall include but not be limited to:
1. Progress and status reports, including deficiencies noted.
 2. Minutes from all commissioning meetings.
 3. Start-up and Checkout procedures and tests.
 4. Training agenda and materials.
 5. As-built records.
 6. Commissioning report.
 7. Operation and maintenance (O & M) manuals.
- D. Detailed Verification and Functional Performance testing shall be performed on all installed equipment and systems to be commissioned to ensure that operation and performance conform to Contract Documents and Design Intent. All tests shall be witnessed by the Commissioning Authority and shall be detailed in Sections 23 08 00 and 23 08 00.
- E. Comprehensive training of O&M personnel shall be performed by the Mechanical Contractor, and where appropriate by other sub-contractors, and vendors prior to turnover of building to the owner. The training shall include classroom instruction, along with hands-on instruction on the installed equipment and systems.

1.05 ROLES AND RESPONSIBILITIES

All parties involved in the construction process shall be involved in the commissioning process. Following is a description of the responsibilities of each party:

- A. Owner
1. Assign maintenance personnel and schedule them to participate in meetings, training sessions and inspections as follows:
 - a. Construction Phase coordination meetings.
 - b. Initial Owner training sessions at initial placement of major equipment and subsequent training sessions.
 - c. Maintenance orientation and inspection.
 2. Attend meetings with TAB contractor as scheduled by the Commissioning Authority. Participate with the Commissioning Authority, the MC, the Mechanical Contractor, the Design Professional and the TAB Contractor to implement the TAB checklist, part of Section 23 08 00-1. The purpose is to verify that the TAB Contractor understands the TAB requirements. The TAB Contractor shall outline TAB procedures and get concurrence from the Design Professional and Commissioning Authority.
 3. Participate in final review at acceptance meeting.

- B. Commissioning Authority (CA)
1. Develop the commissioning requirements and all related testing, and quality control sections.
 2. Include list of all contractors for commissioning events.
 3. Execute the mechanical commissioning program, through organization of meetings, tests, demonstrations, training events and performance verifications. Organizational responsibilities include preparation of agendas, attendance lists, arrangements for facilities and timely notification to participants for each commissioning event. The Commissioning Authority shall act as chairman at all commissioning events and assure execution of all agenda items. The Commissioning Authority shall prepare minutes of every commissioning event and send copies to all attendees and the Owner within 5 workdays of the event.
 4. Review the design documents for their effect on the commissioning process and the final performance of the HVAC system. This includes ensuring that appropriate commissioning guidelines have been followed, and that there are adequate devices included in the design to ensure the ability to properly test, adjust, and balance the systems, and to document the performance of each piece of equipment and each system. Any items required but not shown shall be brought to the attention of the Contractor prior to submittal of shop drawings.
 5. Schedule the first of the Construction Phase commissioning coordination meetings, at some convenient location and at a time suitable to the Contractor and the CM. Subsequent meetings shall be scheduled as required. These meetings shall be for the purpose of reviewing the mechanical orientation and inspections, O&M submittals, training sessions, test, adjust and balance (TAB) work.
 6. Schedule the initial Owner training session so that it will be held immediately before the mechanical system orientation and inspection. This session shall be attended by the Owner=s O&M personnel, the mechanical Contractor and equipment suppliers as necessary, the Design Professional, the CM and the Commissioning Authority. The Design Professional shall conduct this session giving an overview of the system, the system design goals and the reasoning behind the selection of the equipment. Subsequent training sessions need not be attended by the Design Professional. The format shall follow the outline in the O & M manuals and shall include hands-on training.
 7. Supervise and conduct periodic inspection of work in progress to ensure that systems and equipment to be commissioned are installed according to approved shop drawings.
 8. Supervise the Mechanical system orientation and inspection following the initial training session. The Mechanical system orientation and inspection shall be conducted by the mechanical Contractor. The emphasis of this Mechanical system orientation and inspection shall be an observation of the equipment location with respect to accessibility. Prepare minutes of this meeting, with separate summary of deficiency findings by the Owner and Commissioning Authority. Distribute to attendees and the Owner.
 9. Adequate accessibility for maintenance and component replacement or repair is the CM responsibility and shall be checked by the Commissioning Authority.
 10. Submit detailed Verification test procedures and data sheets.

11. Submit detailed Functional Performance Test procedures and data sheets.
12. Witness the implementation of the Verification and Functional Performance Tests as indicated in the specified commissioning checklists for equipment and system to be commissioned. Ensure the results are documented (including a summary of deficiencies) and incorporated in the O&M manuals.
13. Supervise to ensure installation of calibrated test instrumentation to monitor and record data as necessary.
14. Supervise and witness verification tests.
15. Submit Verification test checklists report implementation to the CM for review and acceptance.
16. After Verification Checklist test/acceptance, the Commissioning Authority shall confirm to CM that the mechanical systems are ready for Functional Performance Testing.
17. Supervise and witness Functional Performance Tests.
18. Submit Functional Performance Test checklists report implementation to the CM, for review and acceptance.
19. Supervise and witness the re-test if deficiencies are found, corrected, and additional testing is requested.
20. Receive and review the Operation and Maintenance (O&M) manuals as submitted by the contractor, ensuring that they follow the specified outline and format. Insert systems description as provided by the Design Professional.
21. Prior to initiating the TAB work, the Commissioning Authority shall meet with the Owner, mechanical Contractor, Design Professional and TAB Contractor in preparation for implementing the TAB Plan Checklist (start-up and checkout), part of Section 23 08 00. The purpose is to verify that the TAB Contractor understand the TAB requirements. The TAB Contractor shall outline TAB procedures and get concurrence from the Design Professional and Commissioning Authority.

The TAB report, per the Specifications, shall be submitted by the TAB contractor along with the filled-in check list "Functional Performance Test-TAB Plans" Spot check verification of the TAB report shall be according to "Functional Performance Test B TAB".

22. Upon receipt of notification from the CM that the mechanical systems have been completed and are operational, the Commissioning Authority shall proceed to verify the TAB report and operation of the control systems in accordance with the Commissioning Specification.
23. Review as-built drawings for equipment and systems to be commissioned for accuracy. Request revisions to achieve accuracy.
24. Ensure that the O&M manuals, and all as-built records have been updated to include all modifications reported to CA made during the construction phase.
25. Repeat the supervision of Functional Performance Tests to accommodate seasonal tests and/or correct any performance deficiencies. Revise and re-submit the related report implementation to the CM for review and acceptance.
26. Prepare the final commissioning report.

27. Assemble the final project documentation which shall include the commissioning report, and all as-built records. Submit this documentation to the CM for review and acceptance.
- C. Architect (A)
1. Provide support to all parties providing a service as a part of the commissioning process. This shall include providing adequate space for equipment installation and maintenance.
 2. Include Section 01 91 13 regarding commissioning in Division 1-General Requirements alerting all parties to the need to participate.
- D. Mechanical Design Professional (E)
1. Prepare contract documents, of the mechanical system.
 2. The Design Professional shall specify and verify adequate maintenance accessibility for each piece of equipment in shop drawings and the actual installation.
 3. The Design Professional retains responsibility for the system evaluation, adequacy of the system to meet design intent, capacity of the system, quality control check or any of the other elements of the system design.
 4. Attend the initial Owner training sessions. Conduct the mechanical training session pertaining to the overview of the system design, the system design goals and the reasoning behind the selection of equipment.
 5. Participate with the Commissioning Authority, the Owner, the Mechanical Contractor, the Design Professional and the TAB contractor to implement the TAB checklist, part of Section 23 08 00. The purpose is to verify that the TAB contractor understands the TAB requirements. The TAB contractor shall outline TAB procedures and get concurrence from the Design Professional and Commissioning Authority.
 6. Review Verification and Functional performance testing reports for deficiencies in meeting the finalized Design Intent.
 7. Review as-built records as required by contract documents and turn them over to the Commissioning Authority for inclusion in final project documentation.
 8. Review and comment on the final commissioning report.
- E. Construction Manager (CM)
1. Ensure that cost for commissioning requirements is included in the contract price.
 2. Ensure that commissioning requirements are included in the mechanical, electrical, and controls contracts, as well as in other sub-contractors, to ensure full cooperation of all parties in the mechanical commissioning program.
 3. Ensure acceptable representation, with the means and authority to prepare and coordinate execution of the mechanical commissioning program as described in the contract documents.
 4. Participate in O&M personnel orientation and inspection at the final construction stage.
 5. Attend the O&M training sessions. These training sessions are to be attended by the Owner, Commissioning Authority, CM, Contractors and equipment suppliers

- as necessary. The Design Professionals shall attend only the initial training sessions. The format shall follow the outline in the O&M manuals. This mechanical system orientation and inspection should include hands on training.
6. Participate with the Commissioning Authority, the Owner, the Mechanical Contractor, the Design Professional and the TAB contractor to implement the TAB checklist, part of Section 23 08 00. The purpose is to verify that the TAB contractor understands the TAB requirements. The TAB contractor shall outline TAB procedures and get concurrence from the Design Professional and Commissioning Authority.
 7. Follow up with AC to receive from him a statement that control systems have been calibrated. Distribute that statement to CA.
 8. Follow up with TAB to receive from him a statement that TAB work has been completed and submit the final TAB reports to CA for review.
 9. Participate in any deficiency resolution (See item 3.03).
- F. Mechanical Contractor (MC)
1. Include cost to complete commissioning requirements for mechanical systems in the contract price.
 2. Include requirements for submittal data, O&M data, and training in each purchase order or sub-contract written.
 3. Ensure cooperation and participation of specialty sub-contractors such as sheet metal, piping, refrigeration, and TAB.
 4. Ensure participation of major equipment manufacturers in appropriate training and related videotaping and testing activities.
 5. Attend Construction Phase coordination meeting scheduled by the Commissioning Authority.
 6. Participate with the Commissioning Authority, the Owner, the CM, the Design Professional and the TAB contractor to implement the TAB checklist, part of Section 23 08 00. The purpose is to verify that the TAB contractor understands the TAB requirements. The TAB contractor shall outline TAB procedures and get concurrence from the Design Professional and Commissioning Authority.
 7. Prepare preliminary schedules for mechanical system orientation, inspections, O&M manual submission, training sessions, pipe system testing, flushing and cleaning, duct testing, equipment Start-up and Checkout, TAB Plan Meeting, Verification and Functional Performance tests and task completion schedules for same for use by the Commissioning Authority. Update schedules as appropriate throughout the construction period. Notify the Commissioning Authority a minimum of two weeks in advance of any scheduled event.
 8. Provide to the CA Start-up and Checkout procedures and checklists documenting their successful completion.
 9. Assist the commissioning Authority in Verification and Functional Performance tests, as indicated in the specified checklists.
 10. Attend initial training session.
 11. Conduct mechanical system orientation and inspection at the equipment placement completion stage.

12. Update drawings to the record condition to date, and review with the Commissioning Authority.
 13. Gather O&M data on all equipment and assemble in binders as required by the Commissioning Specification. Submit to Commissioning Authority prior to the completion of construction.
 14. Participate in and schedule vendors and Contractors to participate in the training sessions as set up by the Commissioning Authority.
 15. Provide written notification to the CM and Commissioning Authority that the HVAC and controls work have been completed in accordance with the contract documents, and that the equipment, systems, and sub-systems are operating as required.
 16. Provide a complete set of as-built records to the Commissioning Authority.
- G. Test, Adjust, and Balance Contractor (TAB Contractor)
1. Include cost for commissioning requirements in the contract price.
 2. Attend initial commissioning coordination meeting scheduled by the Commissioning Authority.
 3. Be part of the implementation of the Verification and Functional Performance tests, as indicated in the specified Commissioning Checklists.
 4. Participate with the Commissioning Authority, the Owner, the CM, the Mechanical Contractor and the Design Professional to implement the TAB Plan Checklist, part of Section 23 08 00. The purpose is to verify that the TAB contractor understands the TAB requirements. The TAB contractor shall outline TAB procedures and get concurrence from the Design Professional and Commissioning Authority.
 5. At the completion of the TAB work, and submittal of final TAB report, notify the mechanical Contractor and CM.
 6. Participate in training sessions as scheduled by the Commissioning Authority.
- H. Automatic Controls System Contractors. (AC)
1. Include cost for commissioning requirements in the contract price.
 2. Attend commissioning coordination meetings scheduled by the Commissioning Authority.
 3. Be part of the implementation of the Verification and Functional Performance tests, as indicated in the specified Commissioning Checklists.
 4. Review design for controllability with respect to selected manufacturers equipment.
 - a. Verify that proper hardware exists for functional performance required by specification and sequence of operation.
 - b. Verify that proper safeties and interlocks are included per the design.
 - c. Verify proper selection of sensor ranges.
 - d. Clarify all questions of operation.
 5. Provide the following submittals to the Commissioning Authority.
 - a. Sequences of Operation Submittals. The Controls Contractor=s submittals of control drawings shall include complete detailed sequences of operation for each piece of equipment, regardless of the completeness and clarity of the sequences in the specifications. They shall include:

- 1) An overview narrative system of the system generally describing its purpose, components and function.
 - 2) All interactions and interlocks with other systems.
 - 3) Detailed delineation of control between any packaged controls and the Automatic Temperature Control (ATC) listing which points the ATC monitors only and which points it controls and which points are adjustable.
 - 4) Written sequences of control for packaged control equipment. (Equipment manufacturers= stock sequences may be included but will generally require additional narrative).
 - 5) Startup sequences
 - 6) Warm up mode sequences
 - 7) Normal operating mode sequences
 - 8) Unoccupied mode sequences
 - 9) Shutdown sequences
 - 10) Capacity control sequences and equipment staging
 - 11) Temperature and pressure control: setbacks, setups, resets, etc.
 - 12) Detailed sequences for all control strategies, e.g. economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
 - 13) Effects of power or equipment failure with all standby component functions.
 - 14) Sequences for all alarms and emergency shut downs
 - 15) Seasonal operational differences and recommendations
 - 16) Initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff, and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
 - 17) Daily weekly, and monthly schedules of start, run and end times.
 - 18) To facilitate referencing all sequences shall be written in small statements, each with a number for reference. For a given system, numbers will not repeat for different sequence sections.
- b. Control Drawings Submittal
- 1) The control drawings shall have a key to all abbreviations.
 - 2) The control drawings shall contain graphic schematic depictions of the systems and each component, superimposed on diagrams of the physical layout.
 - 3) The schematic will include the system and component layout of any equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
 - 4) Provide a full points list, of all control points, including analog inputs, analog outputs, digital inputs, and digital outputs. Include the values of all parameters for each system point. Provide a separate list for each stand-alone control unit. The list shall have the following as a minimum included for each point:
 - a) Controlled system

- b) Point abbreviation
- c) Point description
- d) Display unit
- e) Control point or setpoint (Yes/No)
- f) Monitoring point (Yes/No)
- g) Intermediate point (Yes/No)
- h) Calculated point (Yes/No)

Key:

Point Description: DB temp, airflow, etc.

Control or Setpoint: Point that controls equipment and can have its setpoint changed (OSA, SAT, etc.)

Intermediate Point: Point whose value is used to make a calculation which then controls equipment (space temperatures that are averaged to a virtual point to control reset)

Monitoring Point: Point that does not control or contribute to the control equipment, but is used for operation, maintenance, or performance verification.

Calculated Point: A Virtual@ point generated from calculations of other point values.

The Controls Contractor shall keep mechanical, electrical, TAB contractors, A, E, CA and CM informed of all changes to this list during programming and setup

- c. Hardware and software submittals including the logic diagram showing the logic flow of the system.
 - d. Control panel construction shop drawings.
 - e. A complete control language program listing including all software routines employed in operating the control system. Also provide a program write-up, organized in the same manner as the control software. This narrative shall describe the logic flow of the software and the functions of each routine and sub-routine. It should also explain individual math or logic operations that are not clear from reading the software listing.
 - f. Hardware Operation and Maintenance manuals.
 - g. Application software and project applications code manuals.
6. An updated, as-built version of the control drawings and sequence of operations shall be provided for inclusion in the final controls O&M Manual submittals.
 7. Verify proper installation and performance of controls/ATC hardware and software provided by others.
 8. Integrate installation and programming schedule with construction and commissioning schedules.
 9. Provide thorough training to operating personnel on hardware operations and programming, and the application program for the system.
 10. Provide control system technician for use during system verification and functional performance testing.
 11. Provide system modifications as required.
 12. Provide support and coordination with TAB contractor on all interfaces between their scopes of work. Provide all devices, such as portable operators terminals, for

- TAB use in completing TAB procedures. This support and coordination shall be in the following manner:
- a. Meet with the TAB contractor prior to beginning TAB and review the TAB plan to determine the capabilities of the control system toward completing TAB. Provide the TAB any needed unique instruments for setting terminal unit boxes and instruct TAB in their use (handheld control system interface for use around the building during TAB, etc.)
 - b. Provide qualified technician to operate the controls to assist the TAB contractor in performing TAB or provide sufficient training for TAB to operate the system without assistance.
13. The controls contractor shall prepare a written plan indicating in a step- by-step manner, the procedures that will be followed for Start-up and Checkout and adjust the control system prior to commissioning testing. At minimum, the plan shall include for each type of equipment controlled by the automatic controls:
- a. System name
 - b. List of devices
 - c. Step by step procedures for testing each controller after installation, including:
 - 1) Process of verifying proper hardware and wiring installation.
 - 2) Process of downloading programs to local controllers and verifying that they are addressed correctly.
 - 3) Process of performing operational operational checks of each controlled component.
 - 4) Plan and process for calibrating valve and damper actuators and all sensors.
 - 5) A description of the expected field adjustments for transmitters, controllers and control actuators should control responses fall outside of expected values.
 - d. A copy of the log and field checkout sheets that will document process. This log must include a place for initial and final read values during calibration of each point and clearly indicate when a sensor or controller has Apassed@ and is operating within the contract parameters.
 - e. A description of the instrumentation required for testing.
 - f. Indicate what tests on what systems should be completed prior to TAB using the control system for TAB work. Coordinate with the MC, A.E and TAB contractor for this determination.
14. The controls contractor shall have all required Start-up and Checkout checklists, calibrations, tests of the system completed and approved by the E. The E shall determine if these submittals meet his/her requirements and requirements of the Contract Documents. Once the E accepts these submittals, they shall be forwarded to CA who will forward them to the A for record prior to TAB.
15. Assist and cooperate with CA, MC, in the following manner:
- a. Using a licensed technician who is familiar with this building's systems, execute the Verification and Functional testing of the controls systems. Provide two-way radios during the testing.

16. List and clearly identify on the as-built duct and piping drawings the locations of all sensors utilized in the start-up and checkout and commissioning processes.

- I. Equipment Suppliers and Miscellaneous Contractors
 - 1. Include cost for commissioning requirements in the contract price.
 - 2. Provide submittals, and appropriate O&M manual section(s).
 - 3. Attend initial commissioning coordination meeting scheduled by the Commissioning Authority.
 - 4. Participate in training sessions as scheduled by the Commissioning Authority.
 - 5. Demonstrate performance of equipment as applicable.

1.06 DOCUMENTATION:

- A. The Commissioning Authority shall oversee and maintain the development of commissioning documentation. The commissioning documentation shall be kept in three ring binders and organized by system and sub-system when practical. All pages shall be numbered, and a table of contents page(s) shall be provided. The commissioning documentation shall include, but not be limited to, the following:
 - 1. A detailed description of the design intent for the project, listing operating parameters, control sequences, occupancy conditions, etc.
 - 2. A complete description of how the HVAC system is intended to operate.
 - 3. Approved TAB report.
 - 4. All accepted shop drawings of mechanical equipment to be commissioned. Shop drawings shall be full size sheets folded as required to fit in binders.
 - 5. All Start-up and Checkout procedures and tests signed.
 - 6. All verification and functional performance test checklists/results, signed by indicated personnel organized by system and sub-system.
 - 7. Three copies of the operation and maintenance (O&M) manuals specified in other sections of these specifications shall be included with the commissioning documentation. The manuals shall be incorporated in the commissioning documentation prior to commencement of O&M training required in this and other sections of the specification. Preparation of O&M manuals shall be as specified in section 3.07 of these specifications.

PART 2 - PRODUCTS

2.01 TEST TOOL EQUIPMENT:

- A. The appropriate Contractor(s) shall furnish all special tools and equipment required during the commissioning process. A list of all tools and equipment to be used during commissioning shall be submitted to the Commissioning Authority for approval. The Owner shall furnish necessary utilities for the commissioning process.

3.01 GENERAL:

- A. The first meeting of the commissioning team members shall be held at a time and place designated by the CM. The purpose shall be to familiarize all parties with the commissioning process, and to ensure that the responsibilities of each party are clearly understood.
- B. The Contractor shall complete all phases of work so the systems can be started, tested, balanced, and acceptance procedures undertaken. This includes the complete installation of all equipment, materials, piping, ductwork, controls, etc., per the contract documents and related directives, clarifications, and change orders and Design Intent.
- C. A Commissioning Plan shall be developed by the Commissioning Authority. The CM shall assist the Commissioning Authority in preparing the Commissioning Plan by providing all necessary information pertaining to the schedule of actual equipment installation, and their tests.
- D. Acceptance procedures are normally intended to begin prior to completion of a system and/or sub-systems and shall be coordinated with the Division 23 contractor. Start of acceptance procedures before system completion does not relieve the contractor from completing those systems as per the schedule.

3.02 PARTICIPATION IN ACCEPTANCE PROCEDURES:

- A. The Contractor shall provide skilled technicians to start-up and debug all systems within Division 23. These same technicians shall be made available to assist the Commissioning Authority in completing the commissioning program. Work schedules, time required for testing, etc., shall be requested by the Commissioning Authority and coordinated by the CM and Contractor. Contractor shall ensure that the qualified technician(s) are available and present during the agreed upon schedules and of sufficient duration to complete the necessary tests, adjustments, and/or problem resolutions.
- B. System testing problems and discrepancies may require additional technician time, Commissioning Authority time, reconstruction of systems, and/or replacement of system components. The additional technician time shall be made available for subsequent commissioning periods until the required system performance is obtained.
- C. The Commissioning Authority reserves the right to question the appropriateness and qualifications of the technicians relative to each item of equipment, system, and/or sub-system. Qualifications of technicians shall include expert knowledge relative to the specific equipment involved and a willingness to work with the Commissioning Authority. Contractor shall provide adequate documentation and tools for Start-up and Checkout tests and commissioning tests for the equipment, system, and/or sub-system to be commissioned.

3.03 DEFICIENCY RESOLUTION:

- A. In some systems, misadjustments, misapplied equipment, and/or deficient performance under varying loads will result in additional work being required to commission the systems. This work shall be completed under the direction of the Owner and CM, with input from the Contractor, equipment supplier, the design professional and Commissioning Authority. Whereas these members shall have input and the opportunity to discuss, debate, and work out problems, the Owner shall have final jurisdiction over any additional work done to achieve performance.
- B. Corrective work shall be completed in a timely fashion to permit the completion of the commissioning process. Experimentation to demonstrate system performance may be permitted. If the Commissioning Authority deems the experimentation work to be ineffective or untimely as it relates to the commissioning process, the Commissioning Authority shall notify the Owner and the CM, indicating the nature of the problem, expected steps to be taken, and suggested deadline(s) for completion of activities. If the deadline(s) pass without resolution of the problem, the Owner reserves the right to obtain supplementary services and/or equipment to resolve the problem. Costs incurred to solve the problems in an expeditious manner shall be the contractor's responsibility.

3.04 ADDITIONAL COMMISSIONING

- A. Additional commissioning activities may be required after system adjustments, replacements, etc., are completed. The contractor(s) suppliers, and Commissioning Authority shall include a reasonable reserve to complete this work as part of their contractual obligations.

3.05 SEASONAL COMMISSIONING

- A. Seasonal commissioning pertains to testing under full load conditions during peak heating and peak cooling seasons, as well as part load conditions in the spring and fall. Initial commissioning shall be done as soon as contract work is completed, regardless of season. Subsequent commissioning may be undertaken at any time thereafter to ascertain adequate performance during the different seasons.
- B. Heating equipment shall be tested during winter design extremes. Cooling equipment shall be tested during summer design extremes with a fully occupied building. Each contractor and supplier shall be responsible to participate in the initial and the alternate peak season tests of the systems as required to demonstrate performance.

3.06 ACCEPTANCE PROCEDURES

- A. Equipment or system shall be deemed accepted after its Verification Test and Functional Performance Test have been accepted by the Commissioning Authority.
- B. Verification Tests

1. Verification tests are primarily static in nature to ascertain and prepare the equipment or system for operational modes under Functional Performance Testing. These Verification tests shall begin only after the Start-up and checkout tests have been successfully completed.
2. Tests shall be performed for the items indicated on the checklists with participants as shown. Participants shall include in their proposals all costs to do the work involved in these tests.
3. The Commissioning Authority shall coordinate and witness the Verification Tests, see Section 23 08 00 TAB Plan Checklist is included.

C. Functional Performance Tests

1. Functional performance tests are primarily dynamic in nature and shall be performed under operation and various modes to verify all the sequences of operation and interlocks. These tests shall begin only after the Verification tests have been successfully completed.
2. Tests shall be performed for the items indicated on the checklists, with participants as shown. Participants shall include in their proposals all costs to do the work involved in these tests.
3. The Commissioning Authority shall coordinate and witness the Functional Performance Tests, see Section 23 08 00-2.

D. Instrumentation

1. The test, adjust and balance contractor shall provide all instrumentation required for the commissioning tests. Instruments shall have been calibrated within the six month period prior to these tests. The calibration shall be traceable to National Institute of Standards and Technology standards. For the accuracy of the automatic controls commissioning instrumentation, refer to Section 23 08 00-2.

E. Tests For Deficiencies

1. Any identified deficiencies need to be evaluated by the Design Professional and CM to determine if they are part of the contractor=s or sub-contractor=s contractual obligations. Construction deficiencies shall be corrected by the responsible contractor(s), and the specific test repeated.
2. If it is determined that the HVAC system is constructed in accordance with the contract documents, and the performance deficiencies are not part of the contract documents, the Owner must decide whether any required modifications needed to bring the performance of the HVAC system up to the finalized design intent shall be implemented, or if the test shall be accepted as submitted. If corrective work is performed, the owner shall determine if a portion or all required tests should be repeated, and a revised report submitted.

3.07 OPERATING AND MAINTENANCE MANUAL

- A. Shall be in accordance with ASHRAE Guideline 4-1993 (Preparation of Operating and Maintenance Documentation for Building Systems).

B. The operating and maintenance manual shall consist of a sturdy binder with 8-1/2" x 11" sheets containing the following major sections.

1. System Descriptions:

- a. Each major system shall be described, type-written, in general terms, including major components, interconnections, theory of operation, theory of controls, unusual features and major safety precautions. This information should correlate with information provided in the manufacturers' instructions book. This section shall include, but not be limited to, the following data:
 - 1) Detailed description of each system and each of its components showing piping, valves, controls, and other components, with diagrams and illustrations where applicable.
 - 2) Wiring and control diagrams with data to explain detailed operation and control of each component.
 - 3) Control sequences describing start-up, all modes of operation, and shut down.
 - 4) Corrected shop drawings.
 - 5) Approved product data including all performance curves and rating data.
 - 6) Copies of approved certifications and laboratory test reports (where applicable).
 - 7) Copies of warranties.
- b. Updated as-built version of the control drawings and sequences of operation, detailed in article 1.05 H. shall be reduced in size and folded to usefully fit into the Manual, and submitted.

2. Operating Instructions:

- a. Condensed, typewritten, suitable for posting, instructions shall be provided for each major piece of equipment. Where more than one (1) common unit is installed, one instruction is adequate. The instructions shall provide procedures for:
 - 1) Starting up the equipment/system.
 - 2) Shutting down the equipment/system.
 - 3) Operating the equipment in emergency or unusual conditions.
 - 4) Safety precautions.
 - 5) Trouble shooting suggestions.
 - 6) Other pertinent data applicable to the operation of particular systems or requirement.
- b. The instructions shall be suitable for posting adjacent to the equipment concerned.

The Contractor shall provide instructions for:

- 1) Equipment and systems listed under 1.04 Scope of Work.

3. Ongoing and Preventive Maintenance:

- a. Condensed, typewritten procedures for recommended ongoing and preventive maintenance actions shall be provided for each category of equipment and systems listed under 1.04 Scope of Work. This information shall include, but not be limited to the following:
 - 1) Maintenance and overhaul instructions.

- 2) Lubricating schedule including type, grade, temperature, and frequency range.
 - 3) Parts list, including source of supply and recommended spare parts.
 - 4) Name, address, and 24-hour telephone number of each subcontractor who installed equipment and systems, and local representative for each type of system.
 - 5) Other pertinent data applicable to the maintenance of particular systems or equipment.
- b. These recommended preventive maintenance actions shall be categorized by the following recommended frequencies:
- 1) Weekly
 - 2) Monthly
 - 3) Quarterly
 - 4) Semi-Annual
 - 5) Annual
 - 6) Other
- C. Postal Operating Instructions and Diagrams:
1. Operating Instructions:
 - a. Copies of operating instructions provided in the operating manual shall be posted in the near vicinity of each piece of applicable equipment. The instructions shall be mounted neatly in frames under Plexiglas, where they can be easily read by operating personnel. Instructions mounted outdoors shall be suitably protected from weather.
 2. Posted Systems Diagrams:
 - a. Simplified one (1) line diagrams of the systems listed shall be developed of conveniently adequate size and posted neatly under Plexiglas in the main or most appropriate equipment room for easy reference by operating and maintenance personnel. These drawings shall be done in a professional manner which is acceptable to the DDC. The diagrams shall show each component including all valves installed in the system, with name and identifying number. If space does not permit valves installed in the system, with name and identifying numbers on the diagrams, valve charts shall be provided. Explanatory notes, where needed, shall be provided. This shall apply to equipment and systems listed under Article 1.04 Scope of Work.
 - b. These diagrams shall be suitable for reduction in size and use in the operating manual system descriptions previously covered.

3.08 AS-BUILT DRAWINGS

- A. The Commissioning Authority shall review the as-built contract documents pertaining to the equipment/system to be commissioned to verify incorporation of both design changes and as-built construction details. Discrepancies noted shall be corrected by the appropriate party.

3.09 OPERATING AND MAINTENANCE TRAINING AND VIDEOTAPING

- A. The Mechanical Contractor, TAB Contractor, Automatic Controls and appropriate sub-contractors, shall provide comprehensive operating and maintenance instructions on building systems prior to delivery. The instructions shall include classroom instruction delivered by competent instructors based upon the contents of the operating manual. Emphasis shall be placed upon overall systems diagrams and descriptions, and why systems were designed as they were. The classroom instruction shall also include detailed equipment instruction by qualified manufacturer representatives for all equipment listed in Article 1.04 Scope of Work for which operating instructions are provided. The manufacturer representative training shall emphasize operating instructions, and preventing maintenance as described in the operating manual. Videotaping of these instructions shall be by CA. At a minimum, the training sessions shall cover the following items:
1. Types of installed systems
 2. Theory of operation
 - a. Design intent
 - b. Occupied vs. unoccupied or partial occupancy
 - c. Seasonal modes of operation
 - d. Emergency conditions and procedures
 - e. Comfort conditions
 - f. Indoor air quality
 - g. Energy efficiency
 - h. Other issues important to facility operation.
 3. System operations.
 4. Use of control system
 - a. Sequence of operation
 - b. Problem indicators
 - c. Diagnostics
 - d. Corrective actions
 5. Service, maintenance, diagnostics and repair.
 6. Use of reports and logs.
 7. Troubleshooting, investigation of malfunctions, and determining reasons for the problem.
- B. Each classroom training period shall be followed by an inspection, explanation and demonstration of the system concerned by the instructors. All equipment shall be started up and shut down.
- C. The contractor shall be responsible for organizing, arranging, and delivering this instruction in an efficient and effective manner on a schedule agreeable to the owner.
- D. The contractor shall provide, at or before substantial completion, a proposed agenda and schedule of the above training for approval by the Commissioning Authority and the Owner.

END OF SECTION 23 08 00

SECTION 23 09 00 - AUTOMATIC TEMPERATURE CONTROLS - ELECTRIC

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical work shall apply.
- C. The work of this section shall be integrated with the existing BMS provided by Advantex Solutions. Please contact Giovanni Natale from Advantex Solutions Inc. Contact Information: P-718-278-2290; C-917-682-2521; Email GNatale@Advantexsolutions.com).

1.02 DESCRIPTION OF WORK

- A. The work includes the providing of all labor, materials, equipment, accessories, services and tests necessary to complete and place into satisfactory operation a complete system of automatic temperature controls as shown on the drawings and hereinafter specified.
- B. The control system shall be of the electric unless otherwise indicated, all as hereinafter specified. Control equipment shall be as manufactured by Distech Controls. All controls and the Building Management System (BMS) shall be the product of one manufacturer. The temperature control manufacturer shall be responsible for the quality and satisfactory operation of material provided but not actually manufactured by him. The system shall be a BACNET MSTP system.
- C. The system shall have a graphic system which is compatible with the system currently installed in accordance with the specification, which is a Distech Controls system, installed and maintained by Advantex Solutions Inc. Please contact **Giovanni Natale** from Advantex (P-718-278-2290; C-917-682-2521; Email - GNatale@Advantexsolutions.com).
- D. The control system shall include all control and interlock wiring from freezestats, firestats and relays, to motor controllers, contactors, etc. All control circuits shall be 120 volts.
- E. Provide nameplates on all devices, whether or not mounted on the face of local control panels. In occupied areas, nameplates shall be concealed beneath covers of room type instruments, to describe functions.

1.03 QUALITY ASSURANCE

- A. Only firms regularly engaged in manufacture and installation of this equipment with characteristics and capacities required and whose products have been installed by them and are in satisfactory use in similar service for not less than 10 years will be acceptable.
- B. All control equipment used in this project shall have been successfully proven in actual field installations for a period of two (2) years prior to the date of submittal of said equipment to the Architect for approval.
- C. The control system shall be installed complete in all respects by competent mechanics, regularly employed by the manufacturer of the control system.

1.04 SUBMITTALS

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work and submit shop drawings.
- B. Complete shop drawings shall be submitted to the Architect for approval before any field installation is started. Such drawings shall give a complete description of all control elements and shall show completed schematic piping and wiring diagrams, including functional description. Valve and damper schedules shall be included.
- C. Floor plans indicating all room thermostat locations not shown on the Drawings, and samples of each type, shall be prepared and submitted to the Architect for approval before installation. Samples of unitary controls shall also be submitted for approval, and a typical assembly shall be field erected, before installation. All room controls shall be mounted five feet above finished floor.

1.05 RELATED WORK UNDER ELECTRICAL WORK

- A. All power wiring for pumps, fans, unit heaters, clocks, etc. See Special Requirements for Mechanical and Electrical Work.

1.06 COORDINATION

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

1.07 GUARANTEE

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.
- B. The control system herein specified shall be free from defects in workmanship and material under normal use and service. If, within one year from date of acceptance by the Architect, any equipment herein described is proved to be defective in workmanship or material, it shall be adjusted, repaired or replaced, free of charge, during the guarantee period.

2.01 VALVE AND DAMPER OPERATORS

- A. All operators shall be of totally enclosed type in dustproof housings of pressed steel or approved cast metal. All motors shall be of a permanently lubricated type with oil immersed gear train or internal servo relief valve. An open type gear train will not be acceptable. All operators shall be of the spring return type, to provide failsafe operation and overtravel protection. Each automatic damper shall be provided with a separate damper operator. Operators to be located outdoors shall be NEMA 3R rated.

2.02 INSERTION AND IMMERSION THERMOSTATS

- A. All thermostats shall have adjustable throttling ranges and shall be capable of positioning valve or damper operators in intermediate positions. The control elements of the thermostats shall be centrally mounted inside the supply duct or casing to measure the air temperature. The sensing shall be transmitted to the central mechanism located on the local control panel by means of capillary tubing or electronic transmission. Thermostats shall be capable of controlling without hunting and shall be respond to a change of plus or minus 3EF. Control point shall be adjustable 15 deg F above and below intended setting, with a minimum scale of at least 50 deg F. Sensing elements shall be of proper design and material for its specific application and shall have sufficient length to cover a minimum of two-thirds of the coil or duct.

2.03 AUTOMATIC CONTROL VALVES AND DAMPERS

- A. All automatic control valves shall be furnished by the temperature control manufacturer and shall be installed by the HVAC Contractor under the control manufacturer's supervision.
- B. Automatic dampers shall be furnished by the control manufacturer and shall be set in place by the HVAC Contractor under the supervision of the control manufacturer, unless otherwise indicated.

2.04 DAMPERS

- A. Control dampers shall have galvanized frames of not less than 2" in width and blades of #16 galvanized steel and shall be adequately braced to form a rigid assembly, where required in galvanized ductwork. In aluminum ductwork, damper material shall be 16-gauge aluminum. No dampers shall have blades more than 10" wide. Dampers shall be painted with two coats of black enamel.
- B. All dampers shall be of the proportioning or opposed blade type. Dampers shall have continuous stops to avoid leakage. Bearings shall be of oilite nonferrous sleeve type. Outside air and exhaust air dampers shall be provided with continuous neoprene gasketing around perimeter of frame and at interlocking blade edges, to form airtight seal.

2.05 THERMOMETERS

- A. Furnish and install dial thermometers with 1% of range accuracy, on each local panel with appropriate temperature ranges, adjacent to each air insertion and water immersion controller. Thermometers shall have a 32" dial, remote bulb, of liquid filled or electronic transmission type, uniform scale and same type sensing bulbs as thermostats. In addition, provide thermometers on local panels for the following:
1. O.A. temperature.
 2. Return air temperature
 3. H.W. supply and return temperature
 4. Ch. W. supply and return temperature
 5. Air handling unit discharge
 6. Each zone discharge air temperature

2.06 VALVES

- A. All valves shall be equipped with throttling plugs and removable composition discs. All valves shall be sized by the control manufacturer and guaranteed to be of sufficient size to meet the heating and cooling requirements. All water valves shall be sized for pressure drop and flow rates indicated on the drawings. All valves shall be single seated.

2.07 ROOM THERMOSTATS

- A. All proportioning thermostats shall have adjustable throttling range. All thermostats shall be provided with an adjustable range of 55 degF – 85 degF., key operated, non-indicating, locked cover type. Finish and final locations shall be approved by the Architect.

2.08 FREEZE PROTECTION DUCTSTATS

- A. An electric freeze protection ductstat with 20 feet low temperature sensing capillary, and with manual reset, shall be located across the discharge of each heating coil bank in each AC or HV unit, which shall, on a fall in temperature below 35 degF., shut down its respective supply fan and close the outdoor air damper. Case of instrument shall be located outside of supply unit, within 10 feet of supply fan motor.
- B. For systems with return air fans, on fan shut down, the return fan shall continue running or shall start, if not running.

2.09 FIRE PROTECTION DUCTSTATS

- A. A manual reset fire protection ductstat shall be provided in the air inlet to each return air fan, and exhaust fan within 10 feet of fan motor, to stop the return fan, exhaust fan, and its respective supply fan, whenever the temperature exceeds 125°F.

2.10 LOCAL PANELS

- A. Furnish and install adjacent to each water system and each H & V unit and AC unit as herein specified, locked enclosed local control panel of 14 gauge steel or a face of plywood board with bonded aluminum sheets on each side set in an extruded aluminum enclosure and with welded angle iron brackets, wall or floor type, in which shall be mounted the associated temperature controls, relays, thermostats, etc., and on which shall be flush mounted the associated switches, gauges, thermometers, etc., as previously and hereinafter described. The basic background color of the panel shall be as approved by the Architect. Provide canopy light on top of local control panel with light switch.
- B. Panels shall be prewired to terminal strips.
- C. Details of panel shall be submitted for approval prior to fabrication. Locations of local panel are to be convenient for adjustment and service and all such locations are to be approved prior to installation. Provide engraved nameplates beneath panel mounted control device and gauge, clearly describing the function of said device and the range of operation. Provide a laminated color-coded schematic control diagram on panel face. Provide a key for local panel.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine location where controls and equipment are to be installed and determine space conditions and notify architect in writing of conditions detrimental to proper and timely completion of the work.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's written instructions, and with recognized industry practices, to ensure that equipment comply with requirements and serve intended purposes.
- B. Coordinate with other work as necessary to interface installation of equipment with other components of systems.

3.03 FIELD QUALITY CONTROL

- A. Upon completion of installation of the automatic temperature control system and after motors have been energized with normal power source, test system to demonstrate compliance with requirement. When possible, field correct malfunctioning controls then retest to demonstrate compliance. Replace controls which cannot be satisfactorily corrected. Refer to Section - Test and Balancing

3.04 SERVICE

- A. After completion of the control system installation, the control manufacturer shall regulate and adjust all thermostats, control valves, damper motors, etc., and place in complete operating condition, subject to the approval of the Architect. Complete instructions shall be given to the operating personnel. There shall be two day's instruction given for Winter cycle and two day's instruction for Summer cycle operation.

END OF SECTION 23 09 00

SECTION 23 09 01 - BUILDING AUTOMATION SYSTEM

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.
- C. The work of this section shall be integrated with the existing BMS provided by Advantex Solutions. Please contact Giovanni Natale from Advantex Solutions Inc. Contact Information: P-718-278-2290; C-917-682-2521; Email - GNatale@Advantexsolutions.com).

1.02 DESCRIPTION OF WORK

- A. The work includes the providing of all labor, materials, equipment, accessories, services and tests necessary to complete and make ready for operation by the Owner, a building automatic system as shown on the drawings and hereinafter specified.
- B. The Building Automatic System shall be provided by the Distech Controls as the automatic temperature controls. The graphics for the new AC units installed under this projects shall be completed by the ADVANTEX Solutions under this contract and integrated into the existing BMS system.
- C. The Automatic System Subcontractor shall furnish and install all equipment, accessories, wiring and instrument piping required for a complete and functioning system.
- D. All materials and equipment used shall be standard components, regularly manufactured for this and/or other systems and not custom designed especially for this project. All systems and components shall have been thoroughly tested and proven in actual use.
- E. The automation system shall be of a fully modular architecture permitting expansion by adding computer memory, application software, operator peripherals and field hardware.
- F. If expansion of the automation system necessitates greater computer processing power, it shall be possible to transfer all existing software and data base, both vendor supplied and user-defined, to a new more powerful computer. This shall be accomplished by using removable, compatible disk cartridges.
- G. Systems which require the existing user-defined data base to be re-entered through the operator's terminal shall not be acceptable.

- H. Although fire alarm and security points will not be installed or monitored, initially the system shall be installed completely ready to receive or accept these points at a later date without additional central hardware or software.
- I. The system as specified shall monitor, control, and calculate all of the points and functions as listed in the Building Automation Schedule.
- J. The system as installed shall have sufficient computer memory and application software for 100% point expansion above those points as listed in the Building Automation Schedule.
- K. The entire system of Automatic Temperature Controls and the Building Automation System shall be powered from the building's power system. Components and devices to be powered include, but are not limited to, all ATC panels, BAS computers and remote stations, valve actuators, damper actuators, central and unitary equipment controls and terminal unit controls including VAV boxes. The source of emergency power for all such devices shall be derived from either junction boxes left by the Electrical Contractor as indicated on the electrical drawings, or, if not indicated on the electrical drawings, the HVAC Contractor under his contract shall provide power wiring taken directly from the building's Emergency Power Distribution Panel(s).

1.03 QUALITY ASSURANCE

- A. Only firms regularly engaged in manufacture and installation of this equipment with characteristics and capacities required, whose products have been in satisfactory use in similar service for not less than 10 years shall be acceptable.
- B. The entire building automation system shall be installed by skilled electricians and mechanics, all of whom are properly trained and qualified for this work. All wiring shall be installed in accordance with the Project Electrical Specifications.
- C. Supervision and checkout of the system shall be by factory-trained engineers and technicians directly employed by the automation Contractor.
- D. Provide system produced and installed by the manufacturers, which are listed in Section "Approved Manufacturer's List".
- E. Provide equipment which performance, under specified conditions, is certified by the manufacturer.

1.04 SUBMITTALS

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical work and submit shop drawings.

1.05 COORDINATE

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

1.06 GUARANTEE

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.
- B. The system including all hardware and software components shall be guaranteed for a period of one year following the date of final acceptance. Any manufacturing defects arising during this warranty period shall be corrected without cost to the Owner.
- C. All applicable software as detailed in this Specification shall be updated by the Automation Subcontractor free of charge during the warranty period. This will ensure that all system software will be the most up-to-date software available from the Automation Subcontractor.

PART 2 - PRODUCTS

2.01 CENTRAL CONSOLE HARDWARE

- A. The Automation Subcontractor shall provide a central console configuration that shall include as a minimum the following components located in the 6th Floor Engineering Department:
 - 1. A Central Processing Unit (CPU) including a mini-computer, dual hard disk memory subsystem and all necessary interface and control modules.
 - 2. A Dynamic Color Graphic Display Terminal (Color CRT).
- B. The equipment listed above shall be assembled in a console configuration that includes a desk-top workspace and a chair. The Central Processing Unit shall be free standing with minimum peripheral cable lengths of 25 feet to facilitate system placement, service and ventilation. The system design shall allow each operator access to all console equipment from one position.
- C. The components that shall be provided at the central console shall be as hereafter detailed.
 - 1. Computer
 - a. The central computer shall be a microprogrammed, 16-bit word, general purpose digital computer. The minimum acceptable computer shall contain 128K words of 16-bit word, random access memory. Systems that are based on a special purpose, proprietary processor shall not be acceptable.
 - b. Systems that contain the Central Processing Unit (CPU) in the same housing with the operator's video display terminal (CRT) shall not be acceptable.
 - c. The computer shall include integral memory management and self-test diagnostic routines. The computer shall also contain a power interrupt feature that enables an unattended computer to recover from a commercial power failure. The computer shall perform all floating point calculations

- with floating point instructions. Systems which emulate floating point through software subroutines shall not be acceptable.
- d. The central computer, memory subsystem, and operator peripherals shall be capable of operating in environments of 60EF to 90EF and relative humidity of 10% to 90%.
2. Disk Memory System
 - a. The CPU shall employ a moving head hard disk subsystem. The disk subsystem shall include a disk controller, and two disk drives each with a removable medium capacity of at least 5.2 million bytes. The disk subsystem shall include a feature for copying information from disk to disk.
 - b. Systems that utilize only floppy disk or tape memory without also providing the dual moving head disk subsystem shall not be acceptable. A fixed head disk is acceptable if two moving head disks with the aforementioned copy function are also provided.
 3. Dynamic Color Graphic Display Terminal
 - a. A dynamic color graphic display terminal shall be provided which can display alphanumeric data and dynamic color diagrams simultaneously. The system shall upon command generate color schematics of building equipment or groups of building equipment or areas being monitored and simultaneously display the current measured variables associated with the equipment or area. The Color Graphic displays shall be dynamic in that point data or calculated valves will change continuously while being observed. The data may be updated on an owner selected frequency down to one second. The Color CRT shall have a flashing feature to indicate off-normal conditions.
 - b. The Color CRT shall have as a minimum a 19-inch diagonal screen and shall display each character in one of the least eight colors. The color tube shall have a minimum grid of 160 pixels wide by 192 pixels high. Alphanumeric data shall be displayed on 48 lines with 80 characters per line. The CRT shall have an associated keyboard including all standard ASCII characters.
 - c. A Function Keypad shall be provided which shall include a minimum of fourteen keys that will issue, with a single keystroke, often-used operator commands.
 - d. Minimum function keys shall be:
 - 1) Sign on
 - 2) Log
 - 3) Cancel
 - 4) Command Off
 - 5) Sign off
 - 6) Graphic
 - 7) Command
 - 8) Alarm Ack
 - 9) Display
 - 10) Clear
 - 11) Command On
 - 12) Alarm Summary

- e. The keypad shall also include at least four keys that can be custom-defined by the Owner. Owner-defined keys may provide for display of:
 - 1) All Boiler Point
 - 2) All Space Temperature
 - 3) All Building Pumps
 - 4) All Building Exhaust Fans
 - f. Data shall be displayed in a split-screen format that permits data such as logs and summaries to be displayed on one portion of the screen, while allowing the operator to enter or access other information or another portion.
 - g. Systems not providing the feature of simultaneous display of data (such as logs and summaries), while also allowing the operator to enter or access other information on another portion of the screen may provide an additional terminal to meet the requirement. There shall be a portion of the CRT screen reserved for the display of multiple critical alarm information.
 - h. One line of the CRT shall be dedicated for continuous display of: time, data, day, on-duty operator initials and other owner defined data.
 - i. The automation system shall allow simultaneous display of dynamic graphic displays in the display area while providing the alphanumeric display of critical alarms, system time, and the operator access area. While in this mode the color graphic keyboard shall provide the operator with the same function keypad feature as detailed under the operator's video display terminal.
4. Data and Alarm Printer
- a. A wide carriage high speed keyboard/printer shall be provided for hard copy data and alarm printouts. All change of state reporting, system logs, information summaries, system malfunctions and alarms shall be printed at this terminal.
 - b. The minimum acceptable print speed shall be 180 characters per second. The printer shall have a line length of at least 132 characters and the character set shall be the standard 64-character ASCII upper-case subset.
 - c. The printer shall be equipped with an ASCII keyboard. The printer shall include the ability to serve as a backup operator's terminal or future operator's terminal without the need for any additional hardware.
 - d. The printer shall be interfaced to the system on either 2-wire current loop or EIA standard RS232C.
5. Multiple Operator Consoles
- a. The automatic system shall support as a minimum six operator consoles. An operator console is defined as an operator input and output station, which may include a number and variety of devices. All operator consoles must operate independently of and concurrently with any other console. It shall be possible to limit the capabilities of any console to specific functions, specific points, or specific buildings. It shall also be possible for each console to have equal capability.

- b. All consoles shall be connected to the system via standard EIA or current loop interfaces. The system shall be provided with the following devices for an operator's console located in the 1st Floor Security Room:
 - 1) Hard copy terminal with keyboard
 - 2) Video display terminal with keyboard

2.02 TRANSMISSION NETWORK

- A. Distributed Communication Processor
 1. The system shall use an intelligent Distributed Communication Processor (DCP). This processor shall be microprocessor based and shall interface with Central Processing Unit and Remote Processing Units.
- B. Multi-Drop Trunk(s)
 1. The automation system shall include a multi-drop digital transmission network that provides the communication link between the Distributed Communication Processor and all Remote Processing Units.
 2. The transmission shall be asynchronous and utilize a polled-response method. The system shall utilize a cyclic redundancy check or dual transmission with parity check to ensure signal reliability.
 3. The transmission network shall utilize a twisted shielded pair. The transmission speed shall be a minimum of 1200 baud and operate in a half-duplex mode.
 4. The system shall support multiple multidrop trunks. Each multi-drop trunk shall support a minimum of 20 Remote Processing Units.
 5. Each multi-drop trunk shall have an allowable line length of at least 20,000 feet without signal degradation. All multidrop trunks shall be interfaced to the system via standard EIA interfaces. With the addition of modems, the multidrop trunk shall interface to unconditioned voiceband 3002 telephone lines for remote building tie-in to the automation system.
 6. Transmission technique shall allow trunk cable to be installed in conduit with other system signals as well as switched 120 VAC or 240 VAC.

2.03 FIELD HARDWARE

- A. Remote Processing Units
 1. The system shall utilize intelligent distributed Remote Processing Units (RPU's to interface sensors being monitored and equipment being controlled by the automation system. Each RPU shall be microprocessor based and perform the following functions:
 - a. Acquire, process and transfer information to the CPU.
 - b. Accept, process and execute commands from the CPU or other input devices.
 - c. Record evaluate and report changes of state and/or value that occur among points associated with the RPU.
 2. Each RPU shall use multi-point function cards to carry out the control and monitoring functions as specified in the point list. For each RPU location, electronics shall be provided for at least 12 spare points.

3. Each RPU shall perform continuous diagnostics, and any malfunction shall be annunciated at the operator's console as well as visually indicated at the RPU.
4. Failure of any RPU on the system shall not affect the proper operation of the CPU and other RPU's.
5. The system shall be capable of phased startup. That is any RPU shall be capable of properly communicating with the CPU while remaining RPU's are being installed.
6. Surge transient protection shall be provided in each RPU for the purpose of suppressing induced voltage transients.
7. Each RPU shall contain a function card cage and backplane which can accommodate up to 128 points. Each RPU shall contain a power supply sized to drive the function cards, interface relays and sensors for the maximum allowable points.
8. Any RPU which used volatile memory shall have a minimum of four-hour uninterruptible battery backup unless the automation system has an automatic down loading capability.
9. If the CPU or transmission network fails but power to the RPU does not, the RPU shall continue to monitor all changes of state and/or value and shall retain the most recent values. The RPU shall also maintain all analog set points and command positions.
10. RPU's shall have all metal cabinets. Each RPU including cabinet, power supply, function cards and termination modules shall be approved by U.L. Each RPU shall have a pin-hinged door and master keyed lock. RPU's shall be capable of proper operation in an ambient environment of 32E to 120EF and 10% to 90% RH.

B. Function Cards/Termination Modules

1. Each RPU shall be capable of accepting at least 8 multi-point function cards. It shall be possible to insert any function card into any of the available card slots. There shall be four types of function cards corresponding to industry nomenclature. They are:
 - a. Digital In for monitoring status, alarms and accumulating pulses.
 - b. Digital Out for commanding two and three state devices.
 - c. Analog Out for positioning set points.
2. Each function card shall be microprocessor based with sufficient memory to retain characterization data for its associated points.
3. Characterization of point data shall be accomplished on-line at the operators console. The operator shall be able to individually characterize points on each function card through a procedure whereby the operator down-line loads the specific point parameters from the CPU through the operator's keypad to the RPU. This downline loading shall also occur automatically after a power outage to a RPU.
4. Function cards that require foil path cuts, jumpers, or similar physical modifications to customize them for particular applications will not be acceptable.
5. To reduce downtime, each function card shall have a built-in self-test diagnostic and be able to visually indicate its operational status at the RPU as well as failure annunciation at the operator's console.

6. The failure of any one function card shall not deter the reporting or command capability of other function cards in the same of other RPU's.
7. Each function card shall have an associated termination module where the field wiring or tubing shall be connected. All termination modules shall have plug connectors interfacing them to their respective function cards through the card cage backplane.
8. Any termination modules requiring on-site hardwire interconnection to their function cards shall not be acceptable.
9. Digital input signals shall be terminated through plug-in isolation relays. These shall be form "C" type relays, located in the RPU.
10. Analog input signals shall be terminated on screw type terminals. Each analog input shall have the capability to accept 2 or 4 wire inputs.
11. Digital output signals shall be accomplished through plug-in form "C" relays, located in the RPU.
12. Analog output signals shall be accomplished through 3" pneumatic tubing fittings.

C. Sensors

1. All analog sensors shall utilize industry standard 4-20 milliamp signals to facilitate owner expansion. Sensors based on proprietary equipment shall not be acceptable.
2. All analog signals shall be converted for digital transmission to the CPU at the function card.
3. All sensing wiring whether it be analog or digital, input or output, shall be capable of sharing single conduit runs without affecting signal performance. All signal wiring shall also be capable of sharing single conduit runs with switched AC of 120 VAC or 240 VAC.

2.04 SOFTWARE

- A. The Automation System Subcontractor shall provide all software required for efficient operation of all the automation system functions required by this Specification. Software shall be modular in design for flexibility in expansion or revision of the system.
- B. The software shall include a computer-vendor supplied and supported, unmodified real-time disk operating system. Systems which use an operating system which has been modified or is proprietary to the Automation System Subcontractor shall not be acceptable. The Automation System Subcontractor shall supply all the building automation system software. The building automation system software shall be written in high level language such as FORTRAN IV or Pascal.

2.05 REAL-TIME OPERATING SYSTEM

- A. The operating system shall be a general purpose real-time operating system and shall provide the following features of their equivalent:
 1. Program Control: The real-time operating system executive shall control the timing and sequencing of all programs.

2. Multiple Tasking Capability: Multiple Tasking Capability shall be provided to allow the operating system and real-time control programs to run concurrently with the programs assembling or compiling, debugging, loading or executing.
3. Memory Protection: The operating systems shall manage a scheme of storage protection which shall enable assembling, compiling, debugging and execution of programs without direct effect on the real-time programs.
4. Real-Time Clock Routine: The real-time clock routine shall maintain the current date and 24-hour clock time resolved to the nearest second. The real-time clock shall control or be used as reference for time-initiated command signals and printouts and shall be easily resettable by the operator from the operator's console.
5. Input/Output Control: The operating system shall include routines to coordinate all input/output functions of the computer system.
6. Disk File Input/Output: The operating system shall provide routines for disk file input/output including routines to perform the following:
 - a. Open file for input and/or output of data.
 - b. Input from or output to a disk file sequentially.
 - c. Input from or output to a disk file a; record at a time in random order.
7. Powerfail and Automatic Restart: A powerfail routine shall provide an orderly shutdown of the automation system when the power failure to the computer is detected, and which shall automatically restart the automation system when power is restored.
8. Programming Support Capabilities: The operating system shall be capable of supporting the following programs for user program development, compiling, loading and executing.
 - a. Fortran Compiler: Compile the source language into machine language object code that can be loaded and executed directly into the instruction set of the CPU. This compiler shall be directly compatible with FORTRAN IV.
 - b. Assembler Program: This program accepts and translates symbolic instructions into machine instructions. The assembler also generates object code.
 - c. Source Editor: This program allows an operator to edit source programs in assembler and Fortran languages as well as other ASCII text data.
 - d. Loader Program: This program combines relocatable object modules produced by the assembler and the Fortran compiler into an executable program.
 - e. Disk Utility Program: Routines for manipulating program and data files stored on the disk including the following shall be available:
 - 1) Creating new files.
 - 2) Deleting old files.
 - 3) Copying files.
 - 4) Creating file directories.
 - f. Memory Dump and Modify Program: Provides the capability to modify or dump the contents of selected locations in main memory.
 - g. Debug Program: This program aids in the debugging of assembler and FORTRAN programs.

- h. System Generation Provides the capability for reconfiguring the software system to accommodate new software or hardware functions.
- i. System Save and Restore: Provides the capability to save and restore a copy of the software programs and the system data base to facilitate reloading.
- j. Diagnostic Software: Diagnostic software provides the capability to test the computer memory and peripherals.

2.06 BUILDING AUTOMATION SYSTEM SOFTWARE

- A. The building automation system software shall be provided in four categories which are defined as:
 - 1. Operator access to system data base.
 - 2. User control over system configuration.
 - 3. Facility monitoring functions.
 - 4. Energy management control functions.
- B. Each category of software shall consist of interactive software modules. Each module shall have an associated priority level and shall execute as determined by the program controller as defined in the real-time operating system.
- C. Operator Access to System Data Base:
 - 1. Operator/System Communication: The building automation system shall use English language for each point identification. This shall be full English words with the option to abbreviate at the users discretion. To facilitate different building operators, the system shall accept multiple English language identifiers as well as foreign language identifiers for each point on the system. These shall be known as "User Names". For example:
 - ADMINISTRATION BUILDING AHU 1
 - SUPPLY FAN 1
 - AIR HANDLING UNIT 1shall all identify the same desired point. In addition, system formatting shall be provided which shall allow for software grouping of related points.
 - 2. Input Format:
 - a. Allowable operators as defined under operator access shall be able to control system functions by their inputs at appropriate operator terminals.
 - b. The system shall recognize all inputs as functions or commands to be performed. The system's handling of operator inputs such as requests to start a motor, output a log, change a time program, acknowledge an alarm, or do any of the other commands described in this specification, shall be in a similar format.
 - c. All operator interaction with the automation system shall be performed as follows: The operator entry shall begin with the commands he desires the system to perform, followed by the username and any data, such as limit values, program times, etc. Manual commands such as start, stop, log, etc. have no data values associated. Example: COMMAND ON AHU 1.

- d. Upon entry of a command to the point or points desired as described above, the system shall, before performing any command, respond with an echo of the request on the device (Cathode Ray Tube or keyboard printer) being used. This echo feedback shall include the command requested, the username and any entered data.
 - e. Should an operator make an error in entry, the system shall output an advisory message detailing the nature of the error. Advisory messages shall be in full English with a unique advisory for each type of operator input error. Typical operator error advisories might be:
 - 1) System input format is incorrect.
 - 2) Invalid command entered.
 - 3) Analog limit is outside specified range.
 - 4) Point does not respond to the command entered, such as a "start" command to a temperature sensor.
 - 5) Operator's entry did not contain sufficient information.
 - 6) Invalid operator password.
3. Output Format:
- a. The system shall operate on a System Format basis, regardless of the manner of hardware configuration in which data is required. A system of points shall consist of a logical grouping of data points related to a piece of mechanical equipment, an energy distribution system, or an architectural area. For example, in some cases it may be desired to display a space temperature with its associated air handling unit, and in other cases to display all space temperatures on a floor or in a building as a single system. The Automation System shall allow such determinations to be made without regard to a point or group of points physical hardware locations(s). Likewise, the system shall accommodate future changes of system groupings and operations without field hardware changes whatsoever.
 - b. All output displays and logs shall contain a header line indicating the following information:
 - 1) time
 - 2) console identifier
 - 3) date
 - 4) initials of on-duty operator
 - 5) day
 - 6) owner definable information
- Example:
- 12:45 06/23/83 FRI MASTER CONSOLE SMD 76EF 42% RH
- c. All output displays or logs of a system point or group of points shall contain as a minimum the following information:
 - 1) username of point
 - 2) associated engineering units
 - 3) point descriptor
 - 4) alarm descriptor
 - 5) current value/status

Example:

EAST MECHANICAL ROOM AHU SUPPLY TEMP 85EF

- d. Usernames, point descriptors, and engineering units shall be operator definable on a per point basis. Systems which use fixed vendor-supplied look up tables shall not be acceptable.
4. Split Screen Formatting:
- a. To further simplify operator interpretation of displayed data, the display software shall divide the operator's video display into at least 5 areas. The 5 areas shall be defined as:
 - 1) Time Line - continuous display of time, date, day, console identifier, operator's initials and other owner-defined data.
 - 2) Operator Command Line - accept operator English work commands.
 - 3) System Response Line - acknowledgement of commands carried out or operator error advisories.
 - 4) Data Display Area - display the current value of a point or group of points.
 - 5) Alarm Area - Reserved for the display of critical alarm reporting.
 - b. It shall be possible for the above defined areas to display independently of and concurrently with each other.
5. Operator Access Restriction:
- a. Operator access to the automation system shall be via user-defined passwords providing at least five access levels.
 - b. Each operator shall gain access to the system by entering a unique name and password combination.
 - c. Properly signing-on by an operator shall produce a hard copy report indicating the name of the operator, time, and date that operator has signed on.
 - d. Invalid operator attempts to enter the system shall also produce a hard copy report as defined above and additionally indicate the nature of the unsuccessful sign-on.
 - e. To return the system to a secured mode, the operator shall sign off the system.
 - f. Signing off the system shall also produce a hard copy report of the operator's name, time and date.
 - g. The automation system shall automatically sign off an operator should that operator not sign off after a specified period of time.
 - h. In addition to producing hard copy reports of valid or invalid sign-on and sign-off attempts, the automation system shall store in nonvolatile memory a historical record for a minimum of 30 system entries, valid and invalid. This information shall only be available to the operator with the highest access level.
 - i. All information pertaining to operator access shall be user-defined while the system is on-line and fully operational.
 - j. Typical operator access levels are:
 - 1) LEVEL 0 - Normal operator functions such as log and display request, alarm acknowledgement.

- 2) LEVEL 1 - All Level 0 functions plus analog limit changes, point lockouts and comment functions.
- 3) LEVEL 2 - All lower level functions plus modification to calculations and system messages.
- 4) LEVEL 3 - All lower level functions plus changes to point descriptors, user names.
- 5) LEVEL 4 - All lower level functions plus access to add, modify or delete any and all user-defined parameters and access levels.
- k. It shall be possible for the user to define the distinctions between various access levels.
- l. Systems that utilize fixed vendor defined operator access levels shall not be acceptable.
6. Dynamic Color Graphics: The automation system shall include a software program allowing an operator to create, modify or delete dynamic color graphics on-line.
 - a. Generation of Graphics:
 - 1) Through the use of a high level English language, an operator shall be able to create, modify or delete dynamic color graphics while the automation system is on-line and fully operational.
 - 2) A complete set of standard symbols and building systems shall be stored in the computer system memory to aid in creating graphic displays.
 - 3) Each system, symbol or graphic character shall be able to display in any one of the eight colors.
 - 4) Each system, symbol or graphic character shall be able to display in variable size.
 - 5) A mechanism shall be provided for copying graphics of similar requirements. Example: Dual-duct air handling system (2-thus). After the first graphic is created, a one-line input shall make an identical copy.
 - b. Dynamic Data Display:
 - 1) Dynamic data shall be located for display at any location on the CRT screen. Each graphic shall be able to accommodate any combination of dynamic (analog or binary) information, graphic symbols and text displayed on the entire screen. The number of dynamic points being displayed and updated shall be limited only by the area of the CRT screen. A graphic shall be constructed to include any dynamic points regardless of the physical location of these points.
 - 2) Dynamic data shall update automatically without manual initiation at user-defined intervals. Update intervals shall have resolution down to one second.
 - c. Manual or Automatic Operation:
 - 1) Each graphic shall be manually or automatically displayed.
 - 2) In the manual mode an operator shall display a graphic by inputting the appropriate graphic name.

- 3) In the automatic code, a graphic shall display as a result of:
 - a) An alarm occurrence
 - b) A change of state
 - c) Specific time, day, or date
 - d. Dynamic Graphics Capacity: The automation system shall have the capacity to store a minimum of 170 unique dynamic color graphics. Graphics shall be stored on hard disk.
- D. User Control Over System Configuration:
1. Data Base Creation and Modification:
 - a. The intent of this specification is to allow the owner to independently do his own modifications to the system.
 - b. All changes shall be done utilizing standard procedures and must be capable of being done while the system is on-line and operational.
 - c. To aid an operator, instructive prompting software shall be provided. An operator shall be required to simply answer to "yes" and "no" type questions as well as provide information such as English usernames, desired engineering units, point descriptors, etc.
 - d. The owner must have the minimum capability to:
 - 1) Add and delete points.
 - 2) Modify any point parameter.
 - 3) Change, add or delete English language descriptors.
 - 4) Change add or delete engineering units.
 - 5) Change add or delete points in start/stop programs, trend logs, etc.
 - 6) Select analog alarm limits.
 - 7) Characterize each function card to accept different analog inputs, pulsed or steady state digital signals.
 - 8) Adjust analog differentials.
 - 9) Create custom relationships between points. A general-purpose user language shall be provided, such that the user can implement software interlocks, master/slave relationships, and calculations.
 - e. The operator shall be able to modify all points within the data base. This modification shall include adding, deleting and modifying required additional or ranges, engineering units, mode of operation, etc. The addition of a new field point may be totally accomplished from the keyboard once the proper field hardware devices are installed, or the change function may modify existing field hardware to serve a new purpose.
 - f. As points are added to the field, they may be grouped into new system and building displays or they may be substituted for existing points within existing systems or added to existing systems.
 2. Multiple Console Support:
 - a. The automation system software shall support a minimum of six operator consoles. A console shall be defined as at least one input/output device.

- b. Once the hardware terminal devices are installed, the operator shall be able to modify the system software to accommodate the new or reconfigured devices. This modification shall take place while the system is on-line.
 - c. It shall be possible to limit the capabilities of any console on the system.
 - d. It shall be possible to further assign on a per point basis the ability to command, display or alarm a point at a specific console.
 3. Custom Equations and Point Relationships: The system shall provide a comprehensive processor which allows a user (chief engineer, supervisor, etc.) to develop custom operational sequences, unique control algorithms, interactive point relationships, custom calculations, etc. This capability shall use on-line dynamic system data.
 - a. Mathematical and Logical Functions:
 - 1) The processor shall provide as a minimum the following mathematical operators:
 - a) addition, subtraction
 - b) multiplication, division
 - c) square root, exponentials
 - d) linear equations, quadratic equations
 - 2) The processor shall provide as a minimum the following logical operators:
 - a) and, or
 - b) equal to, not equal to
 - c) less than, greater than
 - b. System Inputs: Any of the system connected points such as temperature, pressure, humidity, flow rate, start/stop, status and alarm points shall be valid real time inputs. Also, inputs shall include real time, day of week, date, constants and results of other calculations.
 - c. Result Performance:
 - 1) As a result of evaluating any combination of mathematical or logical functions and dynamic system data, the automation system shall perform as a minimum system changes such as:
 - a) Issuing and off commands
 - b) Increasing/decreasing system set points
 - c) Initiating logs and displays
 - d) Activating/inactivating application programs
 - e) Enabling/disabling alarm functions.
 - d. Processor Implementation:
 - 1) Operator entries to this comprehensive processor shall be through the operator's terminal in an English language format. A step by step interactive prompting routine shall be provided to guide operator entries.
 - 2) Systems requiring binary, hexadecimal, machine language, or coded numeric input shall not be acceptable.
 - e. Applications:

- 1) The following is a brief list of the types of operational sequences, control algorithms, point relationships and custom calculations required by this comprehensive processor:
 - a) If outside air is above 70EF, close OSA dampers.
 - b) If freeze stat is in alarm, start circulating pump.
 - c) Start pump one, wait two minutes, start pump two.
 - d) Display operator instructions on alarm.
 - e) Calculate energy input to monitored equipment.
 - f) Calculate BTU output of boiler.
 - g) Calculate differential temperature.
 - h) Calculate degree days.
 - i) Calculate department energy allocation costs.
- E. Facility Monitoring Functions:
1. Report and Logs:
 - a. An operator shall be able to manually request reports and logs from the console keyboard. The operator shall have the capability to direct any log or report to either a report printer or CRT display.
 - b. It shall be possible for the automation system to automatically initiate logs and reports. These logs and reports shall be initiated on time, date, or day basis, or any combination of time, date or day.
 - c. Each report shall be in English language with information logically grouped in a format that facilitates easy interpretation. Reports and logs shall be attainable on a per point basis or user-defined group of points. Groups of points shall be logically combined without regard to the hardware physical locations. Example:
 - 1) Current value of a discharge temperature in a particular air handler.
 - 2) Current value of all discharge temperatures in a specific building.
 - 3) Current value of all discharge temperatures in a multi-building complex.
 - d. As a minimum, the following report categories shall be provided:
 - 1) Summaries
 - 2) Access Reports
 - 3) Historical Trends
 - 4) Data Base Management Reports
 - 5) Profile Reports
 - 6) System Diagnostic Report
 - 7) Totalization Logs
 - 8) Energy Management
 2. Summaries:
 - a. All Point
 - 1) A summary shall be provided detailing the current values of any and all points associated with the automation system.
 - b. Building or System or Custom Group

- 1) A summary shall be provided detailing the current values of any and all points within a building or system as detailed by the Owner.
 - c. Motor Status
 - 1) A summary shall be provided detailing the current status of any and all motors connected to the system. This summary shall also have the capability of detailing the current values of points associated with any of the system motors.
 - d. Alarm
 - 1) A summary shall be provided to detail the status of any and all the points currently in alarm.
 - e. Alarm Limit
 - 1) A summary shall be provided to detail the operator assigned high and/or low alarm limit for any and all alarmable points on the system.
 - f. CPA Set Point
 - 1) A summary shall be provided detailing the set point for any and all CPA points supported by the system.
 - g. Point Lockout
 - 1) A summary shall be provided of the most recent status of any and all locked out (disabled for alarm reporting) points by the system or operator.
 - h. Message
 - 1) A summary shall be provided detailing the contents of any and all messages within the system.
 - i. Graphics
 - 1) A summary shall be provided detailing the instruction listings for any and all dynamic color graphics.
3. Historical Trend Log: A log shall be provided for each defined trend group which shall include as a minimum; username(s) assigned to that group, time increment in real-time, and associated values per time increment.
 - a. Profile Report
 - 1) Boiler Profile Report
 - b. The automation systems shall include a software program that will provide a boiler profile report (BPR).
 - c. The BPR program shall automatically print a boiler summary report over a day, week or month's time. The boiler profile report shall be capable of reporting the following:
 - 1) Boiler output in BTU's
 - 2) Boiler output in tons of steam
 - 3) Energy input in proper units of fuel
 - 4) Boiler efficiency
 - 5) Hours of operation
 - 6) Heating degree days
 - 7) Energy Cost
 - d. The boiler profile report shall be automatically printed at an operator defined time.

- 1) Chiller Profile Report
- e. The automation system shall include a software program that will provide a chiller profile report (CPR).
- f. The chiller profile report shall be automatically printed at an operator defined time.
4. Totalization Logs
 - a. A log shall be provided including any and all points as defined in the point list. Log shall include username(s) and associated totaled values.
5. Access Reports
 - a. Access Level Assignments
 - 1) A report shall be provided detailing operator access level assignments. This report shall include as a minimum operator's name, password, access level assignment and on-duty initials.
 - b. System Entry
 - 1) A report shall be provided detailing which operator signed on or off the building automation system. The report shall include; operator's name, password, time and date, console number and elapsed time of operator access.
6. Data Base Management Report
 - a. A report shall be provided including a report of the current system data base.
7. System Diagnostic Report
 - a. A report shall be provided detailing any system hardware software errors. This report shall include as a minimum those errors occurring within the central processing unit including disk subsystem.
8. Energy Management Reports
 - a. A report shall be provided for each application program as detailed in the appropriate section of this specification.
9. Alarm Processing
 - a. The automation system shall have the following alarm processing features, all of which shall be owner defined through the input keyboard.
 - 1) Alarm Reporting
 - b. Each alarm as determined by the system shall cause the following information to be logged:
 - 1) Current time, date and initials of on-duty operator.
 - 2) Username assigned to point.
 - 3) Point descriptor.
 - 4) Current value or status.
 - 5) Appropriate engineering units.
 - 6) Alarm designator -nature of alarm - high or low.
 - 7) Operator instructive message.
 - c. The operator message shall be an owner-defined message with a text capability of at least 256 characters per message. These messages shall be generated by the operator while the system is online and fully operational.
 - d. The operator shall have the ability to direct the alarm report and message to any output device on the system.

- e. Any point which goes into alarm and has a graphic display associated with that point shall automatically display that graphic for operator review.
 - f. An operator shall be able to define any alarm as being critical or non-critical.
 - g. All critical alarms shall be displayed in a separate area of the operator's terminal.
 - h. In the event of multiple alarms, all alarms shall be buffered according to priority until displayed or printed.
 - i. All operator acknowledgement of critical alarms shall be logged including time, date, operator's initials and username of point being acknowledged. Alarms shall be acknowledged on a per point basis in the order they reported on the operator's terminal.
10. Analog Limits
- a. Each analog point shall have associated high and low limits. If the measured or calculated value drops below the low limit or exceeds the high limit that point shall be considered in alarm and report as previously defined in alarm reporting.
 - b. Each high and low limit shall have an associated user defined limit differential to prevent nuisance alarms caused from floating about the alarm limit.
 - c. Any analog point shall be disable from alarm reporting if it is associated with a previously defined master point which is turned off.
11. Binary Alarms
- a. Each binary point detected as being in alarm shall report as previously defined in alarm reporting.
 - b. Any binary point shall be disabled from alarm reporting if it is associated with a previously defined master point which is turned off. The operator shall be able to define an adjustable time delay which disables alarm checking during starting and stopping of equipment.
12. Analog/Binary Totalization
- a. The automation system software shall support both analog and binary totalization.
 - b. The operator shall be able to:
 - 1) enable to disable individual points from totalizing.
 - 2) assign upper limits for each point enabled for totalization.
 - 3) reset a totalized value.
13. Display the current value of an individual point, group of points of all system points.
14. Reporting: Any point's current value exceeding its assigned upper limit shall report as a totalized alarm point.
15. Analog Points: It shall be possible to totalize analog values with appropriate engineering units such as kilowatt hours, gallons, pounds, liters, etc.
16. Binary Points: It shall be possible to totalize the accumulated:
- a. Run time in hours or minutes
 - b. Contact status in hours or minutes
(Example: magnetic contact switch indicates a door open for 45 minutes).

- F. History Trending:
1. The system software shall provide the ability to historically trend operator selectable points.
 2. The operator shall be able to assign any system point, analog or binary, real or calculated to a trend group. Trend groups shall consist of a single point or multiple point groups with a capacity of at least 50 points.
 3. Operator assignments shall be through the operator's terminal in simple English language. Points assigned to a trend group shall be the point's English username.
 4. Trended values shall be historically retained on the system disk for future inquiry.
 5. Operator shall be able to request trended values to be retrieved from disk and printed out at operator defined time intervals.
 6. Operator shall be able to define time intervals to one minute resolution.
- G. Preventive Maintenance Work Orders:
1. The system shall provide preventive maintenance instructive work orders which can be displayed manually or automatically.
 2. The operator shall have the capability to create, modify and delete work orders while the system is on-line and fully operational.
 3. Operator entries shall be through the operator's keyboard and all entries shall be in English language.
 4. A report shall be provided to display or log the contents of any and all work orders in the system.
 - a. Capacity:
 - 1) The system shall have the capacity to store on-line a minimum of 750 operator defined work orders.
 - 2) Each work order shall have a capacity of not less than 256 characters.
 - 3) A mechanism shall be provided which allows for lengthy work orders by linking more than one together.
 - b. Display:
 - 1) Work orders shall manually or automatically be displayed on a specified CRT or printed on a specified printer.
 - 2) Manual - The operator shall be able to display or print any and all maintenance work orders by requesting the same.
 - 3) Automatically - The system shall have the capability of displaying or printing maintenance work orders on the following occurrences:
 - a) A designated point exceeding a specified run time limit.
 - b) A specific time, day or date.
 - c) Any combination of time, day and date.
 - d) A designated point having gone into "ALARM".
- H. Powerfail/Automatic System Restart:
1. Power failures affecting the Central Processing Unit (CPU) shall cause the CPU to go into an orderly shut down with no less of memory under any circumstances.
 2. Upon resumption of power to the CPU, the system shall automatically restart the print-out the time and date of the power failure.

3. The restart program shall automatically restart affected field equipment. Restart shall be of a static nature (restart of operator pre-assigned equipment) or an appropriate state restart (places the building equipment in the proper operational state as of the time of return to commercial power.) The nature of the restart program shall be user-definable.
- I. Energy Management Control Functions:
1. The following energy management software shall be provided as a minimum for the purpose of optimizing energy consumption while maintaining occupant comfort.
 2. Time of Day Scheduling:
 - a. A comprehensive program shall be provided to automatically start and stop designated points according to a stored time.
 - b. It shall be possible to individually command a point or group of points. For points assigned to one common load group it shall be possible to assign variable time delays between each successive start or stop command within that group.
 - c. The system shall have the capacity to accommodate a minimum of 500 uniquely defined schedules. Each load group shall be capable of accommodating a minimum of 250 loads.
 - d. The operator shall be able to define the following information:
 - 1) Time, day, dates.
 - 2) Commands such as on, off, auto, etc.
 - 3) Load or loads assigned to groups.
 - 4) Time delays between successive commands.
 - e. There shall be provisions for manual overriding of each schedule by an appropriate operator.
 - f. The following reports shall be provided:
 - 1) Report of any and all defined time schedules.
 - 2) Loads assigned to each time schedule.
 3. Start/Stop Time Optimization:
 - a. The Automation System shall include a software program to perform optimized start-up and shut-down of selected equipment. The SSTO program shall start HVAC equipment at the latest possible time that will still allow the equipment to achieve the desired zone conditions by occupancy time. The SSTO program shall also shutdown HVAC equipment at the earliest possible time before the end of the occupancy period, and still maintain desired comfort conditions. The program shall be self-correcting via stored memory and will not require manual operator updating.
 - b. The SSTO program shall operate in both the heating and cooling seasons. It shall be possible to apply the SSTO program to individual fan systems.
 - c. The SSTO program shall operate on both outside weather conditions as well as inside zone conditions, and empirical factors. The empirical factors shall relate to the dynamic responsiveness of each particular zone such as heat retention and transfer coefficients.

- d. The SSTO program shall meet the local code requirements for minimum outside air while the building is occupied.
 - e. The automation system operator shall be able to, for each zone under control of the SSTO program, establish and modify the following parameters:
 - 1) occupancy period
 - 2) desired occupancy temperature
 - 3) heating/cooling transfer coefficients
 - 4) heating/cooling retention coefficients
 - 5) primary equipment lag time
4. Peak Demand Limiting
- a. The automation system shall include a software program to perform Peak Demand Limiting (PDL). The PDL program shall monitor the rate of electrical power consumption and forecast the total demand during each demand interval. If the predicted demand exceeds a user-defined demand limit, the PDL program shall automatically shed loads to reduce the demand.
 - b. The PDL program shall be able to accommodate a minimum of 32 demand meters. It shall be possible to define a minimum of 32 separate service areas, each of which may have different power company demand interval pulse times.
 - 1) It shall be possible for the operator to set load schedules and demand limits in each service area separately. Each service area shall perform demand prediction and subsequent load shedding and restoring independently.
 - 2) It shall be possible to assign unique scaling factors to each KWH meter to convert pulses to KWH. It shall also be possible to assign a default value factor to each meter should that meter or associated monitoring hardware fail.
 - c. Loads shall be divided into user defined load shed schedules, that include a minimum of four priority levels. All loads in the lowest priority level must be shed in a rotational manner before any load in the next priority level is shed. Each load shall be defined as to its rated power consumption in KW or HP and its maximum off time, minimum off time and minimum on time. These time parameters shall ensure load is not shed or restored too frequently to cause damage to a load.
 - 1) The PDL program shall be designed to accept sliding window metering systems as well as time of day metering. The demand interval length shall be set according to the electric rate schedule.
 - d. The demand shall be predicted each minute, and loads shed as needed. If all sheddable loads are shed by the PDL program and it is forecast that the user-defined demand limit will be exceeded, an alarm message shall be printed.
 - e. The automation system operator shall be able to request the following reports.
 - 1) Meter area load table detailing assigned load parameters such as load name, KW rating, minimum on time, minimum off time, etc.

- 2) Meter report for a meter area detailing name of meter, scaling factor, default failure rating.
 - f. The automation system shall provide the following automatic reports.
 - 1) 24 Hour Energy Summary: This summary will list the demand versus time for each shed set point in the last 24 hours.
 - 2) Monthly Summary Report: This summary list the peak demand occurrences for each meter area for a one-month period.
 - 3) Printed Plot of Actual Demand versus Time: For the previous 24 hours the system shall print a plot for each meter area detailing time, KWH used and set point.
5. Duty Cycle Control:
 - a. The automation system shall include a Duty Cycle Control Program (DCCP). The DCCP shall periodically stop and start loads according to various on/off patterns. The loads shall be cycled such that there is a net reduction in both the electrical demand and the energy consumed.
 - b. The DCCP shall be capable of cycling loads differently at various times throughout the day as well as various schedules from day to day. The DCCP shall be capable of monitoring space temperatures and automatically altering specified duty cycle patterns to maintain comfort limits.
 - c. It shall be possible to designate loads which are supplied power from one electrical feeder. A time delay between successive starts to these loads shall be provided to prevent demand peaks.
 - d. For each load, the operator shall be able to assign:
 - 1) % off time (0% - 100%)
 - 2) Control intervals (15-120 minutes)
 - 3) Maximum off time
 - 4) Minimum off time
 - 5) Time and day load is to be cycled
 - 6) Feeder identifier
 - 7) Time delay between successive starts
 - e. The following reports shall be provided detailing.
 - 1) Loads assigned to DCCP
 - 2) Loads operating parameters
 - 3) Strategy report detailing cycle strategies, time and day strategies are activated.
6. Enthalpy Optimization
 - a. The automation system shall include a software program to perform enthalpy optimization (EO) of air handling units. The EO program shall calculate the enthalpies of both the outside air and the return air, and shall control the mixture of outside air and return air to minimize energy consumption.
 - b. The EO program shall compute enthalpy from the dry bulb temperature and relative humidity of the outside and return air. The program shall use all necessary tables and equations to calculate the proper enthalpies.

- 1) The EO program shall control the mixture of outside air to return air, based on the desired supply air temperatures and the relative outside and return air conditions.
 - c. The automation system operator shall be able to:
 - 1) select whether each air handler is to be controlled by the EO program or the mixed air local loop controller.
 - 2) request a display showing the outside and return air temperatures, humidities, enthalpies and control mode for each air handler under the EO program control.
 - 3) adjust the minimum interval at which the EO program computes enthalpies and optimizes the operation of the air handlers.
- J. Chilled Water Reset and Chiller Plant Optimization
1. The automation system shall include a software program to perform chilled water reset (CWR). The CWR program shall optimize the use of chilled water in either of two ways. The chilled water supply reset shall be based on either maintaining a constant return temperature or supplying sufficient cooling to satisfy zone requirements.
 - a. When the CWR program is based on maintaining a constant chilled water return temperature, the software shall incrementally adjust the supply water set point to achieve the desired space conditions. It shall be possible to individually monitor and control each chilled water loop.
 - b. When the CWR program is based on supplying sufficient cooling to satisfy zone requirements, the software shall incrementally adjust the chilled water set point upwards until at least one zone is requiring additional cooling.
 - c. The system operator shall be able to define, modify and delete the following parameters:
 - 1) loops to be enabled/disabled for CWR
 - 2) high and low reset limits
 - 3) incremental adjustment magnitude
 - 4) sampled time interval
 - d. A log shall be provided detailing each parameter associated with a chilled water reset loop.
 - 1) The purpose of this application program shall be to control the chiller plant in the most efficient way by: Optimizing the selection and loading of chiller sets to match the cooling load.
 - 2) The decision whether to have one or two or more chiller sets on-line shall be optimized by comparing actual chiller plant load and the refrigerant head to a calculated changeover load schedule. The calculated changeover shall be based on the capacity limit or break even efficiency between one or two chillers or two or three chillers, etc., for different load conditions. The Automation Subcontractor shall obtain from the chiller manufacturer partial load characteristics of kw or lbs stm/hr vs load for the design refrigerant head conditions. This information shall be arranged in a kw or lb/hr per ton vs plant load

for each alternate plant line-up such that the program can select the most efficient chiller combination for the current load and head conditions. The chillers that are on-line shall be run in unison for maximum efficiency. Provide all software to monitor the status and operation of the specified chillers, under fully automatic control for chiller loading optimization.

- 3) Program shall monitor the total air conditioning load by measuring the flow rate and supply and return temperatures of the chilled water distribution system and shall reset the chilled water supply temperature to the highest value that will satisfy the load. The program shall raise or lower the chilled water temperature incrementally magnitude and time interval shall be adjustable from the keyboard.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine location where this equipment is to be installed and determine space conditions and notify Architect in writing of conditions detrimental to proper and timely completion of the work.
- B. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install equipment where shown, in accordance with manufacturer's written instructions and with recognized industry practices, to ensure that equipment comply with requirements and serve intended purposes.
- B. Coordinate with other work as necessary to interface installation of equipment with other components.

3.03 SYSTEM TURN-OVER AND SERVICE

- A. System Start-up and Acceptance
 1. Upon completion of the installation, the Automation System Sub-Contractor shall startup the system and perform all necessary testing and debugging operations. An acceptance test in the presence of the Owner's representative, the Architect, and the Engineer shall be performed. When the system performance is deemed satisfactory in whole or in part by these observers, the system parts will be accepted for beneficial use and placed under warranty.
- B. Owner's Instruction
 1. The Automatic System Subcontractor shall provide two copies of an operator's manual describing all operating and routine maintenance service procedures to be used with the system. The Automatic Subcontractor shall instruct the Owner's

designated representatives in these procedures during the start-up and test period. The duration of the instruction period shall be no less than eighty hours. These instructions are to be conducted during normal working hours. The instructions shall consist of both hands-on and classroom training at the job site.

END OF SECTION 23 09 01

SECTION 23 09 93 - CONTROLS AND INSTRUMENTATION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The Control Contractor shall furnish and install a complete Building Automation System including all equipment, accessories, wiring and instrument piping, air compressors, control devices and components required for a complete and functioning system.
- B. All materials and equipment used shall be standard components, regularly manufactured for this and/or other systems and shall not be custom designed especially for this project. All components shall have been thoroughly tested and proven in actual use.
- C. The building control system shall possess a fully modular architecture, permitting expansion through the addition of more stand-alone control units, sensors, actuators, and/or operator terminals.
- D. The equipment, components, and accessories used should be suitable for environment as well as operating condition.
- E. The manufacturer's wiring diagram shall identify and color code all internal and external wires.
- F. Control equipment, valves, panels, and dampers shall bear the manufacturer's name plate.

1.02 RELATED WORK

- A. Work of this section shall comply with the requirements of the Contract Conditions (General and Supplementary), with sections of Division 1 - General Requirements, with the drawings, and all other Contract Documents.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

1.03 REFERENCES

- A. NFPA 70, NFPA 90A - National Fire Protection Association
- B. SMACNA - Low Pressure Duct Work
- C. ASHRAE 15
- D. ANSI B31.1; ANSI B31.5; ANSI B31.9; ANSI C12

1.04 SUBMITTALS

The Contractor shall submit the following to the Architect/Engineers for approval:

- A. Submittals/Drawings
 1. The Control Contractor shall submit prior to installation a set of installation drawings and control strategies for review by the consultant and/or owner's representative. These drawings shall include the physical location of building control system equipment and system architecture. The complete sequence of operation of the control system shall be provided.
 2. Upon completion of the installation and final system adjustment, the Control Contractor shall provide a full set of as-built drawings of the installation and the control strategies.

- B. Manufacturer's Data
 1. Dampers, valves, and operators
 2. Controllers, including complete wiring and connection diagrams
 3. Temperature sensors, including complete wiring and connection diagrams
 4. Temperature and pressure indicators
 5. Switches, relays, transducers, including complete wiring and connection diagrams
 6. Control Panels

1.05 QUALITY ASSURANCE

- A. The Control System Contractor shall provide a list of no less than ten similar projects which have building control systems as specified. These projects must be on-line and functional such that the Owner's representative would observe a direct digital control system in full operation.

- B. The control system shall be installed complete in all respects by competent mechanics, regularly employed by the manufacturer of the control system.

- C. Bids by Wholesalers, Contractors, Franchised Dealers or any firm whose principal business is not that of manufacturing and installing automatic temperature control systems shall not be acceptable.

- D. Single source responsibility of supplier shall be the complete installation and proper operation of the BAS and control system and shall include debugging and calibration of each component in the entire system.

- E. All electronic equipment shall conform to the requirements of FCC regulation Part 15, Section 15, governing radio frequency electromagnetic interference and be so labeled.

- F. All system components are to be designed, built, and installed to be fault tolerant as follows:
 1. Satisfactory operation without damage at 110% above and 85% below rated voltage and at ± 3 hertz variation in line frequency.
 2. Static, transient, and short circuit protection on all inputs and outputs.
 3. Communications lines protected against incorrect wiring, static transients, and induced magnetic interference.

4. All real time clocks and data file RAM shall be battery backed for a minimum of 72 hours in the host, and 8 hours in the SAC panels.
 5. Bus connected devices to be AC coupled or equivalent so that any single device failure will not disrupt or halt bus communication.
- G. All pressure piping, valves, and accessories should be hydraulically/pneumatically tested to 1.5 times the operating pressure.
- H. Performance test should be carried out for all instruments, control equipment, and accessories as required.
- I. Factory performance test results should be submitted with the equipment drawings.

1.06 SYSTEM TURN-OVER AND SERVICE

- A. Upon completion of the installation, the Control System Contractor shall start up the system and perform all necessary testing and run diagnostics to ensure proper operation. An acceptance test in the presence of the Owner's representative, the Architect, and the Engineer shall be performed. When the system performance is deemed satisfactory in whole or in part by these observers, the system parts will be accepted for beneficial use and placed under warranty.
- B. The acceptance test shall consist of verifying the ability of the SAC panels to communicate with each other, communicate with the central system (located in the power plant), verifying calibration of each sensor and/or transmitter, verifying the operation of each control point and verifying the operation of the control algorithms. The contractor shall provide all equipment and support to demonstrate these items.

1.07 TRAINING/OWNER'S INSTRUCTION

- A. The Control System Contractor shall provide two copies of an operator's manual describing all operating and routine maintenance service procedures to be used with the system. The Control Contractor shall instruct the Owner's designated representatives in these procedures during the start-up and test period. The duration of the instruction period shall be no less than 40 hours. These instructions are to be conducted during normal working hours. The instructions shall consist of both hands-on and classroom training at the job site.

1.08 WARRANTY

- A. The building control system, including all hardware, software components and end devices shall be warranted for a period of one (1) year following the date of beneficial use. Any manufacturing defects arising during this period shall be corrected without cost to the owner.

1.09 APPROVED MANUFACTURERS

- A. Distech Controls.

2.01 BUILDING CONTROL SYSTEM

- A. The building control system specified herein shall be a direct digital distributed control system which can, without additional equipment, perform all of the automatic temperature control and energy management functions as required in this Specification. Direct Digital Control shall be defined as a control technique through which the process variable is continuously monitored by a digital computer which accomplishes loop control by calculating a control solution for output to a control device.
- B. The system, as specified, shall independently control the building's HVAC equipment to maintain a comfortable environment in an energy efficient manner. The building operator shall communicate with the system and control the sequence of operation within the building.
- C. System Architecture
 - 1. The building control system shall consist of a network of independent, stand-alone control (SAC) units. Each stand-alone control unit shall be capable of performing all specified control functions in a completely independent manner. Host based systems shall not be acceptable. Control units shall be capable of being networked for single point programming and for the sharing of point information and control instructions between panels. All operator communication with the system shall be via operator terminal provided as specified hereafter. It shall be possible for each control unit to have a dedicated local display or for a collection of control units to share a single operator terminal.
- D. Building Engineers Operators Console
 - 1. The building engineers operator console located in the power plant, shall consist of the following:
 - a. 1 Monochromatic CRT Operators Terminal
 - b. 1 Alarm/Report Printer
 - c. 1 Phone Line Modem
 - 2. CRT Operator's Terminal with Keyboard: The primary man-machine interface for the system shall be a monochromatic Cathode Ray Tube (CRT) terminal operating under software control. All data access, command outputs, alarm annunciation, log request, and system file generation shall be accomplished via the CRT. The terminal shall be a factory assembled unit, complete with 15 inch diagonal screen, a full alpha/numeric keyboard, and a dedicated function key pad. Display capability shall be 24 lines and 80 characters per line with both upper and lower case capability.
 - 3. Printer: A high speed (180 character-per second minimum) wide carriage (132 characters) printer shall be provided for change-of-state and alarm printout. The printer shall be provided with black print and power on/off control via the computer (automatically) or operator (manually). The computer shall automatically turn off

- the printer within 30 seconds after it has completed the printout. The operator shall be able to override the power-off feature when making a request.
4. If an operator begins a request but fails to complete it, the computer shall abort the communication channels between it and the printer within one minute and turn printer power off. Under no conditions will an input device be allowed to stay connected to a communication channel for longer than one minute when neither input nor output occurs.
 5. The ATC contractor shall provide a modem as required for communication with the power plant. The purpose is to provide interconnection with the Building Automation System located in the various buildings of this contract.
 - a. The interconnection, and all required software, interface panels, isolation devices, lightning protection, etc. shall be part of this contract.
- E. Stand-Alone Control (SAC) Unit:
1. Each control unit shall be capable of full operation either as a completely independent unit or as a part of the building-wide control system. All units shall contain the necessary equipment for direct interface to the sensors and actuators connected to it. Provide phone line modem in SAC panel located in main communications closet of each building.
 2. Control strategies shall be owner-definable at each control unit, and for all control units in the system from any one operator terminal. Each control unit shall provide the ability to support its own operator terminal if so desired.
 3. Each stand-alone control unit shall include its own microcomputer controller, power supply, input-output modules, modem (as needed) termination modules, and battery. The battery shall be self-charging and be capable of supporting all memory within the control unit if the commercial power to the unit is interrupted or lost for a minimum of eight (8) hours.
 4. The stand-alone control unit shall be listed by Underwriters Laboratories (UL) against fire and shock hazard as a signal system appliance unit.
- F. Sensors/Input Signals
1. Each stand-alone control unit shall be capable of direct interface to sensors and input devices.
 2. It shall be possible for each stand-alone control unit to monitor the following types of inputs:
 - a. analog inputs
 - 4-20 mA
 - 0-10 vDC
 - thermistors
 - RTD's
 - 3-15 psi
 - b. digital inputs
 - dry contact closure
 - pulse accumulator
- G. Actuators/Output Signals

1. The stand-alone control unit shall directly control pneumatic and electronic actuators and control devices. Each control unit shall be capable of providing the following control outputs:
 - a. digital outputs (contact closure)
 - motor starters, sizes 1 to 4
 - shunt trip panels
 - b. analog outputs
 - 3-15 PSI
 - 4-20 mA
 - 0-16 vDC
- H. Building Control Functions
1. Each Stand-Alone Control Unit within the Building Control System shall perform both temperature control functions, smoke control functions, and energy management routines as defined by these Specifications.
 2. All temperature control functions shall be executed within the stand-alone control unit. Loop control shall be executed via direct digital control algorithms. The user shall be able to customize control strategies and sequences of control and shall be able to define appropriate control loop algorithms and choose the optimum loop parameters for loop control. Control loops shall support any of the following control modes:
 - a. Two-position (on-off, slow-fast, etc.)
 - b. Proportional (P)
 - c. Proportional, plus integral (PI)
 - d. Proportional, integral, plus derivative (PID)
 3. It shall be possible to fully create, modify or remove control algorithms within a specific stand-alone control unit while it is operating and performing other control functions. Input for these changes may be made directly into the stand-alone control unit or via the network from any other control unit. Each control loop shall be fully user definable in terms of:
 - a. sensors/actuators that are part of the control strategy
 - b. control mode
 - c. gain
 - d. control action
 - e. sampling time
 4. In order to minimize wiring and sensor costs, provide stand-alone control units that are able to share point information such that control sequences or control loops executed at one control unit may receive input signals from sensors connected to other stand-alone control units within the network. If the network communication link fails or the other stand-alone control unit malfunctions, the control loop shall continue to function using the last value received from the stand-alone control units. Provide protocol necessary to allow the panel needing the point information to have a local buffer updated periodically. The need to wait on the network shall be avoided. The buffer to be updated by change of value and on time interval, as required.

5. Each stand-alone control unit shall be capable of performing the following energy management routines as a minimum:
 - a. time of day scheduling
 - b. start/stop time optimization
 - c. peak demand limiting
 - d. supply air reset
 - e. event initiated programs
 6. In addition, the owner shall be able to create customized control strategies based upon arithmetic, Boolean or time delay logic. The arithmetic functions shall permit simple relationships between variables (i.e. +, -, -, x) as well as more complex relationships (i.e. square root, exponential).
 7. Each stand-alone control unit shall be capable of performing the following control functions as a minimum:
 - a. discharge air control
 - b. heating and chilled water coil control
 - c. humidity control
 - d. equipment start/stop
 - e. mechanical equipment control
 - f. smoke control functions (as defined in these specifications)
 - g. hot water systems control
 - h. chilled water systems control
 8. The system shall permit the generation of job-specific control strategies that can be activated in any of the following ways:
 - a. continuously
 - b. at a particular time-of-day
 - c. on a predefined date
 - d. when a specific measured or controlled variable reads a selected value or state
 - e. when a piece of equipment has run for a certain period of time
 9. Upon a loss of commercial power to any stand-alone control unit, the other units within the network shall not be affected, and the loss of operation of that unit shall be reported at the designated operator's terminal. All control strategies and energy management routines defined for the stand-alone control unit shall be retained during a power failure via the battery with the unit for a minimum of eight (8) hours. Upon resumption of commercial power, the control unit shall resume full operation without operator intervention. The unit shall also automatically reset its clock such that proper operation of timed sequences is possible without the need for manual reset of the clock.
 10. Should a loss of power exceed memory back-up, the building operator shall be able to manually restore all system programs off of memory storage in the Building Engineers Operators Console.
- I. Operator Interface
1. The building control system shall permit full operator communication including: obtaining information about the performance of his system; allowing the operator to change the system operation; diagnosing the system malfunctions and programming of the system. Operator communication shall be through the black

- and white CRT, hand-held terminal or printer. Any one of these devices shall allow operator communications.
2. The building control system shall permit complete operation of any stand-alone control unit within the network, from any operator terminal within the system.
 3. The network shall be addressable as a whole and shall not require referencing a particular control unit for the commanding or monitoring of points on the network.
- J. User Programmability
1. All temperature control strategies and energy management routines shall be definable by the operator through the operator's terminal. It shall be possible for the operator to program and modify system functions independently after receiving the training from the control contractor as previously specified. The system shall be provided complete with all equipment and documentation necessary to allow a trained operator to independently perform the functions listed below:
 - a. read the value of a measured variable (i.e. temperature)
 - b. start or stop equipment
 - c. monitor the status of equipment being controlled
 - d. read the set point of a control loop
 - e. determine the control strategies that have been defined for a specific piece of equipment
 - f. generate displays of control strategies
 - g. add/delete control loops to the system
 - h. add/delete points to the system
 - i. create, modify or delete control strategies
 - j. assign sensors and/or actuators to a control strategy
 - k. tune control loops through the adjustment of control loop parameters
 - l. enable or disable control strategies
 - m. generate hard copy records of control strategies on a printer
 - n. select points to be alarmable and define the alarm state(s)
- K. Self-Diagnostic and Alarm Reporting
1. Each stand-alone control unit shall contain self-diagnostics that continuously monitor the proper operations of the unit. A malfunction of the unit will be reported and will inform the operator of the nature of the malfunction, and the control unit affected. It shall be possible to annunciate malfunctions as well as other control unit alarms at a selected central operator's terminal.
 2. The system shall also allow on-line diagnosis via telephone modem from a remote location.
- L. Transmission Network
1. The control system shall include a multi-drop digital transmission network that provides the communication link between all the stand-alone control units, and main campus operators console via modem.
 2. The transmission shall be asynchronous and utilize a polled-response method. The system shall utilize a cyclic redundancy check or dual transmission with parity check to ensure signal reliability.

3. The transmission network shall utilize a twisted shielded pair. The transmission speed shall be minimum of 4800 baud and operate in a half-duplex mode.
4. The system shall support multi-drop trunks. Each multi-drop trunk shall support a minimum of 32 Remote Units.
5. Each multi-drop trunk shall have an allowable line length of at least 20,000 feet without signal degradation. All multi-drop trunks shall be interfaced to the system via standard EIA interfaces.
6. Transmission techniques shall allow trunk cable to be installed in conduit with other system signals as well as switched to 120 VAC or 240 VAC.
7. Surge protection shall be provided where the transmission cable enters or leaves a building. Electrical noise suppression shall be provided on all control devices (i.e. relays, transducers, etc.)

M. Sensors

1. All analog sensors shall utilize industry standard 4-20 milli-amp signals to facilitate Owner expansion. Sensors based on proprietary equipment shall not be acceptable.
2. All analog signals shall be converted for digital transmission to the CPU at the function card.
3. All sensing wiring, whether it be analog or digital, input or output, shall be capable of sharing single conduit runs without affecting signal performance. All signal wiring shall also be capable of sharing single conduit runs with switched AC or 120 VAC or 240 VAC.
4. Sensors shall meet the following minimum specifications:
 - a. Room Temperature (RTD Type):

Temperature Monitoring Range.....	+20°/+120°F
Accuracy:	
RTD Element	∓0.5°F
Sensor.....	∓0.7°F
 - b. RTD Duct Sensor (Fan Discharge, and Return Air):

Temperature Monitor Range.....	+20°/120°F
Accuracy:	
RTD Element	∓0.5°F
Sensor.....	∓0.7°F
 - c. RTD Averaging Type Duct Sensor (Mixed Air, Heating, and Cooling Coil):

Temperature Monitoring Range.....	+20°/+120°F
Sensor.....	∓1.1°F
 - d. RTD Immersion Sensor (hot water, chilled water and glycol heating):

Temperature Monitoring Range	
(LTHW)	+20°/+220°F
(MTHW)	+100°/+400°F
Accuracy:	
RTD Element	∓0.5°F
Sensor.....	∓0.9°F
 - e. Outside Air Temperature (RTD):

Temperature Monitor Range.....	-30°/+120°F
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- Accuracy:
 - RTD Element $\nabla 0.5^{\circ}\text{F}$
 - Sensor..... $\nabla 1^{\circ}\text{F}$
- f. Room/Duct/Outside Air Dew Point sensor (High Accuracy) (For Enthalpy Control):
 - Dew Point Monitoring Range $-40^{\circ}/+115^{\circ}\text{FDP}$
 - Accuracy:
 - Dew Point Element $\nabla 1.1^{\circ}\text{FDP}$
 - Sensor..... $\nabla 1.5^{\circ}\text{FDP}$
 - RH% Range 12%-99%
- g. Room Relative Humidity Sensor (High Accuracy):
- h. Humidity Range 0-100%
- i. Accuracy:
 - (Over Full Range of Instrument)..... $\nabla 2\%$
- j. Sensing Element Crystallite Fibre Strain Gage Beam
- k. Companion Transmitter:
 - RFI Susceptibility $\nabla 3\%$ of Scale

2.02 SOFTWARE

- A. The Control System Subcontractor shall provide all software required for efficient operation of all the control system functions required for this Specification. Software shall be modular in design for flexibility in expansion or revision of the system. Software shall be loaded into the system via a compact "floppy" disk from the operator's terminal. The operator's terminal shall also be capable of copying the system software on a "floppy" disk for archival purposes.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine location where controls and equipment are to be installed and determine space conditions and notify Architect in writing of conditions detrimental to proper and timely completion of the work.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's written instructions and with recognized practices, to ensure that equipment complies with requirements and serves intended purposes.
- B. Coordinate with other work as necessary to interface installation of equipment with other components of systems.

- C. All pneumatic piping is to be run concealed in occupied spaces and in other spaces, wherever possible. Where exposed, piping is to be securely fastened at regular intervals, and run in a neat workmanlike manner. Tests on piping are to be made from time to time during the progress of installation to ensure against leaks. No air lines shall be hidden within duct insulation or supported with wire or tape.

3.03 LOCATION AND CONTROL OF COMBINATION FIRE/SMOKE DAMPERS

- A. Provide a normally closed combination fire/smoke damper in each duct crossing a fire or smoke barrier, as indicated on the Drawings, at the point where the duct crosses the barriers and at supply fan discharge. Whenever supply fan stops, smoke damper at the fan discharge shall close. Provide end switch at main after intake and smoke damper and 30 second (adjustable) time delay to prevent supply and exhaust fan start-up until combination dampers have opened, and 20 second time delay to prevent combination dampers from closing until fan stopped. All combination fire/smoke dampers on each floor, shall be connected to EP switches on that floor, which shall close the dampers when the respective air handling system is shut down by Div. 16 fire alarm emergency fan shut-down system. EP switches shall be 3", 3-way air valve, connected to the damper air piping system. EP switch shall be furnished and installed under this Section of the Specifications.

3.04 FAN COIL UNITS

- A. Vertical type fan coils shall be provided with factory mounted electric controls, control valves and pneumatic outside air damper. This contact shall be responsible for the start/stop operation of the fan coil units and the integral outside air dampers.
- B. Division 26 contractor shall wire the power for each coil unit to a shunt trip breaker electrical panel. Fan coils shall be so wired as to provide two zones of start/stop (occupied/unoccupied) control per floor. It shall be this contractor's responsibility to provide control wiring from the respective SAC panel to the shunt trip breaker panels to allow zoned start/stop operation of the fan coil units. This contract to also provide room temperature sensors (one per zone per floor) which shall be used for set up/set back temperature control, of each zone, in the heating mode. Occupied periods shall be set up and un-occupied shall be set back temperatures. If a zone falls out of set back temperature, just that group of fan coils shall be run.
- C. For vertical fan coils with integral p-e switch and electric outside air dampers, and horizontal fan coil units with field installed outside air dampers (where shown on the plan) provide pneumatic piping and signal to control the operation of these dampers. The control signal shall be occupied/unoccupied type such that the dampers shall open when the space is occupied and the fan coils have been started. When the space is unoccupied, the dampers shall be closed. The fan coil units shall be used to provide set back heating during unoccupied periods. If the units are turned on during a setback (unoccupied) heating period the outside air dampers shall remain closed. Outside air damper control signal shall be zoned similarly to the zoned start/stop operation.

- D. Horizontal fan coil units will not be provided with factory mounted controls, with the exception of the 3-way control valve. The fan coil unit manufacturer shall furnish a wall mounted speed selector switch and automatic changeover device which is to be installed and wired by this contract. This contract to provide a duct mounted return air thermostat and automatic summer-winter changeover switch which shall be mounted and wired to operate the electric control valve. Speed switch is to be mounted on the side of the unit, in the hung ceiling space.

3.05 CABINET HEATERS AND UNIT HEATERS

- A. For each unit, a room thermostat set at 70°F (adjustable), shall modulate a control valve and heater fan to maintain its setting. With a drop in temperature the fan shall start, and control valve shall modulate open.
- B. Provide a strap-on aquastat, on the hot water supply to the unit heater to prevent fan operation when the temperature is below 100°F.

3.06 EXHAUST FAN CONTROL

- A. Except where noted below, when the exhaust fan is started by the S.A.C. panel, a normally closed damper in the fan outlet shall open through an e-p relay. When the fan is stopped, the damper shall close. Discharge air dampers shall be provided by this contract, except curb mounted roof fans. Refer to Specifications.
- B. For Mechanical and Elevator Equipment Rooms, provide a room thermostat, set at 80°F., to cycle its respective exhaust fan motor, on a rise in temperature. When the fan starts, its outside air intake damper shall open. For two speed motors, fan shall operate at low speed below 80°F. and at high speed above 80°F.
- C. Exhaust fans for toilet rooms shall be started and stopped whether building is in occupied or un-occupied modes.
- D. Exhaust fans serving classrooms, offices, and corridors shall be started and stopped whether the respective zone (in the building) are in occupied or un-occupied mode. If either of any vertically aligned zones (i.e., 1st floor over basement, or 2nd floor over 1st floor) is scheduled to be occupied while the rest of the zones are un-occupied, then the respective exhaust fans (and companion air handler where applicable) shall be started. The fan coil outside air dampers for the specific occupied zone shall also be opened.

3.07 DIRECT RADIATION

- A. Provide room thermostat where shown on Drawings to control electric radiator to maintain 72°F (adjustable).

3.08 COMPUTER ROOM AC UNITS

- A. All control and interlock wiring to be provided by the HVAC contractor.

3.09 FIELD QUALITY CONTROL

- A. Upon completion of installation of the automatic temperature control system and after motors have been energized with normal power source, test system to demonstrate compliance with requirements.
- B. When possible, field correct malfunctioning controls, then retest to demonstrate compliance. Replace controls which cannot be satisfactorily corrected. Refer to Section "Testing and Balancing".
- C. Checkout of the installation shall be conducted by the Contractor with a representative of the Owner and Architect. The checkout shall consist of verifying the ability of the S.A.C. panels to communicate with the operator's console, verifying calibration of each sensor and/or transmitter, and verifying the operation of each control point.
- D. All software processes shall be thoroughly demonstrated to the Owner's representative and Architect. Alarm conditions shall be simulated for conformance. Analog control points shall be exercised through their entire range. All control interlocks and sequences shall be completely verified. The checkout shall be a thorough and exhaustive review of the installation to assure proper operation of the total system.

3.10 SERVICE

- A. After completion of the control system installation, the control manufacturer shall regulate and adjust all thermostats, control valves, damper motors, etc., and place in complete operating condition, subject to the approval of the Architect.
- B. The Control System contractor shall provide two copies of an operator's manual describing all operating and routine maintenance service procedures to be used with the system. The Control System contractor shall instruct the Owner's designated representatives in these procedures during the start-up and test period. The duration of the instruction period shall be no less than eighty hours. These instructions are to be conducted during normal working hours. The instructions shall consist of both hands-on and classroom training at the job site.

END OF SECTION 23 09 93

SECTION 23 20 00 - PIPING FOR HVAC

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.

1.02 DESCRIPTION OF WORK

- A. The Work includes providing of all labor, materials, equipment, accessories, services and tests necessary to complete and make ready for operation by the Owner, all piping as shown on the Drawings and hereinafter specified.

1.03 QUALITY ASSURANCE

- A. "Manufacturers"-Firms regularly engaged in manufacture of pipe whose products have been in satisfactory use in similar service for not less than ten (10) years.
- B. Provide pipe whose performance, under specified conditions, is certified by the manufacturer.
- C. Piping systems and installation of piping shall comply with ANSI/ASME B31.9, Building Service Piping (B31.1, Power Piping).
Refrigerant piping systems shall comply with ANSI/ASME (B31.5, Refrigeration Piping).
- D. All piping and fittings shall be made in the USA and shall be labeled as such. Piping shall also be labeled with ASTM number for easy identification/verification at the site.

1.04 SUBMITTALS

- A. Refer to Section 01 31 46, "Special Requirements for Mechanical and Electrical Work", and submit shop drawings.

1.05 COORDINATION

- A. Refer to Section 01 31 46, "Special Requirements for Mechanical and Electrical Work".
- B. Furnish fabrication detail drawings for all pipe hangers and supports for piping 2½" inches nominal size and larger.

- C. Furnish hanger and support location drawings for piping 2½" inches nominal size and larger.
- D. Perform calculations necessary for the design and selection of hangers, supports, anchors, guides, restraints, snubbers, and supplementary supporting steel for piping 2½" inches nominal size and larger.
- E. Perform weight distribution, expansion and movement calculations for all piping.
- F. Shop Drawings and Data: Contractor shall prepare the following drawings:
 - 1. Fabrication Detail Shop Drawings: These drawings shall show each pipe hanger or support for piping 2½" inches nominal size and larger and shall include location of hanger with reference to nearest building columns or beams, arrangements and detail of hanger, detail of concrete anchor or detail of welded or bolted attachment to structural steel, bill of materials for all components with ASTM specification numbers and direction and magnitude of movement and thrusts and weight at hanger point. Provide the load at each concrete anchor.
 - 2. Piping Erection Detail and Layout Drawings: Provide scaled detailed piping arrangement drawings showing all piping systems and connected components. Indicate piping in double line detail for all piping 2" and larger. Show piping with insulation thicknesses. Indicate all valves and valve handles, automatic actuators, strainers and access space, reducers, instruments, anchors/guides and supports, seismic components (if applicable) and all equipment to which piping is connected.
 - 3. Hanger and Support Location Shop Drawings: Contractor shall mark all pipe hanger and support locations for piping 2½" inches nominal size and larger on Piping Erection Detail and Layout drawings. Contractor shall also show all structural grids and support points on these drawings.

1.06 WARRANTY

- A. Refer to Section 01 31 46, "Special Requirements for Mechanical and Electrical Work".

PART 2 - PRODUCTS

2.01 PIPE

- A. All pipes shall be new, free from scale or rust, of the material and weight specified under the various services. Each length of pipe shall be properly marked at the mill for proper identification with name or symbol of manufacturer.
- B. All steel piping, except where otherwise rated, shall be standard or extra strong weight, in conformance with the ASTM A-53 Grade B seamless, for piping 2" and larger, as manufactured by National Tube Division, Republic Steel Corp., or approved equal. Piping shall be ASTM A-53 Type F continuous butt weld, for piping less than 2".
- C. High temperature hot water supply and return piping shall be ASTM A-106 Grade B.

- D. All brass piping shall be standard or extra heavy weight 85% red brass semi-annealed seamless-drawn, in conformance with the ASTM B-43, as manufactured by Anaconda, American Brass Co., Chase Brass and Copper Co., or Revere Copper and Brass, Inc.
- E. All copper tubing shall be of weight as required for service specified, with conformance with ASTM B-88 for Types "L" and "K" tubing, as manufactured by Chase, Anaconda, Revere, or approved equal. Tubing and fittings shall be thoroughly cleaned with sand cloth and treated with an approved non-corrosive flux before solder is applied.
- F. All galvanized steel piping shall be standard or extra strong weight, as specified, in conformance with the ASTM A-53 Grade B. Pipe shall be hot-dipped zinc-coated with Prime Western smelter and not wiped.
- G. Generally, unless otherwise specified, joints in steel piping of sizes 2 inches and under shall be screwed, and all sized 2½" inches and over shall be welded or flanged. Brass pipe shall be screwed 2 inches and smaller and flanged 2½" inches and over. Copper tubing shall be silver-soldered or 95-5 solder as herein specified.
- H. Screwed Piping
 - 1. All connections to apparatus with screwed piping shall be made with 250-pound brass seat unions.
 - 2. All screwed nipples shall be Schedule 80 nipples.
- I. Welding Piping
 - 1. All fittings for welded piping shall be as manufactured by Tube Turn, Grinnell, Bonney Forge or equal as approved by the Architect. The fittings shall be of the same weight and material as the piping to which they are attached.
 - 2. For piping 2½" and larger, full size branch connection shall be made with manufactured welding tees, branch connections for less than full size, shall be made with welding tees or with Weldolet forged branch outlet fittings. Fishmouthing, shaped nipples, and stubbing not permitted.
- J. Welding outlet fittings shall be Weldolets as manufactured by Bonney Forge, Inc., or approved equal 2 or 3 and smaller branches shall be made with thredolets as made by Bonney Forge or approved equal.
- K. Weld ells shall have a center line radius not less than diameter of the pipes.
- L. All flanges shall be welding neck flanges ANSI B16.5 ASTM 181 Grade I. All systems, except where otherwise noted - 150 lbs. Class, forged steel.
- M. Instrumentation connections : ½" and smaller on all systems shall be provided by welding threaded 2000# forged steel half couplings to the pipe.
- N. All pipe to be welded shall be cut off clean and beveled. All welding shot shall be removed.

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- O. Composition of welding electrodes shall be in accordance with manufacturer's recommendations.
- P. Backing rings shall be used for all welded piping for high temperature hot water. High temperature hot water piping to be butt welded in sizes 2" and larger, socket welded in sizes 1½" and smaller. Rings shall be carbon steel with knock off spacer pins, for Schedule 40 and/or Schedule 80 pipe dimensions, as manufactured by Tube Turn, Inc. or Robven Backing Ring Co. Smaller branches on high temperature hot water shall be made by using "Weldolets" or approved equal fittings. Ells for high temperature hot water system shall be long radius. All flanges shall be welding neck flanges ASA B16.5 ASTM 181 Grade L,300 lbs. Class, forged steel.
- Q. Pipe welding shall comply with the provisions of the latest revision of the applicable code, whether ASME Boiler and Pressure Vessel Code, ANSI Code for Pressure Piping B31, or such state or local requirements as may supersede codes mentioned above.
- R. Before any pipe welding is performed, submit a copy of the welding procedure specifications together with proof of its qualification as outlined and required by the most recent issue of the code having jurisdiction. Submittal shall comply with ANSI/ASME B31.1/B31.9.
- S. Before any operator shall perform any pipe welding, also submit the operator's qualification record in conformance with provisions of the code having jurisdiction, showing that the operator was tested and certified under the Procedure Specification as before mentioned. Submittal shall comply with ANSI/ASME B31.1/B31.9.
- T. Assume responsibility for the quality of welding done and repair or replace any work not in accordance with these specifications.
- U. In addition, all pipe welding procedures and procedures for qualification of pipe welding operators shall comply with the requirements of the American Welding Society.
- V. Cut weld test plugs at locations selected at random by the Architect. The test plugs shall be tested by the testing agency approved for this project. Failure of the test plugs to meet the standards of the specified codes and agencies shall result in the complete removal and replacement of the joint and retesting of the operator who performed the welding. The removal and replacement of the joints shall be at no additional cost to the Owner.
- W. Pipe Schedule: Pipe for the various services shall be as follows:

Service	Material	Schedule
Reverse Osmosis Steam (to humidifiers)	Type 304L Stainless Steel, Seamless ASTM A-312	40S
Reverse Osmosis Condensate (from humidifiers)	Type 304L Stainless Steel, Seamless ASTM A-312	40S
Reverse Osmosis Water	CPVC, ASTM F441	80
Cold Water	Copper	Type "TP"

Service	Material	Schedule
Chilled Water & Dual Temperature Water	Steel	40 or standard
Refrigerant	Copper Tubing	ACR Type

- X. The Contractor shall have the option to use Type K copper for hot water and chilled water piping up to and including 2", and brazed Type L copper for glycol water piping up to and including 2".

2.02 FITTINGS

- A. Fittings shall be specified under "Fitting Schedule" for various services.
- B. Welding fittings shall be of the same material and schedule as the pipe to which they are welded. Welding elbows shall be long radius pattern unless clearance conditions necessitate the use of standard radius pattern. Welding fittings shall be as made by Tube-Turn.
- C. Fittings shall be of material conforming to the following schedule:
- | | |
|-------------------------|------------------------------------|
| Steel Welding Fittings | ASTM A-106 |
| Forged Steel Fittings | ASTM A-234 |
| Malleable Iron Fittings | ASTM A-197 |
| Ductile Iron Fittings | ASTM A-395 & A-536 |
| Cast-Iron Fittings | ASTM A-126 |
| Brass Fittings | ASTM B-62 |
| Wrought Copper Fittings | ASTM B-75 & B-152 |
| Bronze Cast Fittings | ASTM B-584 |
| Solder Fittings | ASTM B-88 |
| Stainless Steel | ASTM A-403, Grade WP, Class S or W |
- D. All fittings used at expansion loops or bends shall be extra heavy.
- E. Cast-iron, malleable-iron and bronze fittings shall be of Crane manufacturer or approved equal.
- F. Flanges shall be raised face, of the same weight as the fittings in each service category. All flanges shall be drilled to "US Standard" hex nuts and washers. Bolting shall conform to ASTM 193 Grade B-7, threads Class 7 fit. Nuts shall be semi-finished hexagonal, ANSI B18.2 ASTM A194 Grade 2H.
1. Flange Adapters for grooved end pipe shall be ASTM A-395 and A-536 ductile iron, with synthetic rubber gasket. (Grade to suit the intended service.) Flange Adapters shall be CL 150, Victaulic Style 741.
- G. Unions - Unions 2 inches and smaller shall be screwed. Unions 2½" inches and larger shall be flanged. Screwed unions on steel pipe, unless otherwise specified, shall be of malleable iron with bronze ground seats suitable for 300 pounds W.S.P. Screwed unions on copper or brass pipe shall be brass, ground joint suitable for 300 pounds W.S.P.

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Flanged unions shall be malleable iron for steel pipe, and brass for copper or brass pipe, gasket type suitable for 150 pounds W.S.P. If grooved mechanical pipe couplings are used, additional unions are not required. Couplings shall serve as unions. Unions shall be as manufactured by Crane or approved equal.

- H. Brass pipe threads shall be cut with special brass treading dies, and the joints shall be made up with lubricant. Strap wrenches, or equivalent, shall be used in making up brass pipe. Wrenches which gouge or scar the pipe will not be used.
- I. Solder for each solder-type fitting shall be of 95% tin and 5% antimony or silver solder, as specified herein. Refrigerant piping joints shall be made with silver solder.
- J. Unless otherwise specified, all flanged joints shall be fitted with Manville or equal ring gaskets designed for the intended service.
- K. Fitting Schedule: Fittings for the various services shall be as follows:

Service	Size	Material	Weight	Type
Overflow and Drain	ALL	Galv. M.I. Wrought Copper	150# 125#	Screwed Solder
Cold Water	ALL	Bronze Wrought Copper	125# 125#	Brazed Solder
Overflow and Drain	ALL	Wrought Copper	125#	Solder Grooved
Cold Water	ALL	Bronze Wrought Copper	125# 125#	Brazed Solder Grooved
Chilled Water and Dual Temperature Water	2" & Below 2½" & Above	CI Steel DI	125# Sch. 40	Screwed Welding Grooved
Condenser Water	2" & Below 2½" & Above	CI Steel DI	125# Sch. 40	Screwed Welding Grooved
Refrigerant	ALL	Wrought Copper	300#	15% Silver Solder

2.03 PIPE HANGERS AND SUPPORTS

- A. Provide necessary structural members, hangers and supports of approved design to keep piping in proper alignment and prevent transmission of injurious thrusts and vibrations. In all cases where hangers, brackets, etc., are supported from metal decking and/or concrete construction, care shall be taken not to weaken decking and/or concrete or penetrate waterproofing. All hangers and supports shall be capable of screw adjustment after piping is erected. Hangers supporting piping expanding into loops, bends and

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offsets shall be secured to the building structure in such a manner that horizontal adjustment perpendicular to the run of piping supported may be made to accommodate displacement due to expansion. All such hangers shall be finally adjusted, both in the vertical and horizontal direction, when the supported piping is hot, or chilled, as required. Hangers in direct contact with copper or brass pipe shall be solid copper.

- B. Pipe hangers shall be the clevis and pipe roll types, except where otherwise noted.

PIPE HANGER SCHEDULE				
Pipe	Type of Hanger	Make and Model		
		Grinnell Fig. No.	B-Line Fig. No.	Carpenter & Paterson Fig. No.
2" & smaller (steel)	Clevis Hanger	260	B3100	100
2" & smaller (copper)	Adjustable Wrought Iron	CT-65	B3104CT	100 CT
2½" to 4" (steel)	Adjustable Steel Yoke Pipe Roll	181	B3110	140
2½" to 4" (copper)	Adjustable Swivel Ring	CT-69	B3170CT	
5" & above	Two Rod Roller Hanger	171	B3114	142

- C. Beam clamps - Hangers supported from floor steel shall be approved I beam clamps. I beam clamps for hangers shall be wrought steel. B-Line Fig. B3055 (C&P Fig. m 268) or equal.
- D. Where piping is run near the floor and not hung from the ceiling construction but is supported from the floor, such supports shall be of pipe standards with base flange and adjustable top yoke similar to B-Line Fig. B3091 (C&P Fig. 247) or equal.
- E. All vertical piping shall be anchored by means of heavy steel clamps securely bolted or welded to the piping, and with end extension bearing on the building.
- F. All vertical piping shall be guided at each floor by use of clamps fastened to building structure. Provide 360° protective saddle at guides. Saddles shall be fastened to pipe or insulation.
- G. Vertical runs of pipe not over 15 feet long shall be supported by hangers placed not over one foot from the elbows on the connecting horizontal runs.
- H. Vertical runs of pipe over 15 feet long but not over 60 feet long and not over 6 inches in size, or not over 30 feet long and not over 12 inches in size, shall be supported on heavy steel clamps. Clamps shall be bolted tightly around the pipes and shall reset securely on the building structure without blocking. Clamps shall be welded to the pipes or placed below couplings. Clamps shall be B-Line Fig. B3373 or equal.

- I. For all chilled water, dual temperature water, makeup water and insulated refrigerant piping, provide "Insulshield" as made by Insulcoustic Corp. or pipe covering protection shield B-Line Fig. B3151 (C&P Fig. 265P) with steel shield min. 9 inches long, with vapor barrier jacket. For steam, condensate, hot fuel oil and hot-water heating piping 2 inches and smaller, same as above. For steam, condensate and hot-water heating and high temperature hot water piping 2½ inches and larger, provide steel pipe covering protection saddles B-Line Fig. B3160 (C&P Fig. 353 series).
- J. Piping in trenches shall reset or hang from angle iron cross supports provided by the Contractor with two coatings of red primer and final coat for black asphaltum paint.
- K. Hanger rods shall be of the following diameters:

Pipe Size	Rod Diameter	Max. Spacing
1¼ inch & below	¾ inch	6'-0"
1½" and 2 inch	¾ inch	10'-0" (copper 8'-0")
2½ inch 3 inch	½ inch	10'-0" (copper 8'-0")
4 inch 5 inch	⅝ inch	12'-0"
6 inch	¾ inch	12'-0"
8 inch & above	⅞ inch	12'-0"

- L. Hanger rods shall be attached to preset concrete inserts with steel reinforcing rod through the insert and both ends hooked over the reinforcing mesh. For pipes 4 inches and larger, rods shall extend through concrete slab above where they shall be attached to steel bearing plates 6" x 6" x ¼".
- M. All trapeze pipe supports shall be constructed of angle iron or C-channel. Uni-strut type supports are prohibited for use on HVAC piping, except insulated refrigerant piping may be supported using strut type supports as long as AP Armaflex insulation is used and the strut clamp is a Series 72 Klo-Shure by Hydra-Zorb which is intentionally oversized to match the O.D. of the insulation and includes a plastic clamp collar insert. All angle iron supports located outdoors (trapeze supports or vertical components) shall be of galvanized or stainless steel, including all related support rods and hardware.
- N. Piping shall not be hung from other piping, ducts, conduits or from equipment of other trades and no vertical expansion shields will be permitted. Hanger rods shall not pierce ducts.
- O. All water piping connected to rotating equipment within all mechanical spaces shall be isolated from the building structure by means of vibration hangers inserted in the hanger rods. The vibration hangers shall consist of a steel spring in combination with a double deflection neoprene element within a rectangular steel housing. Combined static deflection shall be 1.375" minimum. Hangers shall have capability of supporting the

piping at a fixed elevation during installation and shall incorporate an adjusting device to transfer the load to the spring. Deflection shall be indicated by means of scale. Vibration hangers shall be type PCDNHS made by Mason Industries. Provide flexible pipe connectors at all pump suction and discharge piping.

- P. All steam and condensate piping within all mechanical spaces shall be isolated from the building structure by means of vibration hangers inserted in the hanger rods. The vibration hangers shall consist of a steel spring in combination with a double deflection neoprene element within a rectangular steel housing. Minimum static deflection shall be 1.375". Vibration hangers shall be Vibratol type HESL with options 2 and 4 as made by B-Line Systems, Inc. (Type PCDNHS as made by Mason Industries.)
- Q. Where additional steel is required for the support of hangers, furnish and install same subject to the approval of the Architect. Piping and ductwork shall not be supported from concrete slab construction at ceiling.
- R. All piping running on walls shall be supported by means of hanger suspended from heavy angle iron wall brackets. No wall hooks will be permitted.
- S. Lateral bracing of horizontal pipe shall be provided where required to prevent side sway or vibration. The lateral bracing shall be of a type approved by the Architect and shall be installed where directed by the Architect.
- T. All heavy piping is defined as follows:
1. individual pipes having a nom. dia. greater than 12 inches.
 2. groups of pipes consisting of more than three 8 inches, or more than two 10-inch nom. 1 dia. pipes,
 3. Any combination of closely spaced pipes weighing more than the equivalent of above or 15 lb. per lin. ft., shall be supported at all cross points with overhead floor beams by fastening to the flange of such beams with steel clamps or other suitable means.
- U. Where such heavy piping runs parallel with the floor beams properly designed auxiliary steel must be provided. The spacing of such auxiliary steel supports shall in no case be greater than the spacing of the floor beams running perpendicular to the corrugations of the permanent slab steel forms.
- V. Assume the responsibility for the proper transfer of the loads of the piping systems to the structure. No additional cost to the Owner should be expected for any corrective work during construction.
- W. Rigid type grooved mechanical couplings shall be complete with reverse-angle bolt pads to meet support and hanging requirements corresponding to ANSI B31.1, B31.9, and NFPA 13.

2.04 ANCHORS

- A. All anchors shall be separate and independent of all hangers, guides, and supports. Anchors shall be of heavy blacksmith construction suitable in every way for the work approved by the Architect. Anchors shall be welded to the pipe and fastened to the structure with bolts.
- B. Anchors shall be fabricated and assembled in such a form as to secure the piping in a fixed position. They shall permit the line to take up its expansion and contraction freely in opposite directions away from the anchored points; and shall be so arranged as to be structurally suitable for particular location, and line loading. Submit calculations and details for approval.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Contractor shall examine location where the piping is to be installed and determine space conditions and notify Architect in writing of conditions detrimental to proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Coordinate with other work as necessary to interface installation of piping with other components of systems.
- B. Provide and erect in a workmanlike manner, according to the best practices of the trade, all piping shown on the Drawings or required to complete the installation intended by these Specifications.
- C. The Drawings indicate schematically the size and location of piping. Piping shall be set up and down and offset to meet field conditions and to provide adequate maintenance room and headroom in the Mechanical Rooms.
- D. Study the General Construction Specifications and Plans, of the exact dimension of finished work and of the height of finished ceilings in all rooms where radiation, units, equipment or pipes are to be placed and arrange the work in accordance with the Schedule of Interior Finishes, as indicated on the Architectural Drawings.
- E. All piping shall be run perpendicular and/or parallel to floors, interior walls, etc. Piping and valves shall be grouped neatly and shall be run so as to avoid reducing headroom or passage clearance. Provide min. 7'-6" headroom under passageway in Mechanical Equipment Room. All valves, controls and accessories concealed in furred spaces and requiring access for operation and maintenance shall be arranged to assure the use of a minimum number of access doors.

- F. All pipe lines made with screwed fittings must be provided with sufficient number of flanges or unions to enable the removal of piping without breakage of fittings.
- G. All piping shall be erected as to insure a perfect and noiseless circulation throughout the system. No bull head tees will be permitted.
- H. All valves and specialties shall be placed so as to permit easy operation and access.
- I. Provide proper provision for expansion and contraction in all portions of pipe work, to prevent undue strains on piping or apparatus connected therewith. Provide signed and sealed pipe expansion calculations by an independent, licensed NYS Professional Engineer to substantiate all such provisions for said expansion and contraction. These calculations shall be based on the piping shop drawings. Provide double swings at riser transfers and other offsets wherever possible, to take up expansion. Arrange riser branches to take up motion of riser.
- J. Approved bolted, gasketed, flanges (screwed or welded) shall be installed at all apparatus and appurtenances, and wherever else required to permit easy connection and disconnection. Screwed unions shall be used on piping 2" or less.
- K. All piping connections to coils and equipment shall be made with offsets provided with screwed or welded bolted flanges arranged so that the equipment can be serviced or removed without dismantling the piping.
- L. If, after plant is in operation, any coils or other apparatus are stratified or air bound (by vacuum or pressure), they shall be repiped with new approved and necessary fittings, air vents, or vacuum breakers at no extra cost. If connections are concealed in furring, floors, or ceilings, the Contractor shall bear all expenses of tearing up and refinishing construction and finish, leaving same in as good condition as before it was disturbed.
- M. Fittings shall be of the eccentric reducing type, where changes of size occur in horizontal piping to provide for proper drainage or venting. Steel pipe bends shall be made of the very best grade open hearth, low carbon steel, leaving a smooth uniform exterior and interior surface. Pipe bends shall be made with seamless steel pipe, having a minimum radius of not less than five (5) pipe diameters.
- N. Tubing shall be erected neatly in a workmanlike manner. Bends in soft copper tubing benders to prevent deformation of the tubing in the bends. Approved seat-to-pipe threaded adapters shall be provided for junctions with valves and other equipment having threaded connections.
- O. Vertical sections of main risers shall be constructed of pipe lengths welded together. No couplings shall be used.
- P. The ends of all pipe and nipples shall be thoroughly reamed to the full inside diameter of the pipe and all burrs formed in the cutting of the pipes shall be removed.

- Q. Piping shall be installed in accordance with the latest edition of the ASME Code for Pressure Piping.
- R. All piping shall be concealed above furred ceilings in rooms where such ceilings are provided (except where specifically indicated otherwise on the drawings, or in walls or partitions, except as otherwise indicated).
- S. Piping, fittings or valves of dissimilar materials shall be connected with dielectric connectors as made by Ebco Company or approved equal.
- T. Piping at all equipment and valves shall be supported to prevent strains or distortions in the connected equipment and valves. Piping shall be sufficiently supported to allow for removal of equipment, valves and accessories with a minimum of dismantling and without causing excessive stress or damage to the remaining piping, valves or equipment, without requiring additional supports after these items are removed.
- U. Pipe nipples - Any piece of pipe 3" in length and less shall be considered a nipple. All nipples with unthreaded portion 1½" and less shall be extra heavy. Only shoulder nipples shall be used. No close nipples will be permitted.
- V. Screw threads shall be cut clean and true; screw joints made tight without caulking. No caulking will be permitted. A non-hardening lubricant shall be used. No bushings shall be used. Reductions, otherwise causing objectionable water or air pockets, to be made with eccentric reducers or eccentric fittings.
- W. Pitch steam and condensate lines downward one inch per 40 feet in direction of flow to ensure adequate flow and prevent noise and water hammer. Steam and return run outs to risers and to elements shall pitch ½" inch per foot. At low points of steam lines provide traps adequately sized to collect condensate. Mains shall be dripped at least every 100 feet of run. All supply mains shall be dripped and trapped on any vertical lift, except where otherwise noted. Provide capped dirt pockets at all traps, riser heels, and wherever dirt and scale may accumulate to meet job conditions, mains shall set up (with drip connections to return line) to maintain headroom, clear other pipes, etc. Steam mains are to be installed as high as possible. System is to be arranged to secure venting of air to the return line at all low points in steam mains, without permitting ingress of air. In any case, where return or drip piping, to meet job conditions, may have to set down under stoops, doors, etc., and again rise after passing these, the sets shall be made up with 45-degree fittings and with Y-laterals at each end, with brass plugs to permit easy cleaning of trapped portions of pipe. At any points where return mains have to rise again, after being depressed, provide also approved overhead "air lines" (not smaller than ¾" in size) with adjusting valves, and connect with two high sides. Any turns in water sealed lines shall be made with crosses, with brass plugs in unused outlets to facilitate cleaning. All apparatus subject to high temperature differentials and high steam demand loads such as heating coils, domestic hot water heaters and steam-water converters, shall have a vacuum breaker.

- X. Pitch water piping upward one inch per 100 feet in direction of flow to ensure adequate flow without air binding, and to prevent noise and water hammer. Pitch drain piping 5/8 inch per foot in the direction of flow. Branch connections to mains are to be made in such a manner as to prevent air trapping and permit free passage of air. To meet job conditions, mains shall set up to maintain headroom, and clear other trades. Provide oversized float operated automatic air vent (with valve). Avoid 90-degree lift set-ups in supply lines by using 45 degree ells. Where 90-degree lifts exceed 1½" install automatic air vent in supply lines. All lifts in return lines shall be installed with automatic air vents. Pipe outlet of all automatic air vents to an open sight drain if the vent is concealed, or to within two feet of the floor within machine rooms. All water piping shall pitch back to low points for drainage. Low points shall be provided with capped ¾ inch hose cocks.
- Y. Provide drain valves at the heel of all interior main water risers. Provide capped drain valves at the heel of all perimeter water risers.
- Z. Provide isolation valves where tying new piping into the existing system. Refer to the valves specifications for the proper valve type for the service. Refer to the Drawings for the pipe/valve size. In addition to the isolation valves at the tie-in points, also provide a balancing valve on the supply side for chilled water, chilled glycol/brine, condenser water and heating/reheat hot water system tie-ins.
- AA. Miscellaneous drains, vents, reliefs, and overflows from tanks, equipment, piping, relief valves, pumps, etc., shall be run to the nearest open sight drain or roof drain. Provide capped drain valves whenever required for complete drainage of piping, including the system side of all pumps.
- BB. Provide domestic water connections from valved outlets to any equipment requiring same.
- CC. All drain piping from condensate drain pans shall be properly trapped in accordance with the static pressures involved. Provide cleanout at first change in direction or before the trap. Condensate drain piping sizes shall be not less than 1½" except that fan coil unit drains may be 1".
- DD. Vent piping from the high temperature hot water system shall comply with all requirements of high temperature hot water piping specified hereinbefore. This shall also apply for the high temperature water safety valve discharge piping.
- EE. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove.
- FF. Contractor shall utilize a Smog-Hog (or similar) type local exhaust system vented to the outdoors, when welding steel pipe and/or soldering pipe inside the building.

3.03 FIELD QUALITY CONTROL

- A. Upon completion of installation of piping (partial or complete) test piping to demonstrate compliance with requirements. Where possible, field correct malfunctioning piping, then retest to demonstrate compliance. Replace piping which cannot be satisfactorily corrected. Refer to Section 23 05 93 - Testing and Balancing.

END OF SECTION 23 20 00

SECTION 23 21 23 - PUMPS FOR HVAC

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.

1.02 DESCRIPTION OF WORK

- A. The Work includes providing of all labor, materials, equipment, accessories, services and tests necessary to complete and make ready for operation by the Owner, all pumps as shown and scheduled on the Drawings and hereinafter specified.

1.03 QUALITY ASSURANCE

- A. Manufacturing firms regularly engaged in manufacture of this equipment with characteristics and capacities required, whose products have been in satisfactory use in similar service for not less than ten (10) years.
- B. Provide product produced by the manufacturers, which are listed in Section 23 05 12 "Approved Manufacturer's List".
- C. Provide equipment whose performance, under specified conditions, is certified by the manufacturer.

1.04 SUBMITTALS

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work and submit shop drawings.

1.05 COORDINATION

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

1.06 GUARANTEE

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

2.01 IN-LINE PUMPS

- A. Furnish and install in-line pumps where shown on the plans and as specified.
- B. The pumps shall be of the horizontal, oil-lubricated type, specifically designed and guaranteed for quiet operation. Suitable for 125# working pressure.
- C. The pumps shall have a ground and polished steel shaft with a hardened integral thrust collar. The shaft shall be supported by two horizontal sleeve bearings designed to circulate oil. The pumps are to be equipped with a watertight seal to prevent leakage. The motor shall be non-overloading at any point on pump curve. Impellers shall be of bronze construction.
- D. The motor shall be of the open, drip-proof, sleeve-bearing, quiet-operating, rubber-mounted construction.
- E. Motor efficiencies must meet or exceed that specified in Section 01 31 46.
- F. All pumps in VFD application must have flexible couplings and inverter-duty motors.

2.02 HORIZONTAL SPLIT CASE PUMPS

- A. The casing shall be cast iron, double suction, horizontally split. Pumps shall be assembled on heavy duty fabricated structural steel base plates, which bases must include drip rim with tapped drain connections which shall be piped to nearest floor drain. It shall incorporate replaceable bronze casing rings locked in place and protected against rotation by two monel pins; a vent in the highest point in the casing and a drain in the lowest point; standard 125# ANSI suction and discharge flanges. Impellers shall be bronze, double suction, enclosed type and cast in one piece, hydraulically and statically balanced, keyed to the shaft. Impeller and casing castings shall be clean and show no visual signs of non-homogeneity. Pumps shall have capacities as scheduled on the Drawings. Pumps shall be selected to operate at or near their point of peak efficiency thus allowing for operation at capacities of approximately 25% beyond design capacity. In addition, the design impeller diameter shall be selected so that the design capacity of each pump (GPM and TDH) shall not exceed 90% of the capacity obtainable with maximum impeller diameter at the design speed for that model. Efficiency and unit design BHP shall be quoted and guaranteed. Maximum head shall occur at and only at the no-flow condition. Stuffing box housing be deep enough to allow for a single John Crane type (1) mechanical seal. Each pump shall be flexibly coupled to a motor, Class B insulation, DP enclosure. Shaft shall be stainless steel. Bearings shall be single row, ball type and oil lubricated. Maximum BHP shall not exceed nominal motor nameplate rating.

In all cases, motor sizes shall be selected to be completely non-overloading over the entire performance range of the particular pump involved. A flexible coupling with

coupling guard shall be used. Provide John Crane cyclone separator to ensure clean water flushing of the seal faces.

- B. Pumps shall have replaceable case wear rings.
- C. Seals to be capable to withstand system condition for water temperature and chemical treatment content as hereinafter specified under "Water Treatment".
- D. Casings shall be provided with suitable steel lifting lugs.
- E. Pump shall be drawn down slightly on foundation bolt nuts. Provide a form or dam around the contour of the bed plate. Pour grout through holes, provided for this purpose, in sufficient quantity to reach a level of : " to 1" above the bottom of the bed plate. Allow grouting to set thoroughly then proceed with pipe connection.
- F. Provide OSHA rated steel coupling guard.
- G. Motor efficiencies must meet or exceed that specified in Section 01 31 46.
- H. All pumps in VFD applications must have flexible couplings and inverter-duty motors.

2.03 END SUCTION PUMPS

- A. The casing and suction head of the pump shall be of cast iron material and end suction, vertical split type. Casing and suction head shall be equipped with 125# ANSI flanges. Pumps shall be assembled on heavy duty fabricated structural steel base plates, which bases must include drip rim with tapped drain connections, which shall be piped to nearest floor drain. The impeller shall be of the enclosed type and shall be bronze. The impeller shall be statically and hydraulically balanced and keyed to the shaft. Efficiency and unit maximum BHP shall be quoted and guaranteed. Maximum head shall occur at and only at the no flow condition. The shaft shall be of steel material and removable shaft and shall be stainless steel. Bearings shall be single row, ball type and oil lubricated.
- B. Pumps shall have replaceable case wear rings.
- C. Stuffing box housing shall be deep enough to allow for a single John Crane type (1) mechanical seal. Each pump shall be flexibly coupled to a motor, Class B, DP enclosure. A flexible coupling with coupling guard shall be used. Except where otherwise noted, bearings shall be grease lubricated. Seals to be capable to withstand system condition for water temperature chemical treatment content as hereinafter specified under "Water Treatment". Provide John Crane cyclone separator to ensure clear water flushing of the seal faces.
- D. Pumps shall have capacities as scheduled on the Drawings. Pumps shall be selected to operate at or near their point of peak efficiency thus allowing for operation at capacities of approximately 25% beyond design capacity. In addition, the design impeller diameter shall be selected so that the design capacity of each pump (GPM and TDH) shall not

exceed 90% of the capacity obtainable with maximum impeller diameter at the design speed for that model or as approved.

- E. Casings shall be provided with suitable steel lifting lugs.
- F. Pump shall be drawn down slightly on the foundation bolt nuts. Provide a form or dam around the contour of the bed plate. Pour grout through holes, provided for this purpose, in sufficient quantity to reach a level of 1/2" to 1" above the bottom of the bed plate. Allow grouting to set thoroughly, then proceed with pipe connections.
- G. Provide OSHA rated steel coupling guard.
- H. Motor efficiencies must meet or exceed that specified in Section 01 31 46.
- I. All pumps in VFD applications must have flexible couplings and inverter-duty motors.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Contractor shall examine location where pumps are to be installed and determine space conditions and notify Architect in writing of conditions detrimental to proper and timely completion of the work.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install equipment where shown, in accordance with manufacturer's written instructions, and with recognized industry practices, to ensure that equipment comply with requirements and serve intended purposes.
- B. Add concrete under structural members of pump base and grout around the base as required by manufacturer's written instruction.
- C. Coordinate with other work as necessary to interfere installation of equipment with other components of systems.
- D. Install all pumps with a minimum of five (5) pipe diameters of straight pipe upstream of pump suction connections or provide a suction diffuser. If the suction diffuser is provided, it must contain an integral strainer and the Y-strainer required on the suction piping to the pump shall be omitted.
- E. For any pump which, through balancing, the Contractor is not capable of achieving the design flow and pressure, impeller trimming, a new impeller and/or a new motor shall be provided at no additional cost. If a new motor is provided of larger horsepower, then any required electrical work shall also be included at no additional cost. If necessary,

larger motor starters, VFDs or disconnects shall be provided along with any larger conduits, wire sizes or fuses.

3.03 FIELD QUALITY CONTROL

- A. Upon completion of installation of equipment and after motor has been energized with normal power source, test equipment to demonstrate compliance with requirement. When possible, field correct malfunctioning units, then retest to demonstrate compliance. Replace units which cannot be satisfactory corrected. Refer to Section 23 05 93 - Test and Balancing.
- B. All pump casings shall be hydrostatically tested at 1 ½ times design working pressure. The pump manufacturer shall be responsible for his service department aligning in the field prior to start-up of all flexibly coupled units. Alignment shall be with dial indicator with accuracy of plus or minus .002 inches. The pump manufacturer must submit a written report certifying that the alignment work had been performed by his personnel and that the pumps are ready for operation.

END OF SECTION 23 21 23

SECTION 23 25 00 - WATER TREATMENT AND CLEANING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.

1.02 DESCRIPTION OF WORK

- A. The work includes the providing of all labor, materials, equipment, accessories, services and tests necessary to complete and make ready for operation by the Owner, all water treatment and cleaning as shown on the drawings and hereinafter specified.
- B. The Contractor shall engage the services of a water treatment contractor who shall provide a complete water treatment service. The service shall include furnishing and application of all chemicals, at least one visit a month to collect samples for chemical analysis at the water treatment company's laboratory, and all necessary inspection, adjustment, and maintenance of the chemical treating devices. Complete chemical control of the treatment shall be included. Reports shall be furnished to Architect after each visit.
- C. Water treatment shall be applied concurrently with the operation of each circulating water system for a period of one year. An initial dose of treatment chemical shall also be applied immediately after each system is initially filled with water if operation is to be delayed after filling.
- D. In addition to the chemicals indicated, slimicides and algaecides shall be provided as necessary. Chromate and phosphate will not be acceptable. All chemicals shall be approved by local and state agencies having jurisdiction for discharge to the sewer system.
- E. The firm's water treatment laboratory shall be equipped to analyze water in accordance with the statement methods of the American Public Health Association.

1.03 QUALITY ASSURANCE

- A. Firms regularly engaged in manufacture of this material with characteristics and capacities required, whose products have been in satisfactory use in similar service for not less than 10 years.

- B. Provide product produced by the manufacturers, which are listed in Section 23 05 12, "Approved Manufacturer's List".
- C. Provide equipment whose performance, under specified conditions, is certified by the manufacturer.

1.04 SUBMITTALS

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work and submit shop drawings.
- B. Submit documentation of acceptability of chemicals for discharge to the sewer system.

1.05 COORDINATION

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

1.06 GUARANTEE

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

PART 2 - PRODUCTS

2.01 CHEMICAL TREATMENT CLOSED CHILLED AND HOT WATER SYSTEMS

- A. Provide a Nitrite based material to maintain the following conditions in each closed water system.

	<u>Hot Water</u> (180EF. max.)	<u>Chilled Water</u>	<u>Hot Water</u> (250EF. max)
pH	7.5 - 9.0	7.5 - 9.0	7.5 - 9.0
Nitrite as NO ₂	1500 - 2000	300 - 400 ppm	300 - 400 ppm

2.02 WATER TREATMENT CONTROL TESTING EQUIPMENT

- A. Provide a test set complete with apparatus and chemical reagents for the determination of phosphonate (ortho), ph (7.6 - 9.2), nitrite and any additional test as required by water treatment company.

2.03 CLEANING OF PIPING SYSTEMS

- A. Preliminary Cleaning:
 - 1. Clean new piping internally by flushing prior to the application of pressure tests and before the chemical cleanout procedures specified herein. Provide temporary strainers at the inlet to the chilled water and hot water pumps before the start of cleaning procedures.

2. Block off and isolate circulating pumps, cooling coils, heating coils and steam traps during the preliminary flushing and draining process.
3. Thoroughly flush piping clear of foreign matter with City water under pressure, and then drain before proceeding with pressure testing. Blow down accumulations of grit, dirt and sediment at each strainer and each low point in the piping systems.
4. Clear compressed air piping of foreign matter by progressively blowing compressed air through the piping.
5. Provide bypass flush valves and required piping to permit full circulation of water during the washout of the piping systems. Close shutoff and balancing valves on branch piping to the terminal equipment units during the washout operation to prevent water circulation through the automatic control valves.

2.04 INTERNAL TREATING OF PIPING

- A. This work shall include the internal protective coating of all distribution systems on this construction such as, but not limited to, steam piping, hot water heating and cooling, chilled water and condenser water systems and components.
- B. This method of treating is to be applied to all piping supply and return and then back to the source of equipment.
- C. The Contractor shall clean the piping for the purpose of removing lime, oil, grease, oxides and other wastes therefrom. After the removal of these impurities, a protective coating shall be applied to all inner surfaces, which will inhibit oxidation as well as protect the metals against impurities that may be present in the water. This coating shall be guaranteed for five years from date of completion at no cost to the Owner, covering labor and materials. Valve-off heat exchangers to avoid coating surfaces.
- D. The treating materials use for this purpose must have been in use successfully for at least five years in comparable systems.
- E. It shall be compounded of non-corrosive, non-toxic, non-alkaline and non-injurious ingredients that have been investigated and reported as a "Neutral Compound" by a recognized engineering firm or laboratory, other than the submitting company's own laboratory. Brochures and unbiased test reports shall be submitted to the Architects within 90 days from job acceptance for approval. This treating firm shall show proof, that said firm has been established and accepted for this work, for a minimum of 10 years. The ingredients used shall have no deleterious effects on seals, O-rings, glands, packing, etc.
- F. It shall be the sole responsibility of the approved firm for the application of this process. He shall supply all labor, materials, and equipment for this purpose. A competent supervisor and/or equipment operator shall be kept at the site from commencement of his work until completion. None but experienced men shall provide treating of piping. Any repairs or servicing of components of these systems shall be done by the Contractor.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Contractor shall examine location where this equipment is to be installed and determine space conditions and notify architect in writing of conditions detrimental to proper and timely completion of the work.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. NOT USED

3.03 FIELD QUALITY CONTROL

- A. Upon completion of installation of equipment, and after motors have been energized with normal power source, test equipment to demonstrate compliance with requirements. When possible, field correct malfunctioning units, then retest to demonstrate compliance. Replace units which cannot be satisfactorily corrected.

END OF SECTION 23 25 00

SECTION 23 31 13 - SHEET METAL DUCTWORK

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical work shall apply.

1.02 DESCRIPTION OF WORK

- A. The work includes the providing of all labor, materials, equipment, accessories, services and tests necessary to complete and make ready for operation by the Owner, all Sheet Metal Ductwork as shown on the drawings and hereinafter specified.

1.03 QUALITY ASSURANCE

- A. Fabrication and installation shall be by a single firm specializing and experience in metal ductwork for not less than 10 years.
- B. Comply with SMACNA's (Sheet Metal and Air Conditioning Contractors National Association) 2005 HVAC Duct Construction Standards, Metal and Flexible, Third Edition recommendations for fabrication, construction and details and installation procedures, except as otherwise indicated.
- C. Comply with ASHRAE (American Society of Heating Refrigeration and Air Conditioning Engineers) recommendations, except as otherwise indicated.
- D. Compliance to SMACNA and ASHRAE is a minimum requirement. In case of disagreement between sheet metal work described in this Section and SMACNA or ASHRAE, the specification shall govern.

1.04 SUBMITTALS

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical work and submit shop drawings and coordinate drawings.
- B. Before submitting any sheet metal drawings, submit a complete set of shop standards for review and approval. Sheet metal shop drawings may be submitted only after approval of the shop standards.

1.05 COORDINATION

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical work.

1.06 GUARANTEE

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical work.
- B. Contractor will guarantee all work for one year from the date of acceptance against all defect in material, equipment and workmanship. This guarantee shall include repair of damage to any part of the premises resulting from leaks or other defects in material, equipment or workmanship.

1.07 PRODUCT HANDLING

- A. Protect shop fabricated ductwork, accessories and purchased products from damage during shipping, storage and handling. Protect ends of ductwork and prevent dirt and moisture from entering ducts and fittings.
- B. Where possible, store ductwork inside and protect from weather. Where necessary to store outside, store above grade and enclosed with waterproof wrapping.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR DUCTWORK

- A. Furnish and install the size, connections and run of ducts as indicated on the drawings.
- B. While the Drawings shall be adhered to as closely as possible, the Architect's right is reserved to vary the run and size of ducts during the progress of the work if required to meet structural conditions.
- C. Install all ductwork in strict adherence to the ceiling height schedule indicated on the Architect's Drawings. Consult with the Plumbing, Fire Protection and Electrical Contractors and, in conjunction with the above Contractors, establish the necessary space requirements for each trade.
- D. The sheet metal ductwork shall, whether indicated or not, rise and/or drop and/or change in shape to clear any and all conduits, lighting fixtures, piping and equipment to maintain the desired ceiling heights and to provide adequate maintenance room and headroom in mechanical equipment rooms.
- E. The ductwork shall be continuous, with airtight joints and seams presenting a smooth surface on the inside and neatly finished on the outside. Ducts shall be constructed with curves and bends so as to affect an easy flow of air. Unless otherwise shown on the Drawings, the inside radius of all curves and bends shall be not less than width of ducts in plane of bend.
- F. All rectangular ductwork, unless otherwise noted, shall be built from galvanized sheet steel and thoroughly braced and stiffened.
 - 1. Provide 18" x 18" access doors for every 30'-0" run of supply and return air duct for cleaning purposes. For ducts whose height or width is less than 20", provide

access doors which are 18" wide by a height calculated as 2" less than the height of the duct (thereby providing 1" of clearance between the bottom of the access door and the bottom of the duct, and similar for the top).

- G. All outside air intake and boiler room combustion air ducts and plenums between intake point and air handling unit or mixed air duct or plenum, for at least 10 feet of duct length, shall be aluminum construction with all joints sealed with Foster 32-19, Childers CP-146 or 3M EC-800 sealer.
- H. All air ducts exposed to the weather and not insulated shall be constructed of aluminum or stainless steel and shall be properly braced and supported and secured to the building construction. All seams shall be sealed with Foster 32-19, Childers CP-146 or 3M EC-800 sealer.
 - 1. The construction of ductwork shall be same as conventional ductwork except where transverse reinforcing angles not required, provide 1" x 1" x 1/8" black iron bracing angles matched angles at joint and 1" x 1" x 1/8" black iron between joints 4'-0" from joints.
 - 2. Provide 1/8" thick gasket (3M EC-1202 or equal) for all matched angles.
 - 3. Edge of ducts shall be bent 1/2" over matched angles to obtain watertight seal.
 - 4. Rivet angles to duct and seal with Foster 32-19, Childers CP-146 or 3M EC-800 sealer.
 - 5. Paint black iron angles after installation.

2.02 DUCT PENETRATION THRU FLOOR

- A. Provide 4" high and 4" wide concrete curb all around opening at duct penetration thru floors. Fill in space between duct and floor construction with mineral wool.

2.03 DRAIN PANS

- A. Drain pans for cooling coils shall be aluminum or stainless steel with welded seams and joints and shall be rigidly braced with stiffening angles.
- B. Each coil section composing the coil bank of a built-up unit shall have an individual drain pan extending 9" on both sides of the coil with a minimum 2" vertical lip downstream of the coil. The top edge of the lip shall be turned backward. The pans shall be connected with piping tube to permit drainage to the bottom drain pan. Pans shall be pitched to the drain. As an alternate to aluminum, 14 gauge stainless steel, all welded, may be used.
- C. Provide insulation under drain pans for cooling coils, consisting of 2" thick rigid insulation.

NOTE: CHOOSE ONE

2.04 DRIP PANS

- A. Provide aluminum drip pans and gutters under all equipment subject to leaks mounted above electrical equipment. Each drip pan shall be properly pitched and a drain outlet

provided and piped to drain. See "Drip Pans" under Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

2.05 AUXILIARY AND SECONDARY DRAINS

- A. A secondary/auxiliary drain pan shall be provided below air handling and fan coil units providing cooling which are suspended above a hung ceiling or hung from the slab or building structure above with no hung ceiling.
- B. Requirement for secondary/auxiliary drain pans shall not apply to units hung in mechanical equipment rooms.
- C. The secondary/auxiliary drain pan shall comply with the following:
 - 1. Shall have a separate drain line from the primary drain pan in the unit
 - 2. The drain line shall be piped to the nearest floor drain or slop sink, if not, specifically routed and shown on the drawings
 - 3. Drain pan shall have a minimum depth of 1.5 inches and shall be not less than 3 inches larger than the unit or coil dimension width and length
 - 4. Pan shall be galvanized steel minimum thickness 0.0276 inches

2.06 INSTALLATION OF HVAC DEVICES

- A. Installation of Duct Smoke Detectors: Duct smoke detectors shall be furnished by the Electrical Contractor and shall be installed in the ductwork under this Section. Provide an access door to each smoke detector.
- B. Installation of Dampers: Refer to Drawings and temperature control specification for smoke dampers and other automatic dampers and install them in ductwork.

2.07 DUCT FABRICATION

- A. Ducts shall be neatly finished on the outside with all sharp edges removed.
- B. Inside surfaces shall be smooth with no projections into the air stream except where otherwise indicated.
- C. Longitudinal joints shall be Pittsburgh lock at corners or Acme lock on flat surfaces double seams hammered tight and shall be located above the horizontal axis of the duct. A snap lock seam shall not be permitted as a substitute for the Pittsburgh lock at corners of ducts.
- D. Transverse joints shall be made airtight with all laps in the directions of air flow.
- E. All fasteners and attachments shall be made of the same material as the ducts.
- F. Furnish test wells 12" on the center horizontally and vertically in the suction and discharge duct of each fan. Test wells shall consist of a 1" x 3/4", 125 lb., bronze, screwed hex bushing, secured to the duct with a bronze hex locknut on the inside of the duct. A 3/4" x 2" long standard weight bronze, screwed nipple and cap shall be fitted to the housing

on the outside of the duct. Test wells shall be No. 699 as made by Ventlok or approved equal.

- G. All turns in ductwork shall be accomplished using radius elbows rather than square elbows. Square elbows will only be permitted in instances where the Contractor, through depiction on their sheet metal shop drawings, proves that only a square elbow may be installed due to such limited space availability. All radius elbows shall have a minimum centerline radius of 12 times the width of the duct.
- H. All square elbows shall have factory-designed and built single thick turning vanes. Shop fabricated vanes will not be approved. Where turning vanes are in conflict with the access doors to fire dampers, they shall be made movable so that fire dampers shall be accessible.
- I. Dissimilar metals shall be connected with flanged joints made up with fiber or neoprene gaskets to prevent contact between dissimilar metals. Flanges shall be fastened with bolts protected by ferrules and washers made of the same materials as the gaskets. Where an aluminum duct is to be connected to a galvanized steel duct, the end of the galvanized steel duct shall be coated with heavy black asphaltum paint before connecting it to the aluminum duct.
- J. Changes in shape and dimension shall conform to the following: Except where otherwise noted, for increases in cross-sectional area, the shape of the transformation shall not exceed 1" in 7". Except where otherwise noted, for reductions in area, the slope shall not be less than 1" in 4" but 1" in 7" preferred.
- K. Wherever it may be necessary to make provisions for vertical hangers of the ceiling construction passing through ducts, provide streamlined shaped sleeves around such ceiling construction hangers as to fully protect the duct from being penetrated with holes for the passage of such hangers. Any such streamlined sleeves shall be made airtight at top and bottom of ducts. In no case shall there be more than two rods in any 9 sq. ft. area. No rods shall pierce ducts smaller than 12" in horizontal area.
- L. Ductwork shall be constructed in accordance with the latest version of the SMACNA Duct Construction Standards for both rectangular and round duct. The duct Pressure Class for each duct system shall be determined from the maximum possible (shut-off) static pressure achievable by the supply, return or exhaust fans, and in no instance shall the minimum pressure class be lower than 1" WC. The Sheet Metal Subcontractor shall obtain the associated fan curves from the Mechanical Contractor in order to confirm the maximum static (shutoff) pressure of the fan(s). This pressure class shall extend from the air handlers to the first automatic damper (including fire dampers, smoke dampers and combination fire/smoke dampers). For VAV systems, the pressure class of the ductwork between the first automatic damper and the VAV or CV boxes shall be equal to the external static pressure (ESP) rating of the fan.
- M. Seal Class: All ductwork shall be sealed to SMACNA Seal Class A, with no exceptions.
- N. Ductwork Testing:

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PROJECT #C1536

1. The intent is to test all ductwork and all ducted systems. All ductwork shall be tested in accordance with SMACNA Procedures, including SMACNA Duct Performance Test Standard m DPTS-1995 and the latest editions of the SMACNA HVAC Duct Construction Standards and the SMACNA HVAC Air Duct Leakage Test Manual.
 2. Additional requirements for all ductwork:
 - a. The testing of all joints for air leakage after erection and the repair of any leaks are positive requirements. Leakage must be kept to a specified minimum. The test for air leakage is divided into two phases; namely, testing of individual vertical risers and testing of all branches. Provide all required instruments.
 - b. All risers, branches and runouts shall be tested after installation before insulation is applied and before the air mixing units are installed. The total allowable leakage for the entire system shall be tested, measured and proven to be in accordance with Table 4-1, Applicable Leakage Classes, of the SMACNA HVAC Air Duct Leakage Test Manual; joints, seams and all wall penetrations shall meet Leakage Class 6 for rectangular ducts and Leakage Class 3 for round ducts.
 - c. Equipment necessary for performing this test shall include a rotary hand blower calibrated orifice section and a "U" tube gauge board complete with cocks and rubber tubing. The test hookup, as well as details for the fabrication of the orifice section shall be in accordance with the recommendation of the "High Velocity Duct Manual" of Sheetmetal and Air Conditioning Contractors National Association, Inc.
- O. The construction for low pressure rectangular sheet metal ducts shall be made in accordance with recommendations of ASHRAE Guide, Latest Edition, or as per SMACNA Manual but not less than the following weights and construction:

LOW PRESSURE - RECTANGULAR DUCTWORK				
Dimension Longest Side Inches	Sheet Metal Gauge All Four Sides			Transverse Reinforcing at Joints and Between Joints
	Steel Gauge	Aluminum Thickness In.	Copper Oz. Per Sq. Ft.	
Up thru 12	26	0.020	16	1" pocket lock 24 gauge, standing seam joint 24 gauge, 1" standing S slip 24 gauge. Joint max. on 8 ft. centers.
13 thru 18	24	0.025	24	Same as for up thru 12.
19 thru 30	24	0.025	24	1" pocket lock 22 gauge. Joints max, on 8 ft. centers with 1 x 1 x c in. angles 4 feet from joint.
31 thru 42	22	0.032	32	Same as for 19 thru 30.

LOW PRESSURE - RECTANGULAR DUCTWORK				
Dimension Longest Side Inches	Sheet Metal Gauge All Four Sides			Transverse Reinforcing at Joints and Between Joints
	Steel Gauge	Aluminum Thickness In.	Copper Oz. Per Sq. Ft.	
43 thru 54	22	0.032	32	1" standing S slip 22 gauge with 1½" x 1½" x ⅛ in. angles, 1½" standing seam joint, 1½" pocket lock 22 gauge. Joints on 8 ft. centers with 1½" x 1½" x ⅛ in. angles max. 4 feet from joint.
55 thru 60	20	0.040	36	Same as for 43 thru 54.
61 thru 84	20	0.040	36	1" standing S slip gauge with 1½" x 1½" x ⅛ in. angles, 1½" standing seam joint, with 1½" x 1½" x ⅛ in. angles, 1½" in. pocket lock 22 gauge with 1½" x 1½" x ⅛ in. angles. Joints max. on 8 ft. centers with 1½" x 1½" x ⅛ in. angles max on 2 ft. centers.
85 thru 96	18	0.050	48	Same as for 61 thru 84 except all angles shall be 1½" x 1½" x 3/16 in.
over 96	18	0.050	48	Same as for 61 thru 84 except all angles shall be 2 x 2 x ¼ in.

1. Flat areas of duct over 18 in. wide shall be stiffened by cross breaking or beading.
2. All joints to have corner closures.
3. All joints (longitudinal and transverse) shall be sealed with Foster 32-19, Childers CP-146 or 3M EC-800 mastic or equal UL181A approved mastic, to provide sealing equivalent to SMACNA Seal Class A.

P. The construction for low pressure round sheet metal ducts and fittings shall be as follows:

Girth Reinforcing			
Duct Diameter Inches	Steel-Galv Sheet Gage	Minimum Reinforcing Angle Size & Maximum Longitudinal Spacing	Girth Joints (Continuously Welded or as Below)
Up thru 8	26	None required	Crimped and beaded joint
9 thru 13	26	None required	Crimped and beaded joint
14 thru 22	24	None required	Crimped and beaded joint
23 thru 36	22	None required	--
37 thru 50	20	1¼ x 1¼ x ⅛ @ 72 in.	--
51 thru 60	18	1¼ x 1¼ x ⅛ @ 72 in.	--

Girth Reinforcing			
Duct Diameter Inches	Steel-Galv Sheet Gage	Minimum Reinforcing Angle Size & Maximum Longitudinal Spacing	Girth Joints (Continuously Welded or as Below)
61 thru 84	16	1½x 1½ x ¼ @ 72 in.	--

NOTE: Flanged joints may be considered as girth reinforcing.

1. Ductwork up to 36 in. diameter shall be spiral lockseam construction and it shall be assembled with prefabricated fittings made up of 20 gauge galvanized iron.
2. All joints (longitudinal and transverse) shall be sealed tight with EC-800 to provide sealing equivalent to SMACNA Seal Class A. Joints shall, in addition, be fastened with self-tapping screws.

2.08 DAMPERS

- A. At each main branch take-off and in such other locations where required to properly balance the system, provide volume dampers of the opposed blade, multi-louvered type, which shall be operated by indicating locable quadrants and set screws, for adjusting the system.
- B. Volume dampers shall be constructed as follows: Damper blades shall not be wider than 12", shall be complete with heavy angle iron frames, connecting and operating links, brass trunnions, and bronze bearings. Dampers, unless otherwise noted, shall be fabricated with not less than No. 16 gauge sheet steel. Blades shall overlap and shall be provided with continuous stops on all four sides of dampers to prevent leakage. Blades shall be galvanized. Blades of dampers shall be set into a flat steel frame with frame securely bolted to the duct. All dampers shall be fitted with a hexagonal brass spindle which shall extend through the exterior of duct and be fitted with an indicating self-locking regulator. Regulator shall be similar to Ventlok 641 or approved equal. All hardware shall be Ventlok or approved equal. For insulated ductwork provide No. 644 self-locking regulator as made by Ventlok or approved equal.
- C. All automatic dampers shall be furnished as a part of the automatic temperature control system by the automatic temperature control manufacturer. Install dampers and provide safing in ductwork for automatic dampers smaller than duct size.
- D. For stainless steel and aluminum ductwork, provide dampers of same material as ductwork.
- E. All dampers shall be made accessible from building construction. Access doors in building structure shall be furnished or provided as herein before specified.

2.09 SMOKE DAMPERS

- A. Smoke dampers shall be classified and labeled in accordance with UL 555S, "Standard for Leakage Rated Dampers for Use in Smoke Control System." Smoke dampers shall be of UL 555 S leakage class I, 4 CFM/Ft² at 1" w.g.; 8 CFM/Ft² at 4" w.g.

- B. Smoke dampers installed at smoke barriers shall be installed no more than 2 ft. from the barrier and between any branch takeoff or duct inlet and outlets and the smoke barrier.
- C. Smoke dampers shall be automatically return to closed position in the event of loss of electricity. All wiring required to interconnect the dampers with fire detection, fire alarm and fire alarm supervisory control systems shall be provided under the Division 26 of the Specification. Pneumatic control system for damper actuators shall be provided under Section 23 09 00, as specified hereinafter. All combination fire/smoke dampers and smoke dampers shall be provided with 120 VAC actuators. Power wiring for all combination fire/smoke dampers and all smoke dampers shall be through the fire alarm system control relay and through a BAS relay and control module. The Electrical Contractor shall provide all such wiring; the ATC Sub-Contractor shall provide a BAS relay which must be installed for each combination fire/smoke damper and each smoke damper. If the air handling system is shut down, all associated combination fire/smoke dampers and all smoke dampers shall close. The fire alarm relay shall, if necessary, override the BAS relay. Each damper shall be individually powered and controlled.
- D. Smoke dampers shall be constructed as described above for dampers.
- E. Damper actuators shall be as specified in Section 23 09 00.
- F. For fire/smoke dampers, provide two (2) damper end switches that are blade actuated to signal the fire alarm system when dampers are in the open and closed position. For smoke and fire/smoke dampers which can isolate a fan from its distribution ductwork or as otherwise required by the Sequence of Operation, provide an additional end switch which shall be wired to the fan starter (VFD) control wiring to prevent the fan from operating unless the damper is open.
- G. Apply a bead of sealant between damper and sleeve and between dampers for multiple damper assemblies, as defined below for combination smoke and fire dampers.

2.10 FIRE DAMPERS

- A. Fire dampers and sleeve installation shall be in accordance with NFPA-90A recommendations and shall bear U.L. Label in compliance with U.L. 555.
- B. Clearly indicate fire damper location on shop drawings. Provide access doors in the ducts and supply access doors or panels at building construction at each damper of sufficient size and type to permit inspection and replacement of linkage. Assume responsibility to coordinate all locations of duct access doors with the other Contractors to conform with whatever architectural access openings may be necessary and supply access doors or panels in building construction. Provide shop drawings indicating location of access panels or doors for Architect's approval.
- C. It is the intention of these plans and specifications to be complete. However, it is the responsibility of the Contractor, as being completely cognizant of local regulations, to determine where fire dampers are required and to advise the Architect prior to construction as to any discrepancies or questions in the plans or specifications.

- D. Fire dampers shall be enclosed in sleeve of fourteen gage metal. Sleeve shall be secured at both sides of fire partitions with 1½ x 1½ x 14 ga. mounting angles secured to sleeves only: retaining angles must lap structural opening 1" minimum and cover corners of opening. Provide duct breakaway connections, see detail on drawings. Breakaway connections shall be located within 6 inches of the fire wall on both sides of the fire wall.
- E. Dampers shall be steel plate, mounted to turn freely, in steel plate frame inserted in duct. Dampers shall be proportioned and weighted to close at once, if released from link with spring catches to hold closed, until manually reset. Dampers and frames to have suitable standard fusible-links, normally holding them open, but releasing upon contact with fire. Damper blades shall be mounted on corrosion resisting bearings. Damper shall close by gravity, moving with the air stream to full closed position against one-eighth (1/8) inch angle stop. Steel spring catch shall hold damper closed. Radius arm on shaft shall show position of damper. Submit details for approval.
- F. Fire dampers shall be as per approved manufacturer list Section 23 05 12.
- G. Damper shall be fully out of the air stream (type B) U.O.I.
- H. In stainless steel and aluminum ductwork, provide stainless steel construction fire dampers.

2.11 COMBINATION SMOKE AND FIRE DAMPERS

- A. In lieu installing separate fire and smoke dampers in fire walls with a rating of two hours or less, a combination fire/smoke damper can be installed. Fire walls with a rating exceeding two hours must use separate fire and smoke dampers.
- B. Combination fire/smoke dampers shall be as per approved manufacturer list Section 23 05 12.
- C. Combination fire/smoke dampers shall be installed in sleeves in accordance with NFPA-90A, UL555 and manufacturer's installation instructions. Dampers shall be UL rated, UL555S, leakage class II, 4 CFM/Ft² at 1-inch w.g.; 8 CFM/Ft² at 4" w.g., and UL555 1½ hour fire rated. Each damper shall bear a UL label attesting to these qualifications, in accordance with established UL labeling procedure.
- D. Damper manufacturer shall have tested and qualified with UL, a complete range of damper sizes covering all combination smoke and fire dampers required for this project.
- E. Damper actuators shall be electric as specified in Section 23 09 00. Damper actuators shall be installed by the damper manufacturer at the time of damper fabrication; damper and actuator shall be supplied as a single entity which meets all applicable UL555S qualifications for both dampers and operators. Damper and actuator shall be qualified under UL555S and UL555 to an elevated temperature of 250 deg. F.
- F. Each combination fire/smoke damper shall be equipped with a fusible link which shall melt at 165° F causing the damper to close and lock in the closed position.

- G. Dampers shall automatically return to closed position in the event of loss of control air or electric power.
- H. Each combination fire/smoke damper shall have a factory installed sleeve of length and gauge required for satisfactory installation and with the damper actuator factory installed on the exterior of the sleeve and properly linked to the damper operating shaft. Contractor shall coordinate space requirements where dampers are located, providing required service clearance for actuators.
- I. All wiring required to interconnect the dampers with fire detection, fire alarm and fire alarm supervisory control systems shall be provided under the Division 26 of the Specification. Pneumatic control system for damper actuators shall be provided under Section 23 09 00, as specified hereinafter. All combination fire/smoke dampers and all smoke dampers shall be provided with 120 VAC actuators. Power wiring for all combination fire/smoke dampers and all smoke dampers shall be through the fire alarm system control relay and through a BAS relay and control module. The Electrical Contractor shall provide all such wiring; the ATC Sub-Contractor shall provide a BAS relay which must be installed for each combination fire/smoke damper and each smoke damper. If the air handling system is shut down, all associated combination fire/smoke dampers and all smoke dampers shall close. The fire alarm relay shall, if necessary, override the BAS relay. Each damper shall be individually powered and controlled.
- J. For fire/smoke dampers, provide two (2) damper end switches that are blade actuated to signal the fire alarm system when dampers are in the open and closed position. For smoke and fire/smoke dampers which can isolate a fan from its distribution ductwork or as otherwise required by the Sequence of Operation, provide an additional end switch which shall be wired to the fan starter (VFD) control wiring to prevent the fan from operating unless the damper is open.
- K. Clearly indicate fire damper location on shop drawings. Provide access doors in the duct and supply access doors for installation at building construction, at each damper, of sufficient type to permit inspection and replacement of damper actuators and linkage. Assume responsibility to coordinate all locations of access doors with other contractors. Provide shop drawings indicating locations of access doors, both duct and building construction, for Architect's approval.
- L. It is the intention of these plans and specifications to be complete. However, it is the responsibility of the Contractor, as being completely cognizant of local regulations, to determine where combination fire/smoke dampers are required and to advise the Architect prior to construction as to any discrepancies or questions in the plans or specifications.
- M. Combination fire/smoke dampers shall be enclosed in a sleeve of fourteen-gauge metal set and grouted into the fire partition. The sleeve shall be secured on both sides of the fire partition with 1½ x 1½ x 14 gauge mounting angles secured to the sleeves only. Retaining angles must lap structural opening 1 inch minimum and cover corners of the opening.

- N. Multiple damper assemblies shall be installed and fastened together per manufacturers instructions. Unless the manufacturer's instructions indicate otherwise multiple damper assemblies shall be fastened together with ¼"-20 bolts, No. 10 screws or ½" long welds staggered intermittently on both sides. Fasteners shall be spaced 6" on center and a maximum of 2" from the ends of the joining sections or from the corner. A continuous ⅛" bead of Dow-Corning 100% silicon rubber, Dow-Corning Selastic 732 or GE RTV 108 sealant shall be applied on the mullion joint. Press the surface of the sealant in place to dispel any air.
- O. A bead of sealant, as described above, shall be applied between the damper and the sleeve.
- P. Fire/smoke dampers shall be provided with end switches (Ruskin SP100 or equal) for status indication.
- Q. In stainless steel and aluminum ductwork, provide stainless steel construction combination fire/smoke dampers.

2.12 ACCESS DOORS IN SHEET METAL WORK

- A. Wherever necessary in ductwork, casings or sheet metal partitions, provide suitable access doors and frames to permit inspections, operation and maintenance of all valves, coils, humidifiers, controls, smoke dampers, smoke detectors, fire dampers, filters, bearings, traps, or other apparatus concealed behind the sheet metal work. All such doors shall be of double construction of not less than No. 20 gauge sheet metal and shall have sponge rubber gaskets around their entire perimeter. Doors in insulated ducts of insulated casings shall have rigid insulation between the metal panels.
- B. All access doors in sheet metal ducts shall be hung on heavy flat hinges and shall be secured in the closed position by means of cast zinc clinching type latches. Where space conditions preclude hinges, use four heavy window type latches. Doors into ducts shall in general not be smaller than 24" x 24" except for access door to fire dampers which will depend on size of fire damper.
- C. In no case shall access to any items of equipment requiring inspection, adjustment, or servicing require the removal of nuts, bolts, screws, wing nuts, wedges, or any other screwed or loose device.
- D. Each sheet metal chamber or plenum shall have access doors for access to all parts of the system (outside air intake, exhaust and return air). Doors shall be fitted with cast zinc door latches, two per door. Latches shall be operable from both sides of casing. Hinges shall be extra heavy, zinc plated hinges, minimum of two per door. The doors shall be felted or provided with rubber gaskets so as to make them airtight. The doors shall be made with inner and outer shells 2 inches apart so that they may be properly insulated and properly operated. Doors shall be a minimum size of 20" x 48".
- E. Hinges shall be Ventlok No. 150 or 260 with or without screw holes or approved equal. Latch for walk-in access doors shall be No. 260 as made by Ventlok Co. or approved equal. Latch for access door in ductwork shall be Ventlok No. 100 or approved equal.

- F. Where reheat coils are installed in ductwork, provide two (2) access doors; one on the upstream side of the coil and one on the downstream side of the coil, both within 2'-0" of the coil.
- G. Access doors at humidifier locations shall be provided on both sides of duct.
- H. Provide access doors of adequate size to allow easy access to the equipment that will require maintenance. Provide insulated or acoustically lined doors to prevent condensation where applicable.
- I. Manufacturer to provide an installed neoprene gasket around perimeter of access door for airtight seal.
- J. Systems 3" w.g. or less shall utilize a hinged, cam, or hinged & cam square-framed access door.

2.13 FLEXIBLE CONNECTIONS

- A. All fan and air supply unit connections, both at inlet and discharge shall be made with material as hereinafter specified, so as to prohibit the transfer of vibration from fans to ductwork connecting thereto.
- B. The flexible connections shall be a minimum of 6" long including bands using extra wide fabric as specified and held in place with heavy metal bands, securely attached, to prevent any leakage at the connection points.
- C. Flexible connections shall be fabricated from the following materials unless otherwise required by Local Authorities.
 - 1. Low Pressure Systems - neoprene coated glass fabric - 30 ounce/sq. yd.
 - 2. Medium & High Pressure Systems - neoprene coated glass fabric - 30 ounce/sq. yd.
- D. Flexible connections shall not be painted.
- E. Flexible air connectors shall be listed and labeled to the requirements of UL 181 for class 0 or class 1 flexible air connectors and shall be so identified.

2.14 AIR INTAKE AND DISCHARGES

- A. Air intake and discharge louvers and screens in the facade of the building shall be furnished and installed under another contract.
- B. Air intake and exhaust louvers where indicated on Contract Drawings shall be furnished and installed in this Contract. Such louvers shall be minimum 14 gauge aluminum with maximum blade length between mullions of 4'-0". Provide weathertight joints between louver frames and masonry openings by means of flashing and/or caulking. Provide 2" mesh heavy aluminum wire bird screens. Provide drain pipe at duct plenum connection to louvers - plenum bottom and 6" up each side, joints and seams to be sealed with Foster 32-19, Childers CP-146 or 3M EC-800, bottom pitches to drain connection, drain to be

trapped. Inside of outside air intake plenums to be painted with two (2) coats of black asphaltum paint.

- C. Louvers shall be drainable blade type having water penetration less than 0.005 oz. per Ft.² at 1,000 FPM free area velocity.

2.15 GRILLES, REGISTERS AND DIFFUSERS

- A. Furnish and install where shown on the drawings all metal diffusers, grilles and registers of the sizes and capacities indicated.
- B. Ceiling diffusers shall be selected to diffuse the air uniformly throughout the occupied space. The air shall be introduced at a temperature differential of 20 deg. F and shall be diffused at the five (5) foot level to a velocity of not greater than 50 FPM and a temperature differential of not greater than 2 deg. F when compared with mean room temperature. The sound power level of air distribution equipment devices shall not exceed ratings as shown by Anemostat Corp. data.
- C. Equipment manufacturer shall submit engineering data in a manner to facilitate convenient review of the following factors:
 - 1. Aspiration ability, including temperature and velocity traverses, throw and drop of each unit, noise criteria ratings for each unit, sizes, free area and quality of construction.
- D. All air distribution equipment shall be as manufactured by Anemostat Corp., or approved, as scheduled on plans.
- E. All ceiling diffusers shall be furnished with an equalizing grid.
- F. Location of ceiling diffusers and registers shown on the drawings are approximate. Coordinate with the acoustic tile ceiling Sub-Contractor for exact locations of ceiling diffusers and registers. They shall be in accordance with approved ceiling layout shop drawings.
- G. Return grilles shall match return registers as shown on the drawings.
- H. All registers, grilles and diffusers shall be coated with baked aluminum enamel, baked flat white (W-1), or baked gloss white (W-4) as supplied by Anemostat Corp. unless otherwise indicated. All supply registers and grilles shall have a ¼" sponge rubber gasket around the grille frame.
- I. All grilles, registers and diffusers shall be provided without an integral shut-off damper.
- J. Exceptions to foregoing types of grilles, registers and diffusers shall be as indicated on the plans.
- K. Each air supply outlet shall have the required capacity and shall be guaranteed to give the required draft with draftless diffusion. Where manufacturer's recommendations require

duct sizes differing from those on the drawings, the same shall be provided at no additional cost to the Owner.

- L. All registers and grilles located at face of partitions or plaster line of ceilings or soffits, etc. shall have plaster frames, Anemostat R C or approved equal.
- M. Relocations of ceiling diffusers or registers in order to match the ceiling tile layout shall be made at no additional cost to Owner.

2.16 SOUND REDUCTION

- A. Furnish and install all soundproofing material specified, indicated or necessary to that all systems will comply with requirement of quiet operation. In general, noise level in any part of building (except in machinery rooms), due to air conditioning or ventilating equipment, ducts, and outlets, shall not exceed 40 decibels at 1200-2400 cycles per second, except as otherwise hereinafter specified.
- B. Furnish and install sound-absorptive lining in ductwork for locations and lengths as indicated and/or hereinafter specified. All soundproofing material, installation and arrangement, shall be as approved. Where ducts are acoustically lined and insulation is required per 15850 (23 07 00), external insulation may be omitted provided a minimum R value 6 is maintained for indoor ducts. Dimensions noted for lined ducts are inside clear dimensions. Duct sizes shall be increased for liner.
- C. Sound Absorbent Duct Lining for Low Pressure Ductwork - Furnish and install as herein specified and/or shown on the drawings (except where otherwise noted) 2" thick, meeting ASTM C1071 Type I flexible with a NRC of .70 tested per ASTM C423 using a type "A" mounting, fibrous glass duct lining meeting the requirements of NFPA 90A with a FHC of 25/50, limited combustible and ASTM C411 at 250 deg. F.
- D. Liner shall be adhered to all interior sides of duct with minimum 90% coverage of fire-retardant adhesive similar to Foster 85-60 or Childers CP-127 and with weld pins and washers or equivalent mechanical fastening starting 3" from edges and sides, 12" on center all sides. Minimum one row per side for duct size of 12" or less. Mechanical fasteners shall cause quilting of surface. Acrylic coated surface shall be toward air stream. Before installing liner, seal all butting edges and final edges with heavy coat of adhesive to seal off air between lining and duct unless the material has factory applied edge coating. All exposed edges of lining shall be installed with sheet metal nosing 12" wide, two gauges heavier than duct at fan discharge and at any section preceded by an unlined section. Installation shall be suitable for duct velocities up to 3,000 fpm. Low pressure duct lining shall be provided where specified and/or where shown and noted on the drawings.
- E. Duct sizes indicated on drawings are clear inside dimensions. Increase sheet metal sizes as required to install acoustic lining.
- F. Do not install lining within 5'-0" (downstream and upstream) of humidifier in ductwork. This portion of ductwork shall be externally insulated.

- G. The following ductwork shall be acoustically lined whether or not shown on Drawings.
1. Ductwork downstream of (mixing box) (terminal) units a minimum distance of 10 feet.
 2. All ductwork downstream of (mixing box) (terminal) units.
 3. Single wall built-up casing walls and ceiling except that lining shall be 2" thick 4 lb. density, and inner liner of perforated galvanized sheet metal (7/64" dia. holes on 3/16" staggered centers) shall be used for all systems.
 4. All conditioned air rectangular supply/return ductwork within mechanical equipment rooms, and not less than 20 ft. from fan towards occupied space for supply, exhaust and return fans.
 5. Return air fan and toilet exhaust plenum walls and ceiling, except that the lining shall be 2 inch thick 4 lb. density, and inner liner of perforated galvanized sheet metal (7/64" dia. holes on 3/16" staggered centers) shall be used.

2.17 ACOUSTICAL PERFORMANCE SPECIFICATIONS - GENERAL

- A. It is the intent of this Specification that noise levels due to air conditioning and/or ventilating equipment, ducts, grilles and registers, diffusers and air light fixtures, will permit attaining sound pressure levels in occupied spaces conforming to the following NC curves as explained in the ASHRAE Guide and Data Book.

Room Type	NC Level
Offices and Conference Rooms	NC 25-35
Teleconference Rooms	NC 25 (max)
Corridors and Public Spaces	NC 35-45

- B. Grilles, Registers, Diffusers
1. The maximum permissible sound power levels of air terminal devices when installed and operating per plans and specifications shall be as follows:

Maximum PWL re 10-12 Watts			
<u>Octave Band</u>	<u>NC-30</u>	<u>NC-35</u>	<u>NC-40</u>
1	62	64	66
2	52	56	60
3	44	49	54
4	41	46	51
5	38	43	48
6	37	42	47
7	36	41	46
8	37	42	47

- C. Sound Power Levels for air outlets and inlets shall be tested in accordance with ASHRAE Standard 70.

2.18 ACOUSTICAL PERFORMANCE WITHIN EQUIPMENT SPACES

- A. Equipment room noise levels and noise transmission to adjacent buildings shall comply with all Federal, State, and City Noise Ordinances.
- B. Motor Acoustical Performance:
 - 1. Motor drives for pumps and refrigeration machine when installed per plans and specifications shall operate with noise levels not to exceed 80 dbA.
 - 2. Noise levels shall be determined in accordance with IEEE Standard #85 test "procedure for Air-Borne Noise Measurements on Rotating Electric Equipment".

PART 3 - EXECUTION

3.01 INSPECTION

- A. Contractor shall examine location where ductwork is to be installed and determine space conditions and notify Architect in writing of conditions detrimental to proper and timely completion of the work.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION OF DUCTWORK

- A. Install ductwork in accordance with recognized industry practices, to ensure that ductwork complies with requirements and serve intended purposes.
- B. Coordinate with other work as necessary to interface installation or ductwork with other components of systems.
- C. Duct sizes shown on the drawings at connection to fans or other equipment may vary in actual installation. Contractor shall provide transition pieces as required.
- D. Ducts, casings and hangers shall be installed straight and level and shall be free of vibration and noise when fans are operating.
- E. Ducts at ceilings shall be suspended from inserts in concrete slabs except where otherwise indicated. Inserts shall be Grinnell Fig. 279, 282, or 152 as required. Ducts at floor shall be supported by steel angles suitably anchored to floor construction. Each duct shall be independently supported and shall not be hung from or supported by another duct, pipe, conduit or equipment of any trade.
- F. Supports shall be placed at each joint and change in direction up to a maximum spacing of 8 feet on centers. Prevent buckling of ductwork.
- G. All fastenings to building structure shall be adequate to ensure permanent stability of sheet metal work and shall be capable of resisting all applied forces.

- H. Vertical ducts in shafts or passing through floors shall be supported by steel angles or channels, welded, riveted, screwed or bolted to ducts and fastened to building structural members at each floor level. Provide safing to close all floor openings around ductwork - pack annular space with rockwool and 18 gauge sheet metal safing. Floor openings in plenums shall have ½ inch diameter steel bars.
- I. Rigid connections between ductwork and non-rotating equipment shall be made with flanged joints, sealed with fireproof material (Fiber or Neoprene gaskets).
- J. It is the intent to obtain low pressure ductwork construction with minimum leakage. The construction noted in Specifications can produce low or high leakage rates, depending upon the workmanship, particularly with regard to the connection at the top of the ducts. Guarantee that total diffuser volume, measured by means of velometer, shall be at least 95% of actual fan supply (measured by means of a duct traverse taken with a Pitot tube and water manometer). Seal the ductwork at all joints (longitudinal & transverse and duct wall penetrations) with suitable sealers Foster 32-19, Childers CP-146 or 3M EC-800 and tape equivalent to SMACNA Seal Class A. Use of "HARDCAST" or any other material is subject to Architect's approval.

3.03 DUCT HANGERS

- A. Low pressure ducts up to 24" on a side or up to 20" diameter shall be suspended with 16 gauge, galvanized strap hangers, 1" wide.
- B. Low pressure ducts 25" to 40" on a side or 21" to 42" diameter shall be suspended with galvanized strap hangers 1" wide by ⅛" thick.
- C. Strap hangers shall be bent 90°, extended down sides of ducts and turned under bottom of ducts a minimum of 2". Strap hangers shall be fastened at ceiling with nuts, bolts and lock washers and to sides and bottom of ducts with sheet metal screws.
- D. All ductwork 43" and larger on a side or diameter and all roof-mounted ducts (regardless of size) shall be suspended with steel angle type hangers with rod and angle steel trapeze. The use of strut for support of any HVAC work (ducts, piping or equipment) is prohibited.
- E. Trapeze type hangers shall have steel rods threaded at both ends and bottom bracing angles on ducts, with nuts and lock washers. Threaded rod diameter shall be as scheduled on the drawings based on the size of the duct supported.
- F. Angle type hangers shall be extensions of side bracing angles on ducts, bent 90 at ceiling and fastened with nuts, bolts and lock washers.
- G. The minimum spacing intervals for all duct supports shall be as scheduled on the drawings based on the size of the duct supported.
- H. Hangers for vertical ducts shall be as per SMACNA Duct Manual.
- I. Stainless steel ductwork shall be supported with rod or angle type hangers, so that there will be no penetration of the stainless steel ducts.

- J. Any steel and hardware used for support of aluminum ductwork or any supports for ductwork located outdoors shall be constructed of hot-dipped galvanized or stainless steel. Carbon steel, painted steel or zinc-coated steel is unacceptable.

3.04 CLEANING AND PROTECTION

- A. Clean ductwork internally, unit by unit as it is installed of dust and debris. Clean external surfaces of foreign substances, which might cause corrosion, deterioration of metal or interfere with painting.
- B. At end of ducts which are not connected to equipment or air distribution devices at the time of ductwork installation, provide temporary closure of polyethylene film or other covering.
- C. Cleaning of new and existing supply ductwork: After completion of ductwork installation clean ductwork as follows.
 - 1. Cover all supply registers and diffusers with temporary filter mesh.
 - 2. Use supply fan or install temporary fan to provide air to the system for four (4) hours.
 - 3. Remove temporary filter mesh.

END OF SECTION 23 31 13

SECTION 23 34 00 - FANS AND GRAVITY VENTILATORS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.

1.02 DESCRIPTION OF WORK

- A. The work includes the providing of all labor, materials, equipment, accessories, services and tests necessary to complete and made ready for operation by the Owner, all fans and ventilators as shown on the drawings and hereinafter specified.

1.03 QUALITY ASSURANCE

- A. Firms regularly engaged in manufacture of this material with characteristics and capacities required, whose products have been in satisfactory use in similar service for not less than 10 years.
- B. Provide product produced by the manufacturers, which are listed in Section 23 05 12, "Approved Manufacturer's List".
- C. Provide equipment whose performance, under specified conditions, is certified by the manufacturer.

1.04 SUBMITTALS

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work and submit shop drawings.

1.05 COORDINATION

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

1.06 GUARANTEE

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

2.01 CENTRIFUGAL FANS (CLASS I)

- A. Furnish and install as shown on the plans non-power overloading centrifugal fans with airfoil blades in sizes 24 and larger and plate-type blades in sizes 22 and smaller. Fans shall be of the specified size, arrangement, class and capacity. Fans having outlet velocities greater than those shown will not be acceptable.
- B. Housings of fans, Class I, having wheel diameters 36" and smaller shall be convertible for various directions of discharge. Side sheets shall be fastened to scroll sheets by means of a deep lockseam. Housing supports shall be of one-piece welded constructed. Housing for Class I fans, having wheel diameters over 36", shall have side sheets welded to scroll sheets. Housings shall be split into two or more sections with heavy flanges on each section for bolting together. Flanges joints shall be gasketed for air-tightness. Sealer shall be applied to joints between housing, inlet and housing support to prevent air leakage. The cutoff shall be of the rolled slope type and shall be wider and closer to the shaft at the suction side, then the drive side, for single width fans. Inlet collars on all sizes of single width fans shall extend beyond the fan housing to provide a continuous duct connection. Inlet collars on convertible housings shall be round and on nonconvertible housings shall be square. Both inlet and discharge duct collars shall be drilled or punched at uniform intervals. Inlet cones shall be spun or die-formed to provide smooth air flow into the wheel with minimum shock and turbulence.
- C. Fan wheels shall be constructed of twelve deep airfoil blades, plate type blades in sizes 22 and smaller, backward inclined from the direction of rotation. Blades shall be securely welded to the spun rim and hub plate. Hubs shall be of close grained cast iron, securely riveted to the hub plate. All wheels shall be carefully trued after assembly and shall be dynamically balanced.
- D. Fan shafts shall be of SAE 1040 hot rolled steel, accurately turned, ground and polished. Close tolerances shall be maintained where shaft makes contact with bearings and fan wheel hub.
- E. Fans shall be equipped with precision anti-friction extra heavy-duty bearings of the self-aligning, grease-packed, pillow block type having a grease seal that will prevent loss of lubricant and exclude dirt from the bearings. Lubrication fittings shall be provided on exterior of cabinet or housing. Average bearing life shall be min. 200,000 hrs.
- F. All fans shall be given a bonding coat before painting. After the cleaning and surface conditioning process, but before assembly, parts shall be spray painted with one coat of gray primer-finisher. A second coat of the same paint shall be applied to the exterior and all accessible interior surfaces after the fan is assembled. Shafts shall have a rust-preventive coating.
- G. Fan ratings shall be based upon tests performed in strict accordance with the test code adopted jointly by the Air Moving and Conditioning Association and the American

Society of Heating, Refrigeration and Air Conditioning Engineers. Each fan shall carry, near the manufacturer's nameplate, the seal authorized by AMCA indicating that ratings are certified. Fans not bearing this seal will not be acceptable.

- H. Fans shall be as scheduled on the Drawings.

2.02 UTILITY FANS

- A. Furnish and install utility type centrifugal fans of the sizes and types called for in the equipment schedule and as shown on the plans. All fans shall be rated and tested in accordance with the AMCA test code and shall bear the certified rating label of AMCA.
- B. Fan and motor housings (weatherproof hood) shall be constructed of heavy gauge steel of lockseam construction with Bonderite finish and shall be constructed to permit rotation on the job to any discharge position, in 45 deg. increments. Fan wheels are to be of the type as scheduled on the drawings, except as noted below, with blades riveted to the back plate and inlet shroud. Wheels shall be locked in position on cold rolled steel shaft with a tapered key. Fan bearings shall be of the heavy-duty cast-iron pillow block grease lubricated type, supported independent of the fan housings. Wheels shall be dynamically balanced at the factory.
- C. Where belt driven fans are indicated in the equipment schedule "V" belt drive shall be of the high capacity type. Fan sheave shall be located outboard of the two bearings supported fan shaft to permit replacement of drives without removing bearings or disturbing position of wheel and shaft. Motor base shall be fully adjustable in all directions to provide for proper drive alignment and to allow for adjustment of belt tension.
- D. All indoor fans shall have electrically operated discharge dampers and damper motors furnished by Automatic Temperature Control manufacturers.
- E. All roof-mounted fans shall be completely weatherproof. Provide outdoor covers on motor and drive. Unit to be hot-dip galvanized and painted with an extra coat of zinc chromate iron oxide paint.
- F. All fans shall be driven by two (2) belts. All sheaves shall be of the double pulley type.

2.03 ROOF FANS

- A. Furnish and install the roof fans where indicated on the Drawings.
- B. The fans shall have spun aluminum housings, or sectionalized aluminum housing, non-overloading sparkproof blades, air cooled motor out of the air stream, sheaves and V-belt drives, electrically operated aluminum draft dampers, and motor disconnect switch, and aluminum bird screen. Damper motors shall have inherent overload protection.

- C. For 208 volt fan motors, provide a 208/120 volt transformer with primary protection under the hood to wire damper motor.
- D. The fans shall have the capacities indicated on the drawings.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Contractor shall examine location where this equipment is to be installed and determine space conditions and notify Architect in writing of conditions detrimental to proper and timely completion of the work.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install equipment where shown, in accordance with manufacturer's written instructions, and with recognized industry practices, to ensure that equipment comply with requirements and serve intended purposes.
- B. Coordinate with other work as necessary to interface installation of equipment with other components of systems.
- C. Check alignment and, where necessary (and possible), realign shafts or motors and equipment within tolerances recommended by manufacturer.

3.03 FIELD QUALITY CONTROL

- A. Upon completion of installation of equipment, test equipment to demonstrate compliance with requirement. When possible, field correct malfunctioning units, then retest to demonstrate compliance. Replace units which cannot be satisfactorily corrected. Refer to Section 23 05 93 - Testing and Balancing.

END OF SECTION 23 34 00

SECTION 23 36 00 - DUCT TERMINAL UNITS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.

1.02 DESCRIPTION OF WORK

- A. The work includes the providing of all labor, materials, equipment, accessories, services and tests necessary to complete and made ready for operation by the Owner, all Duct Terminal Units as shown on the drawings and hereinafter specified.

1.03 QUALITY ASSURANCE

- A. Firms regularly engaged in manufacture of this material with characteristics and capacities required, whose products have been in satisfactory use in similar service for not less than 10 years.
- B. Provide product produced by the manufacturers, which are listed in Section 23 05 12 "Approved Manufacturer's List".
- C. Provide equipment whose performance, under specified conditions, is certified by the manufacturer.

1.04 SUBMITTALS

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work and submit shop drawings.

1.05 COORDINATION

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

1.06 GUARANTEE

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Contractor shall examine location where this equipment is to be installed and determine space conditions and notify architect in writing of conditions detrimental to proper and timely completion of the work.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install equipment where shown, in accordance with manufacturer's written instructions, and with recognized industry practices, to ensure that equipment comply with requirements and serve intended purposes.
- B. Coordinate with other work as necessary to interface installation of equipment with other components of systems.
- C. Check alignment and, where necessary (and possible), realign shafts or motors and equipment within tolerances recommended by manufacturer.

3.03 FIELD QUALITY CONTROL

- A. Upon completion of installation of equipment, test equipment to demonstrate compliance with requirement. When possible, field correct malfunctioning units, then retest to demonstrate compliance. Replace units which cannot be satisfactorily corrected. Refer to Section 23 05 93 - Testing and Balancing.

END OF SECTION 23 36 00

SECTION 23 40 00 - AIR FILTERS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.

1.02 DESCRIPTION OF WORK

- A. The work includes the providing of all labor, materials, equipment, accessories, services and tests necessary to complete and made ready for operation by the Owner, all air filters as shown on the drawings and hereinafter specified.

1.03 QUALITY ASSURANCE

- A. Manufacturing firms regularly engaged in manufacture of this material with characteristics and capacities required, whose products have been in satisfactory use in similar service for not less than 10 years.
- B. Provide product produced by the manufacturers, which are listed in Section 23 05 12 "Approved Manufacturer's List".
- C. Provide equipment whose performance, under specified conditions, is certified by the manufacturer.
- D. Equipment shall be shipped in its original package to prevent damage or entrance of foreign matter. All handling and shipping shall be performed in accordance with manufacturer's recommendations. Provide protective coverings during construction.
- E. Standards:
 - 1. ASHRAE Standard 52.1
 - 2. Underwriters Laboratories: U.L. 900, U.L. 586
 - 3. NFPA Standard 90A
- F. Design Criteria
 - 1. Air flow not to exceed rated capacity
 - 2. Initial and final resistance not to exceed scheduled values

1.04 SUBMITTALS

- A. Refer to section 01 31 46 Special Requirements for Mechanical and Electrical Work and submit shop drawings.

1.05 COORDINATION

- A. Refer to section 01 31 46 Special Requirements for Mechanical and Electrical Work.

1.06 GUARANTEE

- A. Refer to section 01 31 46 Special Requirements for Mechanical and Electrical Work.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Furnish and install the air filters shown on the Drawings. The filters shall be component sections of air handling units or shall be installed in ductwork as indicated on the drawings.
- B. The filter arrangements shall be as indicated in the schedule on the Drawings.
- C. Furnish and install filters as shown on drawings. Filters for factory fabricated AHU's shall meet all specification requirements.
- D. Filters shall be as manufactured by Flanders Precisionaire, National Air Filter, or approved equal as approved by Architect.
- E. Filters shall be as indicated in the schedules on the drawings.
- F. Fans and systems shall not be operated until protective filters meeting a minimum of MERV 8 have been installed. All systems are to have a minimum of MERV 8 filters installed during all operating phases of construction.
- G. At the time of acceptance by the owner, the contractor shall install new filtering media for all air handling systems.
- H. Before balancing and prior to acceptance by the owner, each MERV 8 filter shall be replaced with new media to consist of prefilters and final filters as scheduled and specified.

2.02 ACCEPTABLE MANUFACTURERS

- A. Filters:
 - 1. Flanders Precisionaire
 - 2. Camfil

3. American Air Filter
4. As equal as approved by the Architect.

B. Accessories

1. Framing Modules - Holding Frames by filter manufacturer.
2. Side Access Housings by filter manufacturer.
3. Air Filter Gages - Dwyer Instruments, Inc.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Contractor shall examine location where this equipment is to be installed and determine space conditions and notify architect in writing of conditions detrimental to proper and timely completion of the work.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install filters and housings where shown, in accordance with manufacturer's written instructions, and with recognized industry practices, to ensure that equipment comply with requirements and serve intended purposes.
- B. Coordinate with other work as necessary to interface installation of equipment with other components of systems.
- C. Filter Bank Construction
 1. Filter banks of individual holding frames shall be installed leak tight and structurally sound to eliminate air bypass.
 2. Filter banks four filters high or higher shall be provided with proper steel stiffeners between each vertical row of filters. Caulk frames before installing. After installation caulk any gaps appearing at the leading edge of the holding frames.
 3. HEPA filter frames over 6 in. deep shall not require stiffeners, only caulking. HEPA filter frames must be bolted or welded together.
 4. Framing modules require sealant and blanking off between modules and around the periphery.
- D. Filter gages shall be installed across each filter bank, mounted where directed. One gage may serve immediately adjacent pre-filter/final filter banks.
- E. Temporary Prefilters for Construction
 1. Protect all 40% or higher efficient filters upstream of air handling units during construction with temporary Panel filters meeting a minimum efficiency of MERV 8. Filters to be polyester media 2 in. disposable panel filters, U.L. 900 Class 2 listed. Flanders type 325.
 2. Remove after air balancing and prior to acceptance.

3. Provide a spare set of these temporary pre-filters or media and install them during construction if required in accordance with Section 3.03B.

3.03 SPARE FILTERS

- A. Furnish one new complete spare set of cartridges for each filter bank listed below on completion and acceptance of the work:
 1. Medium and high efficiency bag filters.
 2. Medium and high efficiency rigid filters.
 3. HEPA filters.
- B. Install spare set in A. above only if and when directed. If not installed, deliver to owner in sealed cartons.
- C. Replace all panel filters which are not temporary pre-filters with a new set at job completion and furnish owner with an additional set-in sealed cartons.
- D. Furnish owner with one set of spare trays loaded with carbon, if carbon housings or adsorbers are specified on this project.

3.04 FIELD QUALITY CONTROL

- A. Filter cartridges shall be capable of being loaded and unloaded easily through access doors in the housings or access sections.

3.05 START-UP PROCEDURE

- A. No fan shall be operated unless temporary particulate filters as specified are installed.
- B. When the pressure drop of the temporary media reaches 1.0 in. w.g. during construction, replace it with the spare set. If not used, deliver the spare set to the owner at job completion.

3.06 SCHEDULE

- A. See air filter schedule on drawings for filter model numbers, CFM and sizing data.

END OF SECTION 23 40 00

SECTION 23 73 01 - AIR HANDLING UNITS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.

1.02 DESCRIPTION OF WORK

- A. The work includes the providing of all labor, materials, equipment, accessories, services and tests necessary to complete and made ready for operation by the Owner, all air handling units as shown on the drawings and hereinafter specified.

1.03 QUALITY ASSURANCE

- A. Manufacturing firms regularly engaged in manufacture of this material with characteristics and capacities required, whose products have been in satisfactory use in similar service for not less than 10 years.
- B. Provide product produced by the manufacturers, which are listed in Section 23 05 12 "Approved Manufacturer's List".
- C. Provide equipment whose performance, under specified conditions, is certified by the manufacturer.

1.04 SUBMITTALS

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work and submit shop drawings.

1.05 COORDINATION

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

1.06 GUARANTEE

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

2.01 AIR HANDLING UNITS (LOW AND MEDIUM PRESSURE)

- A. Furnish and install air conditioning blower units as scheduled on the Drawings. Units shall be arranged as shown on the Drawings and are to perform as set forth in the equipment schedule.
- B. Framework of the units shall be heavy gauge structural steel shapes which shall be formed to provide a natural recess for flush mounted casing panels. The design of the units shall be such that the entire casing is removable in panels for service or inspection of any portion of the unit interior. The casing panels are to be secured with thread cutting sheet metal screws, and all those over 72 square feet in area are to be not less than 16 gauge steel. Inspection and service access doors are to be provided on entering sides of cooling and heating coil section and filter section and shall extend to full height of the unit and are to be fitted with cast aluminum quick-opening handles and hinges. No unit casing panel shall exceed 15 square feet in area.
- C. Fan ratings shall be certified as per ARI. 410-72.
- D. The unit cabinet and all accessory sections shall be insulated internally with 1" thick glass blanket insulation which has been vinyl coated on the surface exposed to the airstream. Metal edges (nosing) shall be provided for protecting edges of insulation. The casing panels to which the insulation is secured are to be double flanged, both for structural strength and to provide protection for the edges of the insulation blanket. Full drain pans are to be provided under both fan section and coil section, and are to be of double floor construction, with a minimum of 2" of rigid polyurethane cemented in place between the two layers of metal. The inner pans are to be fabricated of not less than 20 gauge stainless steel, mastic coated and are to be pitched, for positive drainage, toward side drain connections.
- E. All units incorporating less than 35 sq. ft. of coil face shall use forward curved blade type fans. All units incorporating 35 sq. ft. of coil face or above shall use Air Foil Blades.
- F. All fans shall be statically and dynamically balanced and tested at rated speed after being installed in the factory-assembled units.
- G. Bearings are to be connected through aluminum tubing to external lubrication fittings located at the drive end of the fan section. The bearings are to be mounted on heavy gauge channel reinforced steel panels which shall form an integral part of the fan section frame. Fan wheels and scrolls are to be protected against corrosion by a two-coat baked-on epoxy enamel finish. Bearings shall be self-aligning, grease-lubricated ball bearings sized to provide minimum average bearing life of 200,000 hours. Lubrication fittings shall be provided on exterior of cabinet. Fan shaft shall be continuous diameter, cold finished steel, ground and polished to insure trouble-free operation and tolerances within the recommendations of bearing manufacturers. Fan motors shall be mounted on an adjustable pivot base in positions external to the unit. Adjustable pitch shall be

furnished with all motors. Fan belt guards shall be furnished by the unit manufacturer, easily removable, and made of solid steel with tachometer openings.

- H. The entire unit cabinet, framework and panels, shall be subjected to a phosphatizing treatment after fabrication. Following this, all exposed steel surfaces on the unit interior are to be spray coated with an asphalt non-asbestos fiber compound, whereas the entire exterior is to be finished with an alkyd phenolic paint primer.
- I. All coils shall be of the cartridge type removable from coil connection side of casing and supported in tracks over the entire length of the coil. Coils shall be a product of the unit manufacturer. Coils shall be of the type as specified under "Coils" section of this Specification. There shall be a minimum of 18" spacer sections with access doors on both sides between heating and cooling coils for control bulb installation.
- J. Bag filter section shall be capable of accepting standard 2 inch thick prefilters and a combination of 12 inch x 24 inch and 24 inch x 24 inch (nominal) bag filters up to 22 inch in depth. Bag filter section to have hinged access doors on both sides for filter replacement. Provide 2" space between prefilter and bag filter for filter gauge probe installation.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Contractor shall examine location where this equipment is to be installed and determine space conditions and notify architect in writing of conditions detrimental to proper and timely completion of the work.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install equipment where shown, in accordance with manufacturer's written instructions, and with recognized industry practices, to ensure that equipment comply with requirements and serve intended purposes.
- B. Coordinate with other work as necessary to interface installation of equipment with other components of systems.
- C. Check alignment and, where necessary (and possible), realign shafts of motors and equipment within tolerances recommended by manufacturer.

3.03 CONDENSATE DISPOSAL

- A. See Special Requirements for Mechanical and Electrical Work section of the specification.

- B. Provide drain pan overflow control as required per this section.

3.04 FIELD QUALITY CONTROL

- A. Upon completion of installation of equipment, energized with normal power source, test equipment to demonstrate compliance with requirement. When possible, field correct malfunctioning units, then retest to demonstrate compliance. Replace units which cannot be satisfactorily corrected. Refer to Section 23 05 93 - Testing and Balancing.

END OF SECTION 23 73 01

SECTION 23 82 13 - VARIABLE FREQUENCY DRIVES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.

1.02 SUMMARY OF WORK IN THIS SECTION

- A. The work includes the providing of all labor, materials, equipment, accessories, services and tests necessary to complete and made ready for operation by the Owner, all variable frequency drives as shown on the drawings and as specified elsewhere in this specification.
- B. Provide a separate variable frequency drive, VFD, for each motor drive.

1.03 QUALITY ASSURANCE

- A. Manufacturing firms regularly engaged in manufacture of this material with characteristics and capacities required, whose products have been in satisfactory use in similar service for not less than 10 years.
- B. Variable frequency drive (VFD) shall be produced by Toshiba. All VFD's for the project shall be the product of a single manufacturer.
- C. Provide equipment whose performance, under specified conditions, is certified by the manufacturer.
- D. Start-up services and customer training shall be provided by a factory trained and authorized representative. Provide a minimum of 4 hours of training for VFD's
- E. VFD shall be UL listed and shall have NYC approvals (BSA number) for NYC projects. Submit proof of approvals.
- F. Control of fan VFD's shall be provided under Section 23 09 00.

1.04 SUBMITTALS

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work and submit shop drawings.

- B. In addition, submittals shall include the following:
 - 1. System summary sheet
 - 2. Sequence of operation
 - 3. System profile analysis including variable speed pump and fan curves and system curves. The analysis shall also include fan, pump, motor and AFD efficiencies, job specific load profile, staging points, horsepower and kilowatt/hour consumption.
 - 4. Pump and fan data sheets

1.05 DELIVERY STORAGE AND HANDLING

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

1.06 GUARANTEE

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.
- B. In addition to the requirements of Section 01 31 46 regarding Guarantee, the manufacturer and/or supplier of variable frequency drives shall provide a 36-month warranty from the date of certified start-up and shall include all parts, labor, travel time and expenses. Any repairs of variable frequency drives shall be done on an emergency basis during the warranty period.
- C. The manufacturer shall assume "Unit Responsibility" for the complete pumping control package for pump applications. Unit responsibility shall be defined as responsibility for interface and successful operation of all system components supplied by the pumping system control manufacturer.
- D. All functions of the variable speed pump control system shall be tested at the factory prior to shipment. This test shall be conducted with motors connected to VFD output and it shall test all inputs, outputs and program execution specific to this application. The manufacturer shall be fully certified by the International Standards Organization per ISO 9001. Proof of this certification shall be furnished at time of submittal.
- E. Manufacturer shall be listed by Underwriter's Laboratories.

PART 2 - PRODUCTS

2.01 VARIABLE FREQUENCY DRIVE

- A. The variable frequency drive(s) (VFD) shall be pulse width modulation (PWM) type, microprocessor controlled design.
- B. The VFD, including all factory installed options, shall have UL approval.
- C. Enclosure shall be NEMA 3R ventilated for installation as a wall mounted or free-standing unit, depending on the amp rating. Drive shall be equipped with an input

disconnect switch and fuses to protect against ground faults. A hand-off-automatic switch and speed potentiometer shall be mounted on the front of the enclosure.

1. Electrical Control Devices
 - a. Allen-Bradley® Electrical Control Devices are the basis of design,
 - b. The electrical control devices shall include:
 - 1) Pilot Devices
 - 2) Relays and Timers
 - 3) Miniature Circuit Breakers
 - 4) Terminal Blocks and Fuse Blocks
 - 5) Alarms and Signals
 - 6) Power Supplies
 - c. The electrical control devices shall be interoperable with standard electrical equipment.
2. Pilot Devices
 - a. 30.5 MM Push Buttons, Selector Switches and Pilot Lights
 - 1) 30.5 mm push buttons, selector switches and pilot lights shall be Allen-Bradley heavy industrial Type 4/13 watertight/oiltight metal [Bulletin 800T].
 - 2) 30.5 mm push buttons, selector switches and pilot lights shall provide EN/IEC 60529 IP66/65 degree of protection.
 - 3) 30.5 mm push buttons, selector switches and pilot lights shall have electrical ratings of:
 - a) Dielectric strength – 2200V for 1 minute [or 300V for 1 minute (Logic Reed)]
 - b) Electrical design life cycles – 10,000,000 at max. rated load [200,000 at max rated load (Logic Reed)]
 - 4) 30.5 mm push buttons, selector switches and pilot lights shall have an operating range of -40 to 131°F (-40 to 55°C).
 - 5) Illuminated devices shall offer universal LED that accepts 12 to 130 VAC/VDC voltage input.
 - 6) 30.5 mm push buttons shall have a diaphragm seal for protection from liquids, particles and corrosive agents.
 - 7) 30.5 mm selector switches shall incorporate a positive detent to prevent the switch from hanging up between positions.
 - b. Potentiometer Devices
 - 1) 30.5 mm potentiometer devices shall be Allen-Bradley heavy industrial Type 4/13 watertight/oiltight metal [Bulletin 800T].
 - 2) Potentiometer devices shall be rated for 300 VAC/VDC, 2 W maximum (6 VDC minimum):
 - a) Mechanical design life – Min. 25,000 cycles
 - b) Rotational torque – 3 to 12 in-oz
 - c) Stopping torque – Min. 12 in-lb
 - 3) Potentiometer devices shall have single-turn operation, 312 degree rotation.
 - 4) Potentiometer devices shall be finger-safe.
 - c. Control Stations

- 1) Control stations shall provide Allen-Bradley heavy industrial 30.5 mm push button(s) or selector switch with appropriate contact action, button/lever type and color/legend marking. Devices shall be Type 4/13 watertight/oiltight metal [Bulletin 800T].
 - 2) Control stations shall be constructed of die-cast aluminum
3. Relays And Timers
- a. Relays – Time Delay
 - 1) Allen-Bradley time delay relays [Bulletin 700-HT] shall mount on tube-type bases with pin-style socket mounting.
 - 2) Time delay relays shall have 10A, B300, DPDT contact ratings and coil voltages as shown on drawings.
 - 3) Time delay relays shall have adjustable timing ranges [or fixed timing ranges to avoid tampering]. Timing ranges shall be as shown on drawings.
 - b. Relays – General Purpose
 - 1) Allen-Bradley general purpose relays [Bulletin 700-HA] shall have tube-base/Octal 8-pin [or 11-pin] terminals and ON/OFF flag indicators.
 - 2) General purpose relay contacts shall be silver nickel [or silver nickel bifurcated or gold-plated bifurcated] and have 10A, B300, DPDT [or 3PDT] ratings. Coil voltages shall be as shown on drawings.
 - 3) General purpose relays shall have an electrical schematic on the faceplate, a clear cover for visual inspection and snap-in marker ability.
 - 4) General purpose relays shall have LED status indicators, push-to-test and manual override.
 - c. Relays – Miniature
 - 1) Allen-Bradley miniature relays [Bulletin 700-HC] shall be square-base, 4-pole, plug-in type with blade-style terminals and ON/OFF flag indicators.
 - 2) Miniature relay contacts shall be silver nickel [or gold-plated silver nickel] and have 7A [or 10A], DPDT [or 4PDT] ratings. Coil voltages shall be as shown on drawings.
 - 3) Miniature relays shall have an electrical schematic on the faceplate and a clear cover for visual inspection.
 - 4) Miniature relays shall have LED status indicators and push-to-test button with incorporated manual override lever.
 - d. Relays – Industrial-Type
 - 1) Allen-Bradley industrial-type relays [Bulletin 700-P] shall be ruggedly constructed (10 million operation mechanical life), 2-pole [or 4-pole, 8-pole, 12-pole], configured N.O./N.C. as shown on drawings, and panel- [or strip-, DIN rail-] mounted.
 - 2) Industrial-type relays shall be finger-safe.
 - 3) Industrial-type relay contacts shall be silver nickel with a double-break and bifurcated design and 10A, A600 rating for AC [5A, P600 rating for DC].

- 4) Accessories shall include adder decks, time delay, latching, surge suppressors and/or mounting strip.
- e. Timers – Solid-State
 - 1) Allen-Bradley solid-state timers [Bulletin 700-FS] shall be DIN rail-mounted.
 - 2) The solid-state timer contacts shall be available as SPDT or DPDT, 8A.
 - 3) Solid-state timers shall be available with On-Delay, Off-Delay, On-and Off-Delay, One-Shot and Flasher operating modes as required on the drawings.
 - 4) Solid-state timers shall have coil surge protection and adjustable timing ranges of 0.05 seconds to 60 hours as shown on drawings.
- f. Timers – Programmable
 - 1) Allen-Bradley programmable timers [Bulletin 700-HX] shall be digital timing relays with LCD display and shall be socket- [or panel-] mounted.
 - 2) Programmable timer contacts shall be SPDT, rated 5A, B300.
 - 3) Programmable timer panel surface shall offer Type 4X/IP66 protection.
 - 4) Programmable timers shall be configurable for Signal On-Delay, Power On-Delay, Off-Delay, Repeat Cycle, One-Shot and Cumulative operating modes as required on the drawings.
 - 5) Programmable timers shall have timing ranges of 0.000 seconds to 9999 hours, depending on selected mode and as shown on drawings.
4. Miniature Circuit Breakers
 - a. Miniature circuit breakers shall be Allen-Bradley Circuit Breakers [Bulletin 1489-M].
 - b. Miniature circuit breakers shall be thermal-magnetic, current-limiting type, sized as specified on the drawings:
 - 1) 0.5A to 63A current rating
 - 2) 1-, 2- or 3-pole
 - 3) Type C or Type D tripping characteristic
 - c. Miniature circuit breakers shall be UL Listed (E197878), CSA Certified (259391), CE Marked, VDE and CCC Certified and RoHS Compliant. Standards compliances shall include:
 - 1) UL 489
 - 2) CSA C22.2, No. 5.1
 - 3) EN 60947-2
 - 4) GB 14048.2
 - d. Miniature circuit breakers shall be rated for:
 - 1) Voltage – Max. 480Y/277 VAC (UL/CSA); U_e 230/400 VAC (IEC)
 - 2) Interrupting capacity – 10 kA (UL/CSA); 15 kA (IEC)
 - e. Housing shall satisfy Insulation Group II/RAL 7035, shall have IP20 finger-safe design, shall be suitable for DIN rail mounting and shall include status indicator window and scratch- and solvent-resistant printing.
 - f. Miniature circuit breakers shall support reversible line and load connections and shall have dual terminals that:
 - 1) Connect up to 4 wires, or 2 wires and a bus bar.

- 2) Clamp from both sides.
 - 3) Have a unique design that directs wires into openings to prevent wiring misses.
 - g. Miniature circuit breakers shall be compatible with UL 508 Listed bus bars, auxiliary contacts, signal contacts, shunt trips and toggle-mount lockout attachments.
 5. Terminal Blocks and Fuse Blocks
 - a. Terminal Blocks – Control, #22 to #8 AWG
 - 1) Control terminal blocks shall be Allen-Bradley screw-type, feed-through [Bulletin 1492-J].
 - 2) Control terminal blocks shall be certified:
 - a) UR/CSA – #22 to #8 AWG wire range, 50A maximum current, 600 VAC/VDC voltage rating
 - b) IEC – 6 mm² wire range, 41A maximum current, 800 VAC/VDC voltage rating
 - c) ATEX – 6 mm² (#20 to #10 AWG) wire range, 36A maximum current, 550 VAC/VDC voltage rating
 - 3) Control terminal blocks shall have a snap-in card marking system.
 - b. Terminal Blocks – Power
 - 1) Power terminal blocks shall be Allen-Bradley [Bulletin 1492-PD]:
 - a) Open-style power distribution block with aluminum or copper connectors – 3-pole [or 1-pole], rated at 600 VAC/VDC, 175 to 760A
 - 2) Power terminal blocks shall be certified by UR, CSA and CE.
 - 3) Wire ranges and tightening torques shall be labeled on the block.
 - 4) Power terminal blocks shall have a write-on marking surface or marker retention feature.
 - c. Fuse Blocks
 - 1) Allen-Bradley fuse block kits [Bulletin 1491] shall be used for protection of transformers and control circuits capable of delivering no more than 200,000 RMS symmetrical amps, 600V maximum.
 - 2) Fuse block kits shall be 1-pole, 2-pole or 3-pole.
 - 3) Each pole shall have a fuse cover.
 6. Alarms And Signals
 - a. Alarm Horn
 - 1) The alarm horn shall be an Allen-Bradley High Performance Electronic Horn [Bulletin 855H] and shall have up to 4 stages and low current consumption.
 - 2) The alarm horn shall have a UV-stable plastic housing and non-moving parts.
 - 3) The alarm horn shall have an on-board microphone, 45 alarm tones selectable by DIP switch and fine volume control via potentiometer.
 - 4) The alarm horn shall allow synchronized output in multi-horn installations and shall have the ability to replicate content to other devices (master/slave).
 - b. Alarm Beacon

- 1) The alarm beacon shall be an Allen-Bradley [Bulletin 855B] with high-intensity, minimum 5-Joule Xenon, minimum 20-Watt Halogen or LED illumination as required on the drawings.
 - 2) The alarm beacon shall have polycarbonate housing and lens, available in square or round configuration, and Type 4/4X/13, IP65/IP66 ingress rating as required on the drawings.
 - 3) Flashing frequency shall be 1 Hz.
 - 4) Alarm beacon lens colors shall be red, green, amber, blue, yellow or clear as required on the drawings.
 - c. Alarm Light Tower
 - 1) The alarm light tower shall consist of Allen-Bradley Control Tower™ Stack Lights [Bulletin 854J or K], stacked 1 [or 2, 3, 4, 5] module(s) high and shall be surface- [or vertical-, quick-release-, pole-] mounted.
 - 2) The alarm light tower shall be 40 mm [or 60 mm] size and the terminal block shall be top-mounted on the base.
 - 3) The light modules shall be Type 4/4X/13, IP65 and are:
 - a) LED (steady, flashing or strobe)
 - 4) The alarm light tower shall include a continuous (or pulsing) piezo [or transducer] sound module.
 - 5) The alarm light tower shall have a DeviceNet base.
 - d. Signal Alarm (Panel Mount)
 - 1) The signal alarm shall be an Allen-Bradley Panel Mount Signaling Alarm [Bulletin 855P] in a 30 mm [or 45 mm, 65 mm] size, that mounts in a standard 22.5 mm hole.
 - 2) The signal alarm shall have polycarbonate base and lens.
 - 3) The signal alarm shall be combination sounder and LED
 - 4) The signal alarm shall be rear-securing and finger-safe.
7. Power Supplies
- a. Control Power Transformer
 - 1) The control power transformer shall be an Allen-Bradley Global Control Transformer [Bulletin 1497], single-phase and sized as shown on drawings.
 - 2) The control power transformer shall be epoxy encapsulated and shall offer EN 60-529 finger-safe protection.
 - 3) The control transformer shall have a dual primary and secondary fuse block, pre-wired and top-mounted.
 - b. 24 VDC Power Supplies
 - 1) 24 VDC power supplies shall be Allen-Bradley [Bulletin 1606-XL] with active or passive PFC choke and input as shown in drawings [or auto-select input].
 - 2) 24 VDC power supplies shall have low inrush current, and power supplies with greater than 100-Watt output shall incorporate a minimum 120% Power Burst design.
 - 3) 24 VDC power supplies shall have NEC Class 2 “Limited Power” output.
 - c. UPS

- 1) The UPS shall be an Allen-Bradley Industrial Uninterruptible Power Supply [Bulletin 1609-B/D] with 120 VAC input voltage and output power as shown on drawings.
 - 2) The UPS shall be back-of-panel- [or DIN rail-] mounted.
 - 3) The UPS shall provide:
 - a) Surge protection to 380 Joules
 - b) Overload protection, resulting in delayed shutdown at 110 to 130% and immediate shutdown at 130%
 - c) Protection against output short online – over-current protection from premises branch circuit
 - d) Protection against output short on battery, resulting in shutdown
 - e) Thermal protection
 - 4) The UPS shall have USB communications and software, integrated remote on/off and dry I/O contacts.
 - 5) The UPS shall have EtherNet/IP communications, expandable battery capacity and/or pure sine wave output.
 - 6) The UPS shall perform to 40°C [50°C, with hi-temp battery].
8. Disconnect/breakers shall be external flange mounted type, all metal construction with painted handle, lockable, similar to Allen Bradley Model 1494F-M1-412. Plastic switches, disconnects and breakers and twist types shall not be used.
- D. VFD shall utilize a diode bridge rectifier to convert three phase AC to a fixed DC voltage or a phase-controlled rectifier. Drives utilizing a phased controlled rectifier shall employ a three-phase line reactor on the line side of the rectifier.
- E. PWM type drives shall use Insulated gate bipolar transistors (IGBTs) shall be used in the inverter section to convert the fixed DC voltage to a three phase, adjustable frequency, AC output. A DC line reactor shall be provided to minimize harmonic and current distortion of the input power line.
- F. The following customer modifiable adjustments shall be provided:
1. Acceleration time: 0.1 to 1800 seconds
 2. Deceleration time: 0.1 to 1800 seconds
 3. Minimum frequency: 0 Hz
 4. Maximum frequency 66 Hz
- G. Speed reference signal shall be customer selectable for 0-10 VDC or 4-20 mA.
- H. The VFD shall be suitable for elevations to 3300 feet above sea level without derating. Maximum operating ambient temperature shall not be less than 104EF. VFD shall be suitable for operation in environments up to 95% non- condensing humidity. PWM type drives shall be capable of operating at carrier frequencies of 12000 Hz without derating.
- I. The VFD shall be capable of displaying the following information via the display:
1. % speed
 2. Voltage
 3. % load

4. Fault identification
- J. All VFDs shall be equipped with a bypass switch to allow the fan or pump to operate at constant speed while the drive is being serviced. The bypasses for motors 100 HP and greater shall be solid state reduced voltage.
- K. The following communication features shall be provided to the BAS:
 1. Remote start/stop
 2. Failure of any system component
 3. VFD speed
- L. VFD's shall meet the requirements as outlined in the latest edition of IEEE-519 for total harmonic voltage and current distortion. Individual or simultaneous operation of the VFD's shall not add more than 5% total harmonic voltage distortion to the normal bus, nor more than 10% while operating from standby generator.

The step-up transformers shall be the point of common coupling, as indicated on the project electrical drawings. The short circuit current at point of common coupling under utility operation shall be provided by the Engineer. Standby generator rating shall be as indicated on the electrical drawings. The minimum subtransient reactance shall be provided by the Engineer. The maximum number of VFD's which will operate simultaneously from the generator are indicated on the equipment schedule as having emergency power (E.P.) Maximum allowable total and individual harmonic current distortion limits for each VFD shall not exceed limits as set forth by IEEE 519 latest edition. If harmonic filters are required to meet these requirements, it is the responsibility of the VFD manufacturer to provide filter. It is the responsibility of the VFD manufacturer to design and manufacture any required filters. A preliminary detailed harmonic analysis must be submitted by the VFD manufacturer at bid time, which includes all harmonics to the 99th. Compliance shall be verified by the VFD manufacturer with field measurements of the harmonic distortion difference at the point of common coupling with and without VFD's operating.

The variable frequency control shall include transient voltage suppression to allow reliable operation on a typical industrial or commercial power distribution system.

- M. Bypass for fans on emergency power (E.P.) shall be both manual and automatic. When the VFD is in fault mode and the fan in smoke purge mode, the VFD shall automatically switch to bypass mode. A signal shall be provided under Section 23 09 00 to the VFD indicating that the fan is in smoke purge mode.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Contractor shall examine location where this equipment is to be installed and determine space conditions and notify construction manager in writing of conditions detrimental to proper and timely completion of the work.

- B. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install equipment where shown, in accordance with manufacturer's written instructions, and with recognized industry practices, to ensure that equipment comply with requirements and serve intended purposes.
- B. Coordinate with other work as necessary to interface installation of equipment with other components of systems.
- C. Check alignment and, where necessary (and possible), realign shafts of motors and equipment within tolerances recommended by manufacturer.

3.03 FIELD QUALITY CONTROL

- A. Upon completion of installation of equipment, energized with normal power source, test equipment to demonstrate compliance with requirement. When possible, field correct malfunctioning units, then retest to demonstrate compliance. Replace units which cannot be satisfactory corrected. Refer to Section 23 05 93 - Testing and Balancing.

END OF SECTION 23 82 13

SECTION 23 82 17 - COILS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. This Section is coordinate with and complementary to the General Conditions and Supplementary General Conditions of the Work, wherever applicable to Mechanical Work.
- B. Section 01 31 46 - Special Requirements for Mechanical and Electrical Work shall apply.

1.02 DESCRIPTION OF WORK

- A. The work includes the providing of all labor, materials, equipment, accessories, services and tests necessary to complete and made ready for operation by the Owner, all coils as shown on the drawings and hereinafter specified.

1.03 QUALITY ASSURANCE

- A. Manufacturing firms regularly engaged in manufacture of this material with characteristics and capacities required, whose products have been in satisfactory use in similar service for not less than 10 years.
- B. Provide product produced by the manufacturers, which are listed in Section 23 05 12 "Approved Manufacturer's List".
- C. Provide equipment whose performance, under specified conditions, is certified by the manufacturer.

1.04 SUBMITTALS

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work and submit shop drawings.

1.05 COORDINATION

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

1.06 GUARANTEE

- A. Refer to Section 01 31 46 - Special Requirements for Mechanical and Electrical Work.

2.01 WATER COILS

- A. All water coils shall be of the continuous flat plate fin type for minimum resistance to air flow. Fins shall be fabricated with drawn collars and shall be bonded to the tubes by a hydraulic expansion process. Openings in unit casing for coil connections to be sealed against leakage. Coil casings shall be not less than 16 gauge galvanized steel.
- B. Water coils shall be of the continuous tube type and circuited so as to be completely drainable by gravity through the supply header. Headers and tubes are to be fabricated of a seamless .024 inch thick wall copper tubing. Fins are to be .009 inch thick aluminum for heating coils and .005 inch thick copper for cooling coils. Supply and return headers shall be complete enclosed within the unit casing or external where called for on the drawing, and shall be equipped with steel nipples of extra length equipped with drain and vent plugs outside unit casing. Coils shall have capacities as called for and shall have the minimum number of rows as shown on the schedule.
- C. Cooling coils shall have ARI Certification.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Contractor shall examine location where this equipment is to be installed and determine space conditions and notify architect in writing of conditions detrimental to proper and timely completion of the work.
- B. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install coils where shown, in accordance with manufacturer's written instructions, and with recognized industry practices, to ensure that coils comply with requirements and serve intended purposes.
- B. Coordinate with other work as necessary to interface installation of coils with other components of systems.
- C. Check alignment and, where necessary (and possible), realign shafts of motors and coils within tolerances recommended by manufacturer.

3.03 FIELD QUALITY CONTROL

- A. Upon completion of installation of coils, test coils to demonstrate compliance with requirement. When possible, field correct malfunctioning units, then retest to

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demonstrate compliance. Replace units which cannot be satisfactorily corrected. Refer to Section 23 05 93 - Testing and Balancing.

END OF SECTION 23 82 17

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Electrical equipment coordination and installation.
 - 2. Sleeves for raceways and cables.
 - 3. Sleeve seals.
 - 4. Grout.
 - 5. Common electrical installation requirements.

1.03 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.04 SUBMITTALS

- A. Product Data: For sleeve seals.

1.05 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping and conduit installed at required slope.
 - 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 2 - PRODUCTS

2.01 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Sleeves for Rectangular Openings: Galvanized sheet steel.
 - 1. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
 - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.02 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space
 - 1. : Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Sealing Elements: EPDM, NBR interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 3. Pressure Plates: Carbon steel. Include two for each sealing element.

4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.03 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.01 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.02 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestopping system used are fabricated during construction of floor or wall.

- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 2 inches above finished floor level.
- G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.03 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.04 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping

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materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 26 05 00

**SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER
CONDUCTORS AND CABLES**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.03 DEFINITIONS

- A. VFC: Variable frequency controller.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Field quality-control reports.

PART 2 - PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide products by the following or comparable product approved equal:
 - 1. Alcan Products Corporation; Alcan Cable Division.
 - 2. Alpha Wire.

3. Belden Inc.
 4. Encore Wire Corporation.
 5. General Cable Technologies Corporation.
 6. Southwire Incorporated.
- C. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.
- D. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THW-2, Type THHN-2-THWN-2 and Type XHHW-2.
- E. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for metal-clad cable, Type MC with ground wire.
- F. VFC Cable:
1. Comply with UL 1277, UL 1685, and NFPA 70 for Type TC-ER cable.

2.02 CONNECTORS AND SPLICES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products by the following or comparable product approved equal:
1. AFC Cable Systems, Inc.
 2. Hubbell Power Systems, Inc.
 3. Ideal Industries, Inc.
 4. NSi Industries LLC.
 5. O-Z/Gedney; a brand of the EGS Electrical Group.
 6. Tyco Electronics.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.03 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Comply with New York City Electrical Code.

3.01 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger, except VFC cable, which shall be extra flexible stranded.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-2-THWN-2, single conductors in raceway, Metal-clad cable, Type MC.
- B. Exposed Branch Circuits: Type THHN-2-THWN-2, single conductors in raceway.
- C. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Metal-clad cable, Type MC.
- D. VFC Output Circuits: Type XHHW-2 in metal conduit.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.
- F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."
- G. Complete cable tray systems installation according to Section 260536 "Cable Trays for Electrical Systems" prior to installing conductors and cables.

3.04 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and 486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.

3.05 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.

3.06 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.07 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078400 "Penetration Firestopping."

3.08 FIELD QUALITY CONTROL

- A. Contractor shall field test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform the following tests and inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test all service entrance and all feeder conductors and conductors

feeding the following critical equipment and services for compliance with requirements:

- a. All conductors serving emergency and standby power system fuel-oil pumps and gas-booster pumps.
 - b. All conductors serving motors 3 hp and larger.
 - c. All conductors serving data center and computer room HVAC system equipment.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 3. Perform insulation resistance (megger) testing on all feeder and service conductors. Provide testing as per ANSI/NETA ATS-2013 (InterNational Electrical Testing Association Standard for Acceptance Testing Specifications) part 7.3.2. Test results shall be validated as per ANSI/NETA ATS-2013 Table 100.1. Applied potential shall be 1000VDC for a duration of one minute. Record on NETA standard forms or other forms approved by engineer. Identify specific feeder tested on each form including equipment name/reference at each end of feeder. Test equipment must measure values accurately up to a minimum of 100 meg-ohms (not a 'pass-fail' tester). Record actual meg-ohm readings below 100 meg-ohms. Submit completed test forms to engineer for review & approval.
- C. Test and Inspection Reports: Prepare a written report to record the following:
1. Procedures used.
 2. Results that comply with requirements.
 3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes grounding and bonding systems and equipment.

1.03 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, and New York City Electrical Code by a qualified testing agency and marked for intended location and application.

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 and New York City Electrical Code and marked for intended location and application.

2.02 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 4. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

- C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.03 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.
- C. Compression fittings that are installed with hydraulically operated tools, approved for the class type.
- D. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions. Only welded connectors for connections and splices concealed in concrete structure or buried in earth.
- E. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.04 ELECTRODES

- A. Ground Rods:
 - 1. Material: Copper-clad steel.
 - 2. Diameter: 3/4 inch (19 mm).
 - 3. Rods shall be not less than 120 inches (3050 mm) long.
- B. Ground Plates:
 - 1. Material: Copper.
 - 2. Thickness: 1/4 inch (min).
 - 3. Plates shall be not less than 24 inches by 24 inches.

2.05 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to

normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

- C. Grounding Bus: Install in electrical and telecommunication equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
 - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.
- D. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.
 - 5. Connections within Concrete Structure: Welded connectors.
 - 6. Lightning Protection System Connections: Welded connectors.

2.06 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.
- B. Provide copper grounding bar in all electric service rooms and at all telecom points-of-entry (PoE). Provide copper bar for intersystem bonding bus (if required). Provide copper grounding bar as otherwise indicated on plans.

2.07 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70 and New York City Electrical Code:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Single-phase motor and appliance branch circuits.
 - 5. Three-phase motor and appliance branch circuits.
 - 6. Flexible raceway runs.
 - 7. Armored and metal-clad cable runs.

8. Computer and rack-mounted electronic equipment circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.
- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- D. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- E. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.
- F. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

2.08 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, unless otherwise noted, and install in conduit.
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.

2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- D. Exothermic welding: Exothermically weld all grounding and bonding connections and splices that will be installed to be inaccessible, including underground and within concrete slabs, columns, walls, floor slabs, etc.
- E. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to **all** metal water service entrances to building. Connect grounding conductors to all metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve and utility meter(s).
- F. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.
- G. Grounding for New Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet (18 m) apart.
- H. Grounding for concrete reinforcing bars in new buildings: Connect grounding electrode system to reinforcing bars via exothermic weld.
- I. CORROSION PROTECTION
1. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture unless moisture is permanently excluded from junction of such materials.
 2. Use conductors with protective coatings where conditions would cause deterioration or corrosion of conductors.

2.09 FIELD QUALITY CONTROL

- A. Tests and Inspections:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.

2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81. Submit test report to Engineer for approval prior to closing up any related underground work.
- B. Grounding system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.
- D. Report measured ground resistances that exceed the following values:
1. Power and lighting equipment or system with capacity of 500 kVA and less: 10 ohms.
 2. Power and lighting equipment or system with capacity of 500 to 1000 kVA: 5 ohms.
 3. Power and lighting equipment or system with capacity more than 1000 kVA: 3 ohms.
 4. Power distribution units (PDUs) or panelboards serving electronic equipment: 1 ohm(s).
- E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
- B. Related Sections include the following:
 - 1. Section 260548 "Vibration and Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.03 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

1.04 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- C. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor as recommended by structural engineer.

1.05 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.
 - 2. Nonmetallic slotted support systems.

- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze hangers. Include Product Data for components.
 - 2. Steel slotted channel systems. Include Product Data for components.
 - 3. Equipment supports.

1.06 QUALITY ASSURANCE

- A. Comply with NFPA 70.

- B. Comply with New York City Electrical Code.

1.07 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.

PART 2 - PRODUCTS

2.01 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or comparable product approved equal:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. Thomas & Betts Corporation.
 - d. Unistrut; Tyco International, Ltd.

 - 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

 - 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.

4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 5. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following or comparable product approved equal:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following or comparable product approved equal:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Hilti Inc.
 - 3) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 4) MKT Fastening, LLC.
 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 6. Toggle Bolts: All-steel springhead type.

7. Hanger Rods: Threaded steel.

2.02 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.01 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted [or other] support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 1. Secure raceways and cables to these supports with two-bolt conduit clamps.

3.02 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 1. To Wood: Fasten with lag screws or through bolts.
 2. To New Concrete: Bolt to concrete inserts.
 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 4. To Existing Concrete: Expansion anchor fasteners.
 5. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.

6. To Light Steel: Sheet metal screws.
 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.03 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS D1.1/D1.1M.

3.04 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi (20.7-MPa) 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete." and Section 033000 "Miscellaneous Cast-in-Place Concrete."
- C. Anchor equipment to concrete base.
 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.05 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

- B. Touchup: Comply with requirements as described in architectural sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 05 29

SECTION 26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Metal conduits, tubing, and fittings.
 - 2. Nonmetal conduits, tubing, and fittings.
 - 3. Metal wireways and auxiliary gutters.
 - 4. Surface raceways.
 - 5. Boxes, enclosures, and cabinets.

1.03 DEFINITIONS

- A. ARC: Aluminum rigid conduit.
- B. GRC: Galvanized rigid steel, threaded conduit.
- C. IMC: Intermediate metal conduit.

1.04 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.05 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
 - 1. Structural members in paths of conduit groups with common supports.

2. HVAC, fire protection and plumbing items and architectural features in paths of conduit groups with common supports.
- B. Seismic Qualification Certificates: For enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
 4. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.
- C. Source quality-control reports.

PART 2 - PRODUCTS

2.01 METAL CONDUITS, TUBING, AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or comparable products approved equal:
1. Allied Tube & Conduit.
 2. O-Z/Gedney.
 3. Thomas & Betts Corporation.
 4. Western Tube and Conduit Corporation.
 5. Wheatland Tube Company.
- B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70 and New York City Electrical Code, by a qualified testing agency, and marked for intended location and application.
- C. GRC: Comply with ANSI C80.1 and UL 6.
- D. IMC: Comply with ANSI C80.6 and UL 1242.
- E. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit and IMC.
1. Comply with NEMA RN 1.
 2. Coating Thickness: 0.040 inch (1 mm), minimum.
- F. EMT: Comply with ANSI C80.3 and UL 797.
- G. FMC: Comply with UL 1; zinc-coated steel.

- H. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- I. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: Setscrew.
 - 2. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
 - 3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.
- J. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70 and New York City Electrical Code, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.02 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or comparable products approved equal:
 - 1. AFC Cable Systems, Inc.
 - 2. Anamet Electrical, Inc.
 - 3. Condux International, Inc.
 - 4. Lamson & Sessions; Carlon Electrical Products.
 - 5. RACO; Hubbell.
 - 6. Thomas & Betts Corporation.
- B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70 and New York City Electrical Code, by a qualified testing agency, and marked for intended location and application.
- C. ENT: Comply with NEMA TC 13 and UL 1653.
- D. LFNC: Comply with UL 1660.
- E. RTRC: Comply with UL 1684A and NEMA TC 14.
- F. Fittings for ENT: Comply with NEMA TC 3; match to conduit or tubing type and material.
- G. Fittings for LFNC: Comply with UL 514B.

2.03 METAL WIREWAYS AND AUXILIARY GUTTERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or comparable products approved equal:
 - 1. Cooper B-Line, Inc.
 - 2. Hoffman.
 - 3. Mono-Systems, Inc.
 - 4. Square D.

- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 and Type 3R, unless otherwise indicated, and sized according to NFPA 70 and New York City Electrical Code.
 - 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70 and New York City Electrical Code, by a qualified testing agency, and marked for intended location and application.

- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

- D. Finish: Manufacturer's standard enamel finish.

2.04 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or comparable products approved equal:
 - 1. Cooper Technologies Company; Cooper Crouse-Hinds.
 - 2. Hoffman.
 - 3. Milbank Manufacturing Co.
 - 4. O-Z/Gedney.
 - 5. Thomas & Betts Corporation.
 - 6. Wiremold / Legrand.

- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

- E. Metal Floor Boxes:
 - 1. Material: Cast metal.

2. Type: Fully adjustable.
 3. Shape: Rectangular or as required by field conditions, subject to engineer's approval.
 4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70 and New York City Electrical Code, by a qualified testing agency, and marked for intended location and application.
- F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.
- G. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb (32 kg).
1. Listing and Labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70 and New York City Electrical Code, by a qualified testing agency, and marked for intended location and application.
- H. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- J. Device Box Dimensions: As required by field conditions, subject to engineer's approval.
- K. Gangable boxes are allowed.
- L. Cabinets:
1. NEMA 250, Type 1 and Type 3R galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 2. Hinged door in front cover with flush latch and concealed hinge.
 3. Key latch to match panelboards.
 4. Metal barriers to separate wiring of different systems and voltage.
 5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.01 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed Conduit: GRC; except where IMC or GRC, PVC coated is specified in the Contract Drawings.

2. Concealed Conduit, Aboveground: IMC.
 3. Underground Conduit: Refer to Section 260543 – Underground Ducts and Raceways for Electrical Systems. Refer to utility specifications for all raceways under utility jurisdiction.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R].
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
 2. Exposed, Not Subject to Severe Physical Damage: EMT.
 3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
 - a. Loading dock.
 - b. Mechanical rooms.
 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 6. Damp or Wet Locations: GRC.
- C. Minimum Raceway Size: 3/4-inch (21-mm) trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 3. EMT: Use setscrew cast-metal fittings except below design flood elevation (DFE). Comply with NEMA FB 2.10.
 4. EMT below design flood elevation (DFE): Rainproof compression connectors. Comply with NEMA FB 2.10.
 5. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

3.02 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 and New York City Electrical Code limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- H. Support conduit within 12 inches (300 mm) of enclosures to which attached.
- I. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot (3-m) intervals.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Arrange raceways to keep a minimum of 2 inches (50 mm) of concrete cover in all directions.
 - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
 - 5. Change from ENT to GRC or IMC before rising above floor.
- J. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT, IMC, or flexr raceways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- K. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

- L. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- M. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- N. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- O. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- P. Surface Raceways:
 - 1. Install surface raceway with a minimum 2-inch (50-mm) radius control at bend points.
 - 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- Q. Install raceway sealing fittings at accessible locations according to NFPA 70 and New York City Electrical Code and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70 and New York City Electrical Code.
- R. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where an underground service raceway enters a building or structure.
 - 3. Where otherwise required by NFPA 70 and New York City Electrical Code.
- S. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- T. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
 2. Use LFMC in damp or wet locations not subject to severe physical damage.
- U. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- V. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
- W. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- X. Locate boxes so that cover or plate will not span different building finishes.
- Y. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- Z. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- AA. Set metal floor boxes level and flush with finished floor surface.
- BB. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.03 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.04 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078400 "Penetration Firestopping."

3.05 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26 05 33

**SECTION 26 05 44 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL
RACEWAYS AND CABLING**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Sleeve-seal systems.
 - 2. Sleeve-seal fittings.
 - 3. Grout.
 - 4. Silicone sealants.
- B. Related Requirements:
 - 1. Section 078400 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

PART 2 - PRODUCTS

2.01 SLEEVES

- A. Wall Sleeves:
 - 1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
- B. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- C. Sleeves for Rectangular Openings:
 - 1. Material: Galvanized sheet steel.
 - 2. Minimum Metal Thickness:

- a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
- b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.02 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Advance Products & Systems, Inc.
 - b. CALPICO, Inc.
 - c. Metraflex Company (The).
 - d. Pipeline Seal and Insulator, Inc.
 2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 3. Pressure Plates: Carbon steel.
 4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating of length required to secure pressure plates to sealing elements.

2.03 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

2.04 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.01 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

- E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.02 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.03 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 26 05 44

**SECTION 26 05 48 - VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL
SYSTEMS**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Isolation pads.
 - 2. Spring isolators.
 - 3. Restrained spring isolators.
 - 4. Channel support systems.
 - 5. Restraint cables.
 - 6. Hanger rod stiffeners.
 - 7. Anchorage bushings and washers.

- B. Related Sections include the following:

1.03 DEFINITIONS

- A. The IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.

1.04 PERFORMANCE REQUIREMENTS

A. Seismic-Restraint Loading:

- 1. Site Class as Defined in the New York City Building Code: 'C'.
- 1. Assigned Seismic Use Group and Building Category as Defined in the New York City Building Code:
 - Seismic Use Group: 'I'.
 - Seismic Design Category: 'B'.
 - a. Occupancy Importance Factor: 1.0.
 - b. Component Importance Factor (I_p): 1.0.

- c. Life-Safety System Component Importance Factor (I_p): 1.5
 - d. Component Response Modification and amplifier Factors: Shall be in accordance with ASCE 7-10, Section 13.6, for seismic coefficients for “Mechanical and Electrical Components”.
3. Design Spectral Response Acceleration at Short Period (0.2 Second).
 4. Design Spectral Response Acceleration at 1.0-Second Period.

1.05 ACTION SUBMITTALS

- A. Delegated-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators and seismic restraints.
 - a. Coordinate design calculations with wind-load calculations required for equipment mounted outdoors. Comply with requirements in other electrical Sections for equipment mounted outdoors.
 2. Indicate materials and dimensions and identify hardware, including attachment and anchorage devices.
 3. Field-fabricated supports.
 4. Seismic-Restraint Details:
 - a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
 - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
 - c. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

1.06 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show coordination of seismic bracing for electrical components with other systems and equipment in the vicinity, including other supports and seismic restraints.

- B. Qualification Data: For testing agency.
- C. Field quality-control test reports.

1.07 QUALITY ASSURANCE

- A. , with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.
- D. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 VIBRATION ISOLATORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following or comparable products approved equal:
 - 1. Ace Mountings Co., Inc.
 - 2. Amber/Booth Company, Inc.
 - 3. Isolation Technology, Inc.
 - 4. Kinetics Noise Control.
 - 5. Vibration Eliminator Co., Inc.
 - 6. Vibration Isolation.
 - 7. Vibration Mountings & Controls, Inc.
- B. Pads: Arrange in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
- C. Spring Isolators: Freestanding, laterally stable, open-spring isolators.

1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch- (6-mm-) thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig (3447 kPa).
 6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.
- D. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.
1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 2. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.
 3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.02 SEISMIC-RESTRAINT DEVICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following or comparable products approved equal:
1. Cooper B-Line, Inc.; a division of Cooper Industries.
 2. Hilti Inc.
 3. Loos & Co.; Seismic Earthquake Division.
 4. Mason Industries.
 5. TOLCO Incorporated; a brand of NIBCO INC.
 6. Unistrut; Tyco International, Ltd.
- B. General Requirements for Restraint Components: Rated strengths, features, and application requirements shall be as defined in reports by an agency acceptable to authorities having jurisdiction.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
- C. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.
- D. Restraint Cables: ASTM A 603 galvanized-steel cables with end connections made of steel assemblies with thimbles, brackets, swivels, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.
- E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod. Do not weld stiffeners to rods.
- F. Bushings for Floor-Mounted Equipment Anchor: Neoprene bushings designed for rigid equipment mountings and matched to type and size of anchors and studs.
- G. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings and matched to type and size of attachment devices.
- H. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
- I. Mechanical Anchor: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchors with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

2.03 FACTORY FINISHES

- A. Finish: Manufacturer's standard prime-coat finish ready for field painting.
- B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
 1. Powder coating on springs and housings.
 2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
 3. Baked enamel or powder coat for metal components on isolators for interior use.
 4. Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

3.01 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 APPLICATIONS

- A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.
- B. Hanger Rod Stiffeners: Install hanger rod stiffeners where required to prevent buckling of hanger rods due to seismic forces.
- C. Strength of Support and Seismic-Restraint Assemblies: Select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.03 SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Equipment and Hanger Restraints:
 - 1. Install restrained isolators on electrical equipment.
 - 2. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch (3.2 mm).
 - 3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- B. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- C. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- D. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.04 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless post-connection testing has been approved), and with at least seven days' advance notice.
 3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
 5. Test to 90 percent of rated proof load of device.

6. Measure isolator restraint clearance.
 7. Measure isolator deflection.
 8. Verify snubber minimum clearances.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

3.06 ADJUSTING

- A. Adjust isolators after isolated equipment is at operating weight.
- B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
- C. Adjust active height of spring isolators.
- D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 26 05 48

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Identification for conductors.
 - 4. Underground-line warning tape.
 - 5. Warning labels and signs.
 - 6. Instruction signs.
 - 7. Equipment identification labels.
 - 8. Miscellaneous identification products.

1.03 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels. Refer to the drawings for equipment identifications for electrical equipment.

1.04 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with New York City Electrical Code.
- D. Comply with New York City Building Code.

- E. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- F. Comply with ANSI Z535.4 for safety signs and labels.

1.05 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

- A. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- B. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- C. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.

2.02 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches (50 mm) wide; compounded for outdoor use.

2.03 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.
- B. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil- (0.08-mm-) thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather-

and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the cable diameter such that the clear shield overlaps the entire printed legend.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
- C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of cable it identifies and to stay in place by gripping action.

2.04 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.
- B. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil- (0.08-mm-) thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the conductor diameter such that the clear shield overlaps the entire printed legend.
- C. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve with diameter sized to suit diameter of conductor it identifies and to stay in place by gripping action.
- D. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.05 FLOOR MARKING TAPE

- A. 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.

2.06 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Metal-Backed, Butyrate Warning Signs:
 1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application.
 2. 1/4-inch (6.4-mm) grommets in corners for mounting.
 3. Nominal size, 10 by 14 inches (250 by 360 mm).

- C. Warning label and sign shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

2.07 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
 - 1. Engraved legend with white letters on black face.
 - 2. Punched or drilled for mechanical fasteners.
 - 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
- B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).
- C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

2.08 EQUIPMENT IDENTIFICATION LABELS

- A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).
- B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.
- C. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).
- D. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).
- E. Stenciled Legend: In nonfading, waterproof, paint. Minimum letter height shall be 1 inch (25 mm).

2.09 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black except where used for color-coding.

- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black.

- C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, self-locking.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 7000 psi (48.2 MPa).
 - 3. UL 94 Flame Rating: 94V-0.
 - 4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
 - 5. Color: Black.

2.10 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Verify identity of each item before installing identification products.

- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- E. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
- F. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In Spaces Handling Environmental Air: Plenum rated.
- G. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.02 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Identify with self-adhesive vinyl tape applied in bands. Install labels at 30-foot (10-m) maximum intervals.
- B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. Emergency Power.
 - 2. Power.
- C. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- D. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

- E. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
 - 1. Limit use of underground-line warning tape to direct-buried cables.
 - 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- F. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- G. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Metal-backed, butyrate warning signs.
 - 1. Comply with 29 CFR 1910.145.
 - 2. Identify system voltage with black letters on an orange background.
 - 3. Apply to exterior of door, cover, or other access.
 - 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
- H. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- I. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer.
- J. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 1. Labeling Instructions:
 - a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.

- b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
2. Equipment to Be Labeled:
- a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.
 - c. Emergency system boxes and enclosures.
 - d. Enclosed switches.
 - e. Enclosed circuit breakers.
 - f. Enclosed controllers.
 - g. Variable-speed controllers.
 - h. Remote-controlled switches, dimmer modules, and control devices.
 - i. Power-generating units.
 - j. Monitoring and control equipment.

END OF SECTION 26 05 53

**SECTION 26 05 72 - OVERCURRENT PROTECTIVE DEVICE
SHORT-CIRCUIT STUDY**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes a computer-based, fault-current study to determine the minimum interrupting capacity of circuit protective devices.

1.03 DEFINITIONS

- A. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.
- B. One-Line Diagram: A diagram which shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.
- C. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.
- D. SCCR: Short-circuit current rating.
- E. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

1.04 ACTION SUBMITTALS

- A. Product Data: For computer software program to be used for studies.
- B. Other Action Submittals: Submit the following after the approval of system protective devices submittals. Submittals shall be in digital form.
 - 1. Short-circuit study input data, including completed computer program input data sheets.

2. Short-circuit study and equipment evaluation report; signed, dated, and sealed by a qualified professional engineer.
 - a. Submit study report for action prior to receiving final approval of the distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Engineer for preliminary submittal of sufficient study data to ensure that the selection of devices and associated characteristics is satisfactory.
 - b. Revised single-line diagram, reflecting field investigation results and results of short-circuit study.
 - c. This study may be combined with studies required by specification sections 260573 if required.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Field Adjusting Agency.
- B. Product Certificates: For short-circuit study software, certifying compliance with IEEE 399.

1.06 QUALITY ASSURANCE

- A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are unacceptable.
- B. Short-Circuit Study Software Developer Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
 1. The computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.
- C. Short-Circuit Study Specialist Qualifications: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.
- D. Field Adjusting Agency Qualifications: An independent agency, with the experience and capability to adjust overcurrent devices and to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

2.01 COMPUTER SOFTWARE

- A. Software Developers:
 - 1. Eaton CYME International
 - 2. ESA Inc.
 - 3. Operation Technology, Inc.
 - 4. Power Analytics, Corporation
 - 5. SKM Systems Analysis, Inc
- B. Comply with IEEE 399 and IEEE 551.
- C. Analytical features of fault-current-study computer software program shall have the capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.
- D. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output.

2.02 SHORT-CIRCUIT STUDY REPORT CONTENTS

- A. Executive summary.
- B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of the computer printout.
- C. One-line diagram, showing the following:
 - 1. Protective device designations and ampere ratings.
 - 2. Cable size and lengths.
 - 3. Transformer kilovolt ampere (kVA) and voltage ratings.
 - 4. Motor and generator designations and kVA ratings.
 - 5. Switchgear, switchboard, motor-control center, and panelboard designations.
- D. Comments and recommendations for system improvements, where needed.
- E. Protective Device Evaluation:
 - 1. Evaluate equipment and protective devices and compare to short-circuit ratings.
 - 2. Tabulations of circuit breaker, fuse, and other protective device ratings versus calculated short-circuit duties.
 - 3. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.

4. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in the standards to 1/2-cycle symmetrical fault current.
 5. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
- F. Short-Circuit Study Input Data: As described in "Power System Data" Article.
- G. Short-Circuit Study Output:
1. Low-Voltage Fault Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
 - a. Voltage.
 - b. Calculated fault-current magnitude and angle.
 - c. Fault-point X/R ratio.
 - d. Equivalent impedance.
 2. Momentary Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
 - a. Voltage.
 - b. Calculated symmetrical fault-current magnitude and angle.
 - c. Fault-point X/R ratio.
 - d. Calculated asymmetrical fault currents:
 - 1) Based on fault-point X/R ratio.
 - 2) Based on calculated symmetrical value multiplied by 1.6.
 - 3) Based on calculated symmetrical value multiplied by 2.7.
 3. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
 - a. Voltage.
 - b. Calculated symmetrical fault-current magnitude and angle.
 - c. Fault-point X/R ratio.
 - d. No AC Decrement (NACD) ratio.
 - e. Equivalent impedance.
 - f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
 - g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.

3.01 EXAMINATION

- A. Obtain all data necessary for the conduct of the study.
 - 1. Verify completeness of data supplied on the one-line diagram. Call any discrepancies to the attention of Engineer.
 - 2. For equipment provided that is Work of this Project, use characteristics submitted under the provisions of action submittals and information submittals for this Project.
 - 3. For relocated equipment and that which is existing to remain, obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers. The qualifications of technicians and engineers shall be qualified as defined by NFPA 70E.

- B. Gather and tabulate the following input data to support the short-circuit study. Comply with recommendations in IEEE 551 as to the amount of detail that is required to be acquired in the field. Field data gathering shall be under the direct supervision and control of the engineer in charge of performing the study and shall be by the engineer or its representative who holds NETA ETT Level III certification or NICET Electrical Power Testing Level III certification.
 - 1. Product Data for Project's overcurrent protective devices involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
 - 2. Obtain electrical power utility impedance at the service.
 - 3. Power sources and ties.
 - 4. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
 - 5. For reactors, provide manufacturer and model designation, voltage rating, and impedance.
 - 6. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip, SCCR, current rating, and breaker settings.
 - 7. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
 - 8. Motor horsepower and NEMA MG 1 code letter designation.
 - 9. Cable sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).

3.02 SHORT-CIRCUIT STUDY

- A. Perform study following the general study procedures contained in IEEE 399.

- B. Calculate short-circuit currents according to IEEE 551.
- C. Base study on the device characteristics supplied by device manufacturer.
- D. The extent of the electrical power system to be studied is the complete electrical distribution system unless otherwise indicated on Drawings.
- E. Begin short-circuit current analysis at the service, extending down to the system overcurrent protective devices as follows:
 - 1. To normal system low-voltage load buses where fault current is 10 kA or less.
 - 2. Exclude equipment rated 240-V ac or less when supplied by a single transformer rated less than 75 kVA and having impedance of 4.5% or greater.
- F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.
- G. The calculations shall include the ac fault-current decay from induction motors, synchronous motors, and asynchronous generators and shall apply to low- and medium-voltage, three-phase ac systems. The calculations shall also account for the fault-current dc decrement, to address the asymmetrical requirements of the interrupting equipment.
 - 1. For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.
- H. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault at each of the following:
 - 1. Incoming switchgear and service switches.
 - 2. Unit substation primary and secondary terminals.
 - 3. Low-voltage switchgear.
 - 4. Motor-control centers.
 - 5. Control panels.
 - 6. Standby generators and automatic transfer switches.
 - 7. Distribution panelboards.
 - 8. Branch circuit panelboards.
 - 9. Switchboards
 - 10. Disconnect switches.
 - 11. All overcurrent protection of systems rated 1000 volts or greater.

3.03 ADJUSTING

- A. Make minor modifications to equipment as required to accomplish compliance with short-circuit study.

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PROJECT #C1536

END OF SECTION 26 05 72

**SECTION 26 05 73 - OVERCURRENT PROTECTIVE DEVICE
COORDINATION STUDY**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes computer-based, overcurrent protective device coordination studies to determine overcurrent protective devices and to determine overcurrent protective device settings for selective tripping.
 - 1. Study results shall be used to determine coordination of series-rated devices.

1.03 DEFINITIONS

- A. Coordination (Selective): Localization of an overcurrent condition to restrict outages to the circuit or equipment affected, accomplished by the choice of overcurrent protective devices and their ratings or settings. Two overcurrent protective devices shall be deemed selectively coordinated if their respective time-current characteristic curves do not intersect at a time of 0.1 seconds (6 cycles on 60 Hz systems) or longer.
- B. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.
- C. OCPD: Overcurrent protective device.
- D. One-Line Diagram: A diagram which shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used therein.
- E. Protective Device: A device that senses when an abnormal current flow exists and then removes the affected portion from the system.
- F. SCCR: Short-circuit current rating.
- G. Service: The conductors and equipment for delivering electric energy from the serving utility to the wiring system of the premises served.

1.04 ACTION SUBMITTALS

- A. Product Data: For computer software program to be used for studies.
- B. Other Action Submittals: Submit the following after the approval of system protective devices submittals. Submittals shall be in digital form.
 - 1. Coordination-study input data, including completed computer program input data sheets.
 - 2. Study and equipment evaluation reports.
 - 3. Overcurrent protective device coordination study report; signed, dated, and sealed by a qualified professional engineer.
 - a. Submit study report for action prior to receiving final approval of the distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Engineer for preliminary submittal of sufficient study data to ensure that the selection of devices and associated characteristics is satisfactory.
 - b. This study may be combined with studies required by specification sections 260572 if required.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Field Adjusting Agency.
- B. Product Certificates: For overcurrent protective device coordination study software, certifying compliance with IEEE 399.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For the overcurrent protective devices to include in emergency, operation, and maintenance manuals.
 - 1. Include the following:
 - a. The following parts from the Protective Device Coordination Study Report:
 - 1) One-line diagram.
 - 2) Protective device coordination study.
 - 3) Time-current coordination curves.
 - b. Power system data.

1.07 QUALITY ASSURANCE

- A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are unacceptable.
- B. Coordination Study Software Developer Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
 - 1. The computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.
- C. Coordination Study Specialist Qualifications: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.
- D. Field Adjusting Agency Qualifications: An independent agency, with the experience and capability to adjust overcurrent devices and to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 COMPUTER SOFTWARE DEVELOPERS

- A. Software Developers:
 - 1. Eaton CYME International
 - 2. ESA Inc.
 - 3. Operation Technology, Inc.
 - 4. Power Analytics, Corporation
 - 5. SKM Systems Analysis, Inc
- B. Comply with IEEE 242 and IEEE 399.
- C. Analytical features of device coordination study computer software program shall have the capability to calculate "mandatory," "very desirable," and "desirable" features as listed in IEEE 399.
- D. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots.

1. Optional Features:
 - a. Arcing faults.
 - b. Simultaneous faults.
 - c. Explicit negative sequence.
 - d. Mutual coupling in zero sequence.

2.02 PROTECTIVE DEVICE COORDINATION STUDY REPORT CONTENTS

- A. Executive summary.
- B. Study descriptions, purpose, basis and scope. Include case descriptions, definition of terms and guide for interpretation of the computer printout.
- C. One-line diagram, showing the following:
 1. Protective device designations and ampere ratings.
 2. Cable size and lengths.
 3. Transformer kilovolt ampere (kVA) and voltage ratings.
 4. Motor and generator designations and kVA ratings.
 5. Switchgear, switchboard, motor-control center, and panelboard designations.
- D. Study Input Data: As described in "Power System Data" Article.
- E. Short-Circuit Study Output: As specified in "Short-Circuit Study Output" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260572 "Overcurrent Protective Device Short-Circuit Study."
- F. Protective Device Coordination Study:
 1. Report recommended settings of protective devices, ready to be applied in the field. Use manufacturer's data sheets for recording the recommended setting of overcurrent protective devices when available.
 - a. Phase and Ground Relays:
 - 1) Device tag.
 - 2) Relay current transformer ratio and tap, time dial, and instantaneous pickup value.
 - 3) Recommendations on improved relaying systems, if applicable.
 - b. Circuit Breakers:
 - 1) Adjustable pickups and time delays (long time, short time, ground).
 - 2) Adjustable time-current characteristic.
 - 3) Adjustable instantaneous pickup.
 - 4) Recommendations on improved trip systems, if applicable.

- c. Fuses: Show current rating, voltage, and class.
- G. Time-Current Coordination Curves: Determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:
1. Device tag and title, one-line diagram with legend identifying the portion of the system covered.
 2. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.
 3. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
 4. Plot the following listed characteristic curves, as applicable:
 - a. Power utility's overcurrent protective device.
 - b. Medium- and low-voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
 - c. Low-voltage equipment circuit-breaker trip devices, including manufacturer's tolerance bands.
 - d. Cables and conductors damage curves.
 - e. Ground-fault protective devices.
 - f. Motor-starting characteristics and motor damage points.
 - g. The largest feeder circuit breaker in each motor-control center and panelboard.
 5. Series rating on equipment allows the application of two series interrupting devices for a condition where the available fault current is greater than the interrupting rating of the downstream equipment. Both devices share in the interruption of the fault and selectivity is sacrificed at high fault levels. Maintain selectivity for tripping currents caused by overloads.
 6. Provide adequate time margins between device characteristics such that selective operation is achieved.
 7. Comments and recommendations for system improvements.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance. Devices to be coordinated are indicated on Drawings.

1. Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to coordination study may not be used in study.

3.02 PROTECTIVE DEVICE COORDINATION STUDY

- A. Comply with IEEE 242 for calculating short-circuit currents and determining coordination time intervals.
- B. Comply with IEEE 399 for general study procedures.
- C. The study shall be based on the device characteristics supplied by device manufacturer.
- D. The extent of the electrical power system to be studied includes the entire electrical distribution system, unless otherwise indicated on Drawings.
- E. Begin analysis at the service, extending down to the system overcurrent protective devices as follows:
 1. To normal system low-voltage load buses where fault current is 10 kA or less.
- F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.
- G. Selective coordination between overcurrent protective devices shall be required to be achieved as follows:
 1. Normal (utility) power system(s)
 - a. Where the service OCPD rating or setting is over 601 amps, include this OCPD and all OCPDs in the next level downstream.
 - b. Where a second level OCPD has the same rating or setting as the service OCPD, include the third level OCPDs and the two upstream OCPDs in the study.
 - c. Note that selective coordination shall not be required between two OCPDs in series with one another when no loads are connected in parallel with the downstream device.
 - d. Note that selective coordination shall not be required between transformer primary and secondary OCPDs, where only one OCPD exists on the transformer secondary.
 2. Emergency and legally required standby power system(s): all supply-side OCPDs and all OCPDs on the load side of transfer switches and other transfer equipment.
 3. Ground-fault protection devices for health-care facilities as per Article 517 of the applicable electrical code.
 4. Where otherwise indicated on the Drawings
- H. Motor Protection:

1. Select protection for low-voltage motors according to IEEE 242 and NFPA 70.
 2. Select protection for motors served at voltages more than 600 V according to IEEE 620.
- I. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and protection recommendations in IEEE 242. Demonstrate that equipment withstands the maximum short-circuit current for a time equivalent to the tripping time of the primary relay protection or total clearing time of the fuse. To determine temperatures that damage insulation, use curves from cable manufacturers or from listed standards indicating conductor size and short-circuit current.
- J. Generator Protection: Select protection according to manufacturer's written recommendations and to IEEE 242.
- K. The calculations shall include the ac fault-current decay from induction motors, synchronous motors, and asynchronous generators and shall apply to low- and medium-voltage, three-phase ac systems. The calculations shall also account for the fault-current dc decrement, to address the asymmetrical requirements of the interrupting equipment.
1. For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.
- L. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault and single line-to-ground fault at each of the following:
1. Electric utility's supply termination point.
 2. Incoming switchgear and service switches.
 3. Unit substation primary and secondary terminals.
 4. Low-voltage switchgear.
 5. Motor-control centers.
 6. Control panels.
 7. Standby generators and automatic transfer switches.
 8. Distribution panelboards.
 9. Branch circuit panelboards.
 10. Switchboards
 11. Disconnect switches.
 12. All overcurrent protection of systems rated 1000 volts or greater.
- M. Protective Device Evaluation:
1. Evaluate equipment and protective devices and compare to short-circuit ratings.
 2. Adequacy of switchgear, motor-control centers, and panelboard bus bars to withstand short-circuit stresses.
 3. Any application of series-rated devices shall be recertified, complying with requirements in NFPA 70.

3.03 POWER SYSTEM DATA

- A. Obtain all data necessary for the conduct of the overcurrent protective device study.
1. Verify completeness of data supplied in the one-line diagram on Drawings. Call discrepancies to the attention of Engineer.
 2. For new equipment, use characteristics submitted under the provisions of action submittals and information submittals for this Project.
 3. For existing equipment, whether or not relocated obtain required electrical distribution system data by field investigation and surveys, conducted by qualified technicians and engineers. The qualifications of technicians and engineers shall be qualified as defined by NFPA 70E.
- B. Gather and tabulate the following input data to support coordination study. The list below is a guide. Comply with recommendations in IEEE 551 for the amount of detail required to be acquired in the field. Field data gathering shall be under the direct supervision and control of the engineer in charge of performing the study and shall be by the engineer or its representative who holds NETA ETT Level III certification or NICET Electrical Power Testing Level III certification.
1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
 2. Electrical power utility impedance at the service.
 3. Power sources and ties.
 4. Short-circuit current at each system bus, three phase and line-to-ground.
 5. Full-load current of all loads.
 6. Voltage level at each bus.
 7. For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
 8. For reactors, provide manufacturer and model designation, voltage rating, and impedance.
 9. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
 10. Generator short-circuit current contribution data, including short-circuit reactance, rated kVA, rated voltage, and X/R ratio.
 11. For relays, provide manufacturer and model designation, current transformer ratios, potential transformer ratios, and relay settings.
 12. Maximum demands from service meters.
 13. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
 14. Motor horsepower and NEMA MG 1 code letter designation.
 15. Low-voltage cable sizes, lengths, number, conductor material, and conduit material (magnetic or nonmagnetic).

16. Medium-voltage cable sizes, lengths, conductor material, and cable construction and metallic shield performance parameters.
17. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram, showing the following:
 - a. Special load considerations, including starting inrush currents and frequent starting and stopping.
 - b. Transformer characteristics, including primary protective device, magnetic inrush current, and overload capability.
 - c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
 - d. Generator thermal-damage curve.
 - e. Ratings, types, and settings of utility company's overcurrent protective devices.
 - f. Special overcurrent protective device settings or types stipulated by utility company.
 - g. Time-current-characteristic curves of devices indicated to be coordinated.
 - h. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
 - i. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
 - j. Panelboards, switchboards, motor-control center ampacity, and SCCR in amperes rms symmetrical.
 - k. Identify series-rated interrupting devices for a condition where the available fault current is greater than the interrupting rating of the downstream equipment. Obtain device data details to allow verification that series application of these devices complies with NFPA 70 and UL 489 requirements.

3.04 FIELD ADJUSTING

- A. Adjust relay and protective device settings according to the recommended settings provided by the coordination study. Field adjustments shall be completed by the engineering service division of the equipment manufacturer under the Startup and Acceptance Testing contract portion.
- B. Make minor modifications to equipment as required to accomplish compliance with short-circuit and protective device coordination studies.
- C. Testing and adjusting shall be by a full-time employee of the Field Adjusting Agency, who holds NETA ETT Level III certification or NICET Electrical Power Testing Level III certification.

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters. Perform NETA tests and inspections for all adjustable overcurrent protective devices.

END OF SECTION 26 05 73

SECTION 26 09 23 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Time switches.
 - 2. Photoelectric switches.
 - 3. Indoor occupancy sensors.
- B. Related Requirements:
 - 1. Section 262726 "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show project specific installation details for occupancy and light-level sensors.
 - 1. Interconnection diagrams showing field-installed wiring.
 - 2. Include diagrams for power, signal, and control wiring.

1.04 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

2.01 TIME SWITCHES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following, or comparable products approved equal:
1. Cooper Industries, Inc.
 2. Leviton Mfg. Company Inc.
 3. NSi Industries LLC; TORK Products.
 4. Tyco Electronics; ALR Brand.
- B. Electronic Time Switches: Solid state, programmable, with alphanumeric display; complying with UL 917.
1. Listed and labeled as defined in NFPA 70 and New York City Electrical Code, by a qualified testing agency, and marked for intended location and application.
 2. Contact Configuration: SPST.
 3. Contact Rating: 30-A inductive or resistive, 240-V ac.
 4. Astronomic Time: All channels.
 5. Automatic daylight savings time changeover.
 6. Battery Backup: Not less than seven days reserve, to maintain schedules and time clock.

2.02 OUTDOOR PHOTOELECTRIC SWITCHES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following or comparable products approved equal:
1. Cooper Industries, Inc.
 2. Intermatic, Inc.
 3. NSi Industries LLC; TORK Products.
 4. Tyco Electronics; ALR Brand.
- B. Description: Solid state, with SPST dry contacts rated for 1800-VA tungsten or 1000-VA inductive to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A.
1. Listed and labeled as defined in NFPA 70 and New York City Electrical Code, by a qualified testing agency, and marked for intended location and application.
 2. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lux), with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of the photocell to prevent fixed light sources from causing turn-off.
 3. Time Delay: Fifteen second minimum, to prevent false operation.

4. Surge Protection: Metal-oxide varistor.
5. Mounting: Twist lock complies with NEMA C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.

2.03 INDOOR OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following or comparable products approved equal:
 1. Bryant Electric; a Hubbell company.
 2. Leviton Mfg. Company Inc.
 3. Lightolier Controls.
 4. Lutron Electronics Co., Inc.
 5. Osram Licht AG, Encelium Brand
 6. Sensor Switch, Inc.
 7. Watt Stopper.
- B. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.
 1. Listed and labeled as defined in NFPA 70 and New York City Electrical Code, by a qualified testing agency, and marked for intended location and application.
 2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
 4. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70 and New York City Electrical Code.
 5. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted through a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
 7. Bypass Switch: Override the "on" function in case of sensor failure.
 8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc (21.5 to 2152 lux); turn lights off when selected lighting level is present.

- C. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.
 - 1. Sensitivity Adjustment: Separate for each sensing technology and adjustable from 100% to 0% sensitivity.
 - 2. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm) and detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
 - 3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.

2.04 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or comparable products approved equal:
 - 1. Bryant Electric; a Hubbell company.
 - 2. Leviton Mfg. Company Inc.
 - 3. Lightolier Controls.
 - 4. Lutron Electronics Co., Inc.
 - 5. Osram Licht AG, Encelium Brand
 - 6. Sensor Switch, Inc.
 - 7. Watt Stopper.
- B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.
 - 1. Listed and labeled as defined in NFPA 70 and New York City Electrical Code, by a qualified testing agency, and marked for intended location and application.
 - 2. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F (0 to 49 deg C).
 - 3. Switch Rating: Not less than 800-VA fluorescent at 120 V, 1200-VA fluorescent at 277 V, and 800-W incandescent.
- C. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.
 - 1. Sensitivity Adjustment: Separate for each sensing technology and adjustable from 100% to 0% sensitivity.

2. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm) and detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.

2.05 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.01 SENSOR INSTALLATION

- A. Sensor layout shown on plans is diagrammatic. Contractor shall provide complete sensor coverage of spaces as required to provide a 100% fully-functional system at no added costs for additional sensors. Contractor shall adjust quantity of all sensors, including occupancy sensor, vacancy sensor, daylight sensor, photo-cell and any additional sensors as required and submit sensor layout shop drawings to engineer for review and approval.
- B. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- C. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.02 WIRING INSTALLATION

- A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch (13 mm).
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.03 IDENTIFICATION

- A. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."
 - 1. Identify controlled circuits in lighting contactors.
 - 2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.
- B. Label time switches and contactors with a unique designation.

3.04 FIELD QUALITY CONTROL

- A. Contractor shall test and inspect components, assemblies prior to installation, and after equipment installations, including connections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative, if required:
 - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Prepare test and inspection reports.

3.05 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied

conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.
3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

3.06 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 26 09 23

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Distribution panelboards.
 - 2. Lighting and appliance branch-circuit panelboards.
 - 3. Load centers.

1.03 DEFINITIONS

- A. SVR: Suppressed voltage rating.
- B. TVSS: Transient voltage surge suppressor.
- C. SPD: Surge protection device.

1.04 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - 1. The term "withstand" means" the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of panelboard, switching and overcurrent protective device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types and details for types other than NEMA 250, Type 1.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and overcurrent protective devices.
5. Include evidence of NRTL listing for series rating of installed devices.
6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
7. Include wiring diagrams for power, signal, and control wiring.

1.06 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Certificates: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces defined in Section 260548 "Vibration and Seismic Controls for Electrical Systems." Include the following:
 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- B. Field Quality-Control Reports:
 1. Test procedures used.
 2. Test results that comply with requirements.
 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- C. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

1.07 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals include the following:
 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

1.08 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Keys: Two spares for each type of panelboard cabinet lock.
 - 2. Circuit Breakers Including GFCI and Ground Fault Equipment Protection (GFEP) Types: Two spares of each size for each panelboard.
 - 3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.09 QUALITY ASSURANCE

- A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Comply with NEMA PB 1.
- E. Comply with NFPA 70.
- F. Comply with New York City Electrical Code.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.
- B. Handle and prepare panelboards for installation according to NECA 407 and NEMA PB 1.

1.11 PROJECT CONDITIONS

- 1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not exceeding minus 22 deg F (minus 30 deg C) to plus 104 deg F (plus 40 deg C).
 - b. Altitude: Not exceeding 6600 feet (2000 m).
- B. Service Conditions: NEMA PB 1, usual service conditions, as follows:
 1. Ambient temperatures within limits specified.
 2. Altitude not exceeding 6600 feet (2000 m).
- C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 1. Notify Construction Manager and Owner no fewer than 7 business days in advance of proposed interruption of electric service.
 2. Do not proceed with interruption of electric service without Construction Manager's and Owner's written permission.
 3. Comply with NFPA 70E.

1.12 COORDINATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.13 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: Five years from date of Substantial Completion.

2.01 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Section 260548 "Vibration and Seismic Controls for Electrical Systems."
- B. Enclosures: Flush- and surface-mounted cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - b. Outdoor Locations: NEMA 250, Type 3R, unless otherwise indicated.
 - c. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
 - 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
 - 3. Finishes:
 - a. Panels and Trim: Galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - b. Back Boxes: Galvanized steel.
 - 4. Directory Card: Inside panelboard door, mounted in metal holder frame with transparent card protector.
- C. Incoming Mains Location: Top and bottom, coordinate with field conditions.
- D. Phase, Neutral, and Ground Buses:
 - 1. Material: Hard-drawn copper, 98 percent conductivity.
 - 2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
 - 3. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box, where specifically indicated.
- E. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 1. Material: Hard-drawn copper, 98 percent conductivity.
 - 2. Main and Neutral Lugs: Mechanical or compression type.
 - 3. Ground Lugs and Bus-Configured Terminators: Mechanical or compression type.
 - 4. Feed-Through Lugs: Mechanical or compression type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
 - 5. Subfeed (Double) Lugs: Mechanical or compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.

- F. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- G. -circuit current available at terminals.

2.02 DISTRIBUTION PANELBOARDS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following or compatible products approved equal:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Schneider Electric.
- B. Panelboards: NEMA PB 1, power and feeder distribution type.
- C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
 - 1. For doors more than 36 inches (914 mm) high, provide two latches, keyed alike.
- D. Mains: As specified on drawings.
- E. Branch Overcurrent Protective Devices: Fused switches, unless otherwise noted.

2.03 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following or compatible products approved equal:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Schneider Electric.
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Mains: As indicated on the drawings.
- D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

- F. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

2.04 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following or compatible products approved equal:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.

- B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
 - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 - 3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replaceable electronic trip; and the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time time adjustments.
 - c. Ground-fault pickup level, time delay, and I^2t response.
 - 4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
 - 5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
 - 6. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
 - 7. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
 - d. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

- e. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
- f. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage with field-adjustable 0.1- to 0.6-second time delay.
- g. Multipole units enclosed in a single housing or factory assembled to operate as a single unit.
- h. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Receive, inspect, handle, and store panelboards according to NECA 407 and NEMA PB 1.1, whichever is more stringent.
- B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install panelboards and accessories according to NECA 407 and NEMA PB 1.1, whichever is more stringent.
- B. Retain first paragraph below for floor-mounted distribution panelboards. Even if floor mounted, all panelboard cabinets must still be securely attached to a vertical wall or surface.
- C. Equipment Mounting: Install panelboards on concrete bases, 4-inch (100-mm) nominal thickness. Comply with requirements for concrete base specified in Section 033000 "Cast-in-Place Concrete and or Section 033000 "Miscellaneous Cast-in-Place Concrete.
 - 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around full perimeter of base.
 - 2. For panelboards, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 4. Install anchor bolts to elevations required for proper attachment to panelboards.

5. Attach panelboard to the vertical finished or structural surface behind the panelboard.
- D. Comply with mounting and anchoring requirements specified in Section 260548 "Vibration and Seismic Controls for Electrical Systems."
- E. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- F. Install overcurrent protective devices and controllers not already factory installed.
- G. Install filler plates in unused spaces.
- H. Stub four 1-inch (27-GRC) empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch (27-GRC) empty conduits into raised floor space or below slab not on grade.
- I. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.
- J. Comply with NECA 1.

3.03 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 260553 "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.04 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 1. Contractor shall inspect components, assemblies, and equipment installations, including connections.

- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.

- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 3. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Instruments and Equipment:
 - 1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

- D. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.05 ADJUSTING

- A. Adjust moving parts and operable component to function smoothly and lubricate as recommended by manufacturer.

- B. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.
 - 1. Measure as directed during period of normal system loading.
 - 2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
 - 3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
 - 4. Tolerance: Difference exceeding 10 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

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END OF SECTION 26 24 16

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Tamper-resistant receptacles.
 - 3. Weather-resistant receptacles.
 - 4. Snap switches and wall-box dimmers.
 - 5. Solid-state fan speed controls.
 - 6. Wall-switch and exterior occupancy sensors.
 - 7. Communications outlets.

1.03 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.
- E. UTP: Unshielded twisted pair.

1.04 ADMINISTRATIVE REQUIREMENTS

- 1. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Approvals: All submittals shall be approved by the Engineer and Architect. Architect shall approve wiring devices and wall plates for style and finish.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles, subject to approval by architect:
 - 1. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
 - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 3. Leviton Mfg. Company Inc. (Leviton).
 - 4. Pass & Seymour/Legrand (Pass & Seymour).
- B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.
- C. Provide wiring devices as specified in this section unless otherwise noted by the Architect and /or Interior designer. Listed manufacturers are subject to approval by the Architect and /or Interior designer.

2.02 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Comply with the current New York City Electrical Code.
- D. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
 - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.

2. Devices shall comply with the requirements in this Section.

2.03 STRAIGHT-BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; 5351 (single), CR5362 (duplex).
 - b. Hubbell; HBL5351 (single), HBL5352 (duplex).
 - c. Leviton; 5891 (single), 5352 (duplex).
 - d. Pass & Seymour; 5361 (single), 5362 (duplex).
- B. Tamper-Resistant Convenience Receptacles, 125 V, 15 A and 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, and FS W-C-596.
 1. Products: Subject to compliance with requirements, provide one of the following or comparable product approved equal:
 - a. Cooper; TR8300.
 - b. Hubbell; HBL8300SGA.
 - c. Leviton; 8300-SGG.
 - d. Pass & Seymour; TR63H; 885TR.

2.04 GFCI RECEPTACLES

- A. General Description:
 1. Straight blade, feed-through type.
 2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
 1. Products: Subject to compliance with requirements, provide one of the following or comparable product approved equal:
 - a. Cooper; VGF20.
 - b. Hubbell; GFR5352L.
 - c. Pass & Seymour; 2095.
 - d. Leviton; 7590.

C. Tamper-Resistant GFCI Convenience Receptacles, 125 V, 15 A and 20 A:

1. Products: Subject to compliance with requirements, provide one of the following or comparable product approved equal:
 - a. Hubbell; GFTR20.
 - b. Pass & Seymour; 2095TR.

2.05 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following or comparable product approved equal:
 - 1) Single Pole:
 - 2) Cooper; AH1221.
 - 3) Hubbell; HBL1221.
 - 4) Leviton; 1221-2.
 - 5) Pass & Seymour; CSB20AC1.
 - 6) Two Pole:
 - 7) Cooper; AH1222.
 - 8) Hubbell; HBL1222.
 - 9) Leviton; 1222-2.
 - 10) Pass & Seymour; CSB20AC2.
 - 11) Three Way:
 - 12) Cooper; AH1223.
 - 13) Hubbell; HBL1223.
 - 14) Leviton; 1223-2.
 - 15) Pass & Seymour; CSB20AC3.
 - 16) Four Way:
 - 17) Cooper; AH1224.
 - 18) Hubbell; HBL1224.
 - 19) Leviton; 1224-2.
 - 20) Pass & Seymour; CSB20AC4.

C. Pilot-Light Switches, 20 A:

1. Products: Subject to compliance with requirements, provide one of the following or comparable product approved equal:
 - a. Cooper; AH1221PL for 120 and 277 V.
 - b. Hubbell; HBL1201PL for 120 and 277 V.
 - c. Leviton; 1221-LH1.
 - d. Pass & Seymour; PS20AC1RPL for 120 V, PS20AC1RPL7 for 277 V.
 2. Description: Single pole, with neon-lighted handle, illuminated when switch is "off."
- D. Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches: 120/277 V, 20 A; for use with mechanically held lighting contactors.
1. Products: Subject to compliance with requirements, provide one of the following or comparable product approved equal:
 - a. Cooper; 1995.
 - b. Hubbell; HBL1557.
 - c. Leviton; 1257.
 - d. Pass & Seymour; 1251.

2.06 DECORATOR-STYLE DEVICES

- A. Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, and UL 498.
1. Products: Subject to compliance with requirements, provide one of the following or comparable product approved equal:
 - a. Cooper; 6252.
 - b. Hubbell; DR15.
 - c. Leviton; 16252.
 - d. Pass & Seymour; 26252.
- B. Tamper-Resistant Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, and UL 498.
1. Products: Subject to compliance with requirements, provide one of the following or comparable product approved equal:
 - a. Cooper; TR6252.
 - b. Hubbell; DR15TR.
 - c. Pass & Seymour; TR26252.

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2. Description: Labeled to comply with NFPA 70, "Receptacles, Cord Connectors, and Attachment Plugs (Caps)" Article, "Tamper-Resistant Receptacles in Dwelling Units" Section.
- C. Tamper-Resistant and Weather-Resistant Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, and UL 498.
1. Products: Subject to compliance with requirements, provide one of the following or comparable product approved equal:
 - a. Cooper; TWRBR15.
 - b. Hubbell; DR15TR.
 - c. LevitonTRW15.
 - d. Pass & Seymour; TRW26252.
 2. Description: Labeled to comply with NFPA 70, "Receptacles, Cord Connectors, and Attachment Plugs (Caps)" Article, "Tamper-Resistant Receptacles in Dwelling Units" Section, when installed in wet and damp locations.
- D. GFCI, Feed-Through Type, Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, UL 498, and UL 943 Class A.
1. Products: Subject to compliance with requirements, provide one of the following or comparable product approved equal:
 - a. Cooper; VGF15.
 - b. Hubbell; GF15LA.
 - c. Leviton; 8599.
 - d. Pass & Seymour; 1594.
- E. GFCI, Tamper-Resistant and Weather-Resistant Convenience Receptacles: Square face, 125 V, 15 A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-15R, UL 498, and UL 943 Class A.
1. Products: Subject to compliance with requirements, provide one of the following or comparable product approved equal:
 - a. Cooper; TWRVGF15.
 - b. Hubbell; GFTR15.
 - c. Pass & Seymour; 1594TRWR.
 2. Description: Labeled to comply with NFPA 70, "Receptacles, Cord Connectors, and Attachment Plugs (Caps)" Article, "Tamper-Resistant Receptacles in Dwelling Units" Section.

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- F. Toggle Switches, Square Face, 120/277 V, 15 A: Comply with NEMA WD 1, UL 20, and FS W-S-896.
 - 1. Products: Subject to compliance with requirements, provide one of the following or comparable product approved equal:
 - a. Cooper; 7621 (single pole), 7623 (three way).
 - b. Hubbell; DS115 (single pole), DS315 (three way).
 - c. Leviton; 5621-2 (single pole), 5623-2 (three way).
 - d. Pass & Seymour; 2621 (single pole), 2623 (three way).

- G. Lighted Toggle Switches, Square Face, 120 V, 15 A: Comply with NEMA WD 1 and UL 20.
 - 1. Products: Subject to compliance with requirements, provide one of the following or comparable product approved equal:
 - a. Cooper; 7631 (single pole), 7633 (three way).
 - b. Hubbell; DS120IL (single pole), DS320 (three way).
 - c. Leviton; 5631-2 (single pole), 5633-2 (three way).
 - d. Pass & Seymour; 2625 (single pole), 2626 (three way).
 - 2. Description: With neon-lighted handle, illuminated when switch is "off."

- H. Telephone Outlet:
 - 1. Products: Subject to compliance with requirements, provide one of the following or comparable product approved equal:
 - a. Cooper; 3560-6.
 - b. Leviton; 40649.
 - 2. Description: Single RJ-45 jack for terminating 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1; complying with Category 5e. Comply with UL 1863.

- I. Combination TV and Telephone Outlet:
 - 1. Products: Subject to compliance with requirements, provide one of the following or comparable product approved equal:
 - a. Cooper; 3562.
 - b. Leviton; 40159.
 - 2. Description: Single RJ-45 jack for 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1; complying with Category 5e. Comply with UL 1863.

2.07 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
 - 3. Material for Unfinished Spaces: Galvanized steel.
 - 4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover and listed and labeled for use in wet and damp locations.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.08 MULTIOUTLET ASSEMBLIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following or comparable product approved equal:
 - 1. Hubbell Incorporated; Wiring Device-Kellems.
 - 2. Wiremold/Legrand.
- C. Description:
 - 1. Two-piece surface metal raceway, with factory-wired multioutlet harness.
 - 2. Components shall be products from single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.
- D. Raceway Material: Metal, with manufacturer's standard finish.

2.09 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.
 - 1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
 - 2. Wiring Devices Connected to Emergency Power System: Red.
- B. Wall Plate Color: For plastic covers, match device color.

3.01 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
 - 1. Take steps to ensure that devices and their boxes are protected... Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 - 4. Existing Conductors:
 - a. Cut back and pigtail or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailling existing conductors is permitted, provided the outlet box is large enough.
- D. Device Installation:
 - 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
 - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.

5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections. No. 10 AWG may be directly wired to devices listed for 10 AWG using side-wire clamping terminals.
8. Tighten all unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down and on horizontally mounted receptacles to the right, unless otherwise indicated.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors online and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on bottom. Group adjacent switches under single, multigang wall plates.

I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.02 GFCI RECEPTACLES

- A.** Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.03 IDENTIFICATION

- A.** Comply with Section 260553 "Identification for Electrical Systems."

- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.04 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Test Instruments: Use instruments that comply with UL 1436.
 - 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- B. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- C. Wiring device will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports, upon request.

END OF SECTION 26 27 26

SECTION 26 28 13 - FUSES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Cartridge fuses rated 600-V ac and less for use in, control circuits, pullout, enclosed switches, panelboards, switchboards, etc.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include material, dimensions, descriptions of individual components, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:
 - 1. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
 - 2. Current-limitation curves for fuses with current-limiting characteristics.
 - 3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse.
 - 4. Coordination charts and tables and related data.
 - 5. Fuse sizes for elevator feeders and elevator disconnect switches.

1.04 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than 3 of each size and type.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NEMA FU 1 for cartridge fuses.
- D. Comply with NFPA 70.
- E. Comply with UL 248-11 for plug fuses.

1.06 PROJECT CONDITIONS

- A. Where ambient temperature to which fuses are directly exposed is less than [40 deg F (5 deg C) or more than 100 deg F (38 deg C), apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.07 COORDINATION

- A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or compatible products approved equal:
 - 1. Cooper Bussmann, Inc.
 - 2. Edison Fuse, Inc.
 - 3. Mersen, USA (Ferraz Shawmut, Inc.)
 - 4. Littelfuse, Inc.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.
- B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.

- C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 FUSE APPLICATIONS

3.03 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable from the front of the equipment, or with partially opened cabinet door, without removing fuse.
- B. Furnish & install spare-fuse cabinet(s). Provide at least one spare fuse cabinet in main electric service room, and at least one additional cabinet in each elevator machine room; and additional cabinets as indicated on drawings.

3.04 IDENTIFICATION

- A. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 26 28 13

SECTION 26 28 16 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Fusible switches.
 - 2. Non fusible switches.
 - 3. Shunt trip switches.
 - 4. Molded-case circuit breakers (MCCBs).
 - 5. Enclosures.

1.03 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.04 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to SEI/ASCE 7 or as specified by the structural engineer.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and

manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
5. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

1.06 QUALITY ASSURANCE

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Comply with NFPA 70.
- E. Comply with New York City Electrical Code.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).
 2. Altitude: Not exceeding 6600 feet (2010 m).
- A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 1. Notify Construction Manager and Owner no fewer than 7 business days in advance of proposed interruption of electric service.

2. Indicate method of providing temporary electric service.
3. Do not proceed with interruption of electric service without Construction Manager's and Owner's written permission.
4. Comply with NFPA 70E.

1.08 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.01 FUSIBLE SWITCHES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following or compatible product approved equal:
 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
- B. Type GD, General Duty, Single Throw, 240-V ac, 800 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with cartridge fuse interiors to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.
- C. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- D. Accessories:
 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 3. Isolated Ground Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 5. Lugs: Mechanical type, suitable for number, size, and conductor material.

6. Service-Rated Switches: Labeled for use as service equipment.
7. Accessory Control Power Voltage: Remote mounted and powered; 120-V ac/208-V ac.

2.02 NONFUSIBLE SWITCHES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
- B. Type GD, General Duty, Single Throw, 600 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.
 1. Lugs: Mechanical type, suitable for number, size, and conductor material.
 2. Accessory Control Power Voltage: Remote mounted and powered; 120-V ac/208-V ac.

2.03 SHUNT TRIP SWITCHES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following or compatible product approved equal:
 1. Cooper Bussmann, Inc.
 2. Ferraz Shawmut, Inc.
 3. Littelfuse, Inc.
- B. General Requirements: Comply with ASME A17.1, UL 50, and UL 98, with 200-kA interrupting and short-circuit current rating when fitted with Class J fuses.
- C. Switches: Three-pole, horsepower rated, with integral shunt trip mechanism and Class J fuse block; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.
- D. Control Circuit: 120-V ac; obtained from integral control power transformer, with primary and secondary fuses, with a control power source of enough capacity to operate shunt trip, connected pilot, and indicating and control devices.
- E. Accessories:
 1. Oiltight green ON pilot light.
 2. Mechanically interlocked auxiliary contacts that change state when switch is opened and closed.

3. Form C alarm contacts that change state when switch is tripped.

2.04 MOLDED-CASE CIRCUIT BREAKERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following or compatible product approved equal:
 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
- B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- D. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
- E. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
 1. Instantaneous trip.
 2. Long- and short-time time adjustments.
 3. Ground-fault pickup level, time delay, and I^2t response.
- F. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.
- G. Ground-Fault, Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
- H. Features and Accessories:
 1. Standard frame sizes, trip ratings, and number of poles.
 2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
 3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads.
 4. Ground-Fault Protection: Comply with UL 1053; integrally mounted type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.

5. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.

2.05 MOLDED-CASE SWITCHES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following or compatible product approved equal:
 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
- B. General Requirements: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.
- C. Features and Accessories:
 1. Standard frame sizes and number of poles.
 2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
 3. Ground-Fault Protection: Comply with UL 1053; remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
 4. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.

2.06 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 2. Outdoor Locations: NEMA 250, Type 3R, unless otherwise indicated.
 3. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Comply with mounting and anchoring requirements specified in Section 260548 "Vibration and Seismic Controls for Electrical Systems."
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Install fuses in fusible devices.
- E. Comply with NECA 1.

3.03 IDENTIFICATION

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.04 FIELD QUALITY CONTROL

- A. Contractor shall field inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 3. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed

- switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.
- b. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
 - E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.05 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as specified in Section 260573 "Overcurrent Protective Device Coordination Study."

END OF SECTION 26 28 16

SECTION 26 51 00 - INTERIOR LIGHTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Interior lighting fixtures, lamps, and ballasts.
 - 2. Emergency lighting units.
 - 3. Exit signs.
 - 4. Lighting fixture supports.
- B. Related Sections:
 - 1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.
 - 2. Section 262726 "Wiring Devices" for manual wall-box dimmers for incandescent lamps.

1.03 DEFINITIONS

- A. BF: Ballast factor.
- B. CCT: Correlated color temperature.
- C. CRI: Color-rendering index.
- D. HID: High-intensity discharge.
- E. LER: Luminaire efficacy rating.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
1. Physical description of lighting fixture including dimensions.
 2. Emergency lighting units including battery and charger, where specified. Submittal must indicate the initial emergency power lumen output rating of all fixtures with local emergency power battery packs.
 3. Ballast, including BF.
 4. Energy-efficiency data.
 5. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.
 6. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.
 - a. Manufacturer Certified Data: Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
 7. Wiring Diagrams: For power, signal, and control wiring.
- B. Installation instructions.

1.05 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Lighting fixtures.
 2. Suspended ceiling components.
 3. Partitions and millwork that penetrate the ceiling or extends to within 12 inches (305 mm) of the plane of the luminaires.
 4. Structural members to which suspension systems for lighting fixtures will be attached.
 5. Other items in finished ceiling including the following:
 - a. Air outlets and inlets.
 - b. Speakers.
 - c. Sprinklers.
 - d. Smoke and fire detectors.
 - e. Occupancy sensors.
 - f. Access panels.

- B. Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, from manufacturer.
- C. Warranty: Sample of special warranty.

1.06 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Lamps: 10 for every 100 of each type and rating installed. Furnish at least one of each type.
 - 2. Plastic Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
 - 3. Ballasts: [One for every 100 of each type and rating installed. Furnish at least one of each type.
 - 4. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.07 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Comply with New York City Electrical Code.

1.08 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide product indicated on Drawings.

2.02 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. Metal Parts: Free of burrs and sharp corners and edges.
- C. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.

2.03 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
 - 1. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.

2.04 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Comply with Section 260529 "Hangers and Supports for Electrical Systems" for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
- C. Twin-Stem Hangers: Two, 1/2-inch (13-mm) steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).
- E. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.
- F. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Lighting fixtures:

1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
 2. Install lamps in each luminaire.
- B. Temporary Lighting: If it is necessary, and approved by Architect, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires, disassemble, clean thoroughly, install new lamps, and reinstall.
- C. Lay-in Ceiling Lighting Fixtures Supports: Use grid as a support element.
1. Install ceiling support system rods or wires, independent of the ceiling suspension devices, for each fixture. Locate not more than 6 inches (150 mm) from lighting fixture corners.
 2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling tees.
 4. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.
- D. Suspended Lighting Fixture Support:
1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
 3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
 4. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.
- E. Air-Handling Lighting Fixtures: Install with dampers closed and ready for adjustment.
- F. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.02 IDENTIFICATION

- A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.03 FIELD QUALITY CONTROL

- A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.
- B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.04 STARTUP SERVICE

- A. Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by Owner. Burn-in fluorescent and compact fluorescent lamps intended to be dimmed, for at least 100 hours at full voltage.

3.05 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Some of this work may be required after dark.
 - 1. Adjust aimable luminaires in the presence of Architect.

END OF SECTION 26 51 00

SECTION 28 46 00 – DIGITAL, ADDRESSABLE, FIRE ALARM SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Fire-alarm control unit.
 - 2. Manual fire-alarm boxes.
 - 3. System smoke detectors.
 - 4. Heat detectors.
 - 5. Carbon monoxide alarms and detectors.
 - 6. Paging appliances.
 - 7. Notification appliances.
 - 8. Remote annunciator.
 - 9. Addressable interface device.
 - 10. Digital alarm communicator transmitter.

1.03 DEFINITIONS

- A. LED: Light-emitting diode.
- B. NICET: National Institute for Certification in Engineering Technologies.

1.04 SYSTEM DESCRIPTION

- A. Fire alarm addressable system, with automatic sensitivity control of certain smoke detectors and multiplexed signal transmission, dedicated to fire-alarm service only. The residential system shall also include one-way paging system to all apartments and stair enclosures.

1.05 SUBMITTALS

- A. General Submittal Requirements:

1. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire-alarm system design.
 - b. NICET-certified fire-alarm technician, Level II minimum.
 - c. Licensed or certified by authorities having jurisdiction.
- B. Product Data: For each type of product indicated.
- C. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.
 1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
 2. Include voltage drop calculations for notification appliance circuits.
 3. Include battery-size calculations.
 4. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
 5. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
 6. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits.
- D. Delegated-Design Submittal: For smoke and heat detectors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 1. Drawings showing the location of each smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the detector.
 2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72.
- E. Qualification Data: For qualified Installer.
- F. Field quality-control reports.
- G. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
 3. Record copy of site-specific software, both hardcopy and disc. The disc shall not be password protected.
 4. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:
 - a. Frequency of testing of installed components.
 - b. Frequency of inspection of installed components.
 - c. Requirements and recommendations related to results of maintenance.
 - d. Manufacturer's user training manuals.
 5. Manufacturer's required maintenance related to system warranty requirements.
 6. Abbreviated operating instructions for mounting at fire-alarm control unit.
 7. Copy of NFPA 25.
- H. Software and Firmware Operational Documentation:
1. Software operating and upgrade manuals.
 2. Program Software Backup: On magnetic media or compact disk, complete with data files, not password protected.
 3. Device address list.
 4. Printout of software application.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
 1. Installation shall be by personnel certified by NICET as fire-alarm Level II technician.
- B. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.07 SOFTWARE SERVICE AGREEMENT

- A. Comply with UL 864.
- B. Technical Support: Beginning with Substantial Completion, provide software support for two (2) years.

1.08 EXTRA MATERIALS

- A. Furnish extra materials for each system described above that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Lamps for Remote Indicating Lamp Units: Quantity equal to 10 (ten) percent of amount installed, but no fewer than 1 unit.
 2. Lamps for Strobe Units: Quantity equal to 10 (ten) percent of amount installed, but no fewer than 1 unit.
 3. Smoke Detectors, Duct Detectors and Heat Detectors: Quantity equal to 10 (ten) percent of amount of each type installed, but no fewer than 1 unit of each type.
 4. Detector Bases: Quantity equal to 2 (two) percent of amount of each type installed, but no fewer than 1 unit of each type.
 5. Keys and Tools: One extra set for access to locked and tamperproofed components.
 6. Audible and Visual Notification Appliances: 3 (three) of each type installed.
 7. Fuses: Two (2) of each type installed in the system.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide UTC EST-3 or comparable product by one of the following:
1. NOTIFIER; a Honeywell company.
 2. FCI/Gamewell
- B. Alternate systems will be entertained provided that a line-by-line comparison to the specified manufactures of all electronic components and peripheral devices, including but not limited to smoke detectors, duct detectors, paging speakers, monitor and control modules, interposing relays and paging speakers is submitted to the engineer and owner not less than 30 days prior to date bids must be submitted for determination of the acceptability of the proposed alternate system.

2.02 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices:
1. Manual stations.
 2. Smoke detectors.
 3. Duct smoke detectors.
 4. Verified automatic alarm operation of smoke detectors.

5. Automatic sprinkler system water flow.
- B. Fire-alarm signal shall initiate the following actions:
1. Continuously operate alarm notification appliances.
 2. Identify alarm at fire-alarm control unit and remote annunciator.
 3. Transmit an alarm signal to the remote alarm receiving station.
 4. Unlock electric door locks in designated egress paths.
 5. Release fire and smoke doors held open by magnetic door holders.
 6. Close smoke dampers in air ducts of designated air-conditioning duct systems.
 7. Recall elevators to primary recall floor (elevator related smoke detectors and sprinkler water flow switches only).
 8. Record events in the system memory.
- C. Supervisory signal initiation shall be by one or more of the following devices and actions:
1. Valve supervisory switch.
 2. Generator run and generator failure
 3. Fire-pump power failure, including a dead-phase or phase-reversal condition.
 4. Low-air-pressure switch operation on a dry-pipe or pre-action sprinkler system.
- D. System trouble signal initiation shall be by one or more of the following devices and actions:
1. Open circuits, shorts, and grounds in designated circuits.
 2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
 3. Loss of primary power at fire-alarm control unit.
 4. Ground or a single break in fire-alarm control unit internal circuits.
 5. Abnormal ac voltage at fire-alarm control unit.
 6. Break in standby battery circuitry.
 7. Failure of battery charging.
 8. Abnormal position of any switch at fire-alarm control unit or annunciator.
- E. System Trouble and Supervisory Signal Actions: Annunciate at fire-alarm control unit and remote annunciator. Record the event in system memory.
- F. All of the above shall transmit a signal to the central office transmitter appropriate to the condition or device initiating the action.

2.03 FIRE-ALARM CONTROL UNIT

- A. General Requirements for Fire-Alarm Control Unit:

1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864 and listed and labeled by an NRTL.
 - a. System software and programs shall be held in flash electrically erasable programmable read-only memory (EEPROM), retaining the information through failure of primary and secondary power supplies.
 - b. Include a real-time clock for time annotation of events on the event recorder and printer.
 2. Addressable initiation devices that communicate device identity and status.
 - a. Smoke sensors shall additionally communicate sensitivity setting and allow for adjustment of sensitivity at fire-alarm control unit.
 - b. Temperature sensors shall additionally test for and communicate the sensitivity range of the device.
 3. Addressable control circuits for operation of mechanical equipment.
 4. Amplification shall be distributed within multiple control units (DGPs) with additional back up amplifier provided in each unit sized for largest amplifier load. No banked amplification shall be permitted.
 5. Signaling line circuits (SLC) shall originate from each control unit (DGP).
- B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
1. Annunciator and Display: Liquid-crystal type, 3 line(s) of 80 characters, minimum.
 2. Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.
- C. Circuits:
1. Initiating Device, Notification Appliance, and Signaling Line Circuits: NFPA 72, Class A.
 - a. Initiating Device Circuits: Style D.
 - b. Notification Appliance Circuits: Style Z.
 - c. Signaling Line Circuits: Style 2.
 - a. Install no more than 100 (one hundred) initiating addressable devices and 100 (one hundred) addressable modules on each signaling line circuit.
 2. Serial Interfaces: Two (2) RS-232 ports for printers.

3. Power to auxiliary relays and 24-volt power circuits to devices shall be supervised.
 4. All notification circuits must be supervised.
- D. Smoke-Alarm Verification (elevator related detectors only):
1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
 2. Activate an NRTL-listed and -approved "alarm-verification" sequence at fire-alarm control unit and detector.
 3. Record events in the system memory.
 4. Sound general alarm if the alarm is verified.
 5. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.
- E. Notification Appliance Circuit: Operation shall sound in a March Time Pattern.
- F. Provide a one-way emergency voice communication system annunciator with the following design:
- This standard LED annunciator shall incorporate the microphone handset for the one-way voice paging capability to apartments on per floor basis and staircases, including all required zone selector switches with LED indicators.
- G. Elevator Recall:
1. Smoke detectors at the following locations shall initiate automatic elevator recall. Alarm-initiating devices, except those listed, shall not start elevator recall.
 - a. Elevator lobby detectors.
 - b. Smoke detector in elevator machine room.
 - c. Smoke detectors in elevator hoistway.
 - d. Water flow switches on any floor.
 2. Elevator lobby detectors located on the designated recall floors shall be programmed to move the cars to the alternate recall floor.
 3. Water-flow alarm connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.
 - a. Water-flow switch associated with the sprinkler in the elevator pit may have a delay to allow elevators to move to the designated floor.
- H. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and

sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory and print out the final adjusted values on system printer.

- I. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a central station transmitter.

2.04 MANUAL FIRE-ALARM BOXES

- A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If
 1. Station Reset: Key- or wrench-operated switch.
 2. Indoor Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation, where specified on the drawings.
 3. Weatherproof Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm, where specified on the drawings.

2.05 SYSTEM SMOKE DETECTORS

- A. General Requirements for System Smoke Detectors:
 1. Comply with UL 268; operating at 24-V dc, nominal.
 2. Detectors shall be two-wire type.
 3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
 4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 6. Integral Visual-Indicating Light: LED type indicating detector has operated.
 7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.
 - a. Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for 15 or 20 deg F per minute.

- b. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F.
 - c. Provide multiple levels of detection sensitivity for each sensor.
- B. Photoelectric Smoke Detectors (for general use):
 1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
- C. Ionization Smoke Detector (for elevator related use):
 1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
- D. Duct Smoke Detectors: Photoelectric type complying with UL 268A.
 1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).

3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector, where specified on the drawings.
4. Each sensor shall have multiple levels of detection sensitivity.
5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
6. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

2.06 CARBON MONOXIDE ALARMS AND DETECTORS

- A. Carbon monoxide alarms shall be hardwired line voltage type units with integral sounder when in alarm. Units shall be interconnected within dwelling units so that all sounders will sound upon actuation of any individual detector.
- B. These alarms may be UL listed combination smoke/carbon monoxide alarms, similar to AMIC1510SB, or equal. The smoke alarm shall be 8th edition UL 217 listed or installed at least 20 feet away from fixed cooking appliance.
- C. System type carbon monoxide detectors, as shown on the drawings, shall be 24 volt, addressable type, with integral sounder base.

2.07 NOTIFICATION APPLIANCES

- A. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections.
 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.
- B. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol.
- C. Speakers: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Speakers shall produce a sound-pressure level of 15 dBA above the ambient noise level as shown in NFPA 72.
- D. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- high letters on the lens.
 1. Rated Light Output:
 - a. 15/30/75/110 cd, selectable in the field.

2. Mounting: Wall mounted unless otherwise indicated.
3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
4. Flashing shall be in a temporal pattern, synchronized with other units.
5. Strobe Leads: Factory connected to screw terminals.
6. Mounting Faceplate: Factory finished, red.

2.08 REMOTE ANNUNCIATOR

- A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.
 1. Mounting: Flush cabinet, NEMA 250, Type 1.
- B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

2.09 ADDRESSABLE INTERFACE DEVICE

- A. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.

2.10 DIGITAL ALARM COMMUNICATOR TRANSMITTER

- A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632 and be listed and labeled by an NRTL.
- B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture two telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.
- C. Local functions and display at the digital alarm communicator transmitter shall include the following:

1. Verification that both telephone lines are available.
 2. Programming device.
 3. LED display.
 4. Manual test report function and manual transmission clear indication.
 5. Communications failure with the central station or fire-alarm control unit.
- D. Digital data transmission shall include the following:
1. Address of the alarm-initiating device, device specific to smoke, water flow and pull station.
 2. Supervisory signal.
 3. Trouble Signal.
 4. Separate signals for Fire Pump Running, Fire Pump Fail and Fire Pump Phase Reversal (where applicable).
- E. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

PART 3 - EXECUTION

3.01 EQUIPMENT INSTALLATION

- A. All installation shall comply with 2014 NYC Construction Code, NFPA 72 of 2010 as annotated by Appendix Q (1 RCNY 3616-04) of the Building Code, 2011 NYC Electrical Code, and all applicable standards set by Authority Having Jurisdiction. All wiring installation shall meet the requirements described in Article 760 of the NYC Electrical Code.
- B. Equipment Mounting: Install fire-alarm control unit on finished floor with tops of cabinets not more than 72 inches above the finished floor.
- C. Smoke-Detector Spacing:
1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
 2. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
 3. Smooth ceiling spacing shall not exceed 30 feet (thirty).
 4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix B in NFPA 72.
 5. HVAC: Locate detectors not closer than 3 feet from air-supply diffuser or return-air opening.
 6. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture.

- D. Duct Smoke Detectors: Comply with NFPA 72 of 2010 as annotated by Appendix Q (1 RCNY 3616-04) of the Building Code and NFPA 90A. Install sampling tubes so they extend the full width of duct.
- E. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.
- F. Audible Alarm-Indicating Devices: Install 80" above finished floor or 6 inches below the ceiling, whichever is lower. Install horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.
- G. Visible Alarm-Indicating Devices: Install adjacent to each alarm horn, unless part of a combination device, 80" above finished floor or 6 inches below the ceiling, whichever is lower
- H. Device Location-Indicating Lights: Locate in public space near the device they monitor.
- I. Fire-Alarm Control Unit: Semi-flush mounted, with tops of cabinets not more than 72 inches above the finished floor.
- J. Annunciator: Install with top of panel not more than 72 inches above the finished floor.

3.02 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section "Door Hardware." Connect hardware and devices to fire-alarm system.
 - 1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - 1. Smoke dampers in air ducts of designated air-conditioning duct systems.
 - 2. Alarm-initiating connection to elevator recall system and components.
 - 3. Supervisory connections at valve supervisory switches.
 - 4. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
 - 5. Fan starters or controller to initiate fan shut down.

3.03 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- B. Install framed instructions in a location visible from fire-alarm control unit.

3.04 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with 2011 NYC Electrical Code. Install a ground wire from main service ground to fire-alarm control unit.

3.05 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by authorities having jurisdiction.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- D. Tests and Inspections:
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
 - b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - 2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 - 3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.

4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
 5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
- E. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- F. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.06 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION 28 46 00

SECTION 31 00 00 - EARTHWORK

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Cast-In-Place Concrete: Section 03 30 00.

1.02 DEFINITIONS

- A. The following terms shall have the meanings ascribed to them in this Article, wherever they appear in this Section.
1. Earth Excavation: The removal of all surface and subsurface material not classified as rock (as defined below).
 2. Subgrade Surface: Surface upon which subbase or topsoil is placed.
 3. Subbase: Select granular material or subbase course Type 2 which is placed immediately beneath pavement or concrete slabs.
 4. Foundation Bearing Grade: Grade/elevation at which the bottom-of-footings are constructed.
 5. Maximum Density: The dry unit weight in pounds per cubic foot of the soil at "Optimum Moisture Content" when determined by ASTM D 698 (Standard Proctor), or ASTM D 1557 (Modified Proctor).
 6. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
 7. Landscaped Areas: Areas not covered by structures, walks, roads, paving, or parking.
 8. Unauthorized Excavation: The removal of material below required elevation indicated on the Drawings or beyond lateral dimensions indicated or specified without specific written direction by the Director's Representative.
 9. Contract Limit Line (Shown on Drawings): Limits of grading, excavations and filling required for the work of this contract.

1.03 SUBMITTALS

- A. Product Data:
1. Filter Fabric: Manufacturer's catalog sheets, specifications, and installation instructions.
- B. Samples: Submit samples as follows. Take the samples in the presence of the Landscape Architect (from here on referred to as Architect) and submit to him or her the laboratory test results for gradation, proctors, and soundness tests, when required. These tests shall be performed in accordance with ASTM standards, shall be performed and signed by a certified soils laboratory, and shall be

submitted as part of the original submittal. At a minimum the samples taken shall be of the following quantities:

1. Select Granular Material: 50 - 60 lb. (Two Samples).
2. Subbase Course Type 2: 50 - 60 lb. (Two Samples).
3. Selected Fill: 40 - 50 lb.
4. Cushion Material: 30 lb.
5. Crushed Stone: 30 lb.
6. Pea Gravel: 40 – 50 lb.

C. Quality Control Submittals:

1. Excavation Procedure: Submit a lay out drawing or detailed outline of intended excavation procedure for the Facility Director and the Architect's information. This submittal will not relieve the Contractor of responsibility for the successful performance of intended excavation methods.
2. Subbase Materials: Name and location of source and the DOT Source Number. If the material is not being taken from an approved DOT Source the results of the gradation and soundness tests performed by an ASTM certified soils laboratory will be required.
3. Other Aggregates: Name and location of source.

1.04 PROJECT CONDITIONS

A. Protect existing trees and plants during performance of the Work unless otherwise indicated. Box trees and plants indicated to remain within the grading limit line with temporary fencing or solidly constructed wood barricades as required. Protect root systems from smothering. Do not store excavated material, or allow vehicular traffic or parking within the branch drip line. Restrict foot traffic to prevent excessive compaction of soil over root systems.

B. Cold Weather Requirements:

1. Excavation: When freezing temperatures are anticipated, do not excavate to final required elevations for concrete work unless concrete can be placed immediately.
2. Backfilling: If backfill is being placed during freezing temperatures the backfilling operations shall be monitored by the Architect and the following procedures shall be followed:
 - a. Frozen ground shall be removed in its entirety from beneath and five feet beyond the area of fill placement.
 - b. The fill material placed shall consist of Selected Fill and shall be free of all frozen chunks that exceed four inches in size. The material transported to the project site shall only consist of material excavated from below the frost depth.
 - c. At the end of the work day, the area of fill placement shall be covered with insulated blankets, or left unprotected. Other means

of protection (hay, wood chips, etc.) may also be used for protection provided it is approved by the Architect.

- d. Following work day, remove the insulated blankets and/or strip the area of all frozen material as specified previously.
- e. Upon establishing the subgrade elevations, protect the grades with insulated blankets or place additional material that will adequately insulate the exposed earth surface from frost. This additional fill or protective material shall be stripped just prior to pouring concrete.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Select Granular Material: Stockpiled, sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with the gradation and material requirements specified below:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
2 inch	50.8	100
1/4 inch	6.35	30-65
No. 40	0.425	5-40
No. 200	0.075	0-10

- 1. Magnesium Sulfate Soundness Test: 20 percent maximum loss by weight after four test cycles.
- 2. Plasticity Index: The plasticity index of the material passing the No. 40 mesh sieve shall not exceed 5.0.
- 3. Elongated Particles: Not more than 30 percent, by weight, of the particles retained on a 1/2 inch sieve shall consist of flat or elongated particles. A flat or elongated particle is defined as one which has its greatest dimension more than three times its least dimension.

- B. Subbase Course Type 2: Stockpiled, crushed ledge rock or approved blast furnace slag. Comply with the gradation and material requirements specified below:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
2 inch	50.8	100
1/4 inch	6.35	25-60
No. 40	0.425	5-40

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
No. 200	0.075	0-10

1. Magnesium Sulfate Soundness Test: 20 percent maximum loss by weight after four test cycles.
2. Plasticity Index: The plasticity index of the material passing the No. 40 mesh sieve shall not exceed 5.0.
3. Elongated Particles: Not more than 30 percent, by weight, of the particles retained on a 1/2 inch sieve shall consist of flat or elongated particles. A flat or elongated particle is defined as one which has its greatest dimension more than three times its least dimension.

C. Selected Clean Fill: Sound, durable, sand, gravel, stone, or blends of these materials, free from organic and other deleterious materials. Comply with the gradation requirements specified below:

Sieve		Percent Passing
Sieve Size	Size opening (mm)	
4 inch	101.6	100
No. 40	0.425	0-70
No. 200	0.075	0-15

D. Suitable Material (Fill and Backfill for Landscaped Areas): Material consisting of mineral soil (inorganic), blasted or broken rock and similar materials of natural or man-made origin, including mixtures thereof. Maximum particle size shall not exceed 2/3 of the specified layer thickness prior to compaction. NOTE: Material containing cinders, industrial waste, sludge, building rubble, land fill, muck, and peat shall be considered unsuitable for fill and backfill, except topsoil and organic silt may be used as suitable material in landscaped areas provided it is placed in the top layer of the subgrade surface.

E. Cushion Material: Shall consist of clean, hard, durable, uncoated particles, free from lumps of clay and all deleterious substances and shall meet the following gradation requirements:

Sieve Size		Percent Passing
Sieve Size	Size opening (mm)	
1/4 inch	6.35	100
No. 60	0.25	0-35
No. 100	0.15	0-10

F. Pea Gravel: Comply with DOT Article 703-02 for screened gravel.

Sieve	Percent Passing
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Sieve Size	Size opening (mm)	
1/2 inch	12.7	100
1/4 inch	6.35	90-100
1/8 inch	3.17	0-15
No. 200 Sieve	0.075	0-1

2.02 GEOTECHNICAL FABRICS

- A. Filter Fabric (GeoTextile)
 - 1. Drainage and Erosion Control: Amoco 1199 & 2019, Maccaferri MacTex MX140 & MX155, Mirafi 140N & 160N, Fiberweave 403 & 404 or equivalent.
 - 2. Separation for foundation drains, underdrains, undercuts: Amoco 2002 & 2004, Contech Construction Products Inc. C-180, Synthetic Industries Geotex 250ST & 315ST, Mirafi Geolon HP570 & HP1500 or equivalent.
 - 3. Separation/Stabilization beneath pavements: Amoco 4551, Bonded Fibers Products PN080, Maccaferri Gabions MacTex MX275 & 340, Mirafi 160N & 180N or equivalent.

PART 3 EXECUTION

3.01 UNDERGROUND UTILITIES

- A. Locate existing underground utilities prior to commencing excavation work. Determine exact utility locations by hand excavated test pits. Support and protect utilities to remain in place.
- B. Do not interrupt existing utilities that are in service until temporary or new utilities are installed and operational.
- C. Utilities to remain in service: Shall not be re-routed. Notify Architect of any conflict for a clarification drawing.
- D. Utilities abandoned beneath and five feet laterally beyond the structure’s proposed footprint shall be removed in their entirety. Excavations required for their removal shall be backfilled and compacted as specified herein.

3.02 EXCAVATION

- A. Excavate earth as required for the Work.
- B. Install and maintain all erosion and sedimentation controls during all earthwork operations as specified on the Contract Drawings or as directed by local officials.

- C. Maintain sides and slopes of excavations in a safe condition until completion of backfilling. Comply with Code of Federal Regulations Title 29 - Labor, Part 1926 (OSHA).
 - 1. Trenches: Deposit excavated material on one side of trench only. Trim banks of excavated material to prevent cave-ins and prevent material from falling or sliding into trench. Keep a clear footway between excavated material and trench edge. Maintain areas to allow free drainage of surface water.
- D. Stockpile excavated materials classified as suitable material where directed, until required for fill. Place, grade, and shape stockpiles for proper drainage as approved by the Architect. Install filter fabric and/or hay bales at base of stockpiles to prevent erosion.
- E. Excavation for Structures: Conform to elevations, lines, and limits indicated. Excavate to a vertical tolerance of plus or minus 1 inch. Extend excavation a sufficient lateral distance to provide clearance to execute the Work.
- F. Footings and Foundations: The foundation bearing grade shall be established just prior to constructing the concrete foundations when concrete is to bear on undisturbed soil.
- G. Concrete Slabs, Floors and Bases: Excavate to the following depths below bottom of concrete for addition of select granular material:
 - 1. Exterior Slabs and Steps: 12 inches unless otherwise indicated.
- H. Conduit, Cable, Tubing and Piping (other than Bell and Spigot): Provide sufficient trench width for installation and to accommodate special backfill when specified.
- I. Sidewalk: Excavate to subgrade surface elevation.
- J. Notify the Architect upon completion of excavation operations. Do not proceed with the Work until the excavation is inspected and approved. Inspection of the excavation by the Architect will be made on 3 working days notice.

3.03 DEWATERING

- A. Prevent surface and subsurface water from flowing into excavations and from flooding the site and surrounding area.
- B. Do not allow water to accumulate in excavations. Remove water from all excavations immediately to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to the stability of subgrades and foundations. Furnish and maintain pumps, sumps, suction and discharge piping

systems, and other system components necessary to convey the water away from the Site.

- C. Convey water removed from excavations, and rain water, to collecting or run-off area. Cut and maintain temporary drainage ditches and provide other necessary diversions outside excavation limits for each structure.
- D. Provide temporary controls to restrict the velocity of discharged water as necessary to prevent erosion and siltation of receiving areas.

3.04 PLACING FILTER FABRIC

- A. Place and overlap filter fabric in accordance with the manufacturer's installation instructions, unless otherwise shown.
- B. Cover tears and other damaged areas with additional filter fabric layer extending 3 feet beyond the damage.
- C. Do not permit traffic or construction equipment directly on filter fabric.
- D. Backfill over filter fabric within two weeks after placement. Backfill in accordance with the fabric manufacturer's instructions and in a manner to prevent damage to the fabric.

3.05 PLACING FILL AND BACKFILL

- A. Surface Preparation of Fill Areas: Remove all concrete pavement in its entirety from areas requiring the placement of fill. Prior to placement of fill, smooth out and compact areas where wheel rutting has occurred due to stripping or earthwork operations.
- B. Excavations: Backfill as promptly as practicable, but only after approval by the Architect. Do not backfill with excavated material unless it meets the requirements of this Section.
- C. Place backfill and fill materials in layers not more than 8 inches thick in loose depth unless otherwise specified. Before compaction, moisten or aerate each layer as necessary to facilitate compaction to the required density. Do not place backfill or fill material on surfaces that are muddy, frozen, or covered with ice.
 - 1. Place fill and backfill against foundation walls, and in confined areas (such as trenches) not easily accessible by larger compaction equipment, in maximum six inch thick (loose depth) layers.
- D. Prevent wedging action of backfill against structures by placing backfill uniformly around structure to approximately same elevation in each layer.
- E. Under Exterior Concrete Slabs and Steps:

1. Up to Subgrade Surface Elevation: Place selected fill when fill or backfill is required.
 2. Subbase Material: Place 12 inches of select granular material over subgrade surface.
- F. Under Pavements and Walks:
1. Up to Subgrade Surface Elevation: Place selected fill when fill or backfill is required.
 2. Subbase Material: Place as indicated.
- G. Rigid Non-Metallic Conduit: Except where concrete encasement is required, place cushion material a minimum of four inches deep under conduit, four inches on both sides, and 12 inches over top of conduit. Complete balance of backfill as specified.

3.06 COMPACTION

- A. Compact each layer of fill and backfill for the following area classifications to the percentage of maximum density specified below and at a moisture content suitable to obtain the required densities, but at not less than 3 percent drier or more than 2 percent wetter than the optimum content as determined by ASTM D 698 (Standard Proctor) or 1557 (Modified Proctor).
1. Concrete Slabs and Steps: 95 percent.
 2. Landscaped Areas: 90 percent.
 3. Pavements and Walks: 95 percent.
- B. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be re-compacted and retested. If compaction cannot be achieved the material/layer shall be removed and replaced. No additional material may be placed over a compacted layer until the specified density is achieved.

3.07 RESTORATION

- A. Restore pavements, walks, curbs, and other exterior surfaces damaged during performance of the Work to match the appearance and performance of existing corresponding surfaces as closely as practicable.

3.08 DISPOSAL OF EXCESS AND UNSUITABLE MATERIALS

- A. Remove from the property and dispose of excess and unsuitable materials, including materials resulting from removal of existing improvements.
- B. Transport excess and unsuitable materials, including materials resulting from removal of existing improvements, to staging areas on the property designated by the Facilities Department, and dispose of such materials as directed.

3.09 FIELD QUALITY CONTROL

- A. Compaction Testing: Notify the Architect at least 3 working days in advance of all phases of filling and backfilling operations. Compaction testing will be performed by an independent testing laboratory, hired by the owner, to ascertain the compacted density of the fill and backfill materials. Compaction testing will be performed on certain layers of the fill and backfill as determined by the Architect. If a compacted layer fails to meet the specified percentage of maximum density, the layer shall be re-compacted and will be retested. No additional material may be placed over a compacted layer until the specified density is achieved.

END OF SECTION 31 00 00

SECTION 32 93 01 - PLANTS

PART 1 GENERAL

1.01 REFERENCES

- A. Plant Nomenclature: Conform to the latest edition of "Standardized Plant Names" as adopted by the American Joint Committee of Horticultural Nomenclature.
- B. Size and Grading Standards: Conform to the current edition of "American Standard for Nursery Stock" - Sponsor - the American Association of Nurserymen Inc., unless otherwise specified.

1.02 SUBMITTALS

- A. List of Plants: Before plant material is shipped to the project site, submit a complete itemized list of all plants including the source of supply.
- B. Product Data: Furnish the following with each planting material delivery.
 - 1. Invoice indicating sizes and variety of plant material.
 - 2. Labels for each plant or bundles of plants indicating name and size.

1.03 QUALITY ASSURANCE

- A. Worker's Qualifications: The persons performing the planting and their supervisor shall be personally experienced in the planting and caring of plant material and shall have been regularly employed by a company engaged in the planting and caring of plant material for a minimum of 2 years.
- B. Caliper trees up to 4 inches in caliber at a point 6 inches above ground and trees over 4 inches in caliber 12 inches above ground.
- C. Do not use woody plant material from regions south of latitude 39 degrees unless such material has been lined out in nurseries located north of latitude 39 degrees for at least 2 growing seasons. Latitude 39 degrees is approximately a line from Annapolis, MD to Cincinnati, OH.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Notify the Architect 48 hours in advance of delivery of plant material.
- B. Protect plants against climatic and mechanical injuries.

- C. Deliver fertilizer in manufacturer's standard sized bags showing weight, analysis, and manufacturer's name. Store under a waterproof cover or in a dry place as designated by the Facility.

1.05 PROJECT CONDITIONS

- A. Water will be furnished by FIT from existing facilities as directed. Furnish hoses and connections required to adequately water plants.

1.06 SCHEDULING

- A. Plant deciduous, woody plants between October 1 and May 15 whenever temperature is above 32 degrees F and soil is in workable condition, unless otherwise approved in writing by Architect.
- B. Plant evergreens between August 15 and September 15 or during April or May before start of new growth.

1.07 PLANTING GUARANTEE

- A. The guarantee shall extend for a period of one year from the date of physical completion. Physical completion for the Work of this Section is the date or dates when all the planting operations, or seasonal portions of the planting operations, or replacement planting operations have been completed and are accepted by the Architect.

PART 2 PRODUCTS

2.01 PLANTS

- A. Shrubs and Trees:
 - 1. Nursery grown stock unless otherwise indicated in the itemized plant list.
 - 2. Acclimated plants true to genus and species.
 - 3. Well developed root and branch systems. Do not prune branches before delivery.
 - 4. Free of disease, insect eggs, bark abrasions, and disfiguring knots.
 - 5. Buds intact and reasonably closed at time of planting.
 - 6. Balled and burlapped from soil which will hold a natural ball. Manufactured balls are unacceptable.
 - 7. Conform to size indicated or larger, or within the minimum maximum size when so indicated. Larger plants cut back to specified dimensions will not be accepted.
- B. Trees:
 - 1. Single erect leader from ground to top, surrounded with uniformly arranged branches.
 - 2. Free from frost cracks, broken bark, and dead or broken branches.
 - 3. Transplanted, or root pruned 360 degrees at least once during the previous 3 years.

2.02 PLANTING SOIL

- A. Topsoil for Planting Soil: Obtain from outside sources.
- B. Soil Amendments (For every 4 cu yd of topsoil):
 - 1. Peat Moss: 7-1/2 cu ft bale or 15 bushels (loose measure).
 - 2. Fertilizer: 5 lb.
 - 3. Bonemeal: 80 lb.
- C. In the presence of the Architect, place the soil amendments over the topsoil piles and turn over the combined elements a minimum of 3 times until thoroughly mixed.

2.03 FERTILIZER

- A. Bonemeal: Commercial, steamed finely ground material containing not less than 1.0 percent nitrogen and 11 percent phosphoric acid.
- B. Commercial Fertilizer (10-6-4): Containing not less than 10 percent nitrogen, 6 percent available phosphoric acid and 4 percent water soluble potash.

2.04 MULCH

- A. Wood Chips: Hardwood or softwood chips produced by a standard wood chipping machine, free of leaves, young green growth, wood shavings, sawdust, or any foreign material. Chips shall not exceed 3 inches in greatest dimension.
- B. Black Shredded Mulch: Wood fiber produced from either hardwood or softwood trees, free of tannic acid, leaves, young green growth, wood shavings, sawdust or other objectionable foreign material.

2.05 MISCELLANEOUS MATERIALS

- A. Stakes, Deadmen and Guy Stakes: Sound, durable White or Red Cedar, or other approved wood, free of insect or fungus infestation.
- B. Guy Wire or Cable: No. 12 galvanized iron wire or cable.
- C. Tree Wrapping: 4 inch wide strips of waterproof paper 30-30-30 Krinklecraft by Eaton Brothers Corp., P.O. Box 60, Hamburg, NY 14075, (800) 433-3244.
- D. Protective Hose: 2-ply garden hose cut to required lengths to protect tree trunk's from damage by wires.
- E. Tree Wound Paint: Antiseptic, waterproof, adhesive, elastic tree wound paint containing no kerosene, coal tar, creosote, or other material harmful to cambium or living tissue.

- F. Anti-desiccants: Wilt-Pruf by Wilt-Pruf Products, Inc., P.O. Box 469, Essex, CT 06426, (203) 767-7033.
- G. All miscellaneous material listed herewith will be the cost responsibility of the Contractor.

PART 3 EXECUTION

3.01 INSPECTION

- A. Do not plant any plant material until after inspection and approval by Architect. Secure written approval of any substitutions before planting. Remove rejected material from planting areas.

3.02 PREPARATION

- A. Planting Layout:
 - 1. Stake out tree locations and planting areas.
 - 2. Obtain layout approval from the Architect prior to excavations of plant pits and beds.
- B. Plant Pit Dimensions: Minimum width 12 inches, measured at the ground surface.
 - 1. Balled and Burlapped Plants:
 - a. Pit Depth: Not to exceed the ball depth.
 - b. Pit Width: Measured at the ground surface, 3 times the width of the ball or as indicated.
 - 2. Container Grown Plants: 2 times the diameter of the container measured at the ground surface.
 - 3. Ground Cover Beds: Excavate entire bed to a depth of 6 inches.
 - 4. Bare Root Plants: Diameter equal to width of roots spread to natural position plus 24 inches, measured at the ground surface.
 - 5. Hedge Trenches: 18 inches wide and 18 inches deep.
- C. Excavation: Excavate pits to the dimensions specified. Dispose of excavated material of the site unless otherwise directed.

3.03 PLANTING

- A. Setting Plants:
 - 1. Backfill pits with planting soil and firm to the level upon which plants were previously growing. Set plants plumb. Plant budded or grafted plants 2 inches below bud or graft line. Complete backfilling with planting soil and settle continually with water.
 - 2. Balled Plants: Set plants in position and backfill 1/3 depth of ball. Remove burlap from top and adjust to eliminate air pockets. Complete backfill and settle with water.

3. Bare-root Plants: Set plant in position and place planting soil around roots settling with water. Use care to avoid bruising or breaking roots when firming soil. Prune bruised or broken roots.

- B. Wrapping: Wrap deciduous trees within 4 days after planting from the ground line to the height of the second branches. Wrap in a single layer wound spirally starting from base and overlapping 1-1/2 inches. Secure wrapping in place by use of approved staples or other approved methods and materials.

- C. Staking: Set tree stakes into solid ground below bottom of roots before backfilling. Place stakes at the outer edge of the roots or ball in line with the prevailing wind at a 10 degree angle from the tree trunk.

- D. Anti-Desiccant: Apply anti-desiccant spray to broadleaved ericaceous plants planted in the Fall season, as directed.

- E. Surface Finish: Form saucer at grade soil line to form a basin on lower side of slope plantings, which will catch and retain water. Top dress basins with fertilizer spread evenly at the rate of 1-1/2 pounds per square yard of plant pit surface. Break saucers and basins before ground freezes.

- F. Mulching:
 1. Spread mulch over finished surface of each plant, plant bed and hedge trench in the following amounts:
 - a. Wood Chips: 3 inches.
 - b. Shredded Wood: 2 inches.
 2. Water plants thoroughly after mulching.

- G. Pruning: Prune immediately after planting using sharp tools approved by the Architect. Remove approximately 1/3 of the wood of deciduous plants, maintaining the natural habit of the plant. Cut no leaders. Paint pruning cuts 3 inches in diameter or over with tree wound paint.

- H. Guying: Guy deciduous trees 4 inches and over in caliber; trees over 6 feet high with 3 or more stems; and evergreens 6 feet or over in height, with 3 guys immediately after planting. Attach guys to stakes and trees as indicated. Connect multi-stem trees with protected connecting wires maintaining each stems relationship to one another.

- I. Establishment of Planting: Maintain plantings immediately following planting operations and continue throughout the guarantee period. Establishment of plantings shall consist of keeping plants in healthy, growing conditions by watering, weeding, cultivating, pruning, spraying, tightening of guys, remulching and by any other necessary operations of establishment. Water all plants at least once a week between April 1 and October 31 with approximately 5 gallons per square yard (1 inch layer of water) per watering unless otherwise directed. Provide additional watering during periods of dry weather when required or when directed. Treat plants with good horticultural preventative or remedial measures to control insects, diseases or rodents.

3.04 INSPECTIONS AND REPLACEMENTS

- A. The following inspections apply only to this Section.
1. Physical Completion Inspection and Replacements: Notify the Architect in writing at least ten days prior to requested date of physical completion inspection. Remove and replace dead, unhealthy or badly impaired plants according to the original specification, if so directed. Replace plants during the next planting season if this inspection is not within a planting season.
 2. End of Guarantee Inspection and Replacements: Remove stakes, guy wires and tree wrapping at the end of the one year guarantee period unless otherwise directed. Remove and replace dead, unhealthy or impaired plants according to original specification, as directed. Replace plantings during the next planting season if end of guarantee period is not within a planting season.

END OF SECTION

RA ENGINEERING

June 6, 2022

Updated July 22, 2022

Deborah A. Homan, RLA
Partner
Architects/Planners (WBE/DBE)
David Smotrich & Partners LLP
443 Park Avenue South
New York, NY 10016

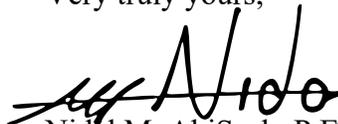
Re: Project no. 22C1021
Geotechnical Investigation
230 West 27th Street
New York, NY 10001

Greetings:

We are pleased to submit this electronic copy of our final report covering the geotechnical investigation at the referenced address. The work was performed in general accordance with our proposals dated May 25, 2022, and June 7, 2022. A preliminary draft report was issued on June 6, 2022

We appreciate this opportunity to be of service and look forward to working with you as the project proceeds.

Very truly yours,


Nidal M. AbiSaab, P.E.



*Unauthorized alteration or addition
to this report is a violation of New
York State Education Law Article
145 section 7209.*



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PROJECT DESCRIPTION

LOCATION AND EXISTING CONDITIONS

The site comprises of Manhattan Block 776, Lot 55. The footprint area of the site is 13,183-ft² according to DOB Oasis website. The site is located on the south side of West 27th Street between 7th Avenue and 8th Avenue. The site is currently occupied by a 15-story building with one below grade level. No NYCT structures are located within 200-ft of the site.

A site survey with elevations referenced to the North American Vertical Datum of 1988 (NAVD88) was not provided. All vertical heights and depths in this report are referenced to the top of the cellar slab.



PROPOSED CONSTRUCTION

We understand that the proposed construction includes new elevator with new pit adjacent to an existing elevator. The new elevator will service two floors. Walls in the area of the proposed elevator will be demolished prior to the pit excavation

Based on geotechnical data from the general area, we anticipated that the site may be underlain by several feet of uncontrolled fill followed by bedrock about 17-ft below sidewalk. An old stream once passed near the site and a potential organic soil layer may be present due to historic swampland in the area. Rock elevations may also be deeper due to the old stream. We anticipated that the groundwater table will be several-ft below existing cellar grade.

Our findings generally confirmed the available data with some variations. Namely, no organics were encountered, and water was relatively shallow.

PURPOSE AND SCOPE OF SERVICES

The purpose of the geotechnical investigation is to obtain subsurface data at the site to provide recommendations for construction of the new elevator pit.

We recommended excavating a test pit adjacent to Column 35 to observe the condition and depth of the footing. The purpose of the test pit was to determine if underpinning or support of excavation is needed for the proposed pit. A boring in addition to the test pit was required because bedrock was not encountered in the test pit.

We provided the following services:

1. Engaged the subcontractor, Warren George, Inc. (WGI) to excavate the test pit and drill the boring.
2. We observed the drilling operations and logged samples in the field. We also visited the site to observe and document the test pit.
3. Evaluated the data and submitted this updated report containing the data obtained and a discussion of our evaluation and recommendations.
4. We will execute TR forms for Soils – Site Investigation (Borings and Test Pits) prepared by your expeditor.
5. We will have a discussion with you regarding our findings.

GEOTECHNICAL INVESTIGATION

BORINGS

Warren George Inc. (WGI) mobilized to the site to drill the recommended boring, B-1W. WGI mobilized the equipment and drilled the boring on July 13 and 14, 2022. The boring was drilled within the cellar in the general location of the proposed new elevator using a portable electric drill rig. Decomposed rock was encountered at approximately 5.5-ft depth while bedrock was encountered at 8-ft depth. The boring was terminated at 13-ft depth. A groundwater observation well was installed in the boring upon completion. The well installation log with the groundwater tracking information and rock core log are presented in Appendix A. The boring location can be seen on the attached Figure 1

The boring was advanced with mud rotary techniques using a tricone roller bit with a water / biodegradable mud as the drilling fluid. Variable lengths of 3-in diameter steel casing were used to stabilize the upper portions of the borehole. Generally, samples were obtained at 5-ft depth intervals by the Standard Penetration Test (SPT) method (ASTM D 1586)¹. A donut hammer was used to advance the spoon samples in the borings. Upon encountering N-values generally exceeding 100-blows/ft (or as indicated by the driller’s “feel” of the drill tools) an AX-size diamond bit, single tube core barrel was used to retrieve rock core. Core recovery and Rock Quality Designation (RQD)² as a percentage of the run were determined and recorded on the boring logs.

The borings were observed and logged by our Mr. John Lorenz, PE. The boring logs are presented in Appendix A.

¹ Standard Penetration Test (SPT) consists of advancing the standard 2-in diameter spoon sampler a distance of 18- or 24-in by driving it with a 140-lb hammer falling freely through a 30-in drop height. The N-value is the number of blows required to advance the sampler the last 12-in of the 18-in drive or the middle 12-in of the 24-in drive.

² RQD (Rock Quality Designation) is defined as the percentage of the 5-ft NX-size core run that is recovered in pieces 4-inches in length or longer. Breaks due to drilling are ignored in the calculation of RQD.



TEST PITS

Warren George Inc. (WGI) excavated one test pit at the site on May 16, 2022. RA visited the site to document the test pit excavation and findings. The test pit was excavated adjacent to Column 35 from the interior of the cellar. Refer to Figure 1 for the approximate location of the test pit.

The test pit was advanced approximately 5-ft below the top of the existing 6- to 8-in. concrete slab adjacent to Column 35 before the excavation was stopped due to groundwater infiltration. Groundwater infiltrated the test pit excavation approximately 32-in. below the top of the existing cellar slab and prevented the excavation from being advanced further to determine the bottom of the column pier. The column pier was observed to extend at least 5-ft below the top of the cellar slab. The test pit was backfilled in lifts and compacted using a tamping bit on a jackhammer. Silty sand with gravel was observed within the excavated material.

The test pit was observed and logged by our Mr. Nidal M. AbiSaab, P.E. The test pit log is presented in Appendix B.

SUBSURFACE CONDITIONS

SUBSURFACE STRATA

The subsurface strata as generalized from the boring data may be summarized as follows:

- A. Below the cellar slab is a layer **Sand**. The Sand sample contained varying percentages of silt and gravel. This layer is generally classified as 3B by NYCBC. USCS classification is generally SP-SM. The Sand stratum terminated on decomposed rock or bedrock.
- B. **Decomposed Rock** was encountered in the borings at approximately 5-ft depth. A fragment of Decomposed Rock was obtained in a split spoon sample that reached refusal and was obtained in a rock core sample. The stratum ranged from approximately 5- to 8-ft depth. The Decomposed Rock is classified as 1D by NYCBC.
- C. **Bedrock** was confirmed the boring at 8-ft depth. The bedrock was cored with a recovery of 97% and RQD of 57%. The core sample consisted of Medium-Hard Mica Schist bedrock. The bedrock is classified as 1B by NYCBC.

GROUNDWATER

Groundwater was encountered in the observation well and the test pit approximately 2.5-ft below the top of the cellar slab. The Groundwater levels may vary with weather conditions, seasonal factors, or other unknown conditions and therefore should be designed for 1-ft below the cellar slab.



EVALUATION AND RECOMMENDATIONS

We understand that the proposed construction includes new elevator with new pit adjacent to an existing elevator. The new elevator will service two floors.

We understand that the proposed construction subgrade for the new elevator pit is approximately 5-ft below the existing cellar slab.

FOUNDATIONS

Shallow foundations at the projected subgrade level will be bearing on the decomposed rock layer.

Shallow foundations with an allowable bearing value of 8-tsf is suitable for the new elevator core. The shallow foundations may be structurally designed using a coefficient of subgrade reaction up to 600-kip/ft³ for a 1-ft x 1-ft plate (k_{v1}) under static or essentially static loads. Where necessary, the coefficient of subgrade reaction (k_v) may be estimated as: $k_v = k_{v1} [(B+1)/2B]^2$ for areas of width B. Edge stresses may exceed the allowable bearing pressure by 25% provided the heel of the foundation is not subjected to tension.

We recommend that the bottom of the shallow foundations match the bottom of the existing footings or shall terminate outside a 1V:1H influence line drawn from the closest corner of the existing footings and extending towards the proposed footings.

The subgrade should be compacted in the dry with at least four passes of a walk-behind twin drum vibratory roller. Minimum footing dimension should be 3-ft.

Settlement is expected to be on the order of 1/4-inch.

SOIL PARAMETERS

We estimated the engineering properties of the subsoils based on our experience in the area and the findings in the boring and test pit. The below values represent the estimated soil parameters and are not necessarily representative of differing values across the site. These values should be used only for preliminary design purposes and are subject to change following the information gathered from the required soil boring.

Soil Type	Unsaturated Unit, Weight, γ (pcf)	Friction Angle, ϕ (°)	Cohesion, c (psf)
Silty Sand	115	30	0
Decomposed Rock	125	40	0

CRITERIA FOR DESIGN OF PIT WALLS

We recommend that pit walls be designed with the following two conditions. Refer to Figure 2 for an illustration of these conditions.



Hydrostatic Pressures should be included in the design for the above cases where applicable. Hydrostatic pressures can be estimated as a triangular distribution based on the unit weight of water, $\gamma_w = 62.4\text{-lbs/ft}^3$.

Surcharge from adjacent structures or other existing features should also be considered in the design for the above cases. The lateral, rectangular distribution may be taken as $k_o \times q_s$, where k_o is the at-rest earth pressure coefficient and q_s is the vertical surcharge area load.

Below grade walls, pits, and slabs shall be waterproofed.

GROUNDWATER CONTROL

The groundwater table was encountered during this investigation approximately 2.5-ft below the existing cellar slab level. Design water elevation should be considered 1-ft below the top of the cellar slab.

Groundwater is likely perched on top of Rock. As the excavation advances for the new elevator pit, we anticipate that perched groundwater will have to be removed from the excavation. As such, we anticipate that localized dewatering will be sufficient to control groundwater. Dewatering during excavation could consist of localized sumps and pumps. A pumping test should be conducted to verify water volume and feasibility of local pumps.

Groundwater levels may vary with weather conditions, seasonal factors, or other unknown conditions.

We understand from discussion with FIT staff that a water leak may be present in the vicinity of the proposed elevator. For this reason, a test of the groundwater should be performed to determine if the source is potable water, sewer water, or groundwater. Separately, the observation well may be used to perform/observe a dye test to help determine the source of water leaks. Note that testing the water is not part of the scope of this investigation.

Below grade walls, pits, and slabs shall be waterproofed in accordance with code.

UNDERPINNING AND SUPPORT OF EXCAVATION

Soil Slope

Excavation side slopes may be made at a slope of 1:1½ (v:h) if sufficient space is available above the groundwater level. Slopes excavated below the groundwater level is not recommended without proper protection. Otherwise, a temporary earth retaining system will be required. If used, soil slope surfaces shall be protected against erosion.

Underpinning

Based on the proposed excavation being outside the influence of adjacent footings, underpinning is not anticipated.

If the proposed foundations are within an influence line of 1V:1H extending down from the bottom of the existing nearby footings to the bottom of the proposed excavation, underpinning will be required. The underpinning should extend about 12-in below the influence line. Tight sheeting or lagging with a lift thickness limited to a few inches more than the width of the lagging should be used in excavating the underpinning pits to minimize loss of ground from beneath the foundations. Steel wedges, shims and plates should be used to transfer the foundation and wall loads to the underpinning. Jacking should be required to minimize post construction settlements if the underpinning will be bearing on soil at or near the ground water level. Small settlements should be expected during the underpinning process with good contractor workmanship.

The underpinning should be designed to resist lateral earth pressures with basement slab surcharge as well as the vertical foundation loads. Therefore, lateral restraint may be required if the underpinning depth is more than about five feet. Underpinning should be designed for earth pressures at rest (see discussion above “Criteria for Design of Pit Walls”).

Underpins must be excavated in the dry. The subgrade for the underpinning must be at least 2-ft above groundwater. In areas where the design groundwater table is higher than the underpinning subgrade, a dewatering system must be considered.

POTENTIAL EFFECTS ON EXISTING AND ADJACENT STRUCTURES

Based on the findings of the test pit, we do not anticipate that underpinning will be necessary. The bottom of the footing for the proposed elevator pit is located approximately 2-ft below the existing concrete pier level observed in the test pit. New foundations can be placed more than 2-ft away from this pier without undermining the existing footing.

Existing and Adjacent Buildings – dewatering, support of excavation (SOE), and deep excavations almost always results in small settlements and/or lateral movements of adjacent structures. With a proper SOE design and quality contractor workmanship, these movements usually are tolerable but could cause cosmetic or structural cracking, requiring repairs.

Retaining structures will provide lateral support to maintain the integrity of the ground and adjacent structures. With excavation in granular soils some settlement of the adjacent ground (or buildings) should be expected. Settlements of about ¼ percent to ½ percent of the excavation depth are typical for pre-stressed tied-back anchors or preloaded braced walls. The zone that may experience settlements should be expected to extend a horizontal distance from the excavation equal to about 1½- to 2-times the depth of the excavation, with the settlement diminishing with distance from the excavation.

CONSTRUCTION MONITORING

The adjacent building walls should be monitored for vibrations and movement during excavation and foundation construction. Further, we recommend that a pre-construction existing conditions survey of the building be undertaken approximately 2- to 4- weeks prior to the commencement of work.



ADDITIONAL INVESTIGATION

We shall be notified if the scope of work changes to determine additional investigation scope.

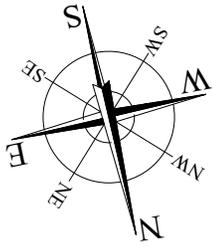
OWNER AND CONTRACTOR OBLIGATIONS

It is the Contractor's responsibility to ensure that construction activities will not cause loss of support or adversely affect the functions of adjacent structures and facilities. By using this report, the Owner agrees that RA Engineering LLP will not be held responsible for any damages to adjacent structures caused by the negligence of others.

RA Engineering LLP shall be added to the Project Wrap and/or Contractor's General Liability Insurance as an additional insured.

LIMITATIONS

The conclusions and recommendations presented herein are applicable only to this project as described above. They are based on our evaluation of the borings done for this investigation our understanding of the project as described above. The subsurface data is applicable at the exploration location. Recommendations provided in this report assume that subsurface conditions do not significantly deviate from those revealed by the boring and test pit. If subsurface conditions or project conditions differ from those presented herein, we should be notified and requested to re-evaluate our recommendations.



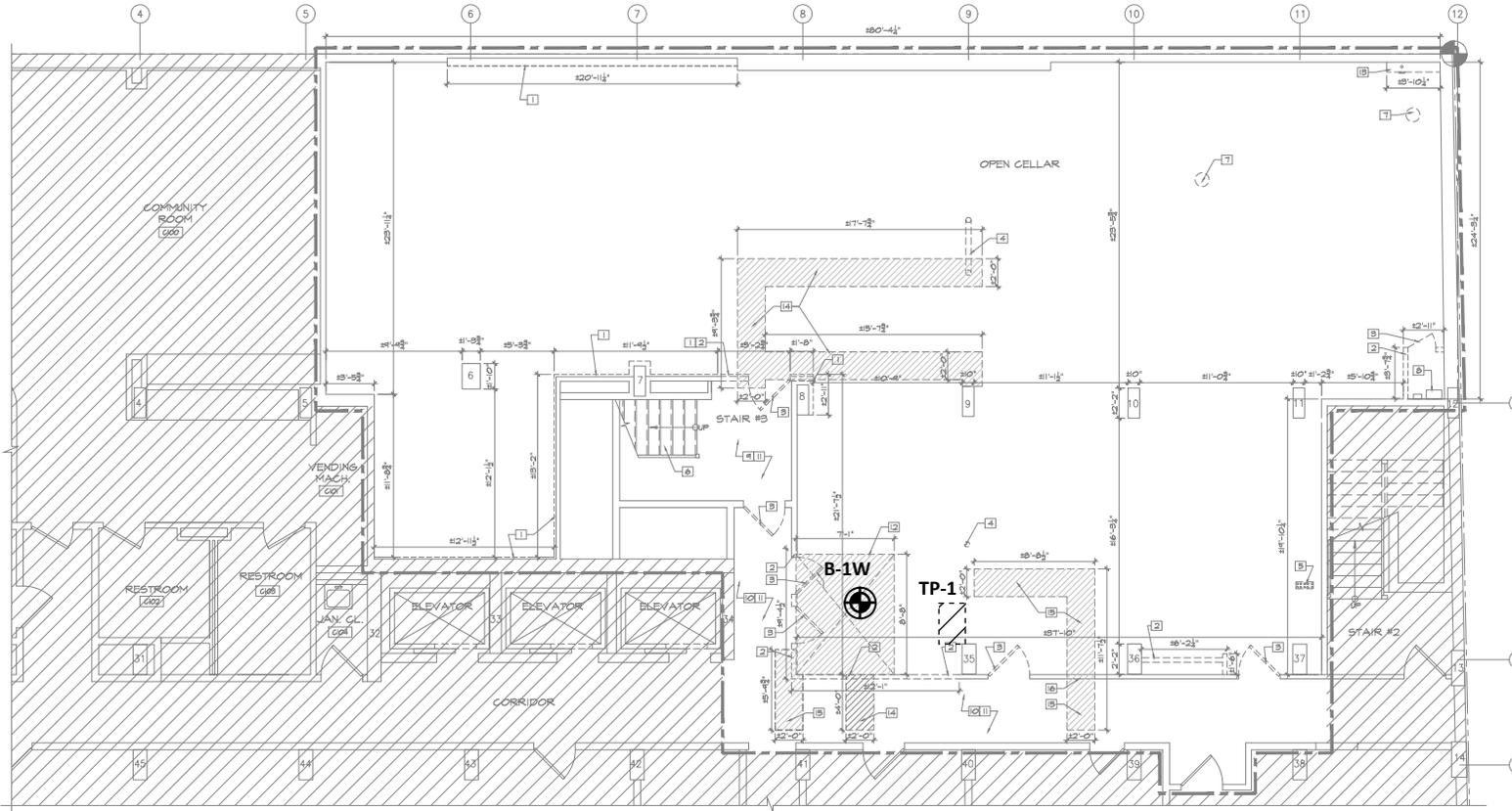
GENERAL NOTES:

TEST PIT WAS EXCAVATED BY WARREN GEORGE INC. AND OBSERVED BY RA ENGINEERING LLP ON MAY 16, 2022.

BORING WAS DRILLED BY WARREN GEORGE INC. AND OBSERVED BY RA ENGINEERING LLP ON JULY 13 AND JULY 14, 2022.

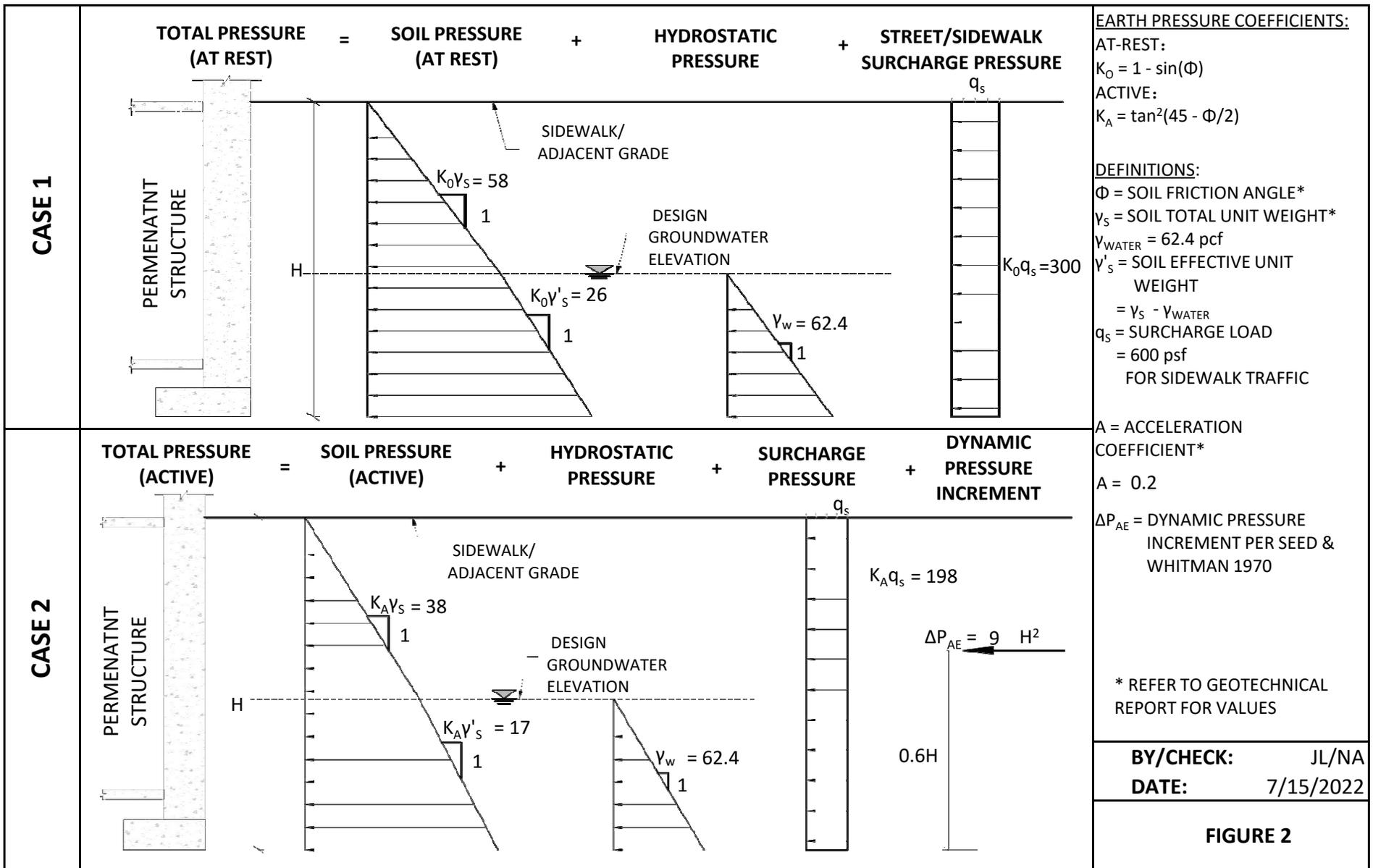
LEGEND:

-  B-XW, BORING LOCATION WITH OBSERVATION WELL
-  TP-X, TEST PIT LOCATION



WEST 27TH STREET

TITLE:		230 WEST 27TH STREET, NEW YORK, NY
AS DRILLED BORING & TEST PIT LOCATION PLAN		
DATE:	07/15/2022	
PROJ. NO.:	22C1021	
DRN/CKD:	JL / NA	
DRAWING:		FIGURE 1



APPENDIX A – BORING LOGS

RA ENGINEERING				SPECIAL INSPECTION GEOTECHNICAL BORING LOG								B-1W		
Project #: 22C1021		Project Name: 230 West 27th Street (FIT - Coed Hall)		Start Date: 7/14/2022										
Owner's Rep: David Smotrich & Partners		Inspector: J. Lorenz		End Date: 7/14/2022										
GC/CM: -		Inspection Tools: Visual, 6-ft tape measure												
Contractor: Warren George Inc		Equipment in Use: Portable Electric Drill Rig												
Present on Site: RA & WGI														
Applicable Codes and Standards: NYCBC & USCS														
Documents Reviewed: Proposal (RA - 06/07/22)														
Boring Details				Casing	Size/Type: 3" O.D.				Drilling Quantities					
Reference Datum: Cellar Slab					Hammer Weight (lbs): 140				Completion Depth (ft):		13			
Surface Elevation: 0					Drop Height (in): 30				Rock Depth (ft):		5.5			
Foreman: Greg Williams				Sampler	Size/Type: 2" O.D. Split Spoon				Rock Core Length (ft):				7.5	
Helper: Ben Scott					Hammer Weight (lbs): 140				Attachments					
Drill Bit Size/Type: 2-15/16" Tricone					Hammer Type: Donut				<input checked="" type="checkbox"/> Well Installation Log					
Core Barrel Size/Type: A-Size single tube					Drop Height (in): 30				<input checked="" type="checkbox"/> Rock Core Log(s)					
Depth (ft) Starting End	Date/Time	Description/Remarks	Strata	Samples								Lab Results		
				Sample ID	USCS Group Symbol	Building Code Designation	Blows/6" or RQD (%)				Recovery (in)	Water Content (%)	-200 (%)	
7/14/22 8:35 Start of boring B-1W. Core through approximate 8" concrete slab.														
1	3	7/14/22 8:45	Brown, poorly graded sand with silt, gravel	Sand	SS-1	SP-SM	3B	3	3	7	8	6		
4 Installed 4-ft of casing														
5	5.5	7/14/22 9:22	Decomposed rock fragments	Dec. Rock	SS-2	Dec. Rock	1D	53	50/1"	-	-	2		
5 Installed additional 1-ft of casing (5-ft total)														
5.5	8	7/14/22 11:20	Soft decomposed Rock, grey mica schist	Dec. Rock	C-1	Dec. Rock	1D	0"/	30"	=	0%	6		
8	13	7/14/22 12:55	Medium-hard bedrock, grey mica schist	Bedrock	C-2	Rock	1B	34"/	60"	=	57%	58		
13 7/14/22 13:30 End of boring B-1W. 12-ft observation well installed (10-ft screen, 2-ft riser, flushmount well cap)														

22C1021

WELL INSTALLATION LOG

WELL INSTALLATION

DATE/TIME: 07/14/2022 at 13:30

PERFORATED PIPE

LENGTH: 10-ft
DIAMETER: 2-in

RISER PIPE

LENGTH: 2-ft
DIAMETER: 2-in

COVER

TYPE: Flush-mount
DIAMETER: 3-in

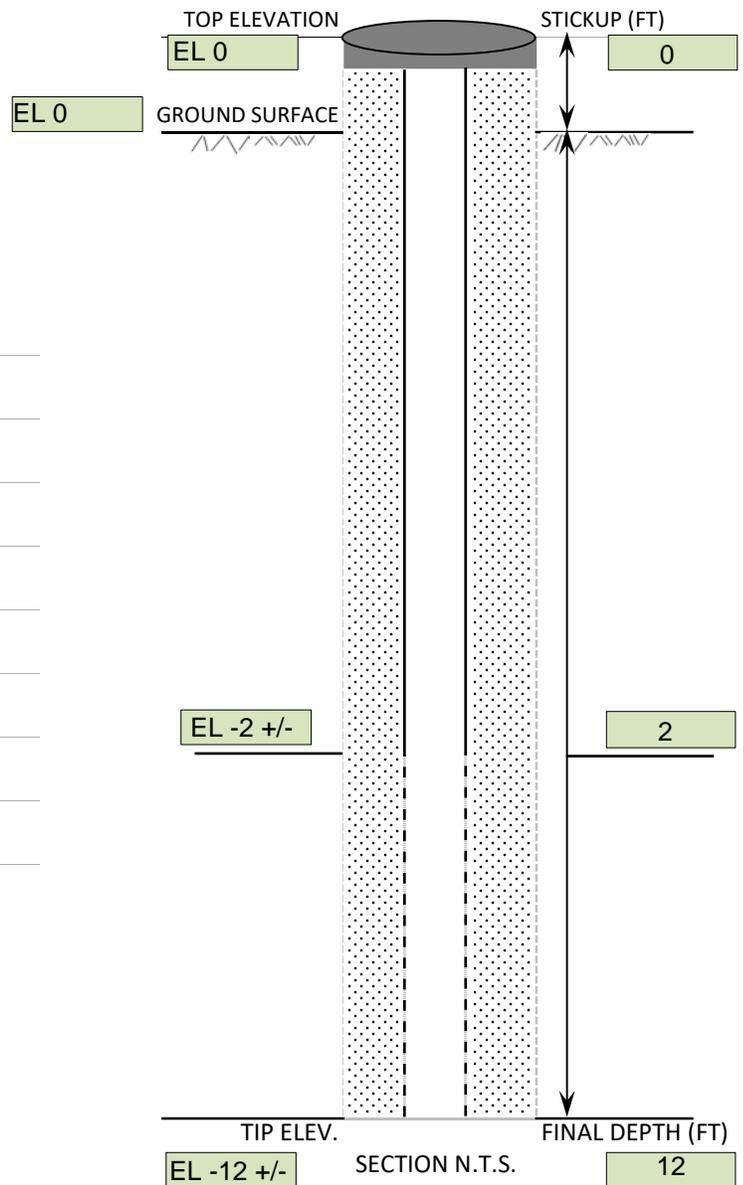


LEGEND

- COVER
- GROUT
- DRAINAGE SAND
- BENTONITE
- RISER PIPE
- PERFORATED PIPE

Reference datum:
Cellar Slab = EL 0

DATE	TIME	DEPTH	ELEV	BY
7/14/22	13:45	1.5-ft	-1.5	JL
7/19/22	11:25	2.2-ft	-2.2	JL



Remarks: Annulus around the well filled with drainage sand

22C1021

ROCK CORE LOG

CORE DETAILS:
 CORE I.D.: B-1w, C-2
 T.O. CORE DEPTH: 8.0 (FT)
 B.O. CORE DEPTH: 13.0 (FT)
 RECOVERY: 58 / 97 (IN/%)
 RQD: 34 / 57 (IN/%)
 CORE DESCRIPTION: Medium-hard mica schist
 NOTES: 30-in single tube core barrel used twice to complete the 5-ft core run

Notes	Time	Length
<u>Start</u>	<u>11:30</u>	0"
		12"
		24"
		36"
		48"
<u>End</u>	<u>12:55</u>	60"



Remarks:

APPENDIX B – TEST PIT LOG

Project #: 22C1021	Project Name: 230 W 27 St.	Date: 5/16/22
Owner's Rep: James @ FIT	Inspector: N. Abi Saab	Time: 900-1430
GC/CM:	Inspection Tools: Visual, Ruler	Weather: RAINY, 60's
Contractor: WGI	Equipment in Use: Hand held tools	
Present on Site: N. Abi Saab, LOUIS & LAWRENCE (WGI)		

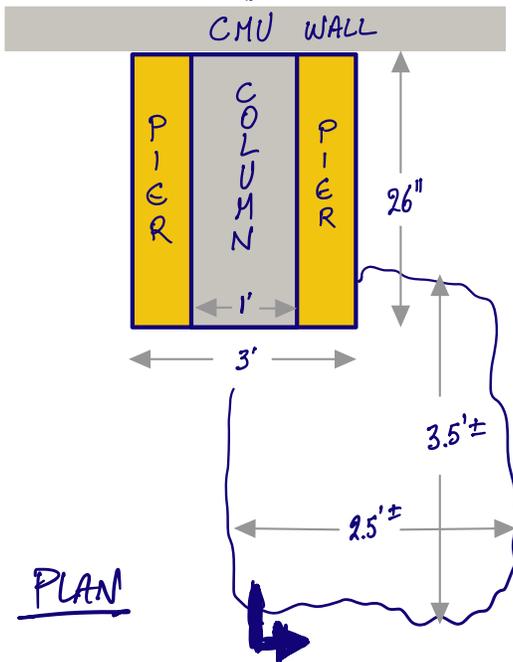
Applicable Codes and Standards:

Documents Reviewed: **Proposal**

Reference Datum/Surface Elevation: **CELAR LEVEL**

Plan/Section (Not to Scale)

Remarks/Pictures



NOTE:

- TEST PIT BACKFILLED & COMPACTED UPON COMPLETION.

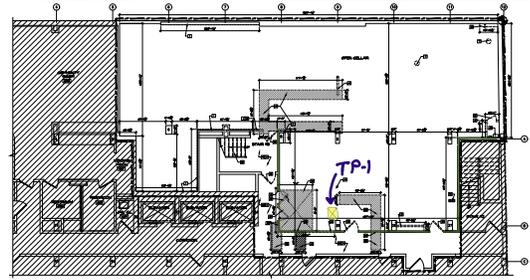
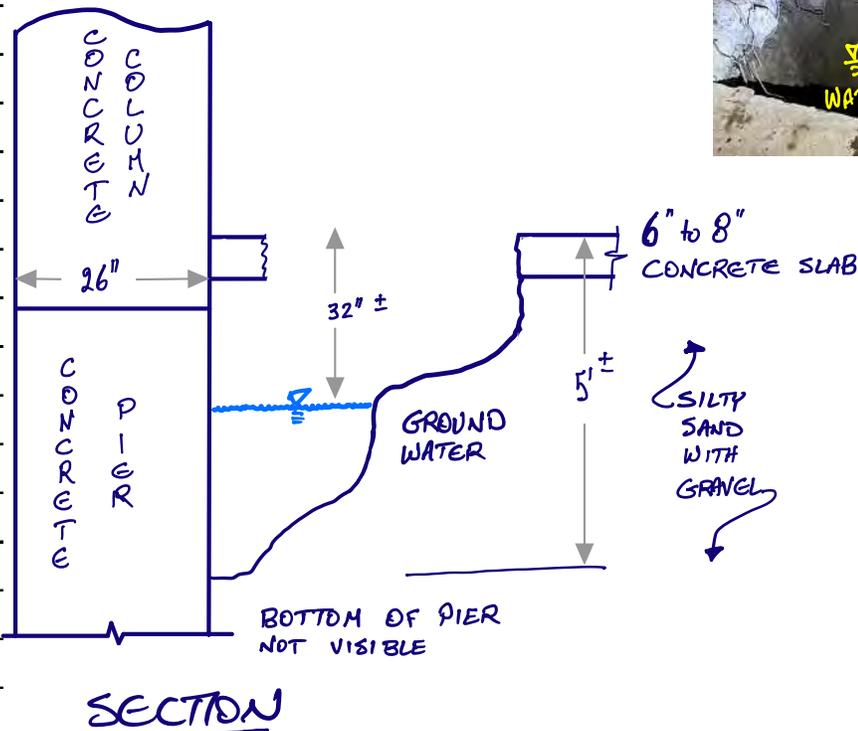


EXHIBIT D: DRAWINGS

Material Designations

	CONCRETE MASONRY UNITS
	GLASS
	GYPSUM DRYWALL/ CEMENT FILL
	INSULATION (LOOSE OR BATT)
	INSULATION (RIGID)
	METAL (SMALL SCALE)
	PLYWOOD
	STEEL (LARGE SCALE)
	TILE - CERAMIC, ACOUSTIC, VCT
	WOOD, FINISHED
	WOOD, ROUGH

Abbreviations

ACCES	ACCESSORY	INFO	INFORMATION
ACOUS	ACOUSTIC(AL)	MFD	MANUFACTURED
AFF	ABOVE FINISHED FLOOR	MFR	MANUFACTURER
AL	ALUMINUM	MECH	MECHANICAL
ALT	ALTERNATE	MTL	METAL
ANOD	ANODIZED	MIN	MINIMUM
APPL	APPLIANCE	MISC	MISCELLANEOUS
ARCH	ARCHITECTURAL	MLNK	MILLWORK
		MTD	MOUNTED
BLDG	BUILDING	NIC	NOT IN CONTRACT
BD	BOARD	NTS	NOT TO SCALE
BLKG	BLOCKING		
BO	BOTTOM OF	OPF HAND	OPPOSITE HAND
CAB	CABINET	PLYWD	PLYWOOD
CPT	CARPET		
CLG	CEILING	RCP	REFLECTED CEILING PLAN
COATG	COATINGS		
CONG	CONCRETE	RFI	REQUEST FOR INFORMATION
CONSTR	CONSTRUCTION		
COV	COVER	RM	ROOM
CMU	CONCRETE MASONRY UNIT	RO	ROUGH OPENING
		SF	SQUARE FEET
DBL	DOUBLE	SIM	SIMILAR
DEPT	DEPARTMENT	SMC	SURFACE MOUNTED CONDUIT
DET	DETAIL		
DIA	DIAMETER	SS	STAINLESS STEEL
DIFF	DIFFUSER	STD	STANDARD
DIM	DIMENSION	STL	STEEL
DN	DOWN	SUSP	SUSPENDED
DR	DOOR		
DWGS	DRAWINGS	THK	THICK
		TOP	TOP OF
ELEC	ELECTRICAL	TYP	TYPICAL
ENG	ENGINEER		
EQ	EQUAL	UN	UNLESS OTHERWISE NOTED
EQUIP	EQUIPMENT	VON	UNLESS OTHERWISE NOTED
ETC	ETCETERA		
EXIST	EXISTING	VIF	VERIFY IN FIELD
EXT	EXTERIOR		
FAB	FABRICATION	W	WITH
FE	FIRE EXTINGUISHER	WD	WOOD
FEC	FIRE EXTINGUISHER CABINET	WO	WITHOUT
		WT	WEIGHT
FIN	FINISH		
FR	FIRE RAT(ING)/ED)		
GA	GAUGE		
GC	GENERAL CONTRACTOR		
GL	GLASS		
GYP	GYPSUM		
HD	HEAD		
HDWD	HARDWOOD		
HDWE	HARDWARE		
HM	HOLLOW METAL		
HVAC	HEATING, VENTILATION, AND AIR CONDITIONING		

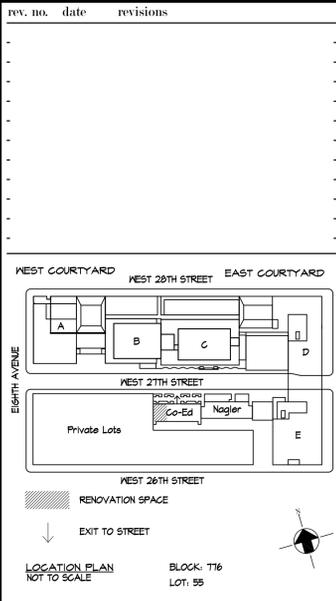
Graphic Symbols

	SECTION LETTER		BUILDING SECTION REFERENCE
	DETAIL NO.		WALL SECTION OR DETAIL REFERENCE
	DETAIL NUMBER		DETAIL REFERENCE
	ELEVATION NUMBER		WALL ELEVATION REFERENCE
	NORTH INDICATOR		
	REVISION NO.		
	DOOR TYPE NO.		
	WINDOW NO.		
	ROOM/SPACE NO.		
	CENTERLINE		
	PARTITION TYPE INDICATOR		
	LEVEL LINE		
	ALIGN		
	APPLIANCE AND PLUMBING FIXTURE DESIGNATION		
	FLOORING DESIGNATION BASE DESIGNATION		
	WALL MATERIAL DESIGNATION		
	HIDDEN LINES OR REMOVALS		
	EXISTING WORK TO REMAIN		
	EXISTING WORK TO BE REMOVED		
	NEW INFILL		
	NEW PARTITIONS		
	EXISTING DOOR & FRAME TO REMAIN		
	NEW DOOR & FRAME W/ DOOR NUMBER		
	EXISTING DOOR & FRAME TO BE REMOVED		
	EXISTING SUSPENDED CEILING TO BE REMOVED		
	EXIT SIGN		
	EXIT SIGN W/ DIRECTIONAL ARROWS		
	ELECTRICAL OUTLET DUPLEX		
	ELECTRICAL OUTLET QUADRAPLEX		
	DATA OUTLET		
	JUNCTION BOX		
	SWITCH		
	THERMOSTAT		
	OCCUPANT SENSOR		
	CLOCK		
	EMERGENCY TELEPHONE		
	DRINKING FOUNTAIN		
	FLOOR OUTLET		
	AV SPEAKER, CEILING MOUNTED		

Drawing List

ARCHITECTURAL	
T-001.00	COVER SHEET
G-001.00	LEGEND, SYMBOLS, ABBREVIATIONS & DRAWING LIST
G-002.00	GEN. NOTES, INSPECTIONS AND SCOPE OF WORK
G-003.00	ACCESSIBILITY DIAGRAMS
G-004.00	CELLAR LIFE SAFETY PLAN, NOTES & CALCULATIONS
G-005.00	1ST FLOOR LIFE SAFETY PLAN, NOTES & CALCULATIONS
G-006.00	2ND FLOOR LIFE SAFETY PLAN, NOTES & CALCULATIONS
L-100.00	SITE PLAN
L-101.00	SITE PLANTING PLAN & PLANTING SCHEDULE
Z-100.00	ZONING PLAN
DM-100.00	CELLAR DEMOLITION PLAN
DM-101.00	1ST FLOOR DEMOLITION PLAN
DM-102.00	2ND FLOOR DEMOLITION PLAN
DM-103.00	ROOF DEMOLITION PLAN
DM-400.00	CELLAR CEILING DEMOLITION PLAN
DM-401.00	1ST FLOOR CEILING DEMOLITION PLAN
DM-402.00	2ND FLOOR CEILING DEMOLITION PLAN
A-100.00	CELLAR CONSTRUCTION PLAN
A-101.00	1ST FLOOR CONSTRUCTION PLAN
A-102.00	2ND FLOOR CONSTRUCTION PLAN
A-103.00	ROOF CONSTRUCTION PLAN
A-200.00	FRONT ELEVATION
A-201.00	REAR ELEVATION
A-202.00	PARTIAL ELEVATIONS
A-300.00	CROSS SECTION
A-301.00	1ST FLOOR INTERIOR ELEVATIONS
A-302.00	1ST FLOOR INTERIOR ELEVATIONS
A-303.00	1ST FLOOR INTERIOR ELEVATIONS
A-304.00	1ST FLOOR INTERIOR ELEVATIONS
A-305.00	CELLAR INTERIOR ELEVATIONS
A-306.00	CELLAR INTERIOR ELEVATIONS
A-307.00	CELLAR INTERIOR ELEVATIONS
A-308.00	CELLAR INTERIOR ELEVATIONS
A-309.00	CELLAR & 2ND FLOOR INTERIOR ELEVATIONS
A-400.00	CELLAR REFLECTED CEILING PLAN
A-401.00	1ST FLOOR REFLECTED CEILING PLAN
A-402.00	2ND FLOOR REFLECTED CEILING PLAN
A-403.00	LIGHTING SCHEDULE & CEILING DETAILS
A-404.00	CEILING DETAILS
A-700.00	PARTITION SCHEDULE AND DETAILS
A-701.00	DOOR SCHEDULE & DETAILS
A-702.00	DOOR DETAILS
A-703.00	WINDOW SCHEDULE, FRONT FACADE WINDOWS, PLAN, ELEVATION & DETAILS
A-704.00	REAR FACADE WINDOWS PLAN, ELEVATION, SECTION & DETAILS
A-705.00	WINDOW DETAILS
A-706.00	VESTIBULE PLAN, ELEVATIONS AND DETAILS
A-707.00	VESTIBULE SECTIONS AND DETAILS
A-708.00	INTERIOR GLASS PARTITION SCHEDULE & DETAILS
A-709.00	LOUVER DETAILS, PATIO FENCE DETAILS, CONCRETE PAD DETAILS, TILE DETAILS
A-710.00	MILLWORK DETAILS
A-711.00	MILLWORK DETAILS
A-712.00	FIRESTOPPING DETAILS
A-800.00	CELLAR FINISH PLAN
A-801.00	1ST FLOOR FINISH PLAN
A-802.00	2ND FLOOR FINISH PLAN
A-803.00	CELLAR FURNITURE/POWER PLAN
A-804.00	1ST FLOOR FURNITURE/POWER PLAN
A-805.00	2ND FLOOR FURNITURE/POWER PLAN
A-806.00	SCHEDULES
VT-100.00	ELEVATOR DETAILS
SS-100	EXTERIOR SIGNAGE

STRUCTURAL	
S-100.00	KEY PLAN & GENERAL NOTES
S-110.00	FLOOR FRAMING PART PLAN
S-120.00	ELEVATIONS AND SECTIONS
S-130.00	TYPICAL DETAILS AND SECTIONS
MECHANICAL	
EN-001.00	MECHANICAL ENERGY COMPLIANCE
M-001.00	SYMBOL LIST, ABBREVIATIONS AND NOTES
M-101.00	CELLAR MECHANICAL PLAN
M-102.00	1ST FLOOR MECHANICAL PLAN
M-103.00	2ND FLOOR MECHANICAL PLAN
M-104.00	MECHANICAL ROOF PLAN
M-501.00	MECHANICAL DETAILS 1
M-502.00	MECHANICAL DETAILS 2
M-503.00	MECHANICAL DETAILS 3
M-701.00	MECHANICAL SCHEDULE 1
M-702.00	MECHANICAL SCHEDULE 2
M-703.00	MECHANICAL SCHEDULE 3
M-801.00	AC-1G MECHANICAL CONTROLS
M-802.00	AC-2G & EXHAUST FANS MECHANICAL CONTROLS
M-803.00	BMS ARCHITECTURE AND UNIT CONTROLS MECHANICAL CONTROLS
M-804.00	ACCU-1 REFRIGERANT SYSTEM PIPING SCHEMATIC AND CONTROLS
M-805.00	ACCU-2 REFRIGERANT SYSTEM PIPING SCHEMATIC
M-901.00	MECHANICAL CELLAR DEMOLITION PLAN
M-902.00	MECHANICAL 1ST FLOOR DEMOLITION PLAN
M-903.00	MECHANICAL ROOF DEMOLITION PLAN
ELECTRICAL	
E-001.00	ELECTRICAL SYMBOL LIST, ABBREVIATIONS & DRAWING LIST
E-002.00	NOTES AND ENERGY FILING INFORMATION
E-100.00	CELLAR ELECTRICAL LIGHTING PLAN
E-101.00	1ST AND 2ND FLOORS ELECTRICAL LIGHTING PLAN
E-200.00	CELLAR ELECTRICAL POWER PLAN
E-201.00	1ST & 2ND FLOOR ELECTRICAL POWER PLANS
E-300.00	ELECTRICAL CELLAR MECHANICAL POWER PLAN
E-301.00	ELECTRICAL 1ST FLOOR MECHANICAL POWER PLAN
E-302.00	ELECTRICAL ROOF PLAN MECHANICAL POWER
E-501.00	ELECTRICAL DETAILS
E-601.00	ELECTRICAL RISER DIAGRAM & PANEL SCHEDULES
E-900.00	CELLAR ELECTRICAL DEMOLITION PLAN
E-901.00	1ST FLOOR & ROOF ELECTRICAL DEMOLITION PART PLANS
FIRE ALARM	
FA-100.00	CELLAR LEVEL FIRE ALARM PLAN
FA-101.00	1ST AND 2ND FLOORS FIRE ALARM PLAN
FA-601.00	1ST FLOOR FIRE ALARM PLAN
FA-602.00	FIRE ALARM SPECIFICATIONS
PLUMBING	
P-001.00	PLUMBING SYMBOL LIST, ABBREVIATIONS, NOTES AND DRAWING LIST
P-100.00	CELLAR LEVEL PLUMBING PLAN
P-101.00	1ST FLOOR PLUMBING PLAN
P-501.00	PLUMBING DETAILS
P-601.00	PLUMBING RISERS DIAGRAM
P-900.00	PLUMBING CELLAR PIPING UNDERSLAB DEMOLITION PLAN
P-901.00	1ST FLOOR PLUMBING DEMOLITION PLAN
FIRE PROTECTION	
SP-001.00	SPRINKLER SYMBOLS LIST, ABBREVIATIONS, PLOT PLAN, AND DRAWING LIST
SP-002.00	SPRINKLER NOTES
SP-100.00	CELLAR LEVEL SPRINKLER PLAN
SP-101.00	1ST FLOOR SPRINKLER PLAN
SP-501.00	SPRINKLER DETAILS
SP-601.00	SPRINKLER RISER DIAGRAM, ABBREVIATIONS, PLOT PLAN AND DRAWING LIST
SP-900.00	CELLAR FIRE PROTECTION DEMOLITION PLAN
SP-901.00	1ST FLOOR SPRINKLER DEMOLITION PLAN



Structural Consultants
Allan Margolin & Associates
 420 Lexington Avenue, Suite 2738
 New York, NY 10170 / (212) 867 6720

Elevator Consultants
VDA
 120 Eagle Rock Avenue, Suite 301
 East Hanover, NJ 07936 / (973) 994-9220

Cost Consultants
Cost Concepts
 104 Bedell Place
 Melville, NY 11747 / (631) 423-7963

Environmental Consultants
EPM, Inc.
 983 Marcus Ave. Suite 109
 Lake Success, NY 11042 / (516) 328-1194

MEP Consultant
MGENGINEERING
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 New York, NY 10001 / (212) 643-9898

Fashion Institute of Technology
 340 8TH AVENUE
 NEW YORK, NY 10001

David Smotrich & Partners LLP
 Architects/Planners

443 Park Avenue South New York, NY 10016
 212 889 4045 Fax 212 889 3672

PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
**LEGEND, SYMBOLS
 ABBREVIATIONS
 DRAWING LIST**

SEAL & SIGNATURE:	DATE: 09.01.2022
	PROJECT No: 13284.154
	DRAWING BY: GD & TM
	CHK BY: DH & CK
	DWG No:
	G-001.00
	SCALE: N.T.S
	2 of 61

General Notes

THE FOLLOWING NOTES SHALL APPLY THROUGHOUT. EXCEPTIONS ARE SPECIFICALLY NOTED ON EACH DRAWING.

- ALL WORK OF THIS CONTRACT SHALL BE DONE IN ACCORDANCE WITH THE LATEST EDITION OF THE NEW YORK CITY BUILDING CODE AND REGULATIONS OF OTHER AGENCIES HAVING JURISDICTION ON THE WORK OF THIS CONTRACT.
- DO NOT SCALE DRAWINGS; DIMENSIONS SHOWN GOVERN. LARGER SCALE DRAWINGS SHALL GOVERN OVER SMALLER SCALE. USE DIMENSIONS ONLY. ALL DIMENSIONS AND CONDITIONS SHOWN AND ASSUMED ON THE DRAWINGS MUST BE VERIFIED AT THE SITE BY THE CONTRACTOR BEFORE ORDERING ANY MATERIAL OR DOING ANY WORK. ANY DISCREPANCIES IN THE DRAWINGS AND SPECIFICATIONS SHALL BE REPORTED TO THE ARCHITECT. NO CHANGE IN DRAWINGS OR SPECIFICATIONS IS PERMISSIBLE WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT/ENGINEER. NO WORK SHALL PROCEED UNTIL SUCH DISCREPANCY HAS BEEN RECTIFIED.
- ALL WORK ON THESE DRAWINGS SHALL BE CONSIDERED NEW WORK WHETHER STATED OR NOT EXCEPT WHERE SPECIFICALLY NOTED AS "EXISTING TO REMAIN".
- COORDINATION OF ALL WORK UNDER THIS CONTRACT SHALL BE MAINTAINED TO ENSURE THE QUALITY AND TIMELY COMPLETION OF THE WORK/PROJECT.
- THE CONTRACTOR SHALL DISCONNECT AND/OR REMOVE ANY EXISTING PLUMBING, ELECTRICAL FIXTURES, WIRE CONDUITS, OR OTHER WORK WHICH MIGHT INTERFERE WITH THE WORK OF THIS CONTRACT. AFTER NEW WORK IS COMPLETED, THE DISCONNECTED OR REMOVED ITEMS SHALL BE REINSTALLED BY THE CONTRACTOR AT THE SAME LOCATION OR AT NEW LOCATION IF INDICATED ON DRAWINGS. CONTRACTOR TO FURNISH ALL NECESSARY NEW MATERIALS/HARDWARE FOR COMPLETION OF WORK.
- THE CONTRACTOR SHALL PATCH, REPAIR OR REPLACE ALL DAMAGED OR EXPOSED SURFACES DUE TO CONTRACT WORK. ALL NEWLY INSTALLED, PATCHED WORK AND ALL AFFECTED AREAS SHALL BE PAINTED OR FINISHED AS INDICATED OR TO MATCH EXISTING. ALL WORK SHALL BE PERFORMED TO COVER THE ENTIRE HORIZONTAL OR VERTICAL SURFACE TO THE CLOSEST CORNER IN ALL FOUR DIRECTIONS TO MATCH EXISTING CONDITIONS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATELY BRACING AND PROTECTING ALL WORK DURING CONSTRUCTION AGAINST DAMAGE, BREAKAGE, COLLAPSE, DISTORTIONS AND INCORRECT ALIGNMENTS ACCORDING TO ALL APPLICABLE CODES AND STANDARDS OF GOOD PRACTICE.
- THE CONTRACTOR SHALL INCLUDE ALL PREPARATORY AND ASSOCIATED SUPPLEMENTARY WORK TO PROVIDE A COMPLETE AND FINISHED INSTALLATION.
- WHERE MANUFACTURER'S NAMES AND PRODUCT NUMBERS ARE INDICATED ON DRAWINGS, IT SHALL BE CONSTRUED TO MEAN THE ESTABLISHMENT OF QUALITY AND PERFORMANCE STANDARDS OF SUCH ITEMS. ALL OTHER PRODUCTS MUST BE SUBMITTED TO THE ARCHITECT FOR APPROVAL BEFORE THEY SHALL BE DEEMED EQUAL.
- FIRESTOPPING SHALL BE INSTALLED AT ALL NEW & EXISTING PENETRATIONS OF FIRE RATED CONSTRUCTION AS PER SPECIFICATIONS.
- SIZE OF MASONRY UNITS AND WOOD MEMBERS ON PLANS, BUILDING ELEVATIONS AND SECTIONS ARE SHOWN AS NOMINAL SIZE, UNLESS OTHERWISE NOTED.
- DIMENSIONS ON PLANS ARE INDICATED FROM SURFACE TO SURFACE BETWEEN WALLS, PARTITIONS AND OTHER ITEMS EXCLUSIVE OF FINISHES.
- PROVIDE GUARDS, RAILS, BARRICADES, FENCES, NIGHT LIGHTING, ETC., AS REQUIRED BY THE NEW YORK CITY BUILDING CODE, SECTION 1901.5 AND AS REQUIRED TO PROVIDE ADEQUATE PROTECTION.
- THERE WILL BE NO CHANGE IN USE, EGRESS OR OCCUPANCY BECAUSE OF THE WORK OF THIS CONTRACT.
- ADDITIONAL NOTES WHICH ARE APPLICABLE TO THIS PROJECT MAY BE FOUND THROUGHOUT THE CONTRACT DOCUMENTS.
- ALL WORK LISTED ON THE CONSTRUCTION NOTES AND SHOWN OR IMPLIED ON ALL DRAWINGS SHALL BE SUPPLIED AND INSTALLED BY THE TRADE CONTRACTOR UNLESS OTHERWISE NOTED ON DRAWINGS AND/OR IN SPECIFICATIONS.
- CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS SHOWN ON DRAWINGS AND SHALL NOTIFY DAVID SMOTRICH & PARTNERS LLP (DSP) OF ANY DISCREPANCIES, OMISSIONS, AND/OR CONFLICTS BEFORE PROCEEDING WITH THE WORK.
- CONTRACTOR MUST COMPLY WITH THE RULES AND REGULATIONS OF ALL AGENCIES HAVING JURISDICTION AND SHALL CONFORM TO ALL CONSTRUCTION AND SAFETY CODES, STATUTES AND ORDINANCES. ALL FEES, TAXES, PERMITS AND APPLICATIONS OF ALL WORK WITH GOVERNMENTAL AGENCIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
- CONTRACTOR SHALL COMPLY WITH THE RULES AND REGULATIONS OF THE BUILDING AS TO HOURS OF AVAILABILITY FOR LOADING DOCKS AND ELEVATORS FOR THE PURPOSES OF DELIVERY AND ALSO AS TO THE MANNER OF HANDLING AND STORAGE & STAGING OF MATERIALS, EQUIPMENT AND DEBRIS TO AVOID CONFLICT AND INTERFERENCE WITH NORMAL BUILDING OPERATIONS.
- ALL DRAWINGS AND CONSTRUCTION NOTES ARE COMPLEMENTARY AND WHAT IS CALLED FOR BY ANY WILL BE BINDING AS IF CALLED FOR BY ALL.
- THE CONTRACTOR SHALL MAINTAIN A CURRENT AND COMPLETE SET OF CONSTRUCTION DOCUMENTS AND APPROVED SUBMITTALS ON THE CONSTRUCTION SITE DURING ALL PHASES OF CONSTRUCTION.
- THE CONTRACTOR SHALL SUPPLY, PRIOR TO COMMENCING WORK, A LIST OF ALL SUBCONTRACTORS TO DSP AND THE OWNER, WITH THE NAME, ADDRESS AND PHONE NUMBER OF THE PRINCIPAL CONTACT OF EACH SUB-CONTRACTOR. IN ADDITION, HE WILL FILE WITH THE OWNER THE EMERGENCY NUMBERS AVAILABLE FOR 24-HR. CONTACT. THE OWNER & ARCHITECT TO BE NOTIFIED IF THERE IS A CHANGE IN SUBCONTRACTOR DURING THE COURSE OF THE PROJECT.
- ALL WORK SHALL BE PERFORMED BY SKILLED AND QUALIFIED WORKMEN IN ACCORDANCE WITH THE BEST PRACTICES OF THE TRADES INVOLVED AND IN COMPLIANCE WITH BUILDING REGULATIONS AND/OR GOVERNMENTAL LAWS, STATUTES OR ORDINANCES.
- ALL MATERIALS SHALL BE NEW, UNUSED AND OF THE HIGHEST QUALITY, UNLESS OTHERWISE NOTED. MANUFACTURED MATERIALS AND EQUIPMENT SHALL BE INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS AND INSTRUCTIONS.

Building Dept. Notes

- ALL APPROVALS OF SUBMITTALS SHALL BE FOR DESIGN INTENT ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR QUANTITIES, DIMENSIONS AND COMPLIANCE WITH CONTRACT DOCUMENTS AND FOR INFORMATION PERTAINING TO FABRICATION PROCESSES OR TECHNIQUES OF FIRST CLASS CONSTRUCTION AND FOR COORDINATION WITH OTHER TRADES.
- ALL WORK SHALL BE ERECTED AND INSTALLED PLUMB, LEVEL, SQUARE, TRUE AND IN PROPER ALIGNMENT.
- CONTRACTOR SHALL BE RESPONSIBLE FOR CUTTING, PATCHING AND RESTORATION REQUIRED FOR THIS WORK.
- ALL CORRESPONDENCE TO ARCHITECT OR TO OWNER SHALL BE FORWARDED IN COPY TO THE OTHER PARTY.
- THE CONTRACTOR SHALL, AT ALL TIMES KEEP THE PREMISES FREE OF ACCUMULATION OF WASTE MATERIALS AND RUBBISH, PREMISES TO BE SWEEP CLEAN DAILY. AT THE COMPLETION OF THE WORK, EACH CONTRACTOR SHALL LEAVE THE JOB SITE FREE OF CONSTRUCTION DEBRIS AND MATERIALS, AND "BROOM CLEAN" INCLUDING THOROUGH CLEANING OF TOILETS, BATHROOMS, ELECTRICAL CLOSETS, STAIRWELLS, AND ALL AREAS OF WORK OR STAGING, ETC.
- PROVIDE ALL NECESSARY PROTECTION AGAINST DIRT AND DAMAGE WITHIN THE PREMISES, AS WELL AS PUBLIC AREAS, AND SHALL BE RESPONSIBLE FOR KEEPING THESE AREAS CLEAN AND FREE OF MATERIALS AT ALL TIMES.
- THE CONTRACTOR SHALL VERIFY LOCATION OF EXISTING UTILITIES AND COORDINATE WITH LOCATION SHOWN ON DRAWINGS.
- THE CONTRACTOR SHALL CHECK FOR ALL BROKEN OR CRACKED WINDOW GLAZING PRIOR TO START OF CONSTRUCTION AND SHALL REPORT SUCH CONDITIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WINDOW GLAZING LATER FOUND TO BE DAMAGED OR MISSING.
- DURING CONSTRUCTION, SECURITY AND FIRE EXIT DOORS & EXIT PASSAGEWAYS MUST REMAIN UNOBSTRUCTED AT ALL TIMES.
- THE CONTRACTOR SHALL TAKE EVERY PRECAUTION TO PROPERLY PROTECT ALL EXISTING CONSTRUCTION TO REMAIN. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGED AREAS TO BE RETURNED TO ORIGINAL CONDITION, AT NO EXTRA COST TO THE OWNER.
- THE CONTRACTOR SHALL SCHEDULE CONSTRUCTION IN SUCH A MANNER SO AS NOT TO DISTURB AREAS OUTSIDE OF THE AREA UNDER CONSTRUCTION DURING NORMAL OPERATING HRS. THE CONTRACTOR SHALL COORDINATE WITH ARCHITECT AND COLLEGE FACILITIES DEPT., PRIOR TO ANY DISRUPTION OF SERVICES TO THOSE AREAS NOT UNDER CONSTRUCTION EVEN IF SUCH A DISRUPTION OCCURS AFTER NORMAL OPERATING HRS.
- THE PROPERTY IS NOT LOCATED IN A SPECIAL FLOOR HAZRD AREA (SFHA).

1. WORK SHALL BE EXECUTED IN FULL COMPLIANCE WITH THE APPLICABLE PROVISIONS OF ALL LAWS, BY-LAWS, STATUTES, ORDINANCES, CODES, RULES, REGULATIONS AND LAWFUL ORDERS OF PUBLIC AUTHORITIES BEARING ON THE PERFORMANCE AND EXECUTION OF THE WORK.

THE CONTRACTOR SHALL PROMPTLY NOTIFY THE ARCHITECT OF ANY PORTIONS OF THE WORK, IN THE CONTRACT DOCUMENTS THAT ARE AT VARIANCE WITH THE ABOVE.

- ALL MATERIALS, ASSEMBLIES, FORMS, METHODS OF CONSTRUCTION AND SERVICE EQUIPMENT SHALL MEET THE FOLLOWING REQUIREMENTS:
 - THEY SHALL HAVE BEEN ACCEPTABLE PRIOR TO THE EFFECTIVE DATE OF THE CODE BY THE BOARD OF STANDARDS AND APPEALS.
 - THEY SHALL HAVE BEEN ACCEPTED FOR THE USE UNDER THE PRESCRIBED TEST METHODS BY THE COMMISSIONER (OR)
 - APPROVED BY THE OFFICE OF TECHNICAL CERTIFICATION AND RESEARCH (OTCR)
- MATERIALS OR ASSEMBLIES REQUIRED TO HAVE A FIRE RESISTANCE RATINGS SHALL COMPLY WITH ONE OF THE FOLLOWING:
 - THEY SHALL CONFORM WITH A.I.S.C. "FIRE RESISTANCE RATINGS," DATED 1985 (OR)
 - THEY SHALL HAVE BEEN TESTED IN ACCORDANCE WITH ASTM E119, STANDARD METHODS OF FIRE TESTS OF BUILDING CONSTRUCTION AND MATERIALS AND ACCEPTED BY THE COMMISSIONER (OR)
 - THEY SHALL HAVE BEEN ACCEPTABLE PRIOR TO THE EFFECTIVE DATE OF THE BUILDING CODE (OR)
 - APPROVED BY THE OFFICE OF TECHNICAL CERTIFICATION AND RESEARCH (OTCR)

- THESE DRAWINGS HAVE BEEN PREPARED BY OR AT THE DIRECTION OF THE UNDERSIGNED AND TO THE BEST OF THE UNDERSIGNED'S KNOWLEDGE, INFORMATION AND BELIEF MEET THE REQUIREMENTS OF THE BUILDING CODE.
- ALL WORK SHALL COMPLY WITH ANSI I17.1 AND LOCAL LAW 58.
- ALL NEW WORK SHALL COMPLY WITH NEW YORK CITY ENERGY CONSERVATION CODE.
- ALL NEW INTERIOR FINISHES SHALL BE CONSTRUCTED OF MATERIALS MEETING SECTION 27-524 FOR FLAME SPREAD RATINGS.
- THE CONTRACTOR IS RESPONSIBLE FOR FILING APPLICATION AND OBTAINING PERMITS FOR ANY CONSTRUCTION EQUIPMENT OR PUBLIC PROTECTIVES REQUIRED TO ENSURE SAFETY OF OPERATION AND THE PUBLIC AS PER NYC CONSTRUCTION CODE, CHAPTER 33, SECTION BC3307. THE CONTRACTOR IS ALSO RESPONSIBLE FOR OBTAINING CONSTRUCTION PERMITS.
- THE CONTRACTOR IS RESPONSIBLE TO PROVIDE THE INSURANCE REQUIRED BY THE NYC DOB IN ORDER TO OBTAIN CONSTRUCTION PERMITS.

- EMERGENCY POWER, IF REQUIRED UNDER THIS CONTRACT SHALL BE INSTALLED AS PER SECTION 27-346.04
- FOLLOW CHAPTER 33 OF THE 2014 NYC CONSTRUCTION CODE(NYCC) PROTECTION OF THE PUBLIC AND ADJACENT PROPERTIES.

Special Inspections

SPECIAL INSPECTIONS REQUIRED IN ACCORDANCE WITH CHAPTER 17 AND THE APPLICABLE SECTIONS OF THE NYC CONSTRUCTION CODE ARE LISTED IN THE FOLLOWING TABLES.

THE CONTRACTOR MUST NOTIFY THE ARCHITECT OR ENGINEER FOR SPECIAL INSPECTIONS AT LEAST 72 HOURS BEFORE THE SPECIFIC WORK COMMENCES.

THE OWNER SHALL BE RESPONSIBLE FOR THE FOLLOWING SPECIAL INSPECTIONS:

SPRAY RESISTANT MATERIALS	BC 1704.11
FIRE-RESISTANT PENETRATIONS	BC 1704.27
FIRE-RESISTANT JOINTS	BC 1704.27
MECHANICAL SYSTEMS	BC 1704.16
STRUCTURAL STEEL - WELDING	
STRUCTURAL STEEL - DETAILS	
CONCRETE - CAST IN PLACE	
MASONRY	
STRUCTURAL STABILITY - EXISTING BUILDINGS	
POST INSTALLED ANCHORS	
CONCRETE DESIGN MIX	
CONCRETE SAMPLING AND TESTING	
SUBGRADE INSPECTION	
EXCAVATION - SHEETING, SHORING, AND BRACING	

Progress Inspections

THE CONTRACTOR MUST NOTIFY THE ARCHITECT OR ENGINEER FOR PROGRESS INSPECTIONS AT LEAST 72 HOURS BEFORE THE SPECIFIC WORK COMMENCES.

THE OWNER SHALL BE RESPONSIBLE FOR THE FOLLOWING PROGRESS INSPECTIONS:

ENERGY CODE COMPLIANCE	BC 110.3.5
FINAL INSPECTION	28-116.2.4.2 AND BC 110.5, DIRECTIVE 14 OF 1975 AND 1 RCNY 101-10

Site Safety and Protection Notes

- SUBMIT TO THE CAMPUS FACILITIES DEPT. FOR REVIEW A ENVIRONMENTAL HEALTH & SAFETY PLAN PREPARED AND SIGNED BY A NEW YORK CITY LICENSED SITE SAFETY MANAGER. THE PLAN(S) SHALL BE COMPLETE, REFLECTING THE ENTIRE SITE AND SHALL SHOW ANY PHASED PROTECTION.
- THE ENVIRONMENTAL HEALTH & SAFETY PLAN TO INCLUDE, BUT NOT BE LIMITED TO NOTES, EGRESS, SCAFFOLDING, FIRE PROTECTION ETC. THEY SHOULD ADDRESS ANY POTENTIAL INTERACTION BETWEEN THE BUILDING OCCUPANTS AND GENERAL PUBLIC AND EXPOSURE TO THE CONSTRUCTION PROCESS. SEE SPECIFICATIONS.
- NO WORK IS TO PROCEED UNTIL ENVIRONMENTAL HEALTH & SAFETY PLAN ARE APPROVED BY THE SAFETY DIRECTOR OF FIT.
- PROGRESS INSPECTIONS REQUIRED IN ACCORDANCE WITH CHAPTER 17 OF THE NYCC AND THE APPLICABLE SECTIONS OF THE NYC CONSTRUCTION CODE ARE LISTED IN THE TABLE BELOW.

THE CONTRACTOR MUST NOTIFY THE ARCHITECT / ENGINEER FOR PROGRESS INSPECTIONS AT LEAST 72 HOURS BEFORE THE SPECIFIED WORK COMMENCES OR REQUIRES INSPECTION. THEY ARE AS FOLLOWS:

PRELIMINARY	28-116.2.1, BC 109.2
FIRE RESISTIVE RATED CONSTRUCTION	28-116.2.2
FINAL	28-116.2.4.2 & BC109.5

REFER TO MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL SPECIAL INSPECTION REQUIREMENTS.

Scope Of Work

THE MAIN FEATURES OF THE WORK AS INDICATED IN PLANS SHALL INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING:

Project Scope:
The proposed relocation of the Admissions Office to the first floor and lower level of the western most part of the Coed Residence Hall. The new space, which is currently empty, will have its own street entrance, canopy and new storefront glass at the front and rear of the space. The new space will accommodate meeting rooms for potential students and their parents, a waiting room, reception desk, a security desk, as well as offices and workstations for the recruitment and operations department. A new elevator, ADA restrooms, new lighting and finishes are part of this renovation. New site work, signage and exterior fencing and light relocation are included.

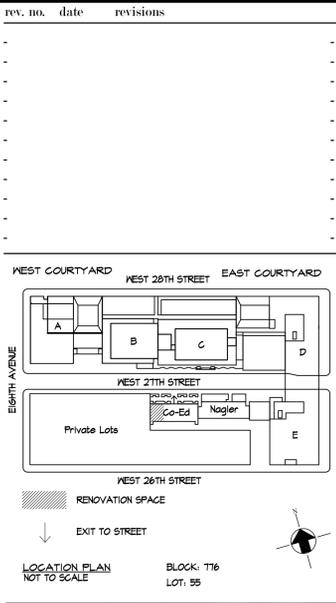
- Demolition - General Construction**
- Portions of the lower-level slab to accommodate an elevator pit and sump pump. Denaturing will be required.
 - Remove existing GMB walls, equipment, and outlets
 - Remove existing 1st Floor door and frame
 - Remove storefront
 - Remove portions of rear masonry wall
 - Remove VCT Flooring down to slab and base
 - Remove a section of slab between 1st and 2nd floor to accommodate elevator
 - Remove GMB walls, existing windows, existing light-fixtures, 2x2 ACT and support system
- See the following drawings for all detail demolition:
- DM-100.00
 - DM-101.00
 - DM-102.00
 - DM-400.00
 - DM-401.00
 - DM-402.00

Demolition - Mechanical/Plumbing/Electrical/Sprinkler/Fire Protection

- See Demolition Drawings for the extent of Demolition
- Plumbing
 - Piping
 - Electrical conduits
 - Floor drain
 - Electrical panel and electrical risers
 - Fire alarm devices and conduits

- New General Construction:**
- New GMB partitions
 - New elevator and shaft
 - New doors (HM and glass)
 - New glass partition
 - 3 new restrooms and all fixtures
 - Carpeting
 - Window coverings
 - Tile, VCT, base
 - New millwork
 - New storefront
 - New glass vestibule
 - Column enclosures
 - New ceilings 2x2 & GMB
 - Paint

SEE MEP DRAWINGS AND SPECIFICATIONS FOR MEP SCOPE OF WORK.



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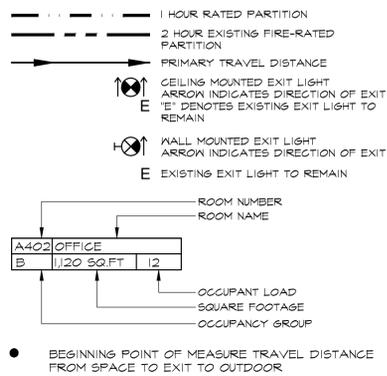
443 Park Avenue South New York, NY 10016
212 889 4045 Fax 212 889 3672

PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 27TH ST
NEW YORK, NY 10001

DRAWING TITLE:
GEN. NOTES, INSPECTIONS & SCOPE OF WORK

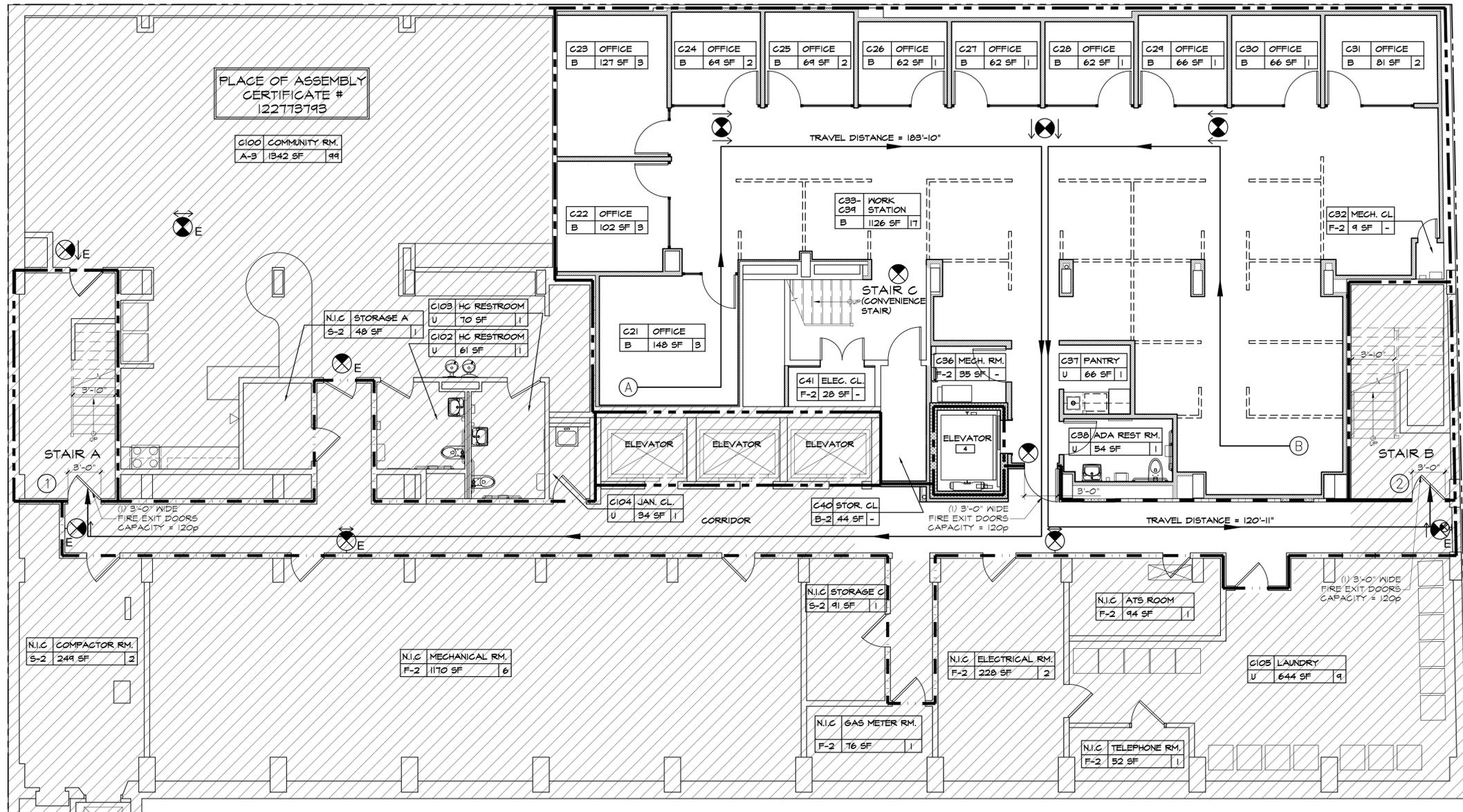
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	PROJECT No: 13284154
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	DWG No:
	G-002.00
	SCALE: N.T.S
	3 of 61

LEGEND:

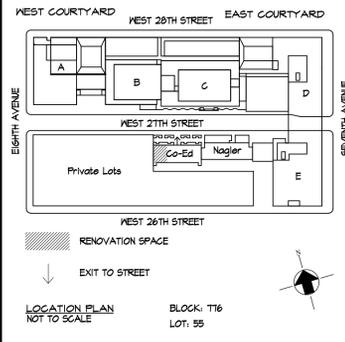


● BEGINNING POINT OF MEASURE TRAVEL DISTANCE FROM SPACE TO EXIT TO OUTDOOR

NIC NOT IN CONTRACT



1 LIFE SAFETY PLAN - CELLAR
SCALE: 3/16" = 1'-0"



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PROJECT:
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 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 CELLAR
 LIFE SAFETY PLAN, NOTES
 & CALCULATIONS

SEAL & SIGNATURE:
 DATE: 09.01.2022
 PROJECT No: 13284.154
 DRAWING BY: GD & TM
 CHK BY: DH & CK
 DWG No:

G-004.00

SCALE: AS NOTED 5 of 61

APPLICABLE CODE:
 1968 NYC BLDG CODE

CONSTRUCTION TYPE:
 CLASS 1A - FIREPROOF CONSTRUCTION

OCCUPANCY:
 BUILDING CODE 2014 OCCUPANCY GROUP : B BUSINESS
 R-2 RESIDENTIAL

AREA:
 OFFICE = 404 SF
 WORKSTATION = 1,126 SF
 PANTRY = 66 SF
 ADA RESTROOM = 54 SF
 MECHANICAL ROOM = 35 SF
 MECHANICAL CLOSET = 9 SF
 STORAGE CLOSET = 44 SF

FIRE PROTECTION SYSTEMS:
 REQUIRED: FIRE ALARM / PROVIDED: FIRE ALARM

DOOR FIRE RATINGS:
 CELLAR CORRIDOR DOORS REQUIRE .75 FPMCC HOUR RATING.
 STAIR DOORS REQUIRE 1 1/2 HOUR RATING.

WALL/PARTITION FIRE RATINGS: PER TABLE 3-4
 SHAFT AND STAIRS: REQUIRE 2 HOUR RATING
 CELLAR CORRIDOR: REQUIRE 1 HOUR RATING

TOTAL NUMBER OF PEOPLE ON THE FLOOR:
 167 PEOPLE

DOOR EGRESS CALCULATIONS (B BUSINESS) PER TABLE 6-1				
DOOR #	WIDTH	UNITS OF WIDTH	CAPACITY	PROPOSED CAPACITY
1	3'-0"	1.5	80	83
2	3'-0"	1.5	80	84
TOTAL:			240	167 < 240

NUMBER OF EXITS (PERIC 26-603.2127-366)
 REQUIRED PER FLOOR = 2 EXITS - PROVIDED: 2

CORRIDOR WIDTH (TABLE 6-1)
 REQUIRED (B-BUSINESS) 44 MINIMUM
 PROVIDED 4'-4" (52")

TRAVEL DISTANCE PER BC 27-360 & TABLE 6-1

PATH NO.	TOTAL TR. DISTANCE	MAX. TR. DISTANCE
A	183'-10"	300'-0" (SPRINKLERED) - B BUSINESS
B	120'-11"	300'-0" (SPRINKLERED) - B BUSINESS

NOTES:
 1. DOORS SHALL COMPLY WITH THE REQUIREMENTS OF SECTION 27-371.
 2. EGRESS SHALL BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 27-365.
 3. TRAVEL DISTANCES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 27-360.
 4. CORRIDORS SHALL COMPLY WITH THE REQUIREMENTS OF SECTION 27-364.
 5. EXIT LIGHTING SHALL BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 27-381.
 6. EXIT SIGNS SHALL BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 27-383.
 7. EMERGENCY POWER SHALL BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 27-396.4.

EGRESS STAIRS CALCULATIONS (B BUSINESS) PER TABLE 6-1				
STAIR #	WIDTH	UNITS OF WIDTH	CAPACITY (PER UNIT WIDTH)	PROPOSED CAPACITY
A	3'-10"	2	60	83
B	3'-10"	2	60	84
TOTAL			240	167 < 240

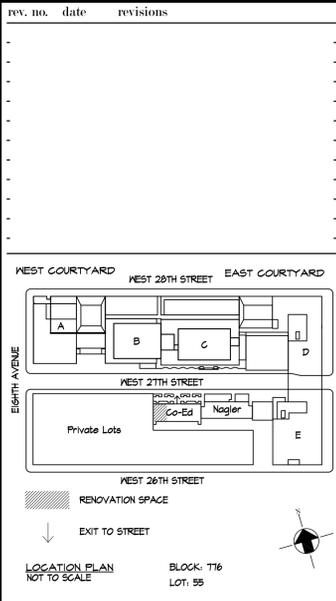
OCCUPANCY LOAD (BASED ON 1968 NYC BUILDING CODE)

ROOM #	ROOM NAME	OCCUPANCY TYPE	SF	AREA PER OCCUPANT TABLE 6.2	OCCUPANT LOAD	TITLE 27 SUBCH. 6
						REQ. EXIT TABLE 6-3
						REQ. PROV
(NIC)	COMMUNITY ROOM	A-3	1342	10	135	2 2
(NIC)	LAUNDRY	U	644	75	9	1 1
(NIC)	HC RESTROOM	U	61	75	1	1 1
(NIC)	HC RESTROOM	U	70	75	1	1 1
(NIC)	MOP SINK	U	34	75	1	1 1
(NIC)	STORAGE A	S-2	48	200	1	1 1
(NIC)	COMPACTOR ROOM	S-2	249	200	2	2 1 1
(NIC)	MECHANICAL ROOM	F-2	1170	200	6	6 1 1
(NIC)	STORAGE / GAS METER	F-2	76	200	1	1 1 1
(NIC)	ATS ROOM	F-2	94	200	1	1 1 1
(NIC)	TELEPHONE ROOM	F-2	52	200	1	1 1 1
(NIC)	ELECTRICAL ROOM	F-2	228	200	2	2 1 1
(NIC)	STORAGE C	S-2	41	200	1	1 1 1
(NIC)	MOP CLOSET	U	34	200	1	1 1 1
C21	OFFICE	B	148	100	2	3 1 1
C22	OFFICE	B	102	100	2	3 1 1
C23	OFFICE	B	127	100	2	3 1 1
C24	OFFICE	B	69	100	1	2 1 1
C25	OFFICE	B	69	100	1	2 1 1

OCCUPANCY LOAD (BASED ON 1968 NYC BUILDING CODE)

ROOM #	ROOM NAME	OCCUPANCY TYPE	SF	AREA PER OCCUPANT TABLE 6.2	OCCUPANT LOAD	TITLE 27 SUBCH. 6
						REQ. EXIT TABLE 6-3
						REQ. PROV
C26	OFFICE	B	62	100	1	1 1 1
C27	OFFICE	B	62	100	1	1 1 1
C28	OFFICE	B	62	100	1	1 1 1
C29	OFFICE	B	66	100	1	1 1 1
C30	OFFICE	B	66	100	1	1 1 1
C31	OFFICE	B	81	100	1	2 1 1
C32	MECHANICAL CLOSET	F-2	9	NO*	0	0 1 1
C33/34/35/36	WORKSTATION	B	1126	65	17	17 1 1
C36	MECHANICAL ROOM	F-2	35	NO*	0	0 1 1
C37	PANTRY	U	66	200	1	1 1 1
C38	ADA RESTROOM	U	54	200	1	1 1 1
C40	STORAGE CLOSET	S-2	44	200	1	1 1 1
C40	STORAGE CLOSET	F-2	28	NO*	0	0 1 1
TOTAL NET AREAS FOR CONTRACT AREAS					197	167

*NONSIMULTANEOUS OCCUPANCY - THE OCCUPANT LOAD OF TOILETS, LOCKER ROOMS, MEETING ROOMS, STORAGE ROOMS, EMPLOYEE CAFETERIAS, AND SIMILAR ROOMS OR SPACES THAT ARE NOT OCCUPIED AT THE SAME TIME AS OTHER ROOMS OR SPACES ON THE SAME FLOOR OF A BUILDING, MAY BE OMITTED FROM THE OCCUPANT LOAD CALCULATION OF THE FLOOR ON WHICH THEY ARE LOCATED TO THE EXTENT THAT SUCH SPACES SERVE OCCUPIED ROOMS ON THE SAME FLOOR.



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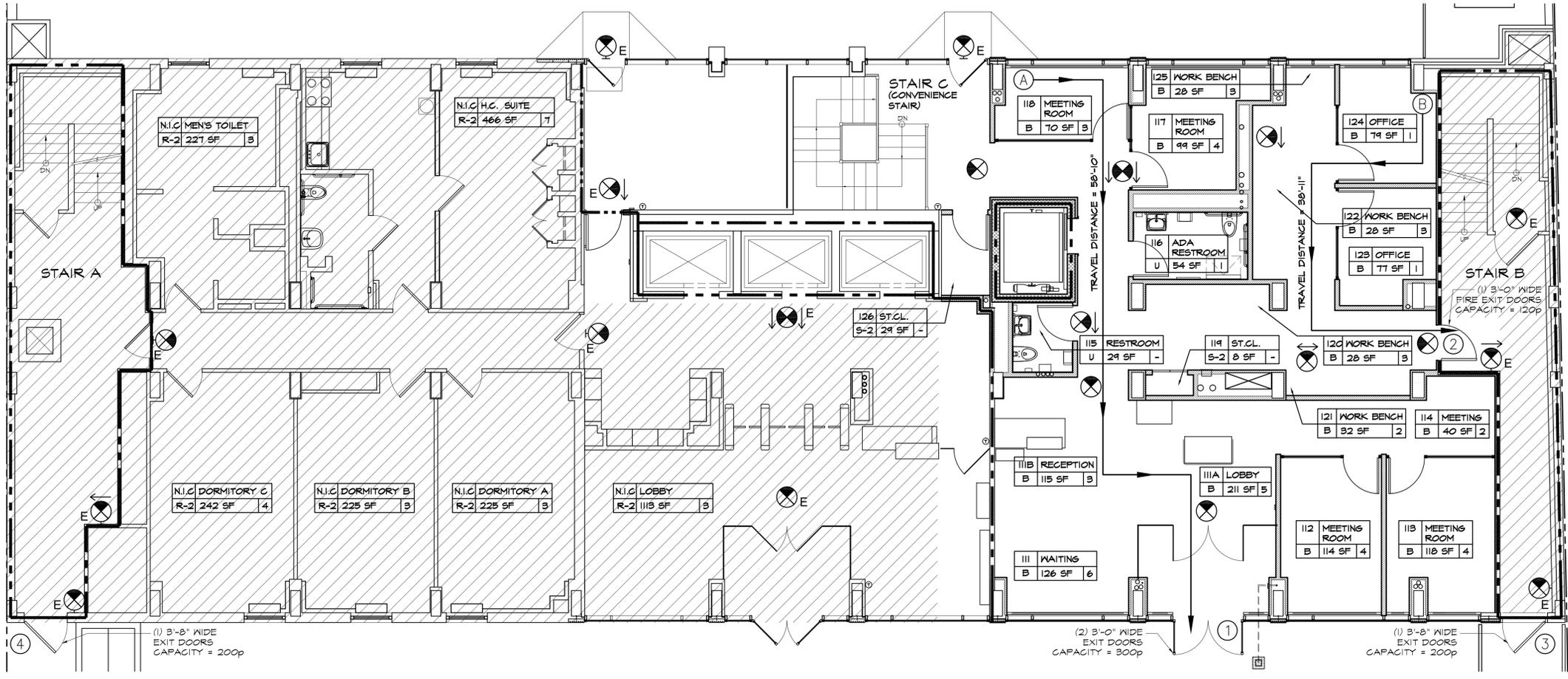
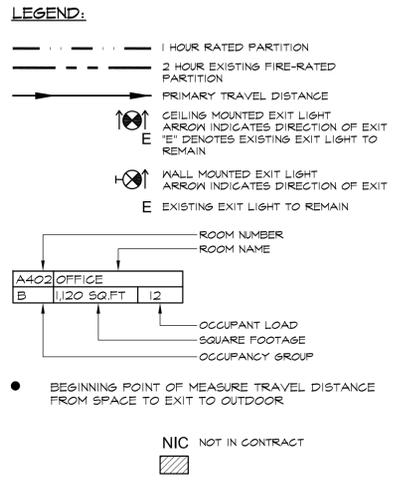
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PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 FIRST FLOOR
 LIFE SAFETY PLAN, NOTES
 & CALCULATIONS

SEAL & SIGNATURE:
 DATE: 09.01.2022
 PROJECT No: 13284.154
 DRAWING BY: GD & TM
 CHK BY: DH & CK
 DWG No:
G-005.00
 SCALE: AS NOTED 6 of 61



1 LIFE SAFETY PLAN - FIRST FLOOR
 SCALE: 3/16" = 1'-0"

APPLICABLE CODE:
 1968 NYC BLDG CODE

CONSTRUCTION TYPE:
 CLASS 1A - FIREPROOF CONSTRUCTION

OCCUPANCY:
 BUILDING CODE 2014 OCCUPANCY GROUP: B BUSINESS
 R-2 RESIDENTIAL

AREA:
 OFFICE = 156 SF
 WORKBENCH = 108 SF
 MEETING ROOM = 402 SF
 ADA RESTROOM = 54 SF
 RESTROOM = 24 SF
 LOBBY = 21 SF
 WAITING AREA = 126 SF
 RECEPTION = 115 SF
 MEETING AREA = 40 SF
 STORAGE CLOSET = 26 SF

FIRE PROTECTION SYSTEMS:
 REQUIRED: FIRE ALARM / PROVIDED: FIRE ALARM

DOOR FIRE RATING:
 FIRST FLOOR CORRIDOR DOORS REQUIRE .75 FPSC HOUR RATING.
 STAIR DOORS REQUIRE 1 1/2 HOUR RATING.

WALL/PARTITION FIRE RATING: PER TABLE 3-4
 SHAFT AND STAIRS: REQUIRE 2 HOUR RATING
 FIRST FLOOR CORRIDOR: REQUIRE 1 HOUR RATING

TOTAL NUMBER OF PEOPLE ON THE FLOOR:
 41 PEOPLE

DOOR EGRESS CALCULATIONS (B BUSINESS) PER TABLE 6-1					
DOOR #	WIDTH	UNITS OF WIDTH	CAPACITY	MAXIMUM ALLOWABLE CAPACITY	PROPOSED CAPACITY
1	(2)3'-0"	3	100	300	28
2	3'-0"	1.5	80	120	13
3	3'-8"	2	100	200	13
4	3'-8"	2	100	200	84
TOTAL:			820	188 < 420	

NUMBER OF EXITS (PER G26-603.2(2)-366)
 REQUIRED PER FLOOR = 2 EXITS PROVIDED: 3

CORRIDOR WIDTH (TABLE 6-1)
 REQUIRED (B BUSINESS) 44 MINIMUM PROVIDED 4'-0" (48")

TRAVEL DISTANCE PER BC 27-360 & TABLE 6-1

PATH NO.	TOTAL TR. DISTANCE	MAX. TR. DISTANCE
A	58'-10"	300'-0" (SPRINKLERED) - B BUSINESS
B	38'-11"	300'-0" (SPRINKLERED) - B BUSINESS

NOTES:
 1. DOORS SHALL COMPLY WITH THE REQUIREMENTS OF SECTION 27-371.
 2. EGRESS SHALL BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 27-365.
 3. TRAVEL DISTANCES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 27-360.
 4. CORRIDORS SHALL COMPLY WITH THE REQUIREMENTS OF SECTION 27-369.
 5. EXIT LIGHTING SHALL BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 27-381.
 6. EXIT SIGNS SHALL BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 27-383.
 7. EMERGENCY POWER SHALL BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 27-396.4.

EGRESS STAIRS CALCULATIONS (B BUSINESS) PER TABLE 6-1

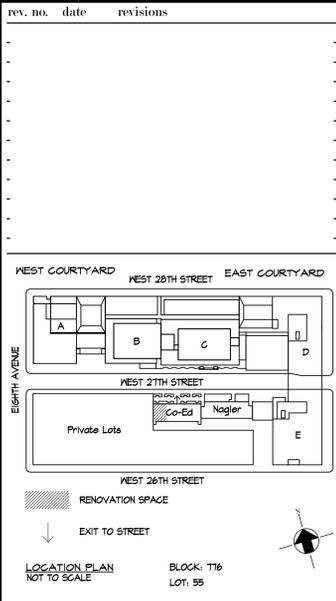
STAIR #	WIDTH	UNITS OF WIDTH	CAPACITY (PER UNIT WIDTH)	MAXIMUM ALLOWABLE CAPACITY
A	3'-10"	2	60	120
B	3'-10"	2	60	120
TOTAL			60	120

OCCUPANCY LOAD (BASED ON 1968 NYC BUILDING CODE)

ROOM #	ROOM NAME	OCCUPANCY TYPE	SF	AREA PER OCCUPANT TABLE 6.2	OCCUPANT LOAD		REQ. EXIT TABLE 6-3	
					CALC.	ACTUAL	REQ	PROV
III	WAITING AREA	B	126	25	6	6	1	1
IIIA	LOBBY	B	211	50	5	5	1	1
IIIB	RECEPTION	B	115	50	3	3	1	1
112	MEETING ROOM	B	114	30	4	4	1	1
113	MEETING ROOM	B	116	30	4	4	1	1
114	MEETING AREA	B	40	30	2	2	1	1
115	RESTROOM	U	24	200	1	1	1	1
116	ADA RESTROOM	U	54	200	1	1	1	1
117	MEETING ROOM	B	99	30	4	4	1	1
118	MEETING ROOM	B	70	30	3	3	1	1
114	STORAGE CLOSET	S-2	8	N.O.*	0	0	1	1
120	WORK BENCH	B	28	50	1	1	1	1
121	WORK BENCH	B	32	50	1	1	1	1
122	WORK BENCH	B	28	50	1	1	1	1
123	OFFICE	B	71	100	1	2	1	1
124	OFFICE	B	74	100	1	2	1	1
125	WORK BENCH	B	25	50	1	1	1	1
126	STORAGE CLOSET	S-2	24	N.O.*	0	0	1	1
TOTAL NET AREAS FOR CONTRACT AREAS					34	41		

*NONSIMULTANEOUS OCCUPANCY - THE OCCUPANT LOAD OF TOILETS, LOCKER ROOMS, MEETING ROOMS, STORAGE ROOMS, EMPLOYEE CAFETERIAS, AND SIMILAR ROOMS OR SPACES THAT ARE NOT OCCUPIED AT THE SAME TIME AS OTHER ROOMS OR SPACES ON THE SAME FLOOR OF A BUILDING, MAY BE OMITTED FROM THE OCCUPANT LOAD CALCULATION OF THE FLOOR ON WHICH THEY ARE LOCATED TO THE EXTENT THAT SUCH SPACES SERVE OCCUPIED ROOMS ON THE SAME FLOOR.

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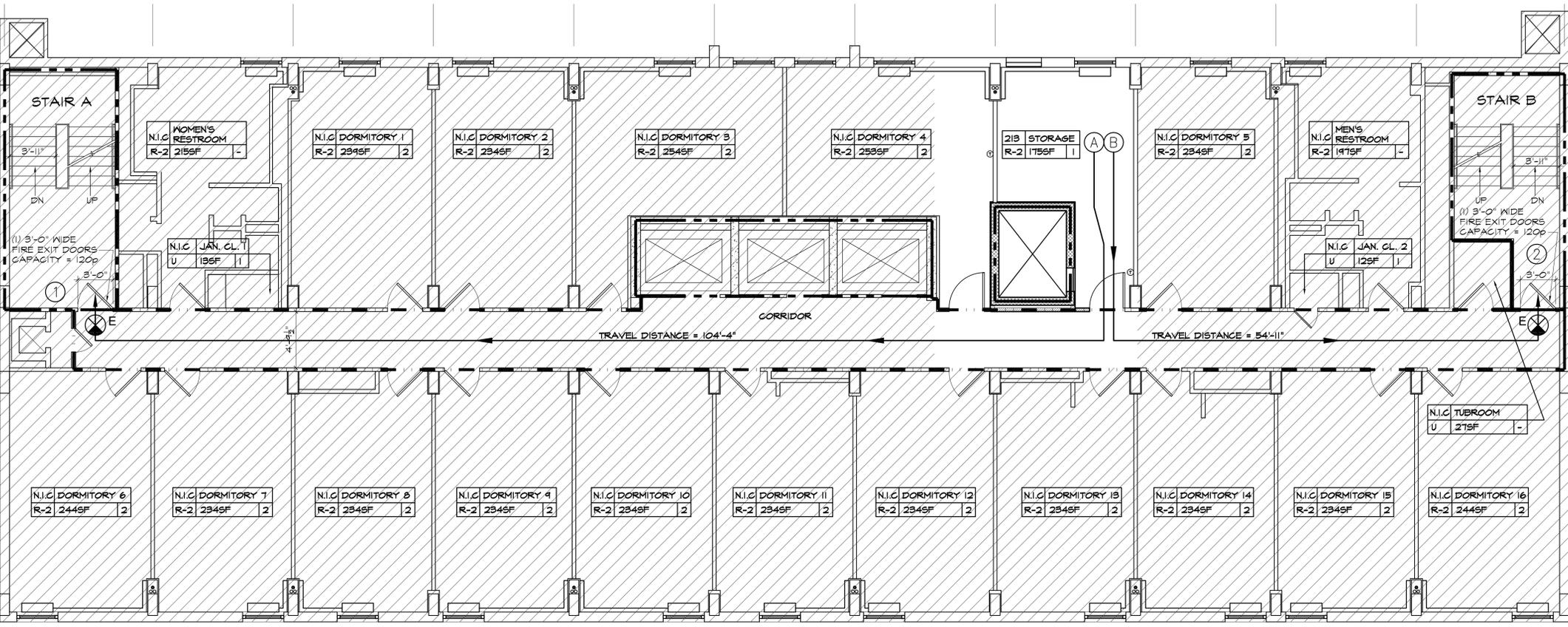
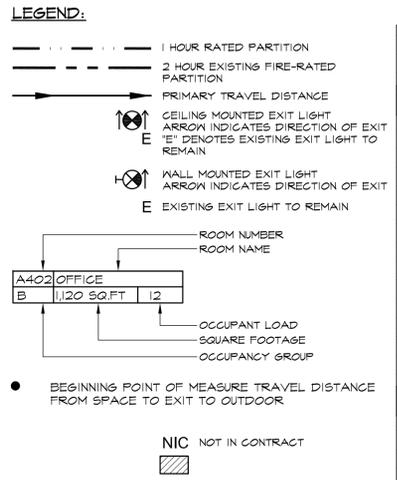
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 443 Park Avenue South New York, NY 10016
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PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 SECOND FLOOR
 LIFE SAFETY PLAN, NOTES
 & CALCULATIONS

SEAL & SIGNATURE: _____
DATE: 09.01.2022
PROJECT No: 13284.154
DRAWING BY: GD & TM
CHK BY: DH & CK
DWG No: _____
G-006.00
SCALE: AS NOTED **T of 61**



1 LIFE SAFETY PLAN - FIRST FLOOR
 6-006
 SCALE: 3/16" = 1'-0"

APPLICABLE CODE:
 1968 NYC BLDG CODE

CONSTRUCTION TYPE:
 CLASS 1A - FIREPROOF CONSTRUCTION

OCCUPANCY:
 BUILDING CODE 2014 OCCUPANCY GROUP: R-2 RESIDENTIAL

AREA:
 DORMITORY = 3,985 SF
 RESTROOM = 412 SF
 CORRIDOR = 603 SF
 JANITOR'S CLOSET = 15 SF
 STORAGE = 175 SF
 TUB ROOM = 27 SF

FIRE PROTECTION SYSTEMS:
 REQUIRED: FIRE ALARM / PROVIDED: FIRE ALARM

DOOR FIRE RATING:
 SECOND FLOOR CORRIDOR DOORS REQUIRE .75 FPSC HOUR RATING.
 STAIR DOORS REQUIRE 1 1/2 HOUR RATING.

WALL/PARTITION FIRE RATING: PER TABLE 3-4
 SHAFT AND STAIRS: REQUIRE 2 HOUR RATING
 SECOND FLOOR CORRIDOR: REQUIRES 1 HOUR RATING

NUMBER OF EXITS (PER [26-603.2] 27-366):
 REQUIRED PER FLOOR = 2 EXITS PROVIDED: 2

CORRIDOR WIDTH (TABLE 6-1):
 REQUIRED (R-2 BUSINESS) 36 MINIMUM PROVIDED 4'-4 1/2" (41.5')

TRAVEL DISTANCE PER BC 27-360 & TABLE 6-1

PATH NO.	TOTAL TR. DISTANCE	MAX. TR. DISTANCE
A	104'-4"	200'-0" (SPRINKLERED) - R2 RESIDENTIAL
B	54'-11"	200'-0" (SPRINKLERED) - R2 RESIDENTIAL

NOTES:
 1. DOORS SHALL COMPLY WITH THE REQUIREMENTS OF SECTION 27-371.
 2. EGRESS SHALL BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 27-365.
 3. TRAVEL DISTANCES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 27-360.
 4. CORRIDORS SHALL COMPLY WITH THE REQUIREMENTS OF SECTION 27-369.
 5. EXIT LIGHTING SHALL BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 27-381.
 6. EXIT SIGNS SHALL BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 27-383.
 7. EMERGENCY POWER SHALL BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 27-386.4.

TOTAL NUMBER OF PEOPLE ON THE FLOOR:
 95 PEOPLE

DOOR EGRESS CALCULATIONS (R2 RESIDENTIAL) PER TABLE 6-1

DOOR #	WIDTH	UNITS OF WIDTH	CAPACITY	MAXIMUM ALLOWABLE CAPACITY	PROPOSED CAPACITY
1	3'-0"	1.5	40	60	18
2	3'-0"	1.5	40	60	17
TOTAL:			120	120	35 x 120

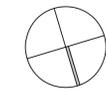
EGRESS STAIRS CALCULATIONS (R2 RESIDENTIAL) PER TABLE 6-1

STAIR #	WIDTH	UNITS OF WIDTH	CAPACITY (PER UNIT WIDTH)	MAXIMUM ALLOWABLE CAPACITY
A	3'-11"	2	30	60
B	3'-11"	2	30	60
TOTAL:			60	120

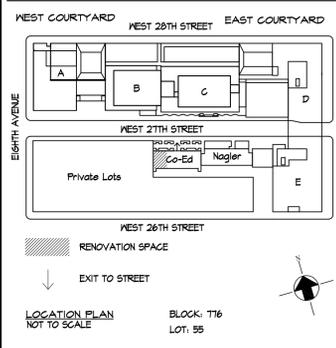
OCCUPANCY LOAD (BASED ON 1968 NYC BUILDING CODE) TITLE 27 SUBCH. 6

ROOM #	ROOM NAME	OCCUPANCY TYPE	SF	AREA PER OCCUPANT TABLE 6.2	OCCUPANT LOAD	REQ. EXIT TABLE 6-3		
					CALC.	ACTUAL	REQ	PROV
(NIC)	DORMITORY 1	R-2	234	140	2	2	1	1
(NIC)	DORMITORY 2	R-2	234	140	2	2	1	1
(NIC)	DORMITORY 3	R-2	254	140	2	2	1	1
(NIC)	DORMITORY 4	R-2	253	140	2	2	1	1
(NIC)	DORMITORY 5	R-2	234	140	2	2	1	1
(NIC)	DORMITORY 6	R-2	244	140	2	2	1	1
(NIC)	DORMITORY 7	R-2	234	140	2	2	1	1
(NIC)	DORMITORY 8	R-2	234	140	2	2	1	1
(NIC)	DORMITORY 9	R-2	234	140	2	2	1	1
(NIC)	DORMITORY 10	R-2	234	140	2	2	1	1
(NIC)	DORMITORY 11	R-2	234	140	2	2	1	1
(NIC)	DORMITORY 12	R-2	234	140	2	2	1	1
(NIC)	DORMITORY 13	R-2	234	140	2	2	1	1
(NIC)	DORMITORY 14	R-2	234	140	2	2	1	1
(NIC)	DORMITORY 15	R-2	234	140	2	2	1	1
(NIC)	DORMITORY 16	R-2	244	140	2	2	1	1
(NIC)	WOMEN'S RESTROOM	U	215	N.O.*	0	0	1	1
(NIC)	MEN'S RESTROOM	U	197	N.O.*	0	0	1	1
(NIC)	JANITOR'S CLOSET 1	U	13	100	1	1	1	1
(NIC)	JANITOR'S CLOSET 2	U	12	100	1	1	1	1
(NIC)	TUB ROOM	U	21	N.O.*	0	0	1	1
21B	STORAGE	S-2	175	200	1	1	1	1
TOTAL NET AREAS FOR CONTRACT AREAS					95	95		

*NONSIMULTANEOUS OCCUPANCY. - THE OCCUPANT LOAD OF TOILETS, LOCKER ROOMS, MEETING ROOMS, STORAGE ROOMS, EMPLOYEE CAFETERIAS, AND SIMILAR ROOMS OR SPACES THAT ARE NOT OCCUPIED AT THE SAME TIME AS OTHER ROOMS OR SPACES ON THE SAME FLOOR OF A BUILDING, MAY BE OMITTED FROM THE OCCUPANT LOAD CALCULATION OF THE FLOOR ON WHICH THEY ARE LOCATED TO THE EXTENT THAT SUCH SPACES SERVE OCCUPIED ROOMS ON THE SAME FLOOR.



REV. NO. DATE REVISIONS



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PROJECT:
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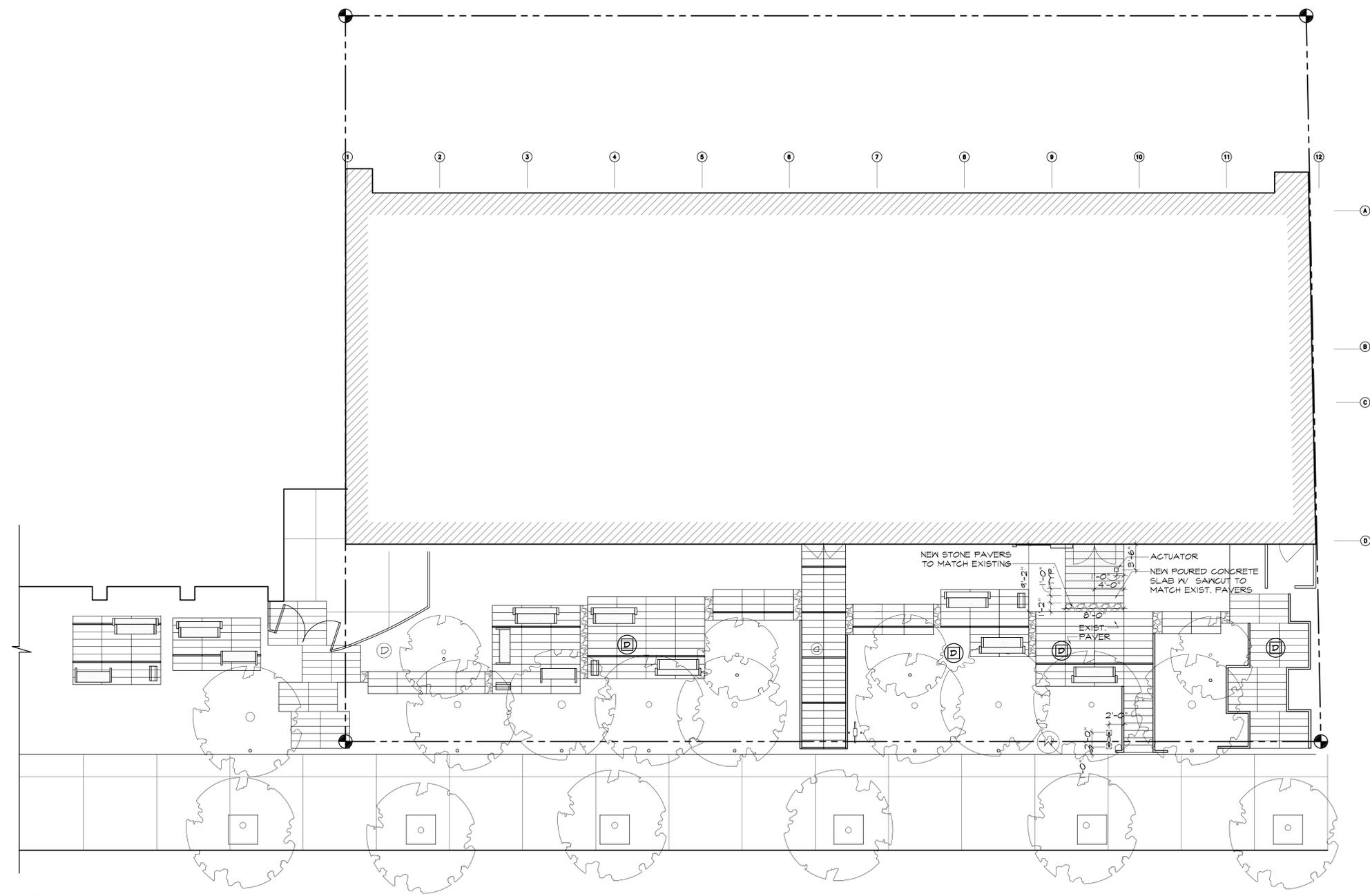
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 SITE PLAN

SEAL & SIGNATURE:

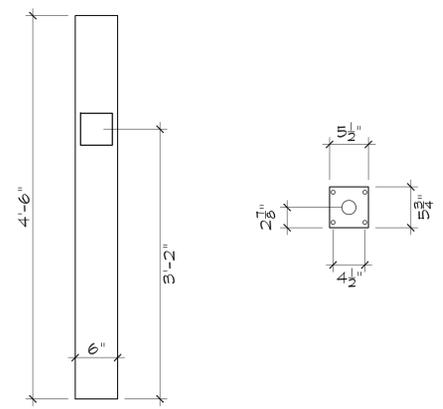
DATE: 09.01.2022
PROJECT No: 13284.154
DRAWING BY: GD & TM
CHK BY: DH & CK
DWG No:

L-100.00

SCALE: AS NOTED 8 of 61



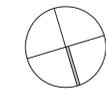
1 SITE PLAN
 L-100
 SCALE: 1/8"=1'-0"



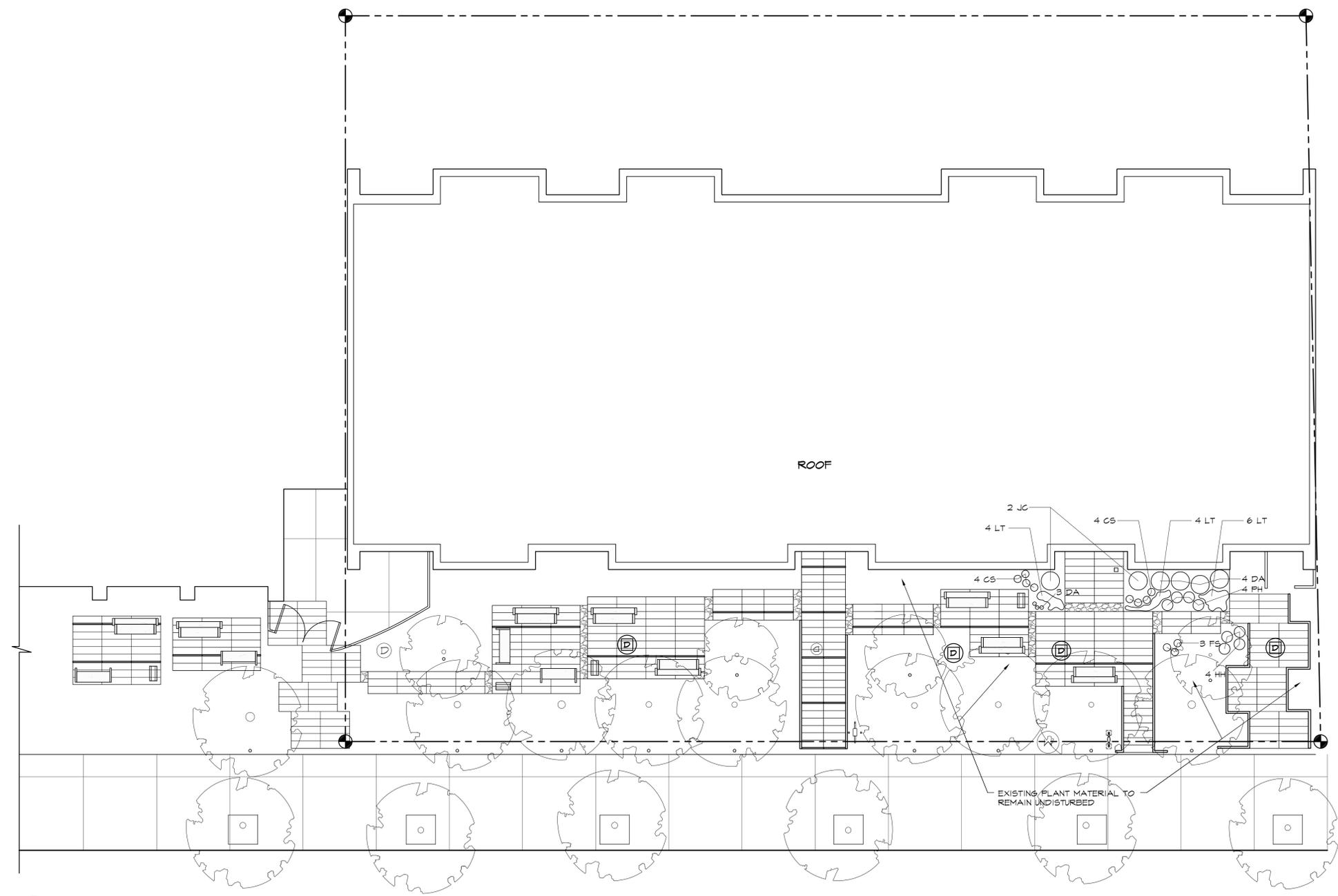
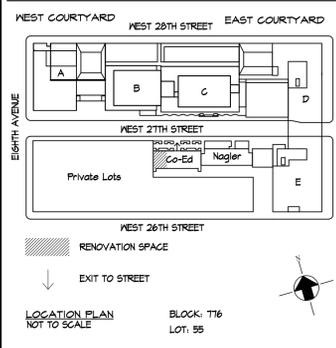
2 ACTUATOR - ELEVATION AND BASE PLATE DETAIL
 L-100
 SCALE: 1"=1'-0"

NOTE: THIS IS THE BASIS OF DESIGN (OR EQUAL IS ACCEPTABLE)
 MFG: CAREPROD X
 SIZE: 54" X 6" SQUARE BOLLARD
 FINISH: CLEAR (SILVER)
 PUSH PLATE: 4-1/2" SQUARE 635

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REV. NO.	DATE	REVISIONS



1 SITE PLANTING PLAN
L-101 SCALE: 1/8" = 1'-0"

Planting Schedule						
ITEM KEY.	QTY.	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	COMMENTS
CS	8	CLETHRA SUGARTINA 'CRYSTALINA'	SUMMERSWEET	1 GAL.	POTTED	WHITE FLOWERS: WINTER, SUMMER, SPRING
DA	8	DEER-LEERIOUS ARTEMISIA	NORWOOD	1 QT.	POTTED	DARK RED OR GREEN
FS	3	FALSE SPIREA	ASTILBE	1 GAL.	POTTED	PURPLE FLOWERS EARLY SUMMER
HH	4	HALCYON HOSTA	HOSTA	2' HEIGHT	B+B	BLUE GREEN
JC	2	JUNIPERUS CHINENSIS 'BLUE POINT'	BLUE POINT JUNIPER	1 GAL.	POTTED	STATEMENT PLANT
LT	14	LIRIOPE	LILY TUFT	16 GAL.	POTTED	SUPER BLUE VAR.
PH	4	PURPLE SENSATION HOSTA	HOSTA	1 GAL.	POTTED	PURPLE HOSTA

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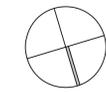
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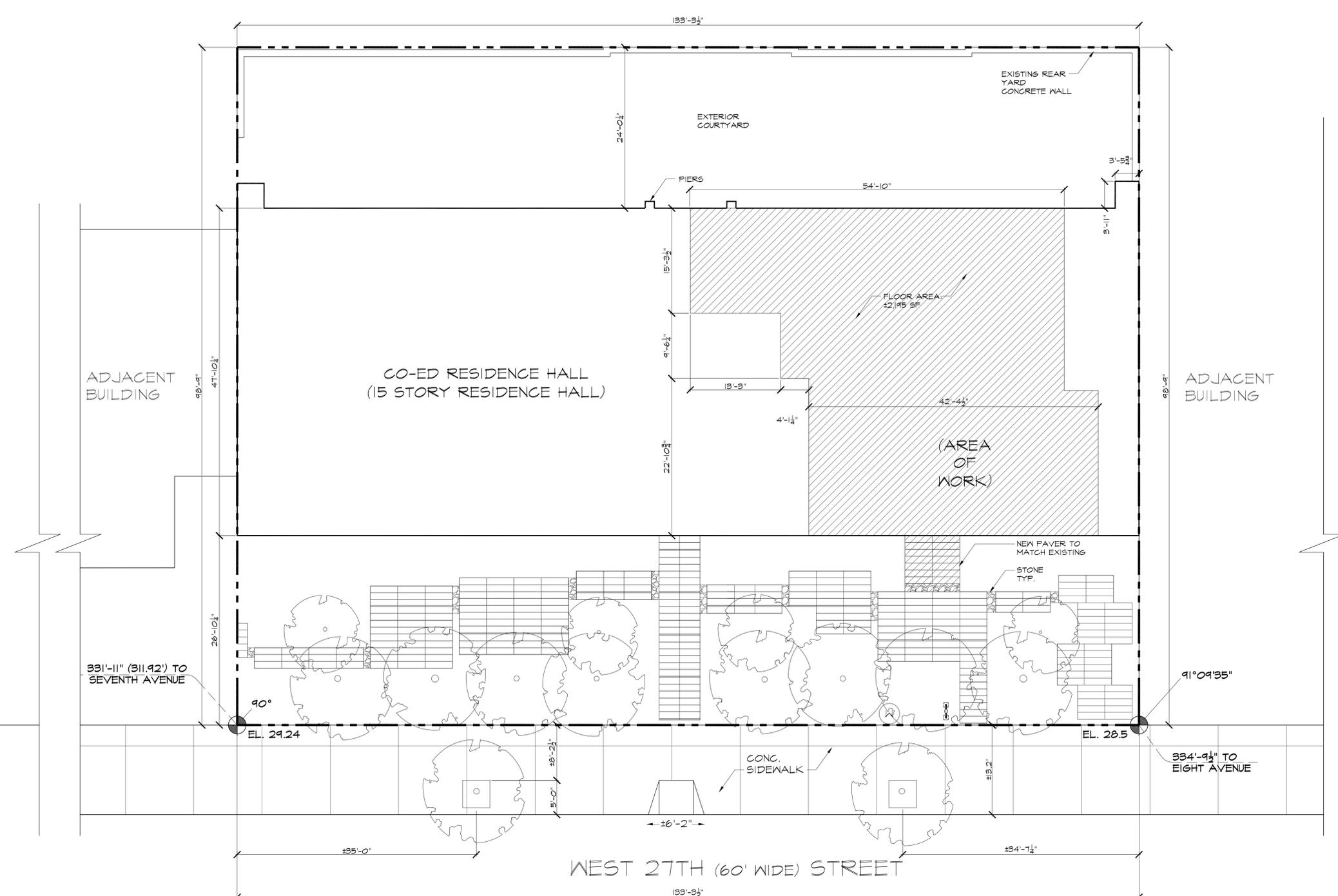
PROJECT:
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DRAWING TITLE:
SITE PLANTING PLAN
& PLANTING SCHEDULE

SEAL & SIGNATURE: _____ DATE: 09.01.2022
 PROJECT No: 13284.154
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L-101.00
 SCALE: AS NOTED 9 of 61



SEVENTH (100' WIDE) AVENUE

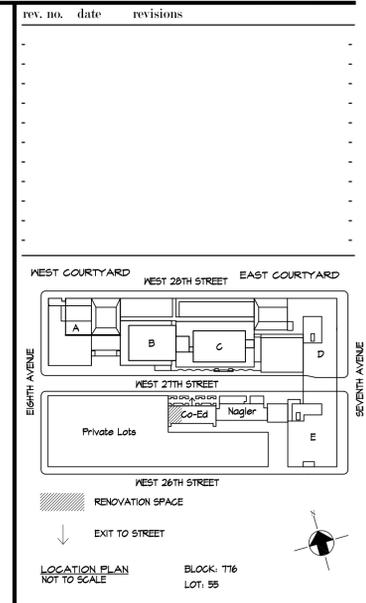


ZONING PLAN
Z-100 SCALE: 1/8" = 1'-0"

ZONING RES SECTION	ITEM	REQUIRED OR ALLOWED	EXISTING OR PROPOSED	COMPLIES	REMARKS
USE REGULATIONS					
32-10	USE GROUPS 1 THRU 12 (RESIDENTIAL, COMMUNITY FACILITY & COMMERCIAL)	PERMITTED AS OF RIGHT	EXISTING USE GROUPS, COMMUNITY FACILITY	YES	
36-21	GENERAL PROVISION REQUIRED OFF-STREET PARKING SPACES FOR COMMUNITY FACILITY USE	0 REQUIRED	0 EXISING	YES	

- NOTES:**
- SCOPE OF WORK INVOLVES A CHANGE TO OCCUPANCY ON PARTIAL FIRST FLOOR ONLY.
 - PROPOSED WORK DOES NOT INCLUDE ANY CHANGE TO FLOOR AREA, HEIGHT, SETBACK, USE.

LEGEND:
 AREA OF WORK
 PROPERTY LINE



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PROJECT:
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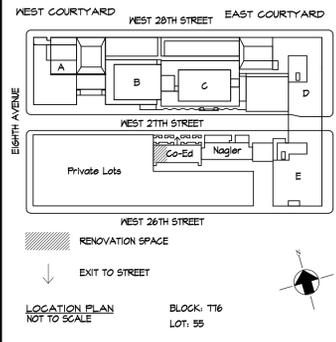
DRAWING TITLE:
 ZONING PLAN

SEAL & SIGNATURE:
 DATE: 09.01.2022
 PROJECT No: 13284.154
 DRAWING BY: GD & TM
 CHK BY: DH & CK
 DWG No:

Z-100.00

SCALE: AS NOTED 10 of 61

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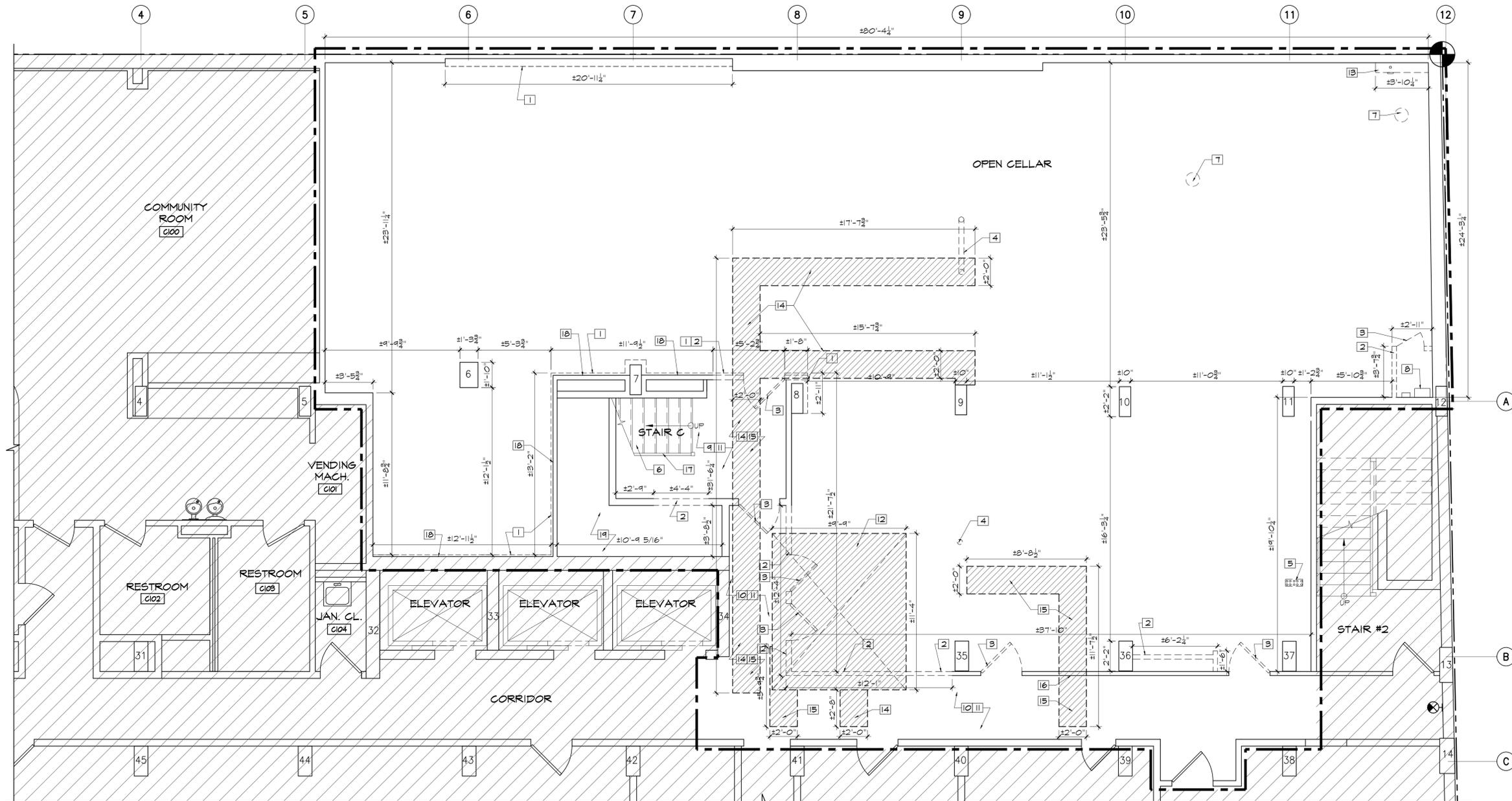
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PROJECT:
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 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 CELLAR
 DEMOLITION PLAN

SEAL & SIGNATURE:	DATE: 09.01.2022
	PROJECT No: 13284.154
	DRAWING BY: GD & TM
	CHK BY: DH & CK
	DWG No:
	DM-100.00
	SCALE: AS NOTED 11 of 61

ISSUED FOR BID 09.01.2022

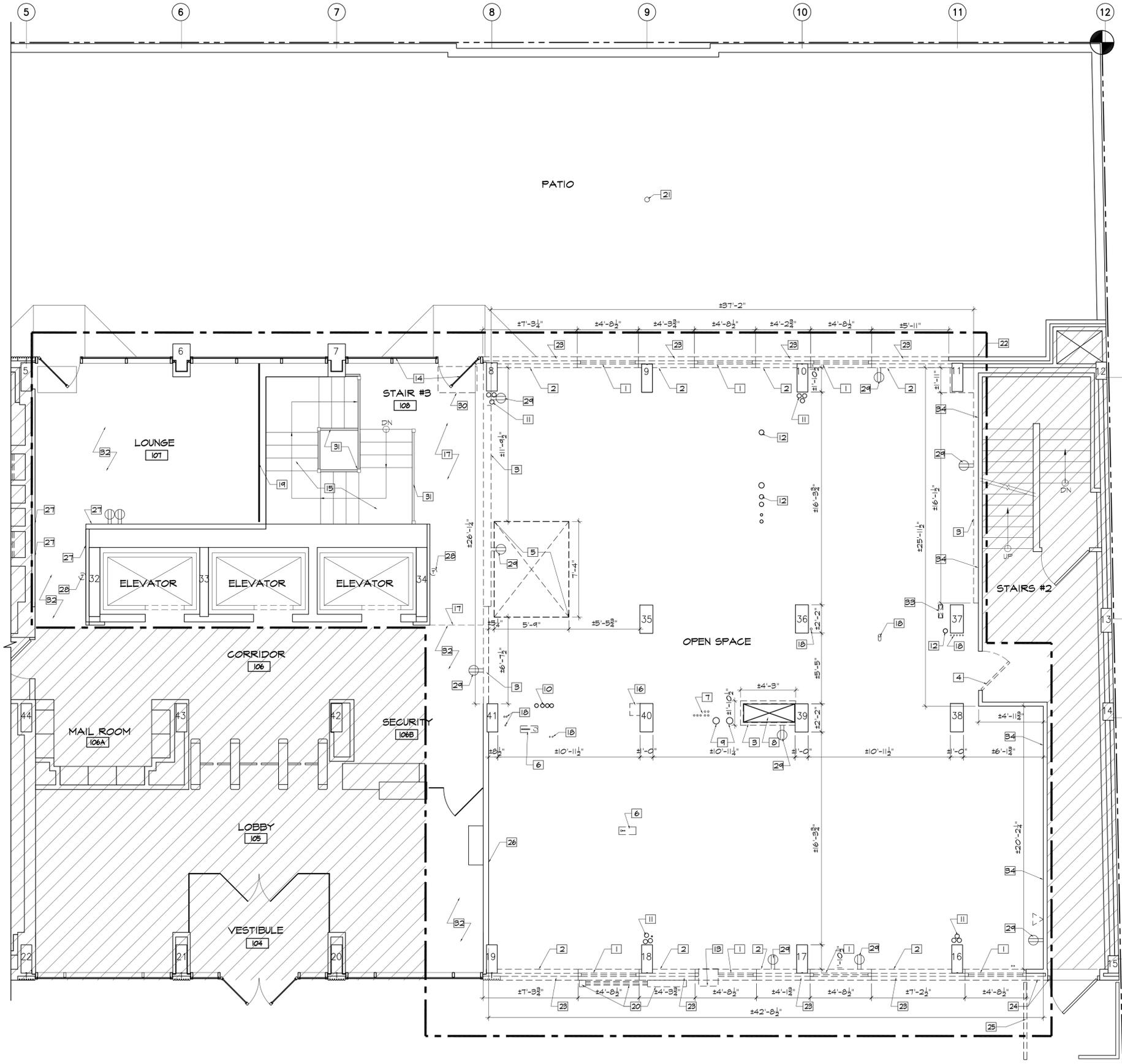


1 CELLAR DEMOLITION PLAN
 DM-100
 SCALE: 1/4" = 1'-0"

- DEMOLITION NOTES:**
- 1 REMOVE EXISTING GMB WALLS AND ALL ASSOCIATED OUTLETS & EQUIPMENT AS INDICATED.
 - 2 REMOVE EXISTING CMU WALL AND ALL ASSOCIATED OUTLETS & EQUIPMENT AS INDICATED.
 - 3 REMOVE EXISTING DOOR AND FRAME.
 - 4 REMOVE EXISTING PLUMBING PIPING. REFER TO PLUMBING DRAWINGS FOR DETAILS.
 - 5 REMOVE EXISTING ELECTRICAL PANEL AND CONDUITS. REFER TO ELECTRICAL DRAWINGS FOR DETAILS.
 - 6 EXISTING STAIR TO REMAIN. REMOVE EXISTING ALUMINUM TREADS. EXISTING TERRAZZO LANDINGS, METAL STAIR AND RAILING TO REMAIN AND BE PROTECTED AS REQUIRED.
 - 7 REMOVE EXISTING FLOOR DRAIN. REFER TO PLUMBING DRAWING FOR DETAILS.
 - 8 EXISTING DUCTWORK TO REMAIN. PROVIDE PROTECTION AS REQUIRED.
 - 9 REMOVE EXISTING VINYL FLOORING DOWN TO SLAB.
 - 10 REMOVE EXISTING VCT FLOORING DOWN TO SLAB.
 - 11 REMOVE EXISTING VINYL BASE.
 - 12 OPEN EXISTING SLAB FOR NEW ELEVATOR PIT AND FOOTINGS. REFER TO ELEVATOR DRAWINGS, STRUCTURAL DRAWINGS AND GEOTECHNICAL REPORT FOR DETAILS. COORDINATE WITH CONSTRUCTION PLANS, ELEVATOR DRAWINGS AND STRUCTURAL DRAWINGS FOR LOCATION.
 - 13 REMOVE EXISTING LOW CMU WALL AND PLUMBING PIPING. COORDINATE WITH PLUMBING DRAWINGS.
 - 14 OPEN EXISTING SLAB FOR REMOVAL OF EXISTING RECESSED PLUMBING PIPING. COORDINATE WITH PLUMBING DRAWINGS.
 - 15 OPEN EXISTING SLAB FOR NEW PLUMBING WORK. COORDINATE WITH PLUMBING DRAWINGS.
 - 16 OPEN EXISTING CMU WALL AS REQUIRED FOR NEW PLUMBING WORK. COORDINATE WITH PLUMBING DRAWINGS.
 - 17 EXISTING METAL RAILING, POSTS, STINGERS AND RISERS TO BE STRIPPED AND PREP FOR PAINTING.
 - 18 TRENCH EXISTING WALL FOR NEW POWER AND DATA. COORDINATE WITH POWER PLAN AND ELEVATIONS FOR LOCATIONS.
 - 19 REMOVE ALL EXISTING CONSTRUCTION DEBRIS DOWN TO EXISTING SLAB.

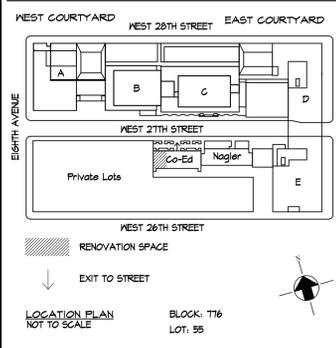
- GENERAL NOTES:**
1. ALL EXISTING EQUIPMENT TO REMAIN TO BE PROTECTED AS REQUIRED.
 2. CONTRACTOR TO PROVIDE PROTECTION TO ALL EXISTING WALLS AND CEILINGS THAT ARE TO REMAIN (TYP).
 3. PROTECT ALL ADJACENT AREAS AND PATHWAYS OF TRAVEL TO AND FROM AREAS OF WORK.
 4. CONTRACTOR TO PERFORM A GROUND PENETRATING RADAR (GPR) SCAN OF THE EXISTING SLAB TO VERIFY ANY EXISTING CONDUITS AND/OR PIPING EMBEDDED IN THE SLAB. PROVIDE FIELD VERIFICATION DRAWINGS PRIOR TO THE SUBMITTAL OF ELEVATOR AND PLUMBING LAYOUT SHOP DRAWINGS. ALL SCANNING TO BE DONE PRIOR TO DEMOLITION.





- DEMOLITION NOTES**
- 1 REMOVE EXISTING WINDOWS.
 - 2 REMOVE EXISTING EXTERIOR CMU WALL AND ALL ASSOCIATED OUTLETS & EQUIPMENT AS INDICATED.
 - 3 REMOVE EXISTING GMB WALL AND ALL ASSOCIATED OUTLETS & EQUIPMENT AS INDICATED.
 - 4 REMOVE EXISTING DOOR AND FRAME.
 - 5 OPEN EXISTING FLOOR SLAB FOR NEW ELEVATOR SHAFT. COORDINATE WITH CONSTRUCTION PLANS, ELEVATOR DRAWINGS AND STRUCTURAL DRAWINGS FOR LOCATION AND DETAILS.
 - 6 REMOVE EXISTING ELECTRICAL RISERS AND ELECTRICAL PANEL. REFER TO ELECTRICAL DRAWINGS FOR DETAILS.
 - 7 EXISTING ELECTRICAL RISERS TO BE REROUTED BELOW THE SLAB AND BELOW CEILING. REFER TO ELECTRICAL DRAWINGS FOR DETAILS.
 - 8 EXISTING DUCTWORK TO REMAIN. PROVIDE PROTECTION AS REQUIRED.
 - 9 EXISTING STEAM RISERS TO REMAIN. PROVIDE PROTECTION AS REQUIRED.
 - 10 EXISTING LARGE ELECTRICAL RISERS TO REMAIN. PROVIDE PROTECTION AS REQUIRED.
 - 11 EXISTING HEATING/COOLING RISERS TO REMAIN. PROVIDE PROTECTION AS REQUIRED.
 - 12 EXISTING PLUMBING RISERS TO REMAIN. PROVIDE PROTECTION AS REQUIRED.
 - 13 REMOVE EXISTING AC WINDOW UNIT.
 - 14 EXISTING GLASS DOOR AND WINDOW TO REMAIN. PROVIDE PROTECTION AS REQUIRED.
 - 15 EXISTING STAIR TO REMAIN. REMOVE EXISTING ALUMINUM TREADS. EXISTING TERRAZZO LANDINGS, METAL STAIR AND RAILING TO REMAIN AND BE PROTECTED AS REQUIRED.
 - 16 REMOVE EXISTING FLOOR ELECTRICAL CONNECTION AND GMB ENCLOSURE. REFER TO ELECTRICAL DRAWINGS FOR DETAILS.
 - 17 REMOVE EXISTING CERAMIC TILE FLOOR DOWN TO SLAB.
 - 18 REMOVE EXISTING ELECTRICAL RISERS. REFER TO ELECTRICAL DRAWINGS FOR DETAILS.
 - 19 GLASS PARTITION TO REMAIN. PROVIDE PROTECTION AS REQUIRED.
 - 20 REMOVE EXISTING EXTERIOR WALL MOUNTED POWER BOXES AND CONDUITS. COORDINATE WITH ELECTRICAL DRAWING.
 - 21 REMOVE EXISTING PATIO FLOOR DRAIN. REMOVE AND SAVE EXISTING PATIO PAVERS AS REQUIRE FOR PLUMBING WORK. REFER TO PLUMBING DRAWINGS FOR DETAILS.
 - 22 PROVIDE OPENINGS IN EXISTING CMU WALL FOR NEW MECHANICAL PIPING. REFER TO MECHANICAL DRAWINGS FOR DETAILS.
 - 23 CAREFULLY REMOVE AND SAVE EXISTING EXTERIOR SPLIT FACE CONCRETE BLOCK FOR FUTURE REINSTALLATION AND PATCHING.
 - 24 PARTIALLY OPEN EXISTING EXTERIOR SPLIT FACE CONCRETE FACE FOR NEW WINDOW INSTALLATION. EXISTING HW DOOR AND FRAME TO REMAIN. PROVIDE SUPPORT AS REQUIRED DURING THE PARTIAL REMOVAL OF THE EXISTING BLOCK.
 - 25 TEMPORARILY REMOVE AND SAVE FOR REINSTALLATION EXISTING METAL FENCE.
 - 26 OPEN EXISTING GMB WALL FOR NEW POWER, DATA, AV INSTALLATION. COORDINATE WITH FURNITURE AND ELECTRICAL DRAWINGS. INSTALL NEW BLOCKING FOR AV EQUIPMENT.
 - 27 OPEN EXISTING GMB WALL FOR NEW DOOR, DOOR ACTUATOR & MAGNETIC HOLD OPEN COORDINATE WITH NEW WORK FOR EQUIPMENT AND LOCATION. COORDINATE WITH ELECTRICAL AND FIRE ALARM DRAWINGS.
 - 28 REMOVE AND SAVE FOR RELOCATION EXISTING WALL MOUNTED THERMOSTAT. COORDINATE WITH MECHANICAL DRAWING.
 - 29 REMOVE EXISTING POWER OUTLET.
 - 30 REMOVE EXISTING RECESSED FLOOR MAT.
 - 31 EXISTING METAL RAILING, POSTS, STINGERS AND RISERS TO BE STRIPPED AND PREP FOR PAINTING.
 - 32 EXISTING LOBBY TILE FLOOR TO BE PROTECTED AS REQUIRED.
 - 33 REMOVE EXISTING DUCT RISER. COORDINATE WITH MECHANICAL DRAWINGS.
 - 34 TRENCH EXISTING WALL FOR NEW POWER AND DATA. COORDINATE WITH POWER PLAN AND ELEVATIONS FOR LOCATIONS.

- GENERAL NOTES:**
1. ALL EXISTING EQUIPMENT TO REMAIN TO BE PROTECTED AS REQUIRED.
 2. CONTRACTOR TO PROVIDE PROTECTION TO ALL EXISTING WALLS AND CEILINGS THAT ARE TO REMAIN (TYP).
 3. PROTECT ALL ADJACENT AREAS AND PATHWAYS OF TRAVEL TO AND FROM AREAS OF WORK.
 4. CONTRACTOR TO PERFORM A GROUND PENETRATING RADAR (GPR) SCAN OF THE EXISTING SLAB TO VERIFY ANY EXISTING CONDUITS AND/OR PIPING EMBEDDED IN THE SLAB. PROVIDE FIELD VERIFICATION DRAWINGS PRIOR TO THE SUBMITTAL OF THE ELEVATOR AND MEP LAYOUT SHOP DRAWINGS. ALL SCANNING TO BE DONE PRIOR TO DEMOLITION.
- LEGEND**
- - - - - DOOR & DOOR FRAME TO BE REMOVED
 - ==== WALL TO BE REMOVED
 - ===== WALL TO REMAIN
 - - - - - CONSTRUCTION LIMIT LINE



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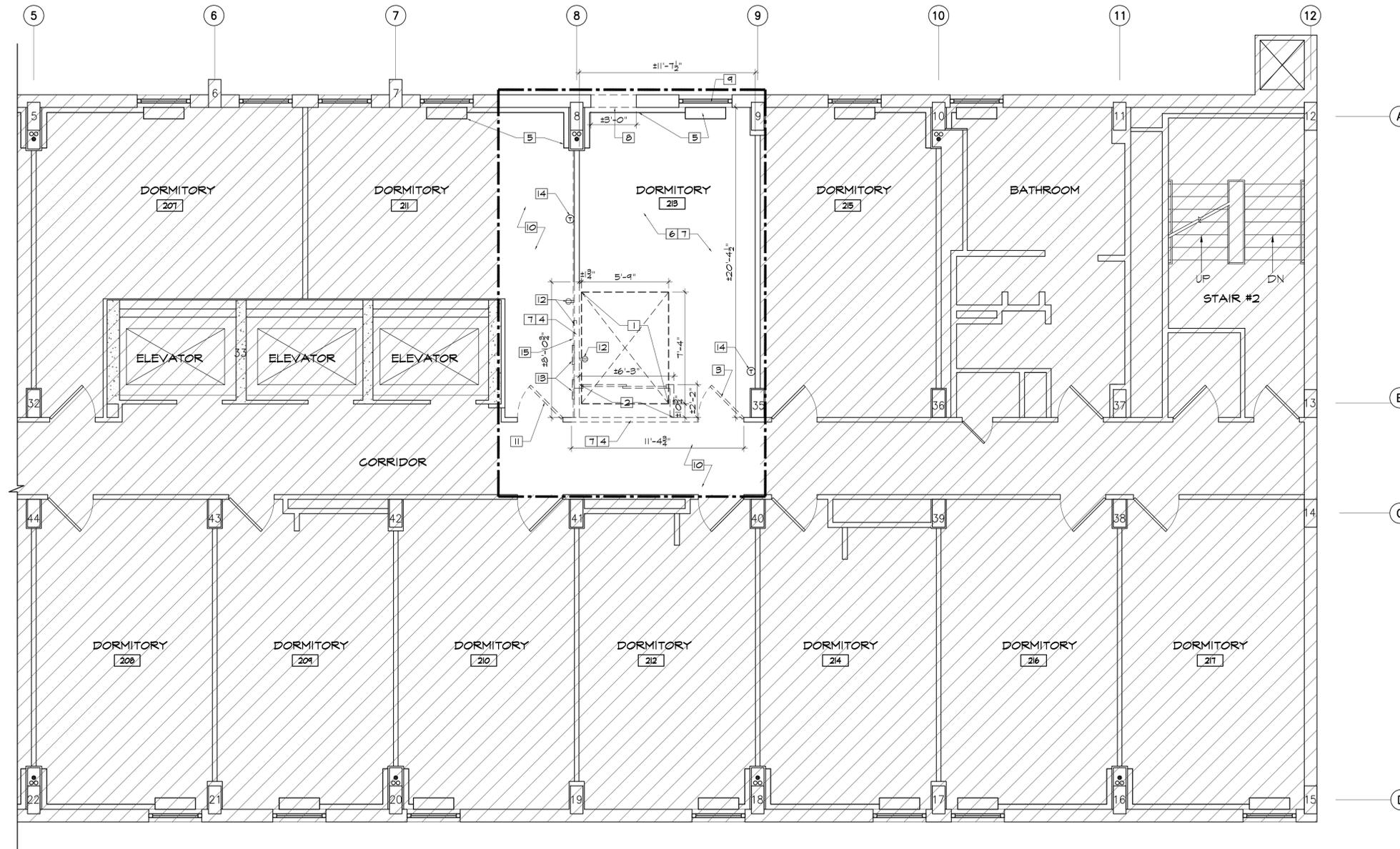
PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 1ST FLOOR
 DEMOLITION PLAN

SEAL & SIGNATURE: _____
 DATE: 09.01.2022
 PROJECT No: 13284.154
 DRAWING BY: GD & TM
 CHK BY: DH & CK
 DWG No: _____
DM-101.00
 SCALE: AS NOTED 12 of 61

DM-101 1ST FLOOR DEMOLITION PLAN
 SCALE: 1/4" = 1'-0"

ISSUED FOR BID 09.01.2022



1 2ND FLOOR DEMOLITION PLAN
DM-02 SCALE: 1/4" = 1'-0"

DEMOLITION NOTES

- 1 OPEN EXISTING FLOOR SLAB FOR NEW ELEVATOR SHAFT. COORDINATE WITH CONSTRUCTION PLANS, ELEVATOR DRAWINGS AND STRUCTURAL DRAWINGS FOR LOCATION AND DETAILS.
- 2 REMOVE EXISTING CLOSET, INCLUDING WALLS, DOORS AND ACCESSORIES.
- 3 REMOVE EXISTING DOOR AND FRAME.
- 4 REMOVE EXISTING WALL AND ALL ASSOCIATED OUTLETS & EQUIPMENT AS INDICATED.
- 5 EXISTING HVAC UNIT AND PIPING WITH ENCLOSURE TO REMAIN. PROVIDE PROTECTION AS REQUIRED.
- 6 REMOVE EXISTING VGT FLOOR TILES DOWN TO SLAB.
- 7 REMOVE EXISTING VINYL BASE.
- 8 PROVIDE OPENING IN EXISTING CMU WALL FOR NEW DUCTWORK AND EXTERIOR GRILLE. COORDINATE WITH MECHANICAL DRAWINGS.
- 9 EXISTING WINDOW TO REMAIN AND BE PROTECTED.
- 10 EXISTING FLOORING AND WALLS TO BE PROTECTED (TYP.).
- 11 REMOVE AND SAVE FOR REINSTALLATION EXISTING HM DOOR & FRAME.
- 12 REMOVE EXISTING OUTLETS AND ELECTRICAL BACKBOXES.
- 13 REMOVE EXISTING WALL MOUNTED HOOKS AND TURN OVER TO FIT.
- 14 EXISTING SURFACE MOUNTED THERMOSTAT & WIREMOLD TO REMAIN AND BE PROTECTED DURING CONSTRUCTION.
- 15 REMOVE EXISTING SURFACE MOUNTED WIREMOLD AT THE BASE OF THE WALL. DATA CABLES TO BE DISCONNECTED AS REQUIRED. GC TO COORDINATE WITH FIT PRIOR REMOVAL OF CABLING.

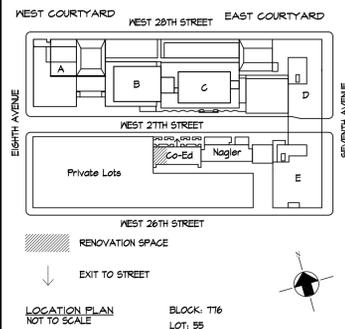
GENERAL NOTES:

1. ALL EXISTING EQUIPMENT TO REMAIN TO BE PROTECTED AS REQUIRED.
2. CONTRACTOR TO PROVIDE PROTECTION TO ALL EXISTING WALLS AND CEILINGS THAT ARE TO REMAIN (TYP.).
3. PROTECT ALL ADJACENT AREAS AND PATHWAYS OF TRAVEL TO AND FROM AREAS OF WORK.
4. CONTRACTOR TO PERFORM A GROUND PENETRATING RADAR (GPR) SCAN OF THE EXISTING SLAB TO VERIFY ANY EXISTING CONDUITS AND/OR PIPING EMBEDDED IN THE SLAB. PROVIDE FIELD VERIFICATION DRAWINGS PRIOR TO THE SUBMITTAL OF THE ELEVATOR AND MEP LAYOUT SHOP DRAWINGS. ALL SCANNING TO BE DONE PRIOR TO DEMOLITION.

LEGEND

- - - - - DOOR & DOOR FRAME TO BE REMOVED
- ===== WALL TO BE REMOVED
- ===== WALL TO REMAIN
- - - - - CONSTRUCTION LIMIT LINE

REV. NO. DATE REVISIONS



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PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 27TH ST
NEW YORK NY 10001

DRAWING TITLE:
**2ND FLOOR
DEMOLITION PLAN**

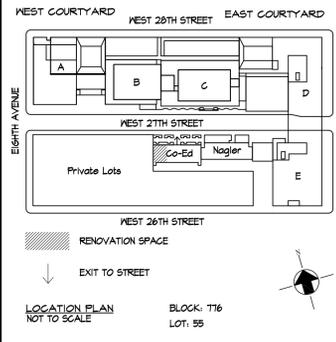
SEAL & SIGNATURE:

DATE: 09.01.2022
PROJECT No: 13284.154
DRAWING BY: GD & TM
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DWG No:

DM-102.00

SCALE: AS NOTED 13 of 61

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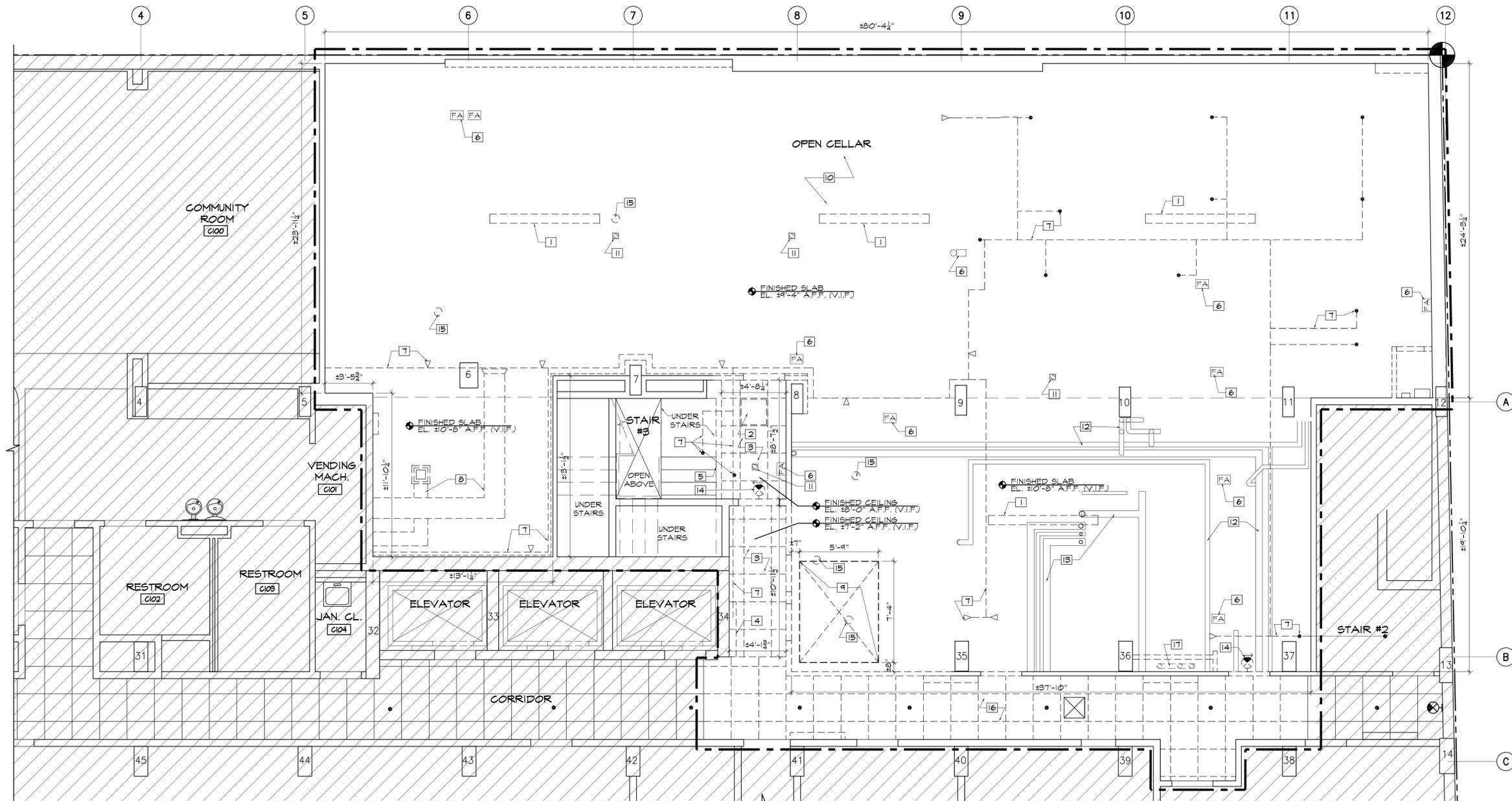
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PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 CELLAR
 CEILING DEMOLITION PLAN

SEAL & SIGNATURE:
 DATE: 09.01.2022
 PROJECT No: 13284.154
 DRAWING BY: GD & TM
 CHK BY: DH & CK
 DWG No:
DM-400.00
 SCALE: AS NOTED 15 of 61

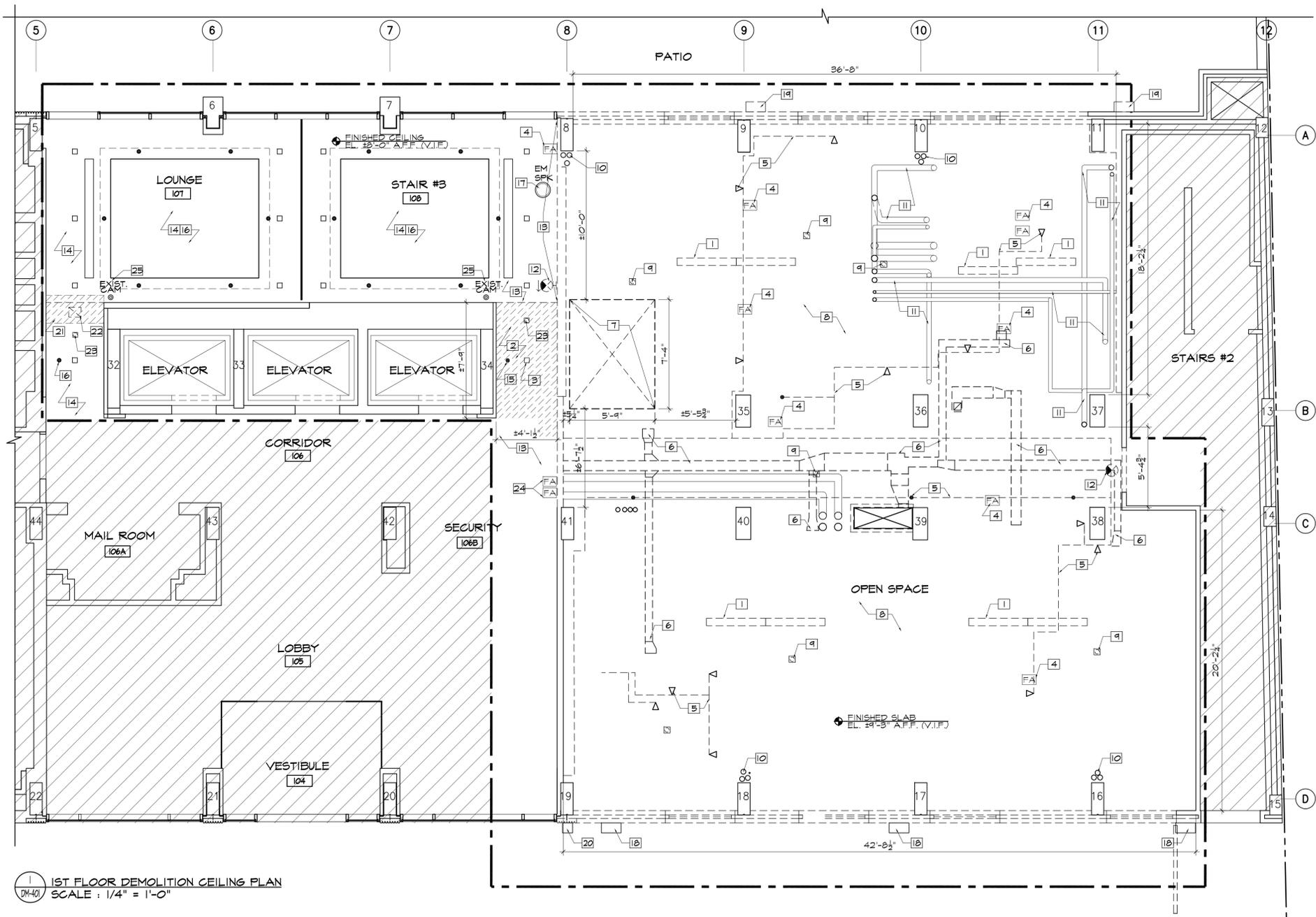
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CELLAR DEMOLITION CEILING PLAN
 SCALE: 1/4" = 1'-0"

- DEMOLITION NOTES:**
- 1 REMOVE EXISTING 1X8 LIGHT FIXTURE.
 - 2 REMOVE EXISTING 2X2 LIGHT FIXTURE.
 - 3 REMOVE EXISTING 2X2 ACCT AND SUPPORT SYSTEM.
 - 4 REMOVE EXISTING WALL MOUNTED 1X4 LIGHT FIXTURE.
 - 5 REMOVE EXISTING 6x6 SOFFIT.
 - 6 REMOVE EXISTING FIRE ALARM DEVICES AND CONDUITS. REFER TO FA DRAWINGS FOR DETAILS.
 - 7 REMOVE EXPOSED SPRINKLER PIPING AND HEADS. REFER TO SPRINKLER DRAWINGS FOR DETAILS.
 - 8 REMOVE EXISTING EXPOSED DUCTWORK & DIFFUSERS. REFER TO MECHANICAL DRAWINGS FOR DETAILS.
 - 9 OPEN CEILING SLAB FOR NEW ELEVATOR SHAFT. COORDINATE WITH CONSTRUCTION PLANS, ELEVATOR DRAWINGS AND STRUCTURAL DRAWINGS FOR LOCATION AND DETAILS.
 - 10 REMOVE ALL SPRAY-ON (POPCORN/VERMICULITE CEILING) FROM CEILING SLAB THROUGHOUT.
 - 11 REMOVE EXISTING SMOKE DETECTOR. REFER TO FA DRAWINGS FOR DETAILS.
 - 12 EXISTING HVAC PIPING TO REMAIN. REFER TO MECHANICAL DRAWINGS FOR DETAILS. PROVIDE PROTECTION AS REQUIRED.
 - 13 EXISTING PLUMBING PIPING TO REMAIN. REFER TO PLUMBING FOR DETAILS. PROVIDE PROTECTION AS REQUIRED.
 - 14 REMOVE EXISTING EM LIGHT & EXIT SIGN. REFER TO ELECTRICAL DRAWINGS FOR DETAILS.
 - 15 REMOVE EXISTING SURFACE MOUNTED POWER BACKBOXES AND CONDUITS.
 - 16 PARTIALLY REMOVE AND SAVE EXISTING ACCT CEILING, DIFFUSERS, LIGHTING AND SPRINKLER HEADS AS REQUIRED FOR NEW WORK. PROVIDE TEMPORARY SUPPORT TO EXISTING TO REMAIN CEILING.
 - 17 REMOVE EXISTING PLUMBING PIPING. COORDINATE WITH PLUMBING DRAWINGS.

- GENERAL NOTES:**
1. ALL EXISTING FINISHES TO REMAIN TO BE PROTECTED AS REQUIRED.
 2. ALL EXISTING EQUIPMENT TO REMAIN TO BE PROTECTED AS REQUIRED.
 3. FOR ANY CORE DRILLS OR OPENING IN THE EXISTING SLABS, GO TO SCAN THE AREA TO VERIFY IF THERE ARE ANY EXISTING CONDUITS OR PIPING RECESSED IN THE SLAB.



1 1ST FLOOR DEMOLITION CEILING PLAN
SCALE: 1/4" = 1'-0"

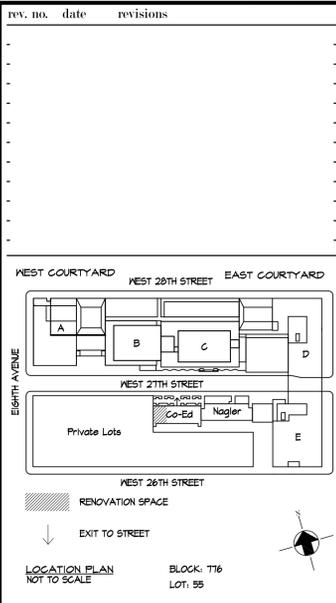
DEMOLITION NOTES

- 1 REMOVE EXISTING SURFACE MOUNTED 1x4 LIGHT FIXTURES.
- 2 PARTIALLY REMOVE EXISTING G&B CEILING AND SUPPORTING FRAME AS INDICATED. PROVIDE SUPPORT TO EXISTING TO REMAIN G&B CEILING.
- 3 REMOVE EXISTING DOWNLIGHT.
- 4 REMOVE EXISTING FIRE ALARM DEVICES AND CONDUITS. REFER TO FA DRAWINGS FOR DETAILS.
- 5 REMOVE EXPOSED SPRINKLER PIPING AND HEADS. REFER TO SPRINKLER DRAWINGS FOR DETAILS.
- 6 REMOVE EXISTING EXPOSED DUCTWORK & DIFFUSERS. REFER TO MECHANICAL DRAWINGS FOR DETAILS.
- 7 OPEN CEILING SLAB FOR NEW ELEVATOR SHAFT. COORDINATE WITH CONSTRUCTION PLANS, ELEVATOR DRAWINGS AND STRUCTURAL DRAWINGS FOR LOCATION AND DETAILS.
- 8 REMOVE ALL SPRAY-ON (POPCORN/VERMICULITE CEILINGS) FROM CEILING SLAB THROUGHOUT.
- 9 REMOVE EXISTING HVAC SMOKE DETECTOR. REFER TO FA DRAWINGS FOR DETAILS.
- 10 EXISTING HVAC RISERS & PIPING TO REMAIN. REFER TO MECHANICAL DRAWINGS FOR DETAILS. PROVIDE PROTECTION AS REQUIRED.
- 11 EXISTING PLUMBING PIPING TO REMAIN. REFER TO PLUMBING FOR DETAILS. PROVIDE PROTECTION AS REQUIRED.
- 12 REMOVE EXISTING EM LIGHT & EXIT SIGN. REFER TO ELECTRICAL DRAWINGS FOR DETAILS.
- 13 PROVIDE SUPPORT TO EXISTING TO REMAIN G&B CEILING.
- 14 EXISTING G&B CEILING, DOWNLIGHTS AND DIFFUSERS TO REMAIN. PROVIDE PROTECTION AS REQUIRE.
- 15 REMOVE EXISTING RECESSED SPRINKLER HEAD.
- 16 EXISTING RECESSED SPRINKLER HEAD TO REMAIN. PROVIDE PROTECTION AS REQUIRED.

- 17 EXISTING RECESSED EM SPEAKER TO REMAIN. PROVIDE PROTECTION AS REQUIRED.
- 18 EXISTING EXTERIOR WALL MOUNTED LIGHTS AND CONDUITS TO REMAIN AND BE PROTECTED AS REQUIRED.
- 19 REMOVE AND SAVE FOR REINSTALLATION EXISTING EXTERIOR WALL MOUNTED LIGHTS.
- 20 EXISTING EXTERIOR WALL MOUNTED DEVICE TO REMAIN AND BE PROTECTED AS REQUIRED.
- 21 PARTIALLY OPEN EXISTING G&B CEILING FOR NEW WALL AND DOOR INSTALLATION. PROVIDE TEMPORARY SUPPORT TO EXISTING G&B CEILING TO REMAIN. COORDINATE WITH NEW WORK FOR SIZE OF OPENING.
- 22 REMOVE AND SAVE FOR RELOCATION EXISTING RETURN DIFFUSER. COORDINATE WITH MECHANICAL DRAWINGS.
- 23 REMOVE AND SAVE FOR RELOCATION EXISTING CEILING MOUNTED SMOKE DETECTOR. COORDINATE WITH ELECTRICAL AND FIRE ALARM DRAWINGS.
- 24 EXISTING FIRE ALARM PANEL AND STROBE TO BE REMOVED FROM WALL WITHOUT DISCONNECTING THE DEVICES. GO TO PROVIDE TEMPORARY SUPPORT DURING CONSTRUCTION.
- 25 EXISTING CEILING MOUNTED CAMERA TO REMAIN AND BE PROTECTED AS REQUIRED.

GENERAL NOTES:

- 1. ALL EXISTING FINISHES TO REMAIN TO BE PROTECTED AS REQUIRED.
- 2. ALL EXISTING EQUIPMENT TO REMAIN TO BE PROTECTED AS REQUIRED.
- 3. FOR ANY CORE DRILLS OR OPENING IN THE EXISTING SLABS, GO TO SCAN THE AREA TO VERIFY IF THERE ARE ANY EXISTING CONDUITS OR PIPING RECESSED IN THE SLAB.



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PROJECT:
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DRAWING TITLE:
 1ST FLOOR
 CEILING DEMOLITION PLAN

SEAL & SIGNATURE: _____ DATE: 09.01.2022
 PROJECT No: 13284.154
 DRAWING BY: GD & TM
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 DWG No: _____
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 SCALE: AS NOTED 16 of 61



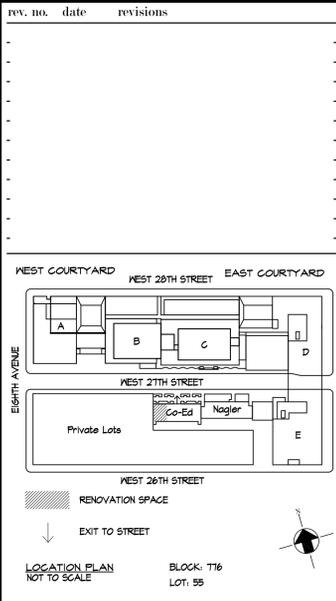
1 2ND FLOOR DEMOLITION CEILING PLAN
 SCALE: 1/4" = 1'-0"

DEMOLITION NOTES

- 1 REMOVE AND SAVE FOR REINSTALLATION EXISTING 1X4 SURFACE MOUNTED LIGHT.
- 2 EXISTING SURFACE MOUNTED SPRINKLER AND PIPING TO REMAIN. PROVIDE PROTECTION AS REQUIRED.
- 3 EXISTING SURFACE MOUNTED SMOKE DETECTOR AND WIREMOLD TO REMAIN. PROVIDE PROTECTION AS REQUIRED.
- 4 REMOVE AND SAVE FOR REINSTALLATION EXISTING CEILING MOUNTED WAP.
- 5 EXISTING CEILING SURFACE MOUNTED SPRINKLER PIPING AND WIREMOLDS TO REMAIN AND BE PROTECTED (TYP.).
- 6 EXISTING SURFACE MOUNTED 1X4 LIGHT FIXTURES TO REMAIN AND BE PROTECTED (TYP.).

GENERAL NOTES:

- 1. ALL EXISTING FINISHES TO REMAIN TO BE PROTECTED AS REQUIRED.
- 2. ALL EXISTING EQUIPMENT TO REMAIN TO BE PROTECTED AS REQUIRED.
- 3. FOR ANY CORE DRILLS OR OPENING IN THE EXISTING SLABS, GC TO SCAN THE AREA TO VERIFY IF THERE ARE ANY EXISTING CONDUITS OR PIPING RECESSED IN THE SLAB.



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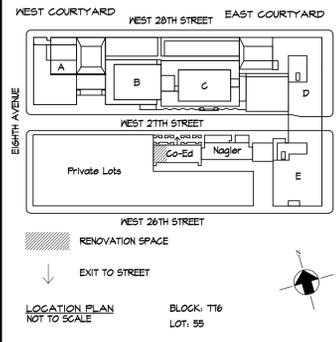
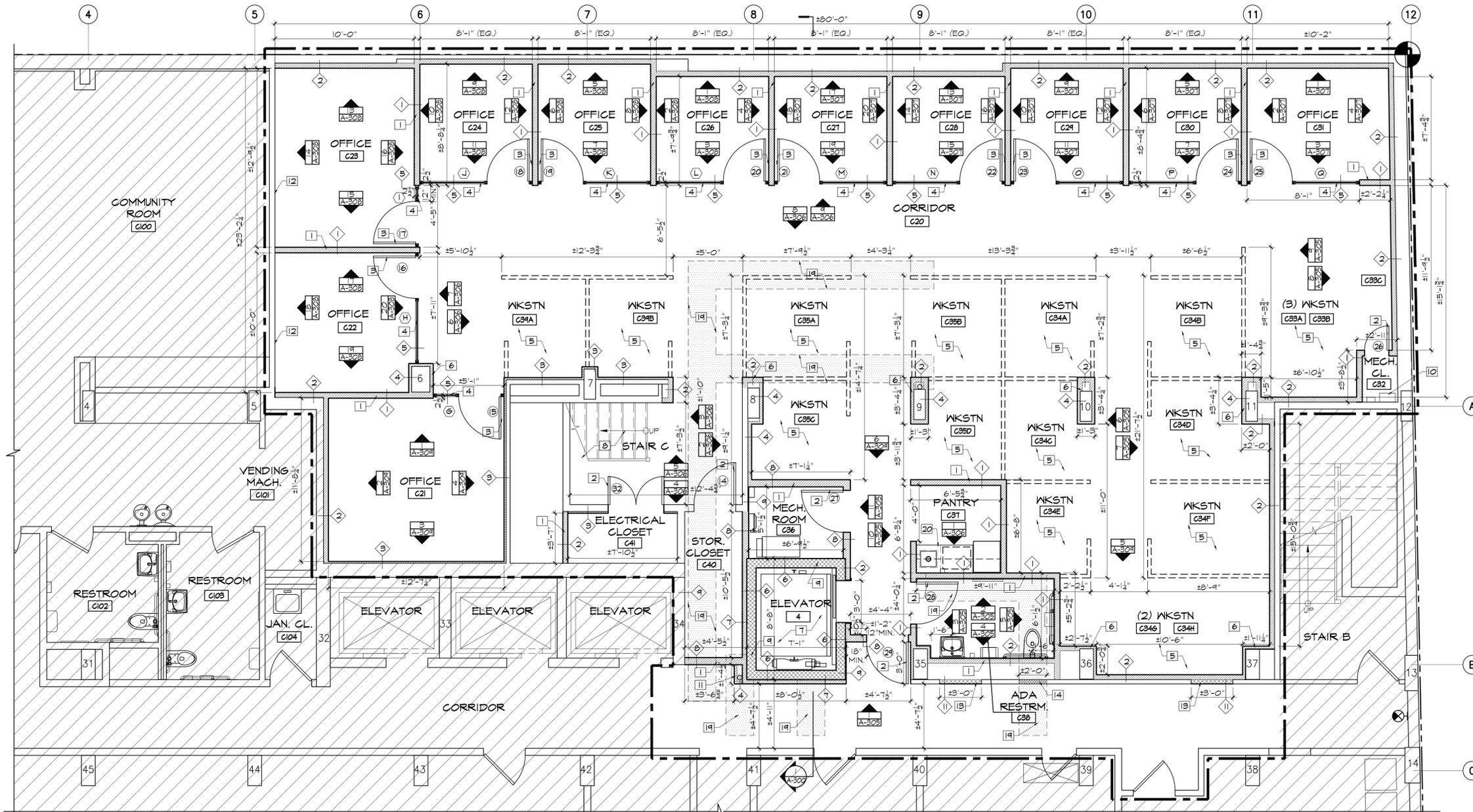
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PROJECT:
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 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 2ND FLOOR
 CEILING DEMOLITION PLAN

SEAL & SIGNATURE: _____ DATE: 09.01.2022
 PROJECT No: 13284.154
 DRAWING BY: GD & TM
 CHK BY: DH & CK
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DM-402.00
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 CONSTRUCTION PLAN

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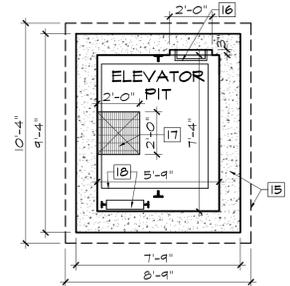
SCALE: AS NOTED 18 of 61

1 CELLAR CONSTRUCTION PLAN
 SCALE: 1/4" = 1'-0"

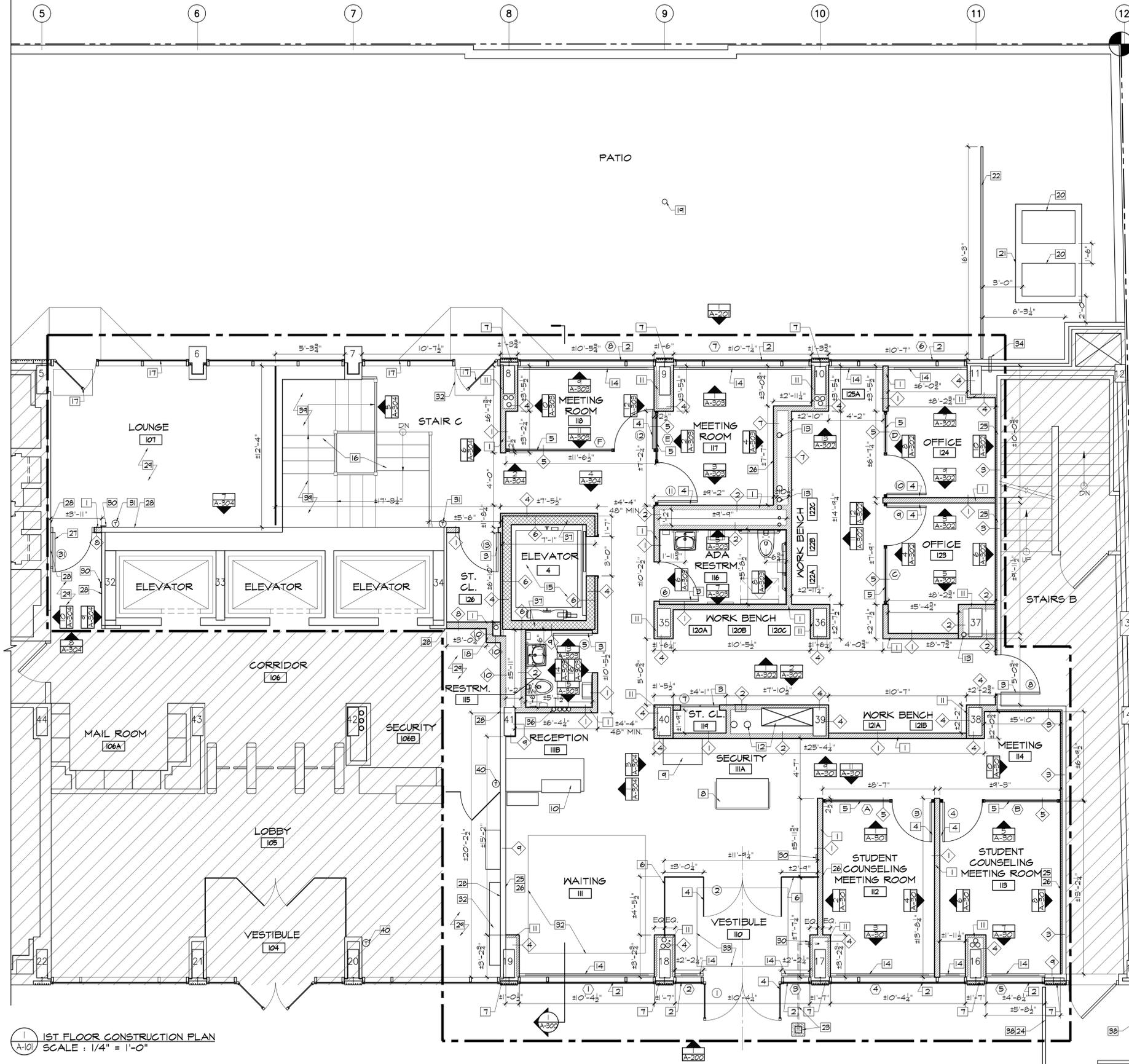
- CONSTRUCTION NOTES**
- 1 NEW GMB WALL. SEE DRAWING A-100 FOR PARTITION TYPE.
 - 2 NEW HM DOOR. REFER TO DRAWINGS A-101 FOR SCHEDULE AND DETAILS.
 - 3 NEW GLASS DOOR. REFER TO DRAWING A-101 FOR SCHEDULE AND DETAILS.
 - 4 NEW GLASS PARTITION. REFER TO DRAWING A-102 FOR SCHEDULE AND DETAILS.
 - 5 NEW WORKSTATIONS FURNITURE SYSTEM. REFER TO DRAWINGS A-203 FOR DETAILS.
 - 6 NEW GMB COLUMN ENCLOSURE.
 - 7 NEW ELEVATOR AND ELEVATOR SHAFT. REFER TO ELEVATOR & STRUCTURAL DRAWINGS FOR DETAILS.
 - 8 EXISTING STAIR'S METAL RAILING, RISERS AND STRINGERS TO BE PAINTED. CONTRACTOR TO INSTALL NEW METAL STAIR TREAD WITH GRIT STRIPS, MFR. AMERICAN SAFETY TREAD, TYPE 6505R.
 - 9 NEW CMU WALL. SEE DRAWING A-100 FOR PARTITION TYPE.
 - 10 EXISTING DUCTWORK TO REMAIN. PROTECT AS REQUIRED.
 - 11 GMB ENCLOSURE FOR NEW PLUMBING RISER. COORDINATE WITH PLUMBING DRAWINGS.
 - 12 EXISTING GMB WALL TO BE PATCHED AND PAINTED.
 - 13 CLOSE OPENINGS W/ NEW CMU TO MATCH EXISTING. PATCH AND PAINT AS REQUIRED.
 - 14 CLOSE AND PATCH EXISTING CMU AFTER PLUMBING WORK IS COMPLETED.
 - 15 NEW ELEVATOR PIT FOUNDATION CONCRETE WALL AND FOOTING. COORDINATE WITH STRUCTURAL AND ELEVATOR DRAWINGS.

- 16 PIT ACCESS LADDER. COORDINATE WITH ELEVATOR DRAWINGS.
- 17 SUMP PIT WITH GRATING. COORDINATE WITH ELEVATOR & STRUCTURAL DRAWINGS.
- 18 ELEVATOR CAB AND EQUIPMENT. REFER TO ELEVATOR DRAWINGS FOR DETAILS.
- 19 CLOSE AND PATCH EXISTING SLAB AFTER NEW PLUMBING WORK IS COMPLETED. COORDINATE WITH PLUMBING DRAWINGS. SEE DRAWING 2/A-100 FOR DETAIL.
- 20 CABINETRY. SEE DRAWING A-110 FOR DETAILS.
- 21 FURRED OUT EXISTING CMU WALL WITH NEW GMB. SEE DRAWING A-100 FOR PARTITION TYPE.

- GENERAL CONSTRUCTION NOTES:**
1. ALL EXISTING FINISHES TO REMAIN TO BE PROTECTED AS REQUIRED.
 2. ALL EXISTING EQUIPMENT TO REMAIN TO BE PROTECTED AS REQUIRED.
 3. ALL EXISTING FURNITURE TO REMAIN TO BE PROTECTED (TYP).
 4. SEAL CONCRETE SLAB PRIOR TO NEW FLOOR FINISH INSTALLATION.
 5. FINISH FLOOR AS NEEDED FOR PROPER LEVEL NEW FLOOR FINISH INSTALLATION.
 6. PATCH FLOOR SLAB AT AREA OF PIPE REMOVAL.
 7. PROVIDE 14 GA SHEET METAL STRAPPING AS BLOCKING BETWEEN GMB AND METAL STUDS AS REQUIRED FOR INSTALLATION OF PLUMBING FIXTURES, WALL MOUNTED LIGHT FIXTURES AND ACCESSORIES. GC TO COORDINATE DIMENSIONS AND LOCATIONS OF ALL BLOCKING WITH PLUMBING FIXTURES, LIGHT FIXTURES AND ACCESSORIES. SEE DRAWING A-100 FOR DETAIL.



2 ELEVATOR PIT FLOOR PLAN
 SCALE: 1/4" = 1'-0"



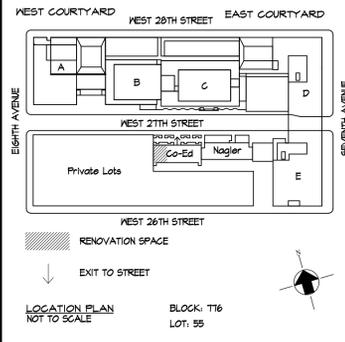
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A-10 1ST FLOOR CONSTRUCTION PLAN
SCALE: 1/4" = 1'-0"

CONSTRUCTION NOTES

- 1 NEW GMB WALL. SEE DRAWING A-100 FOR PARTITION TYPE.
- 2 NEW STOREFRONT WINDOW. REFER TO DRAWING A-103, A-104 & A-105 FOR SCHEDULE AND DETAILS.
- 3 NEW HM DOOR. REFER TO DRAWING A-101 FOR SCHEDULE AND DETAILS.
- 4 NEW GLASS DOOR. REFER TO DRAWING A-101 FOR SCHEDULE AND DETAILS.
- 5 NEW GLASS PARTITION. REFER TO DRAWING A-108 FOR SCHEDULE AND DETAILS.
- 6 NEW VESTIBULE GLASS PARTITION. REFER TO DRAWING A-106 & A-107 FOR DETAILS.
- 7 REUSE EXISTING EXTERIOR SPLIT FACE CONCRETE BLOCK TO MATCH EXISTING INSTALLATION.
- 8 NEW SECURITY DESK. REFER TO DRAWING A-110 FOR MILLWORK DETAILS.
- 9 NEW WALL MOUNTED CHECK IN DESK. REFER TO DRAWING A-804 FOR PRODUCT INFORMATION.
- 10 NEW RECEPTION DESK. REFER TO DRAWING A-111 FOR MILLWORK DETAILS.
- 11 NEW GMB COLUMN ENCLOSURE. SEE DRAWING A-100 FOR PARTITION TYPE.
- 12 EXISTING DUCT RISERS AND STEAM PIPES TO REMAIN. PROVIDE GMB ENCLOSURE.
- 13 EXISTING PLUMBING RISERS TO REMAIN. PROVIDE GMB ENCLOSURE.
- 14 NEW FLOOR MOUNTED BASEBOARD. COORDINATE WITH MECHANICAL DRAWING.
- 15 NEW ELEVATOR AND ELEVATOR SHAFT. REFER TO STRUCTURAL & ELEVATOR DRAWINGS FOR DETAILS.
- 16 EXISTING STAIRS METAL RAILING, RISERS AND STRINGERS TO BE PAINTED. CONTRACTOR TO INSTALL NEW METAL STAIR TREAD WITH GRIT STRIPS, MFR. AMERICAN SAFETY TREAD, TYPE 6505R.
- 17 EXISTING STOREFRONT AND GLASS DOOR TO REMAIN. PROVIDE PROTECTION AS REQUIRED.
- 18 GMB FIRE RATED GMB ENCLOSURE FOR NEW PLUMBING RISER. COORDINATE WITH PLUMBING DRAWINGS.
- 19 NEW PATIO DRAIN. REFER TO PLUMBING DRAWINGS FOR DETAILS. PROVIDE WATERPROOFING AND REINSTALL PAVERS TO MATCH EXISTING.
- 20 NEW HVAC UNITS. COORDINATE WITH MECHANICAL DRAWINGS.
- 21 NEW CONCRETE BASE. SEE DRAWING A-109 FOR DETAILS. COORDINATE WITH MECHANICAL DRAWINGS.
- 22 NEW FENCE TO BLOCK HVAC UNITS. SEE DRAWING A-109 FOR DETAILS.
- 23 NEW DOOR ACTUATOR ON CONCRETE PAD WITH 1" CONDUIT FOR POWER AND DATA. CONDUIT TO BE RECESSED UNDERGROUND AND RUN BELOW 1ST FLOOR SLAB. PROVIDE PIPE SLEEVE THROUGH FOUNDATION WALL AND CORE DRILL SLAB AS REQUIRED.
- 24 REINSTALL EXISTING METAL FENCE. LOCATION TO MATCH EXISTING.
- 25 CLOSE AND PATCH EXISTING FIRE RATED GMB WALL. INSTALL NEW LAYER OF GMB ON EXISTING SURFACE.
- 26 INSTALL BLOCKING AS REQUIRED FOR NEW AV EQUIPMENT. COORDINATE WITH EQUIPMENT FOR LOCATION. SEE DRAWING 3/A-100 FOR DETAIL.
- 27 NEW 90 MINUTE FIRE RATED HM & GLASS DOOR AND FRAME. PROVIDE AUTOMATIC DOOR OPENER WITH ACTUATOR AND ELECTRO-MAGNETIC DOOR HOLDER. COORDINATE WITH ELECTRICAL & FIRE ALARM DRAWINGS.
- 28 PATCH AND PAINT EXISTING GMB WALL TO MATCH EXISTING.
- 29 EXISTING TILE FLOORING TO REMAIN AND BE PROTECTED. REPLACE ANY DAMAGED FLOORING AS REQUIRED.
- 30 NEW PUSH BUTTON FOR AUTOMATIC DOOR OPENING SYSTEM. SEE ELEVATIONS FOR LOCATION.
- 31 RELOCATED WALL MOUNTED THERMOSTAT. COORDINATE WITH MECHANICAL DRAWINGS.
- 32 NEW FLOOR INSERT CARPET. SEE DRAWING A-801 FOR SIZE & FINISH. SEE DRAWING A-107 FOR DETAIL.
- 33 NEW FLOOR INSERT WALK OFF MAT. SEE DRAWING A-801 FOR SIZE AND FINISH. SEE DRAWING A-107 FOR DETAIL.
- 34 NEW PENETRATION IN EXTERIOR WALL WITH SLEEVES FOR HVAC PIPING AND ELECTRICAL CONDUITS. SEE DRAWING 15/A-109 FOR DETAIL. COORDINATE WITH MECHANICAL AND ELECTRICAL DRAWINGS.
- 35 NEW HVAC UNIT. CORE DRILL FLOOR SLAB FOR NEW PIPING. COORDINATE WITH MECHANICAL DRAWINGS.
- 36 EXISTING ELECTRICAL RISERS TO REMAIN. PROVIDE GMB ENCLOSURE.
- 37 NEW CMU PARTITION. SEE DRAWING A-100 FOR PARTITION TYPE.
- 38 EXISTING ENTIRE FENCE TO BE SHOP PAINTED WITH PPG PAINT COLOR : FLAGSTONE, NO. 518-4.
- 39 TERRAZZO ON EXISTING STAIR LANDINGS TO REMAIN AND BE PROTECTED (TYP.).
- 40 NEW WALL MOUNTED THERMOSTAT. COORDINATE WITH MECHANICAL DRAWINGS.

GENERAL CONSTRUCTION NOTES:

1. ALL EXISTING FINISHES TO REMAIN TO BE PROTECTED AS REQUIRED.
2. ALL EXISTING FURNITURE TO REMAIN TO BE PROTECTED (TYP).
3. ALL EXISTING FURNITURE TO REMAIN TO BE PROTECTED (TYP).
4. SEAL CONCRETE SLAB PRIOR TO NEW FLOOR FINISH INSTALLATION.
5. FINISH FLOOR AS NEEDED FOR PROPER LEVEL. NEW FLOOR FINISH INSTALLATION.
6. PATCH FLOOR SLAB AT AREA OF PIPE REMOVAL.
7. PROVIDE 14 GA SHEET METAL STRAPPING AS BLOCKING BETWEEN GMB AND METAL STUDS AS REQUIRED FOR INSTALLATION OF PLUMBING FIXTURES, WALL MOUNTED LIGHT FIXTURES AND ACCESSORIES. GO TO COORDINATE DIMENSIONS AND LOCATIONS OF ALL BLOCKING WITH PLUMBING FIXTURES, LIGHT FIXTURES AND ACCESSORIES. SEE DRAWING A-100 FOR DETAIL.



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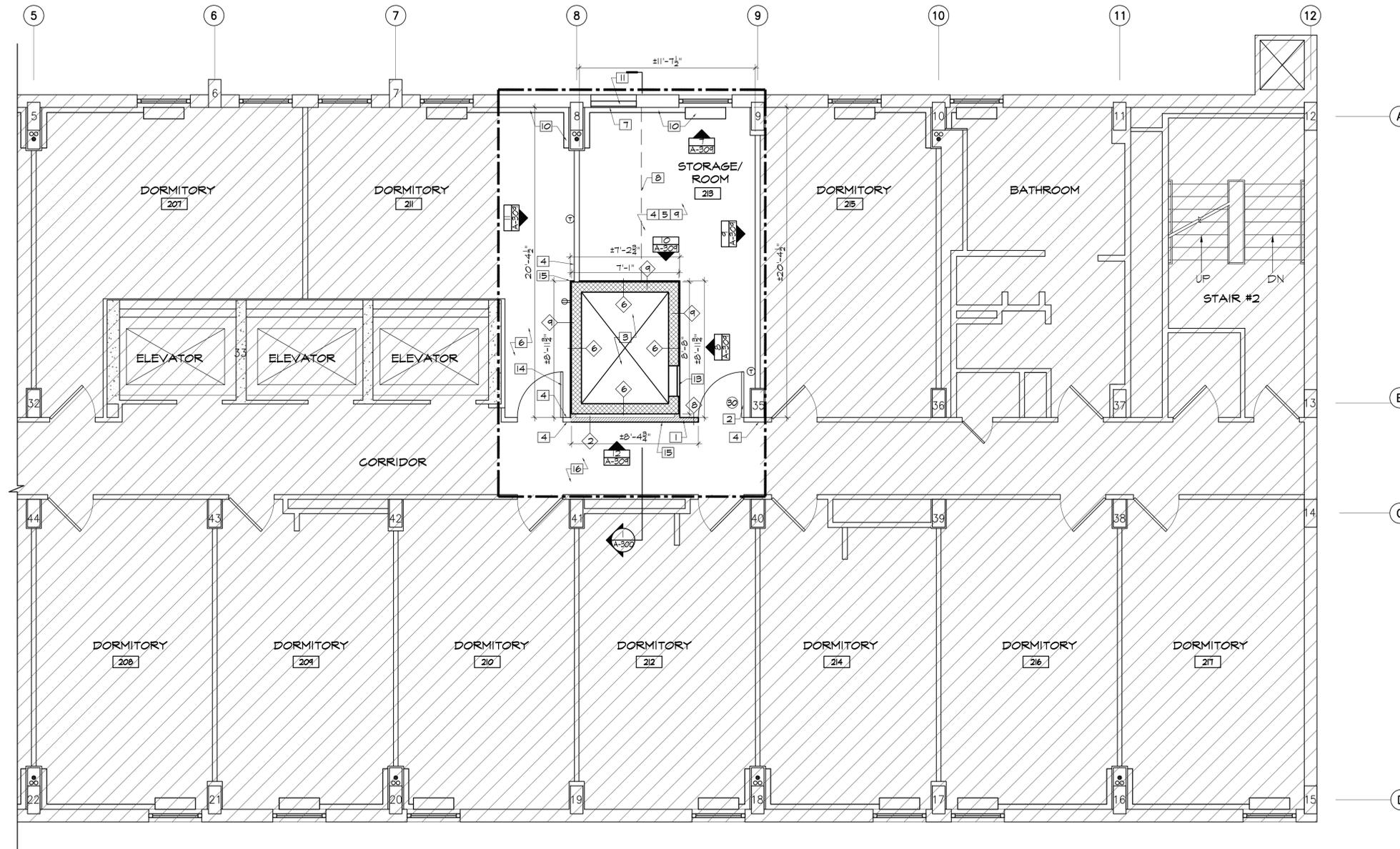
PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
**1ST FLOOR
 CONSTRUCTION PLAN**

SEAL & SIGNATURE: _____ DATE: 09.01.2022
 PROJECT No: 13284.154
 DRAWING BY: GD & TM
 CHK BY: DH & CK
 DWG No: _____

A-101.00

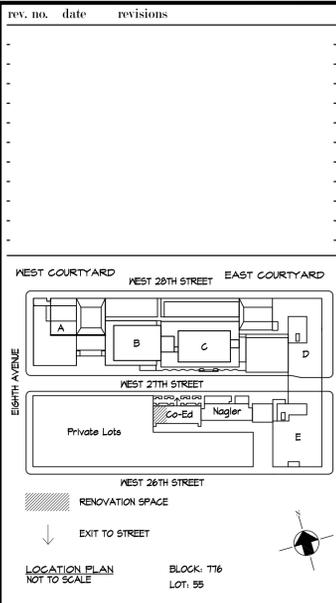
SCALE: AS NOTED 19 of 61



1 2ND FLOOR CONSTRUCTION PLAN
A-02 SCALE: 1/4" = 1'-0"

- CONSTRUCTION NOTES**
- 1 NEW G/W WALL. SEE DRAWING I/A-100 FOR PARTITION TYPE.
 - 2 NEW HM DOOR. REFER TO DRAWING A/101 FOR SCHEDULE AND DETAILS.
 - 3 NEW ELEVATOR AND ELEVATOR SHAFT. REFER TO STRUCTURAL & ELEVATOR DRAWINGS FOR DETAILS.
 - 4 PATCH AND PAINT EXISTING WALL TO MATCH EXISTING.
 - 5 NEW VGT FLOOR AND VINYL BASE TO MATCH EXISTING.
 - 6 PATCH FLOOR AND REPLACE ANY DAMAGED VGT TILE TO MATCH EXISTING.
 - 7 PATCH AND PAINT EXTERIOR WALL AFTER MECHANICAL WORK IS COMPLETED.
 - 8 NEW DUCT AND SOFFIT ABOVE.
 - 9 PAINT ROOM THROUGHOUT.
 - 10 EXISTING HVAC UNIT AND PIPING WITH ENCLOSURE TO REMAIN AND BE PROTECTED.
 - 11 NEW EXTERIOR LOUVER ABOVE. SEE DRAWING A-104 FOR DETAILS. COORDINATE WITH MECHANICAL DRAWINGS.
 - 12 NOT USED
 - 13 2 HOUR FIRE RATED ACCESS PANEL. COORDINATE SIZE WITH ELEVATOR DRAWINGS.
 - 14 REINSTALL EXISTING HM DOOR AND FRAME.
 - 15 INSTALL NEW VINYL BASE TO MATCH EXISTING.
 - 16 REPLACE ANY DAMAGED CARPET. NEW CARPET TO MATCH EXISTING.

- GENERAL NOTES:**
1. ALL EXISTING FINISHES TO REMAIN TO BE PROTECTED AS REQUIRED.
 2. ALL EXISTING EQUIPMENT TO REMAIN TO BE PROTECTED AS REQUIRED.
 3. ALL EXISTING FURNITURE TO REMAIN TO BE PROTECTED (TYP).



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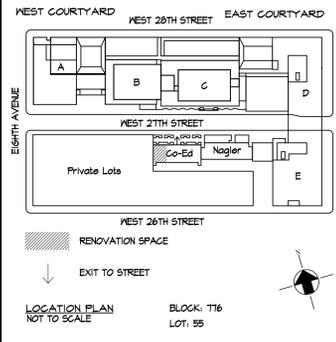
PROJECT:
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 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
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DRAWING TITLE:
 2ND FLOOR
 CONSTRUCTION PLAN

SEAL & SIGNATURE: DATE: 09.01.2022
 PROJECT No: 13284.154
 DRAWING BY: GD & TM
 CHK BY: DH & CK
 DWG No:

A-102.00

SCALE: AS NOTED 20 of 61



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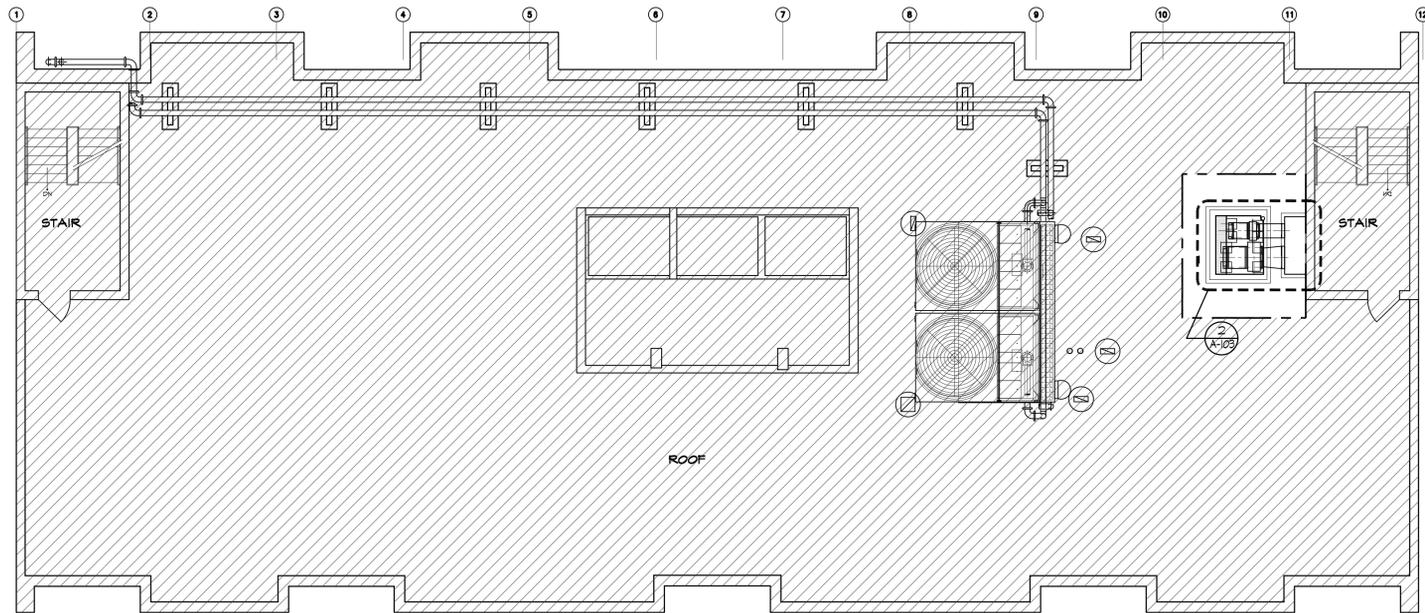
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PROJECT:
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 ADMISSIONS OFFICE RELOCATION
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DRAWING TITLE:
**ROOF
 CONSTRUCTION PLAN**

SEAL & SIGNATURE: DATE: 09.01.2022
 PROJECT No: 13284.154
 DRAWING BY: GD & TM
 CHK BY: DH & CK
 DWG No:
A-103.00
 SCALE: AS NOTED 21 of 61



ROOFING NOTES:

- EXISTING ROOF IS A Siplast SBS WATERPROOFING MEMBRANE UNDER SIPLAST WARRANTY UNTIL MARCH 1, 2046 WARRANTEE #: 54641.
- IF ANY MODIFICATION ARE TO BE MADE TO THE EXISTING ROOF, SIPLAST IS TO BE NOTIFIED IN ADVANCE AND A SIPLAST APPROVED DETAIL AND CONSTRUCTION METHOD IS TO BE UTILIZED.
- A SIPLAST CERTIFIED INSTALLER MUST BE UTILIZED TO PERFORM ANY WORK ON THIS ROOF.
- PRIOR TO ANY WORK BEING DONE CONTRACTOR TO COORDINATE WITH SIPLAST TO ENSURE EXISTING WARRANTY IS NOT VOIDED IN ANY WAY.
- AFTER WORK IS COMPLETE CONTRACTOR TO COORDINATE A SITE VISIT WITH SIPLAST AND OBTAIN UPDATED WARRANTY FOR THE WORK PERFORMED.

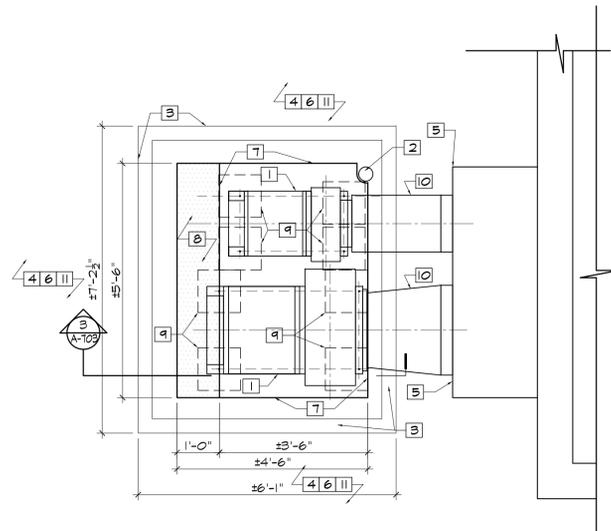
1 ROOF KEY PLAN
 A-103 SCALE: 1/8" = 1'-0"

CONSTRUCTION NOTES

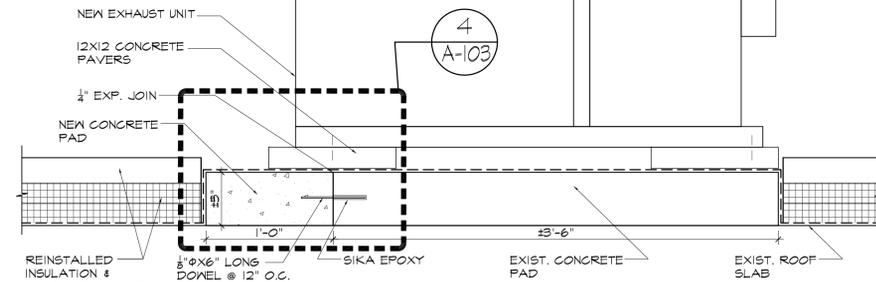
- NEW EXHAUST FANS. REFER TO MECHANICAL DRAWINGS FOR DETAILS.
- EXISTING PLUMBING VENT PIPE TO REMAIN AND BE PROTECTED DURING CONSTRUCTION.
- INSTALL BALLAST PANEL INTERIOR SECUREMENT STRAP - 3" WIDE, 22 GAUGE (MIN.) COATED STEEL SHEET, AS MANUFACTURED BY U.S. STEEL UNDER TRADE NAME GALVALUME SHEET STEEL, MEETING ASTM A792 Z55 STANDARD. STRAPS TO BE SECURED WITH 1/4" DIAMETER, 1-1/4" LONG, ALL ALUMINUM, MANUFACTURED BY SFS INTEC UNDER TRADE NAME BULB - TITLE RIVET (PART NO. 1194634) - SPACED @ 12" O.C. MAX. - POSITION AT LEAST 3" FROM PANEL JOINT.
- REINSTALL EXISTING ROOF PAVERS AFTER THE MECHANICAL WORK IS COMPLETED. TRIM EXISTING PAVERS AS REQUIRED.
- EXISTING MASONRY ENCLOSURE TO REMAIN AND BE PROTECTED. ANY DAMAGED WATERPROOFING TO BE PATCH TO MATCH EXISTING.
- ANY DAMAGED WATERPROOF MEMBRANE ON THE ROOF OR MASONRY ENCLOSURE TO BE REPAIRED AS REQUIRED. NEW ROOFING MEMBRANE TO MATCH EXISTING.
- EXISTING CONCRETE PAD. PROVIDE NEW WATERPROOF ROOFING MEMBRANE ON ALL EXPOSED SURFACE. NEW ROOFING MEMBRANE TO MATCH EXISTING. SEE ROOFING NOTES.
- NEW CONCRETE PAD EXTENSION. INSTALL NEW WATERPROOFING MEMBRANE TO MATCH EXISTING.
- INSTALL NEW CONCRETE PAVERS (12'X12") UNDER THE EQUIPMENT CONNECTION POINTS. UNITS TO BE BOLTED TO THE PAVERS TO MATCH EXISTING INSTALLATION. PROVIDE DRAIN MAT BELOW PAVERS. COORDINATE WITH MECHANICAL DRAWINGS.
- NEW DUCT CONNECTED TO EXISTING DUCT. SEE MECHANICAL DRAWINGS FOR DETAILS. ANY DAMAGED WATERPROOFING A BASE OF THE EXISTING DUCT TO BE REPLACED TO MATCH EXISTING.
- PROVIDE NEW WATERPROOF ROOFING MEMBRANE ON ALL EXPOSED SURFACE OF THE EXISTING ROOF CONCRETE DECKING. NEW ROOFING MEMBRANE TO MATCH EXISTING. SEE ROOFING NOTES.

GENERAL NOTES:

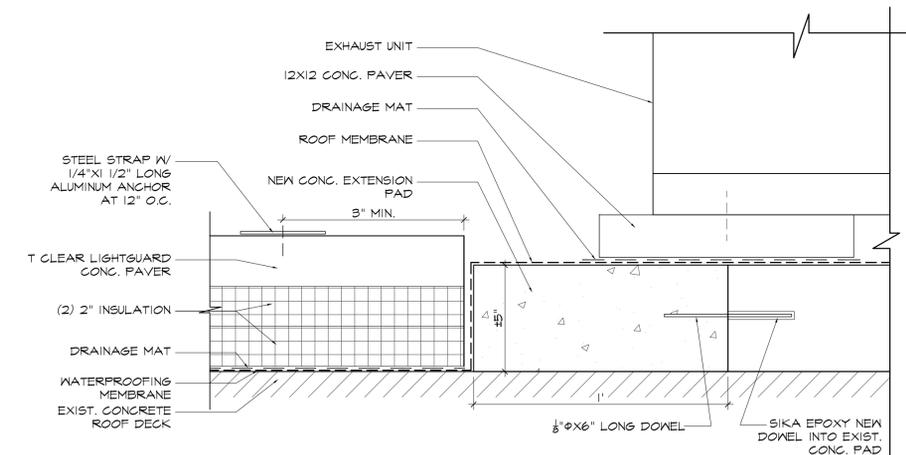
- CONTRACTOR TO PROVIDE PROTECTION TO EXISTING ROOF PAVERS, ROOF MEMBRANE AND EQUIPMENT.
- PROTECT ALL ADJACENT AREAS AND PATHWAYS OF TRAVEL TO AND FROM AREAS OF WORK.
- FOR ANY CORE DRILLS OR OPENING IN THE EXISTING SLABS, GC TO SCAN THE AREA TO VERIFY IF THERE ARE ANY EXISTING CONDUITS OR PIPING RECESSED IN THE SLAB.



2 ROOF EQUIPMENT DETAIL PLAN
 A-103 SCALE: 1/2" = 1'-0"



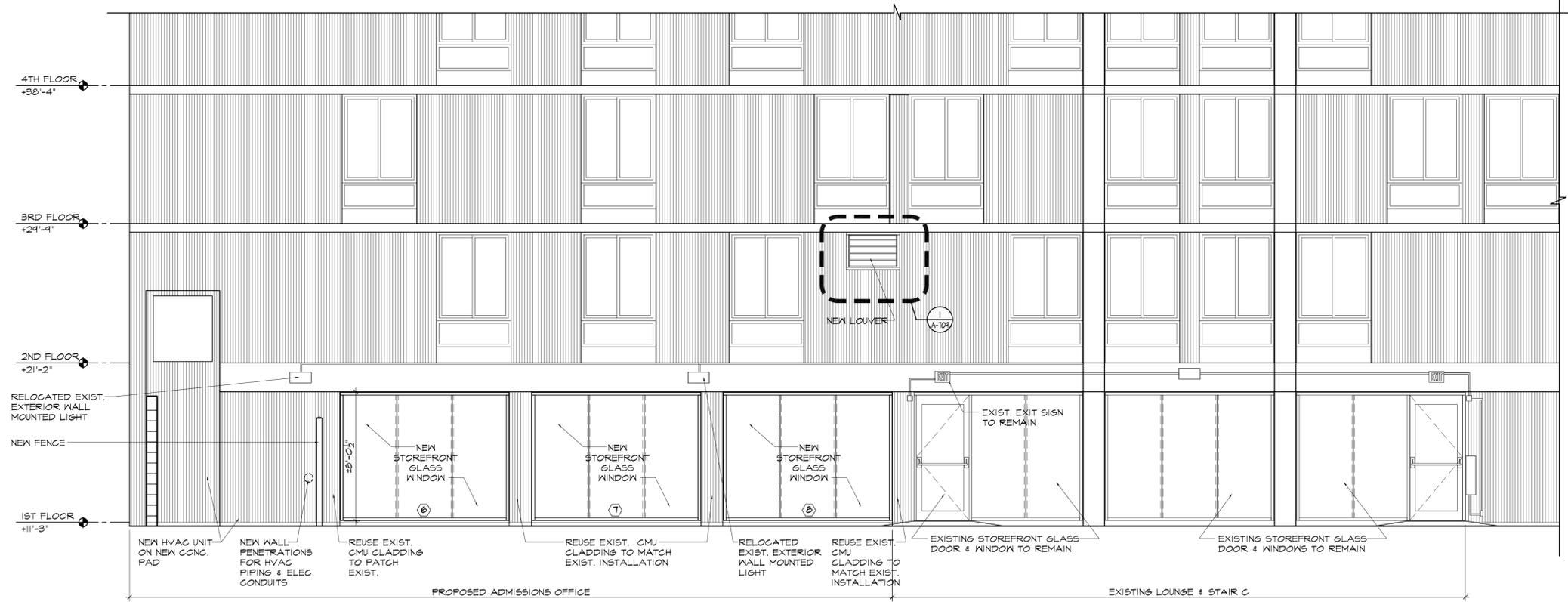
3 SECTION
 A-103 SCALE: 1 1/2" = 1'-0"



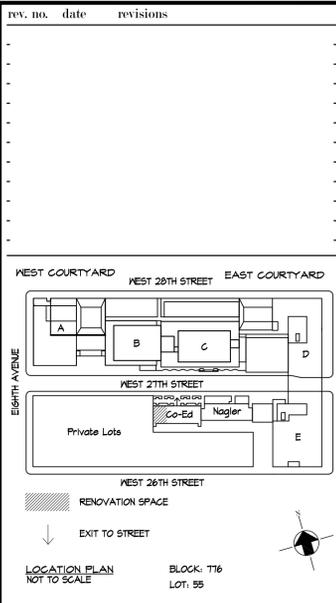
4 DETAIL-SECTION
 A-103 SCALE: 3" = 1'-0"



1 FRONT ELEVATION
A-202
SCALE: 1/4" = 1'-0"



2 REAR ELEVATION
A-202
SCALE: 1/4" = 1'-0"



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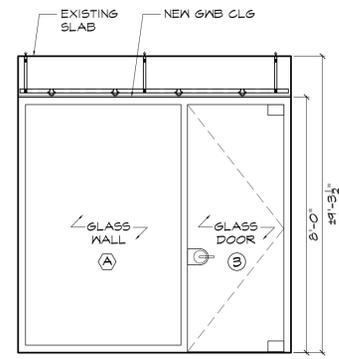
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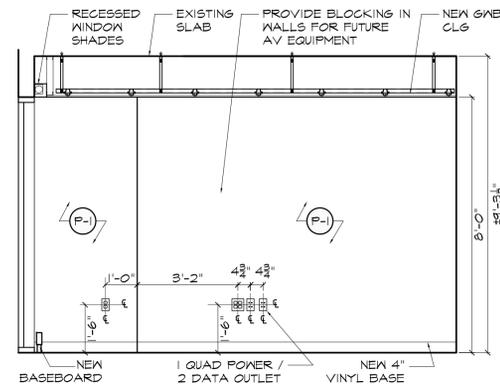
PROJECT:
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DRAWING TITLE:
**PARTIAL
 ELEVATIONS**

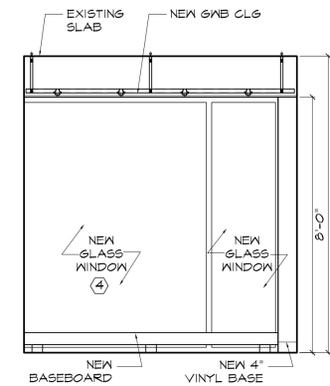
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	DWG No:
	A-202.00
	SCALE: AS NOTED 24 of 61



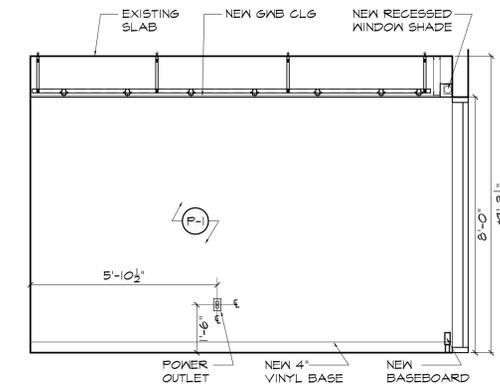
1 1ST FLOOR STUDENT COUNSELING ELEVATION
SCALE: 3/8" = 1'-0"



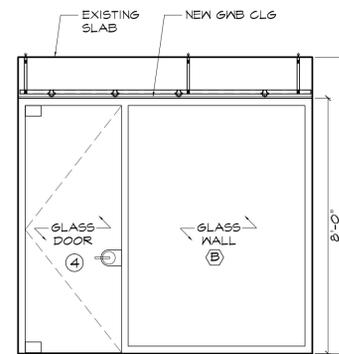
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SCALE: 3/8" = 1'-0"



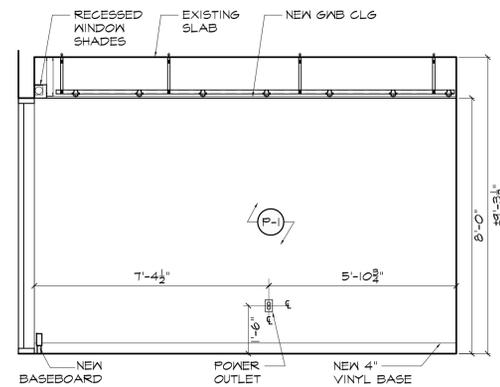
3 1ST FLOOR STUDENT COUNSELING ELEVATION
SCALE: 3/8" = 1'-0"



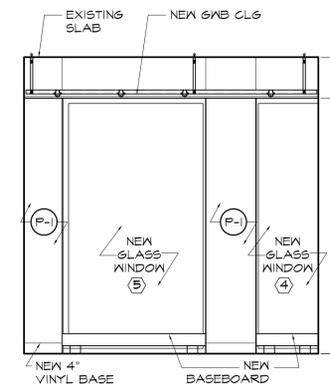
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SCALE: 3/8" = 1'-0"



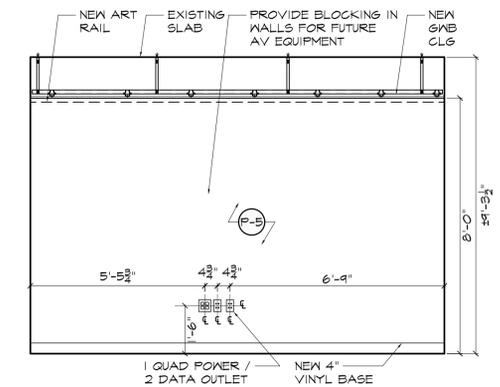
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SCALE: 3/8" = 1'-0"



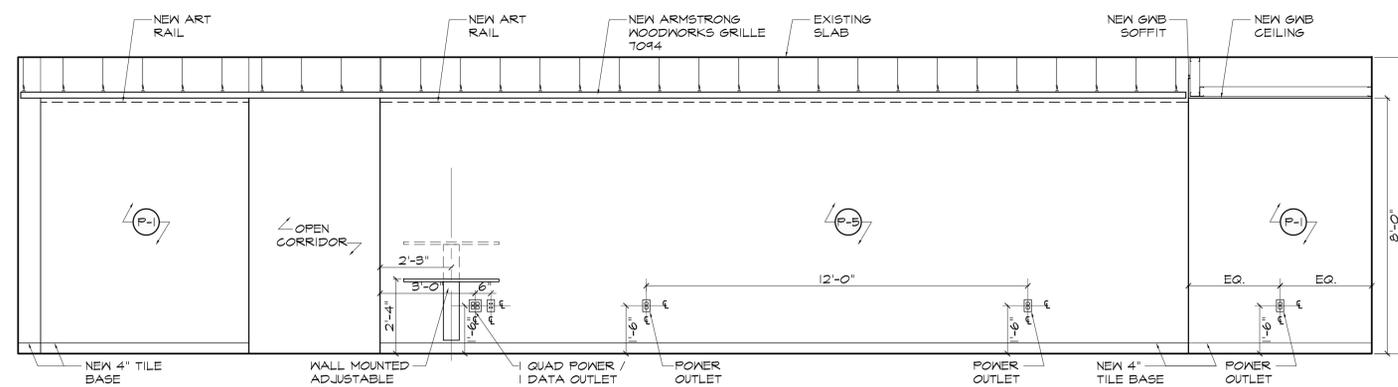
6 1ST FLOOR STUDENT COUNSELING ELEVATION
SCALE: 3/8" = 1'-0"



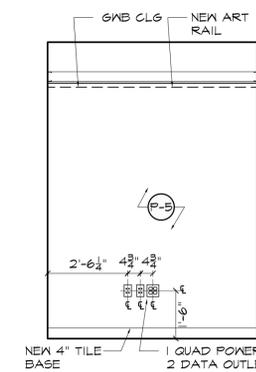
7 1ST FLOOR STUDENT COUNSELING ELEVATION
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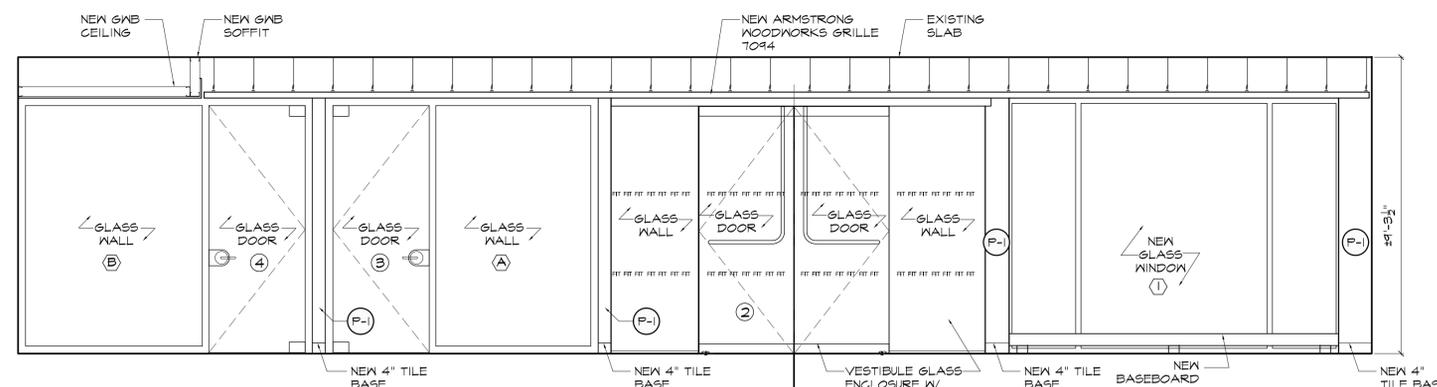
8 1ST FLOOR STUDENT COUNSELING ELEVATION
SCALE: 3/8" = 1'-0"



9 1ST FLOOR CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



10 1ST FLOOR MEETING ROOM ELEVATION
SCALE: 3/8" = 1'-0"



11 1ST FLOOR CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"

rev. no. date revisions

WEST COURTYARD WEST 28TH STREET EAST COURTYARD

Private Lots

WEST 27TH STREET

WEST 26TH STREET

RENOVATION SPACE

EXIT TO STREET

LOCATION PLAN NOT TO SCALE

BLOCK: T16 LOT: 55

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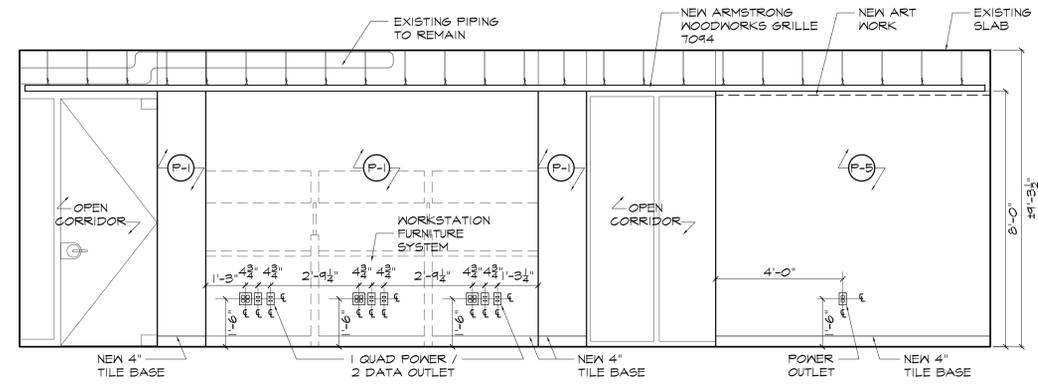
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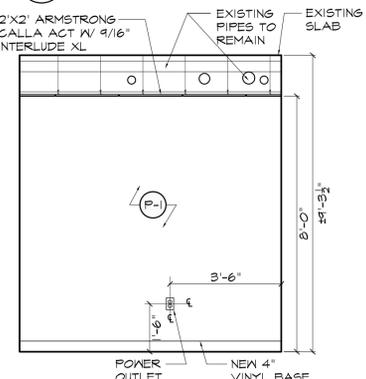
PROJECT:
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DRAWING TITLE:
**FIRST FLOOR
 INTERIOR ELEVATIONS**

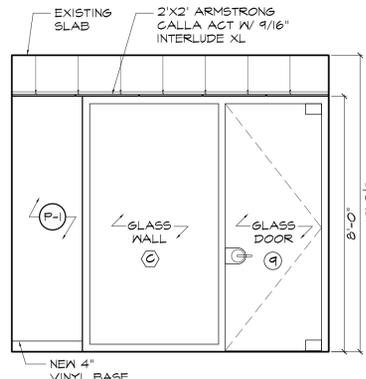
SEAL & SIGNATURE: _____ DATE: 09.01.2022
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 DWG No: _____
A-301.00
 SCALE: AS NOTED 26 of 61



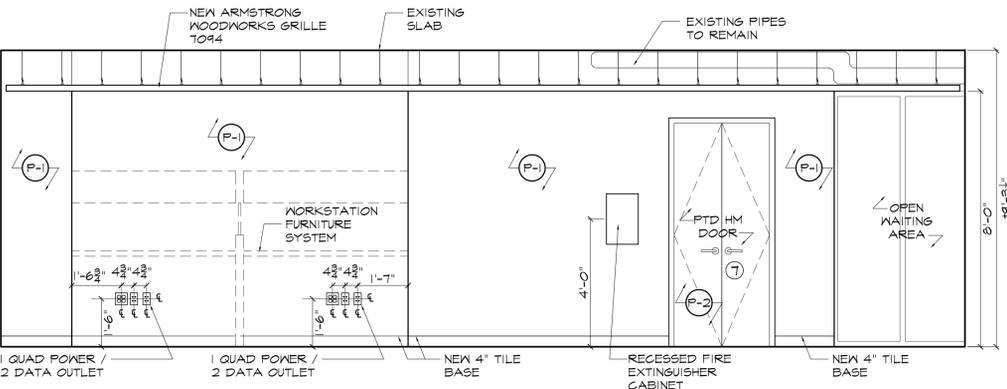
1
A-302
1ST FLOOR
CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



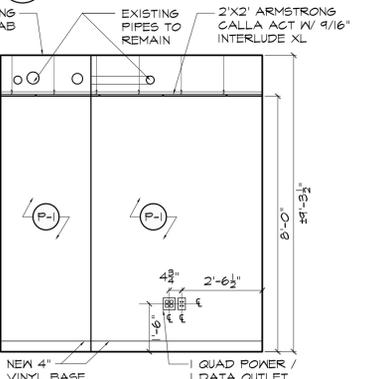
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A-302
1ST FLOOR
CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



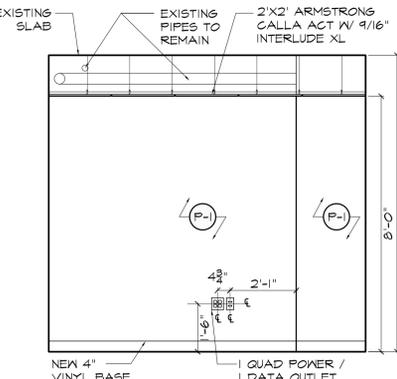
3
A-302
1ST FLOOR
OFFICE ELEVATION
SCALE: 3/8" = 1'-0"



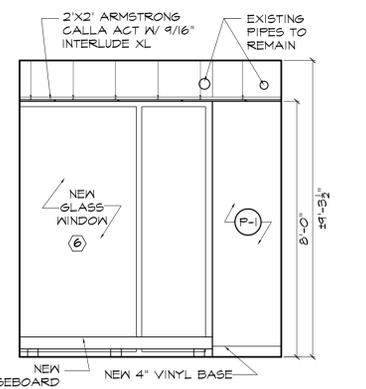
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A-302
1ST FLOOR
CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



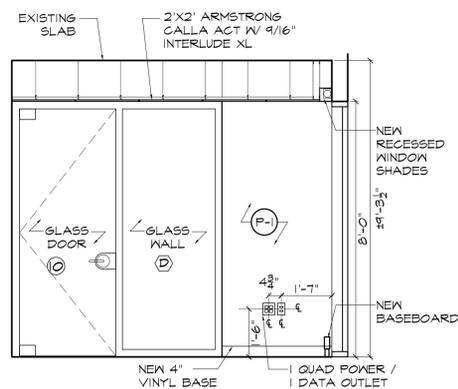
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A-302
1ST FLOOR
OFFICE ELEVATION
SCALE: 3/8" = 1'-0"



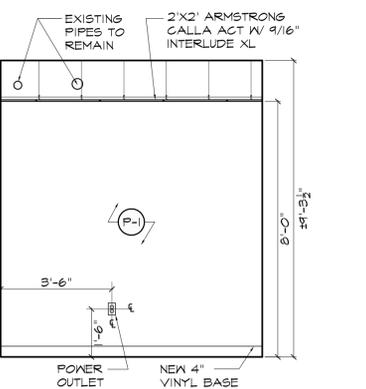
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A-302
1ST FLOOR
OFFICE ELEVATION
SCALE: 3/8" = 1'-0"



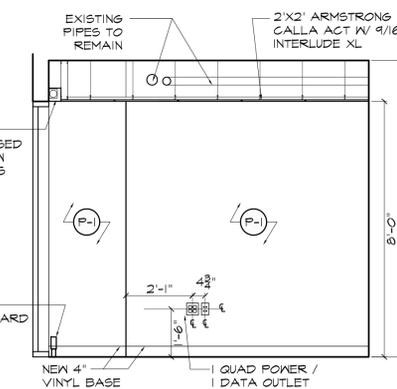
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A-302
1ST FLOOR
OFFICE ELEVATION
SCALE: 3/8" = 1'-0"



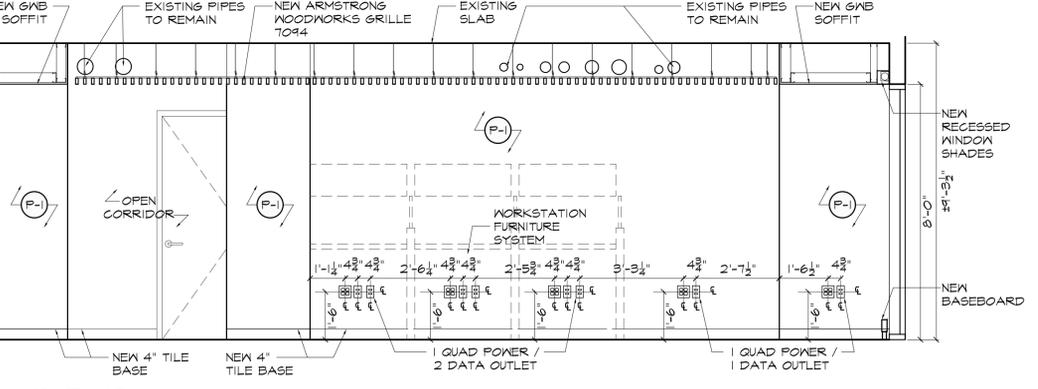
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A-302
1ST FLOOR
OFFICE ELEVATION
SCALE: 3/8" = 1'-0"



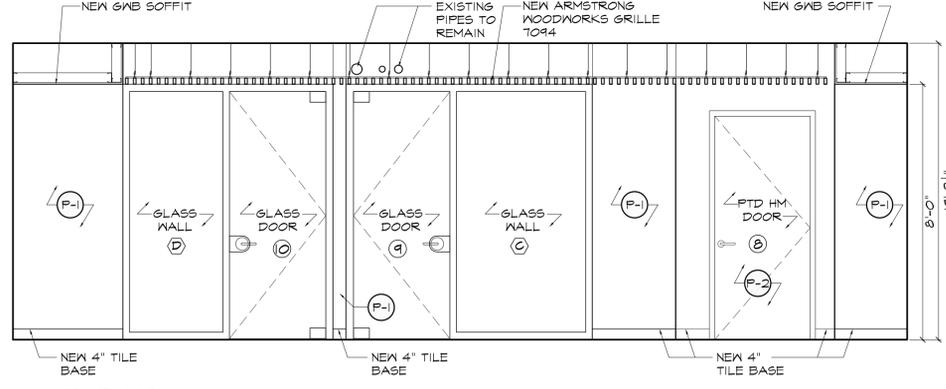
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A-302
1ST FLOOR
OFFICE ELEVATION
SCALE: 3/8" = 1'-0"



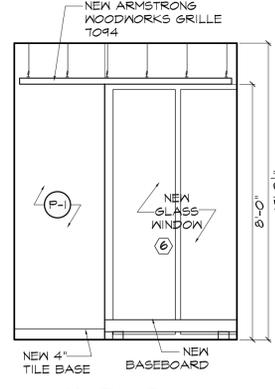
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A-302
1ST FLOOR
OFFICE ELEVATION
SCALE: 3/8" = 1'-0"



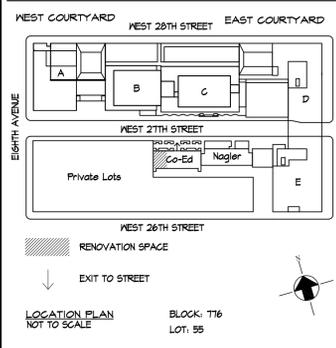
11
A-302
1ST FLOOR
CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



12
A-302
1ST FLOOR
CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



13
A-302
1ST FLOOR
CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



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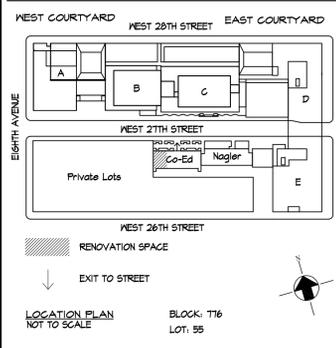
David Smotrich & Partners LLP
 Architects/Planners
 443 Park Avenue South New York, NY 10016
 212 889 4045 Fax 212 889 3672

PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
**FIRST FLOOR
 INTERIOR ELEVATIONS**

SEAL & SIGNATURE:	DATE: 09.01.2022
	PROJECT No: 13284.154
	DRAWING BY: GD & TM
	CHK BY: DH & CK
	DWG No:
	A-302.00
	SCALE: AS NOTED 27 of 61

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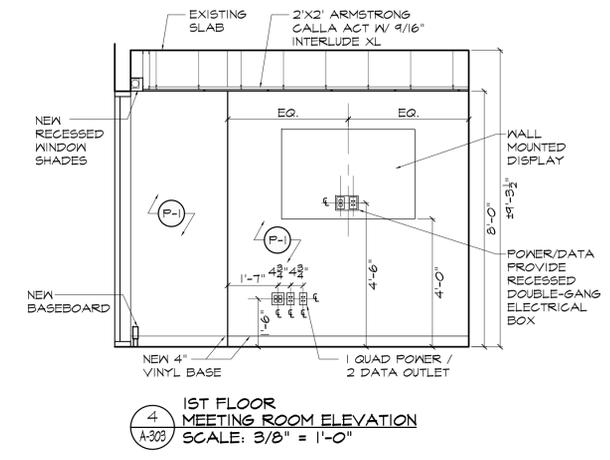
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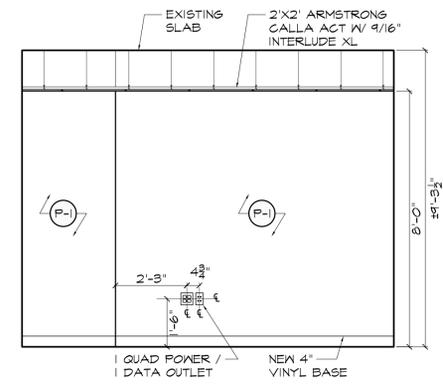
PROJECT:
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DRAWING TITLE:
 FIRST FLOOR
 INTERIOR ELEVATIONS

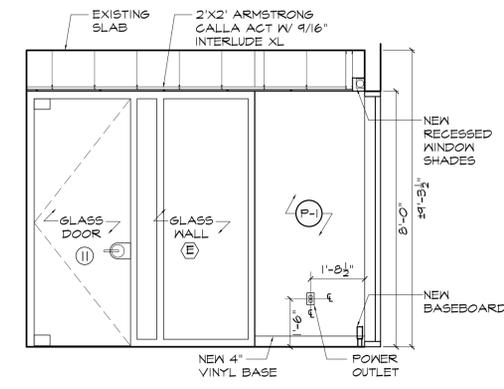
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	PROJECT No: 13284.154
	DRAWING BY: GD & TM
	CHK BY: DH & CK
DWG No:	A-303.00
	SCALE: AS NOTED 28 of 61



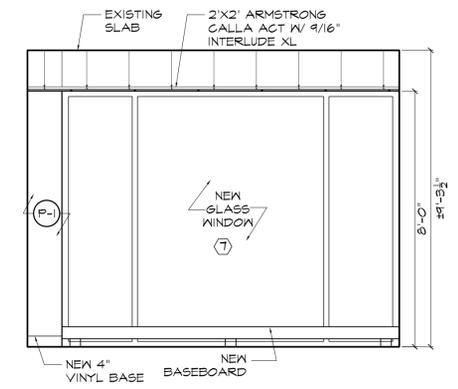
4 1ST FLOOR MEETING ROOM ELEVATION SCALE: 3/8" = 1'-0"



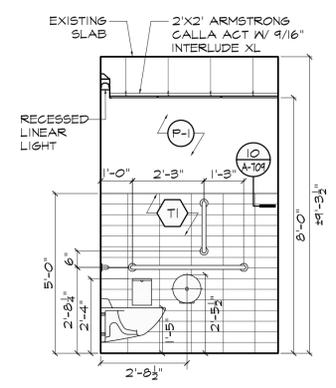
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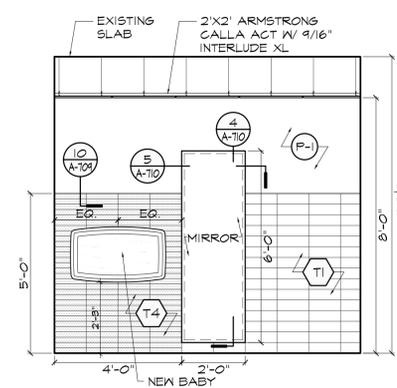
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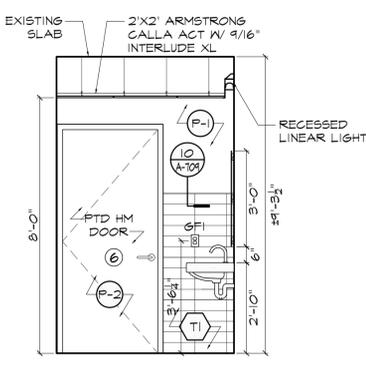
1 1ST FLOOR MEETING ROOM ELEVATION SCALE: 3/8" = 1'-0"



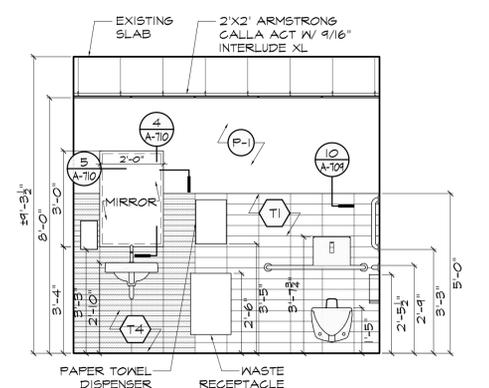
8 1ST FLOOR ADA RESTROOM ELEVATION SCALE: 3/8" = 1'-0"



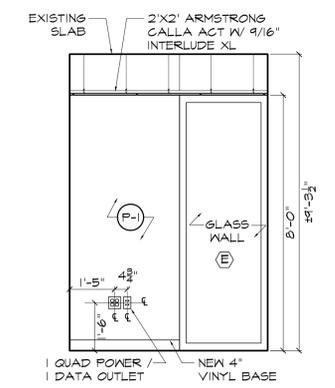
7 1ST FLOOR ADA RESTROOM ELEVATION SCALE: 3/8" = 1'-0"



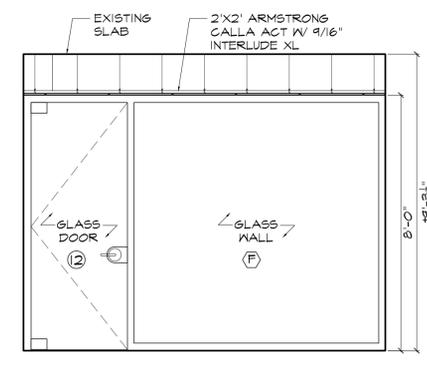
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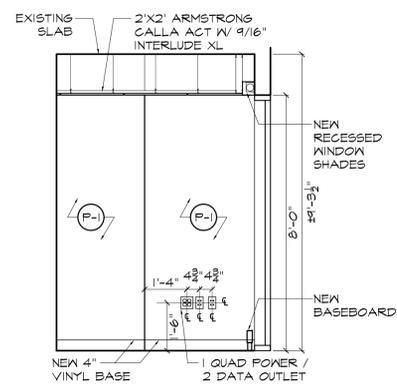
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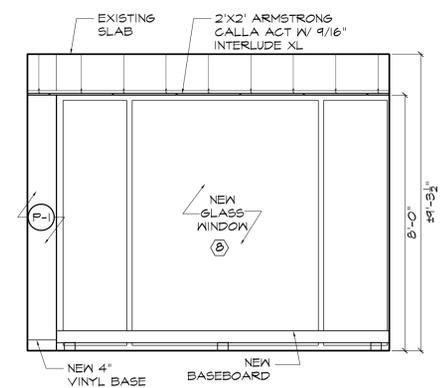
12 1ST FLOOR MEETING ROOM ELEVATION SCALE: 3/8" = 1'-0"



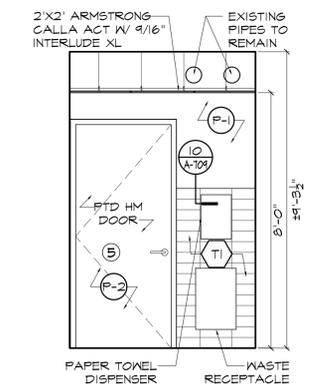
11 1ST FLOOR MEETING ROOM ELEVATION SCALE: 3/8" = 1'-0"



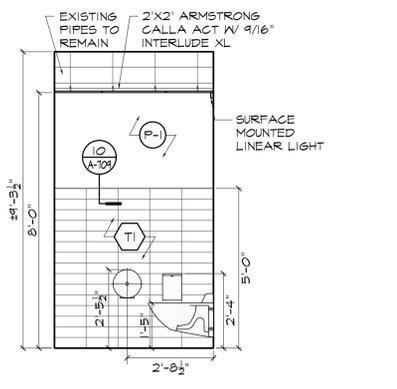
10 1ST FLOOR MEETING ROOM ELEVATION SCALE: 3/8" = 1'-0"



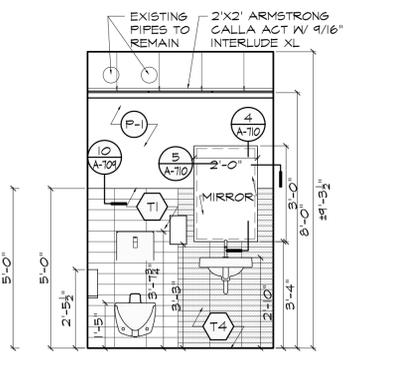
9 1ST FLOOR MEETING ROOM ELEVATION SCALE: 3/8" = 1'-0"



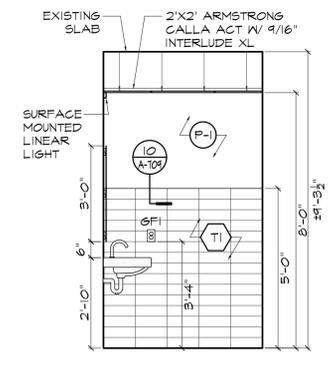
16 1ST FLOOR MEETING ROOM ELEVATION SCALE: 3/8" = 1'-0"



15 1ST FLOOR MEETING ROOM ELEVATION SCALE: 3/8" = 1'-0"

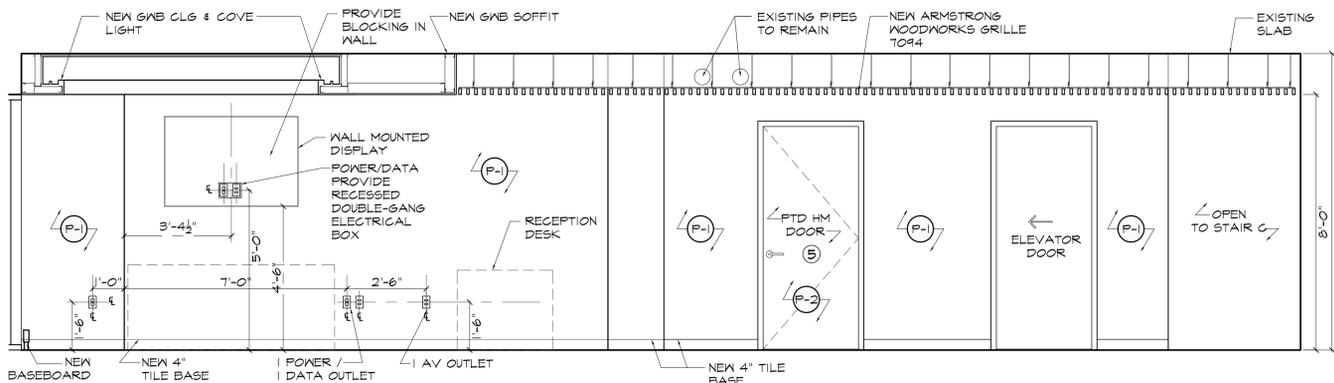


14 1ST FLOOR MEETING ROOM ELEVATION SCALE: 3/8" = 1'-0"

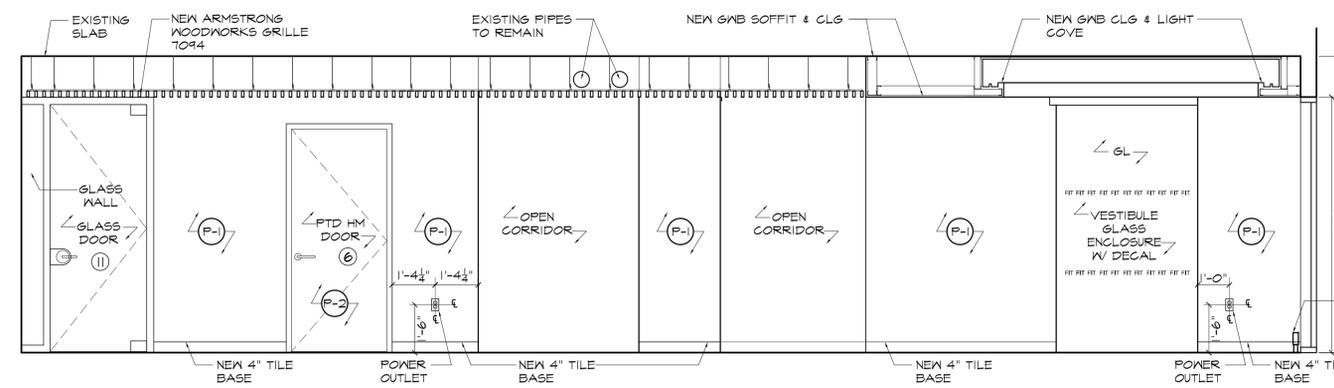


13 1ST FLOOR MEETING ROOM ELEVATION SCALE: 3/8" = 1'-0"

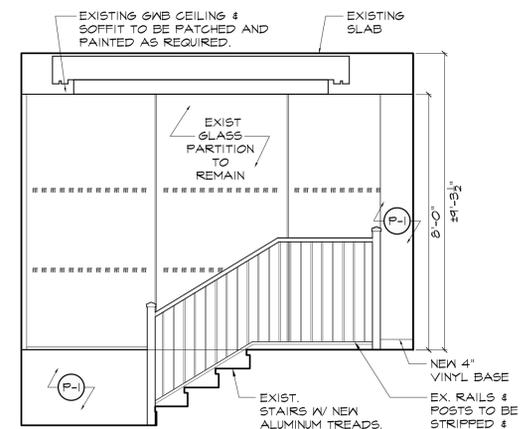
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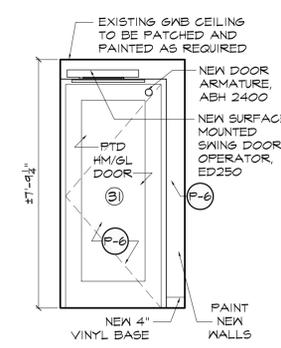
1
A-304
1ST FLOOR
CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



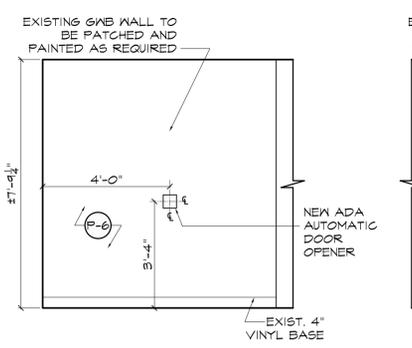
3
A-304
1ST FLOOR
CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



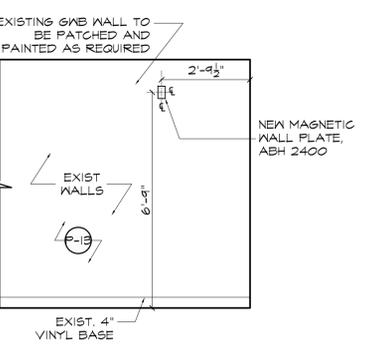
5
A-304
1ST FLOOR
STAIR C ELEVATION
SCALE: 3/8" = 1'-0"



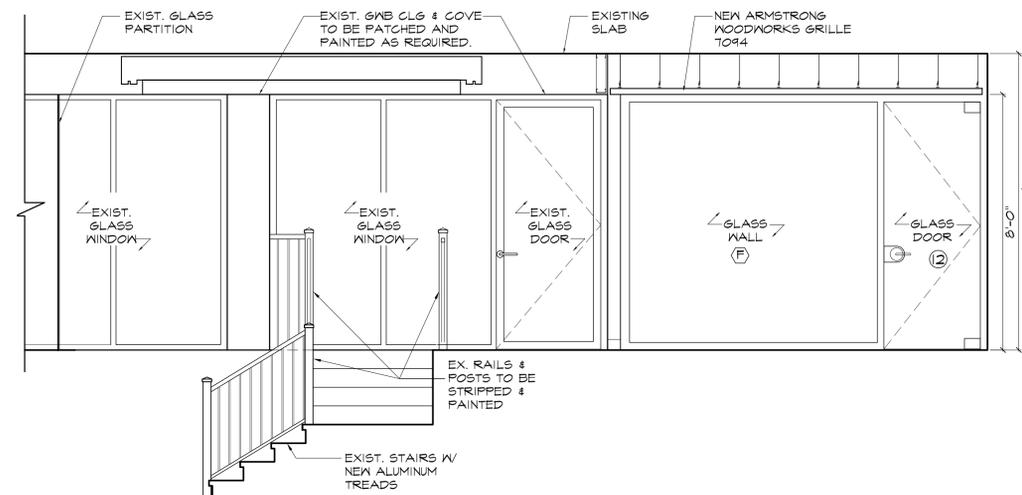
8
A-304
1ST FLOOR
COED CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



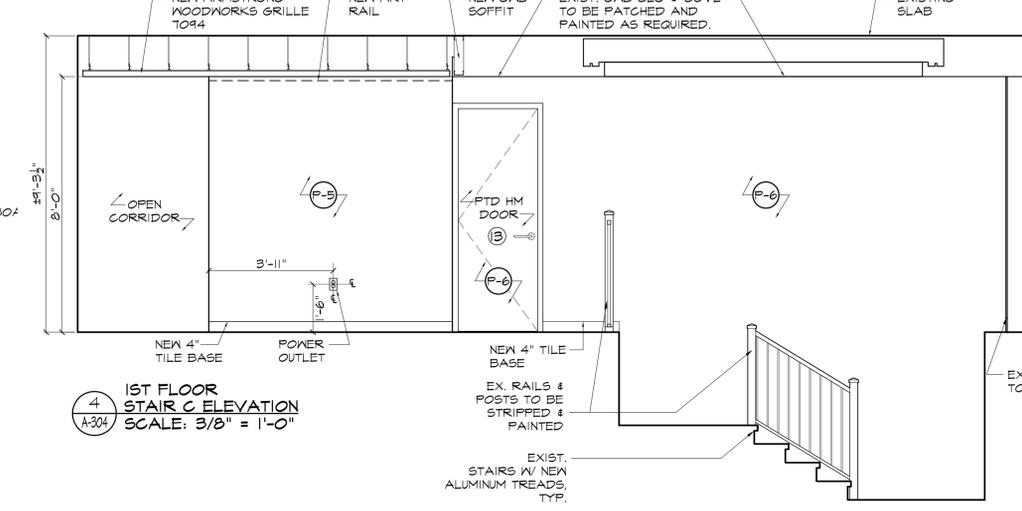
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A-304
1ST FLOOR
COED CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



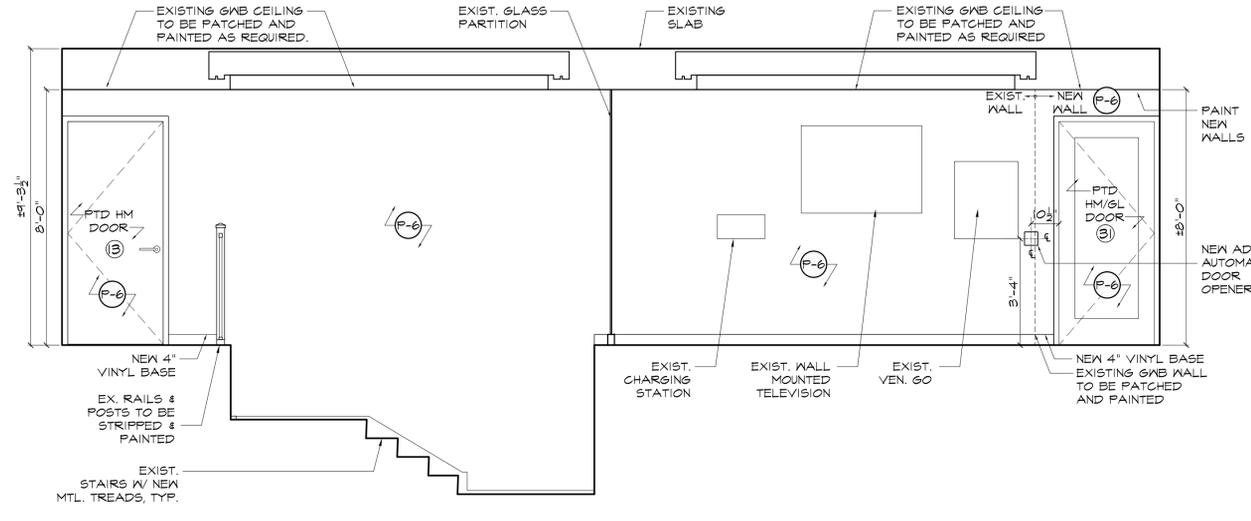
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A-304
1ST FLOOR
COED CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



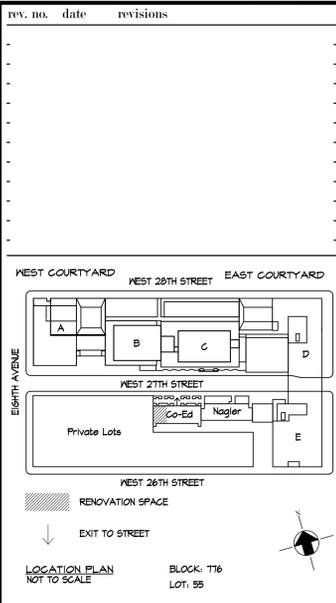
2
A-304
1ST FLOOR
STAIR C ELEVATION
SCALE: 3/8" = 1'-0"



4
A-304
1ST FLOOR
STAIR C ELEVATION
SCALE: 3/8" = 1'-0"



7
A-304
1ST FLOOR
STAIR C - LOUNGE ELEVATION
SCALE: 3/8" = 1'-0"



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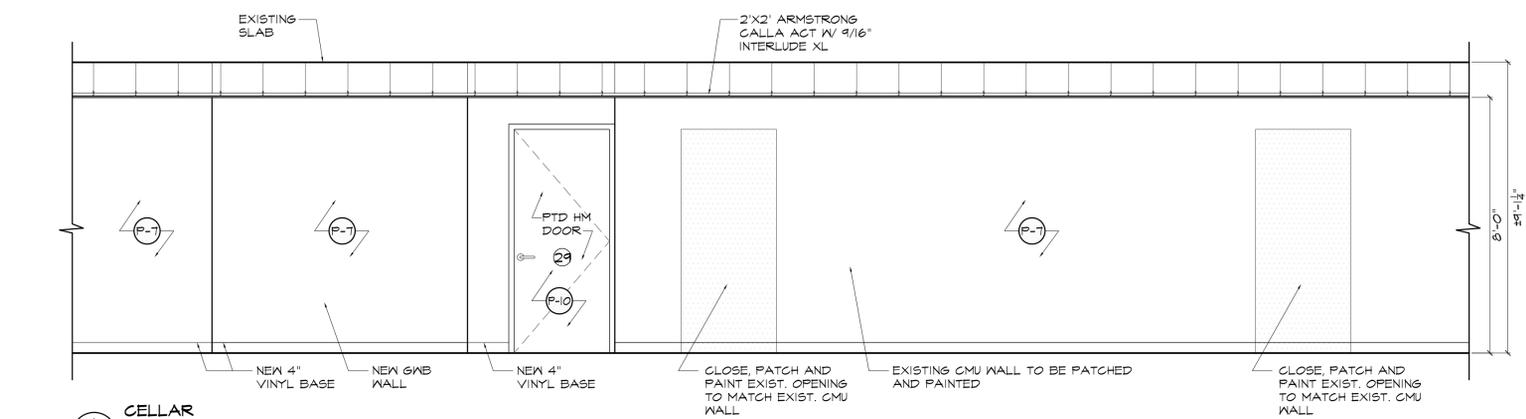
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PROJECT:
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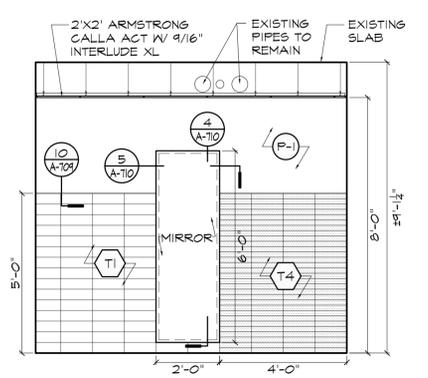
DRAWING TITLE:
**FIRST FLOOR
INTERIOR ELEVATIONS**

SEAL & SIGNATURE:	DATE: 09.01.2022
	PROJECT No: 13284.154
	DRAWING BY: GD & TM
	CHK BY: DH & CK
	DWG No:
	A-304.00
	SCALE: AS NOTED 29 of 61

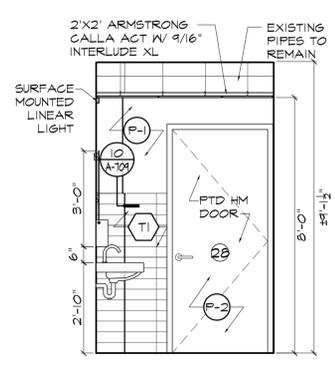
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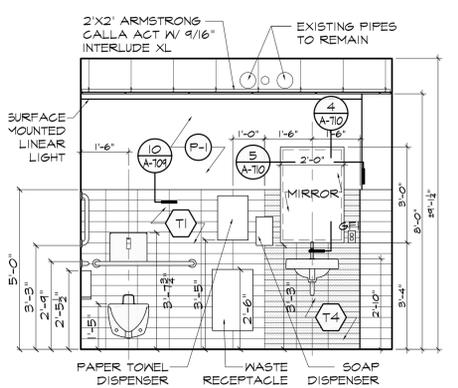
1 CELLAR CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



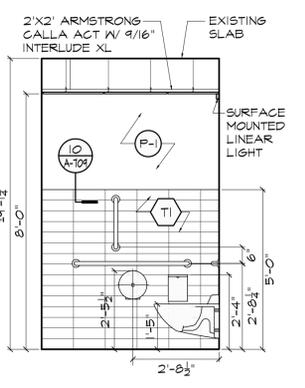
2 CELLAR ADA RESTROOM ELEVATION
SCALE: 3/8" = 1'-0"



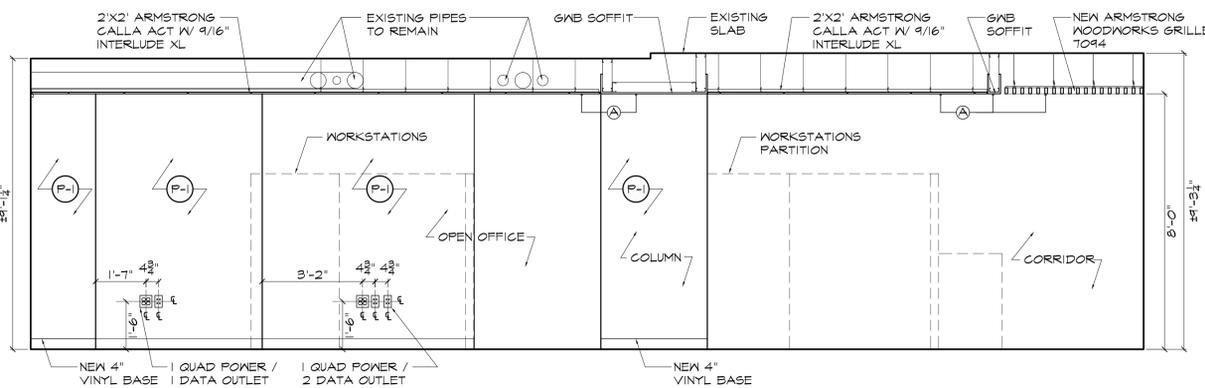
3 CELLAR ADA RESTROOM ELEVATION
SCALE: 3/8" = 1'-0"



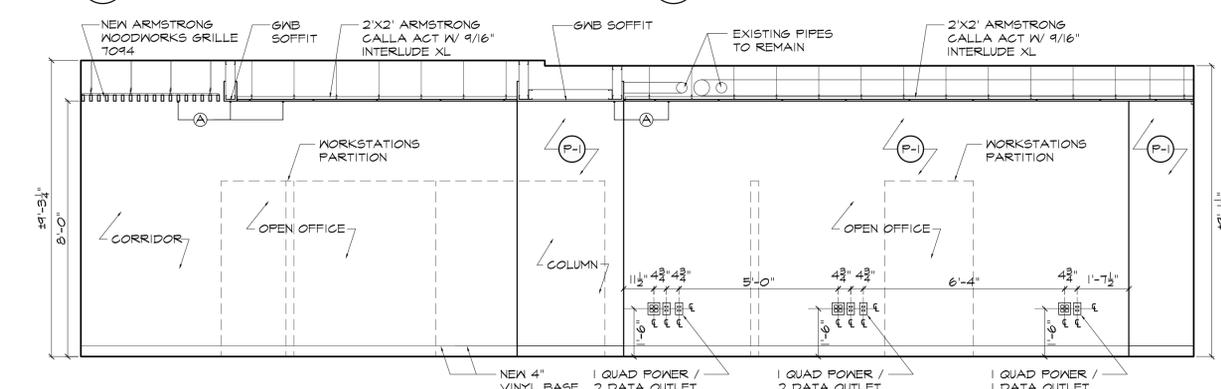
4 CELLAR ADA RESTROOM ELEVATION
SCALE: 3/8" = 1'-0"



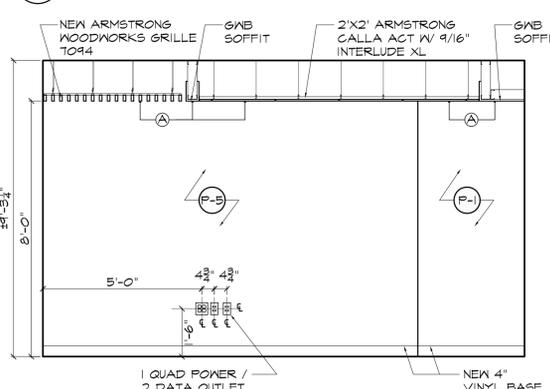
5 CELLAR ADA RESTROOM ELEVATION
SCALE: 3/8" = 1'-0"



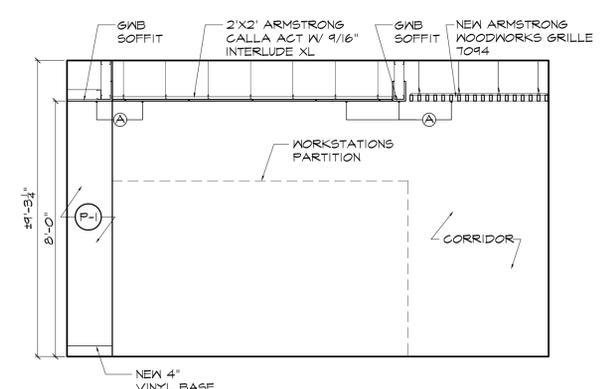
6 CELLAR WORKSTATION ELEVATION
SCALE: 3/8" = 1'-0"



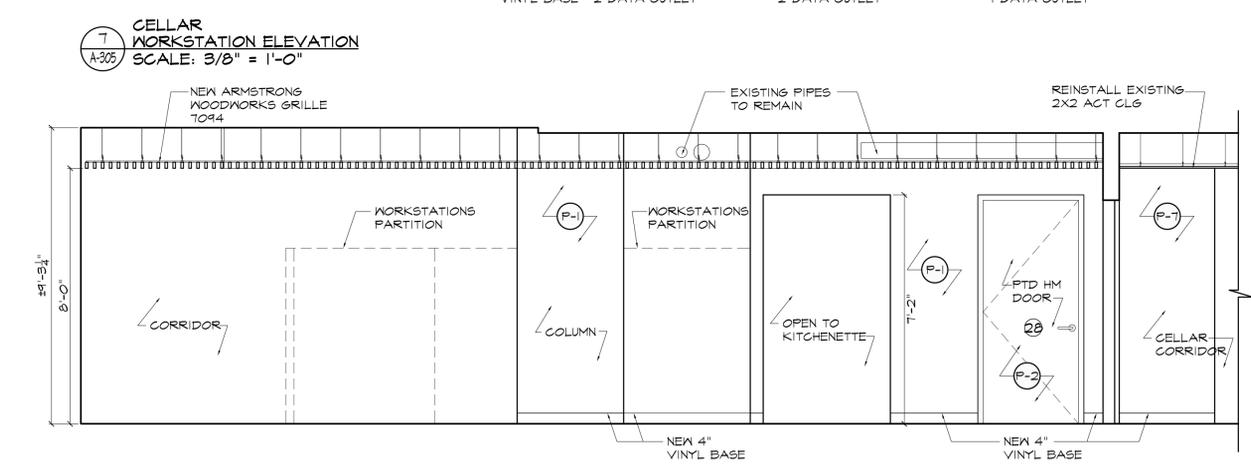
7 CELLAR WORKSTATION ELEVATION
SCALE: 3/8" = 1'-0"



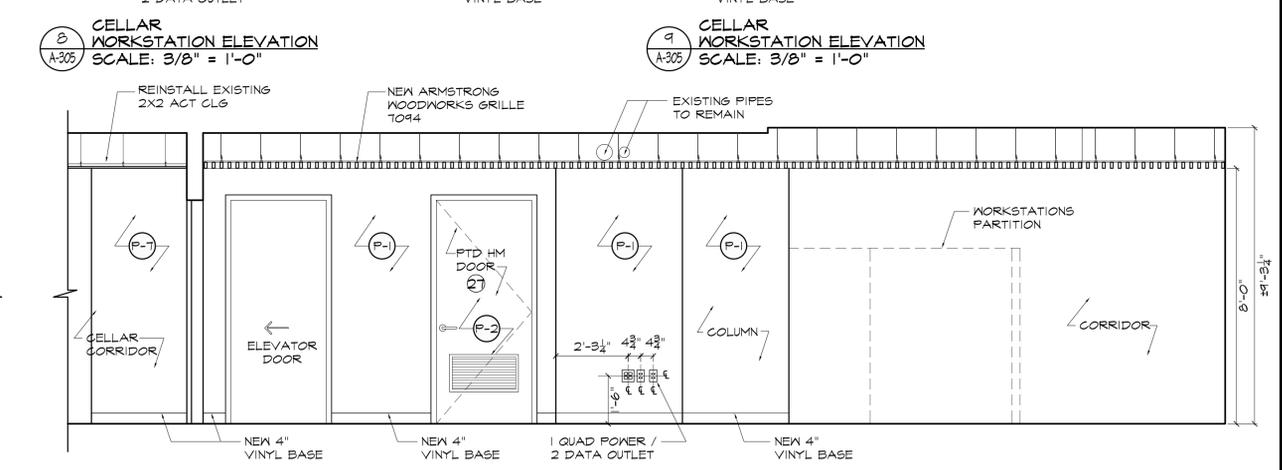
8 CELLAR WORKSTATION ELEVATION
SCALE: 3/8" = 1'-0"



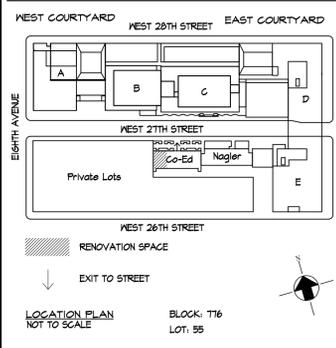
9 CELLAR WORKSTATION ELEVATION
SCALE: 3/8" = 1'-0"



10 CELLAR WORKSTATION ELEVATION
SCALE: 3/8" = 1'-0"



11 CELLAR WORKSTATION ELEVATION
SCALE: 3/8" = 1'-0"



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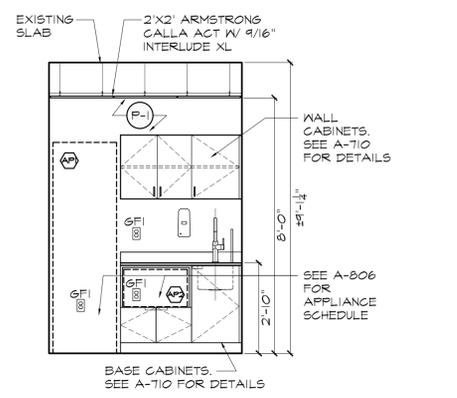
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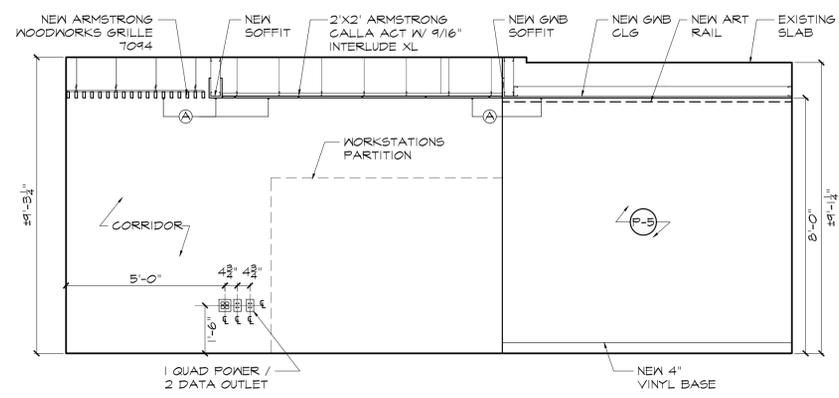
PROJECT:
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DRAWING TITLE:
**CELLAR
 INTERIOR ELEVATIONS**

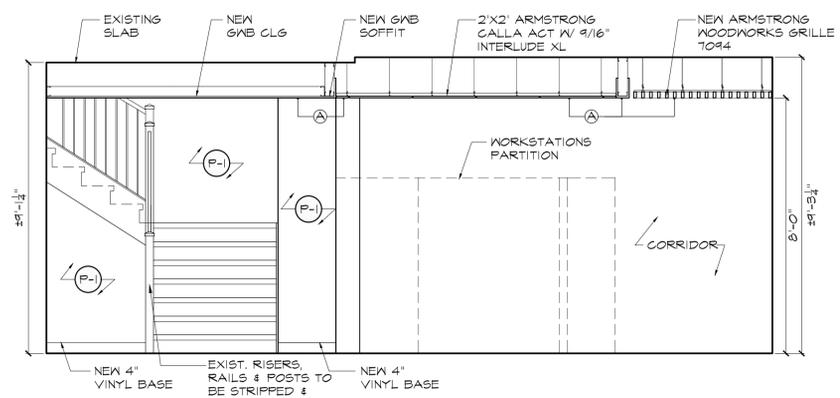
SEAL & SIGNATURE: _____ DATE: 09.01.2022
 PROJECT No: 13284.154
 DRAWING BY: GD & TM
 CHK BY: DH & CK
 DWG No: _____
A-305.00
 SCALE: AS NOTED 30 of 61



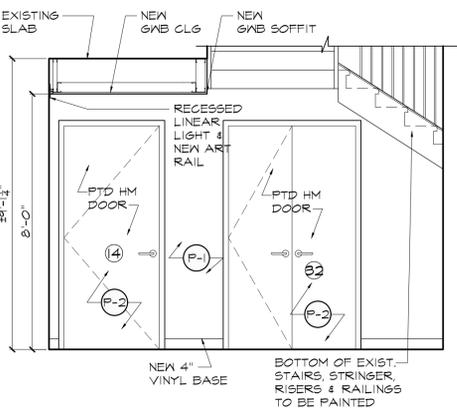
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SCALE: 3/8" = 1'-0"



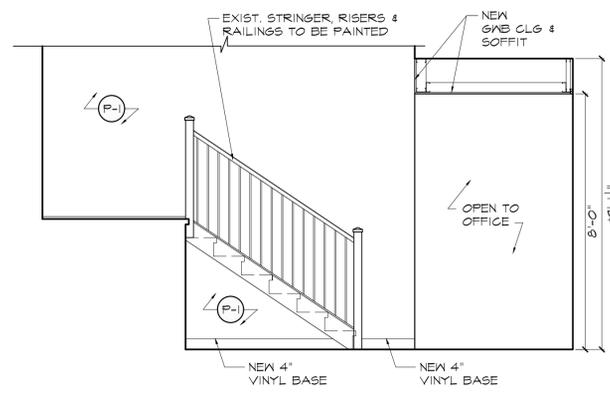
2 CELLAR CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



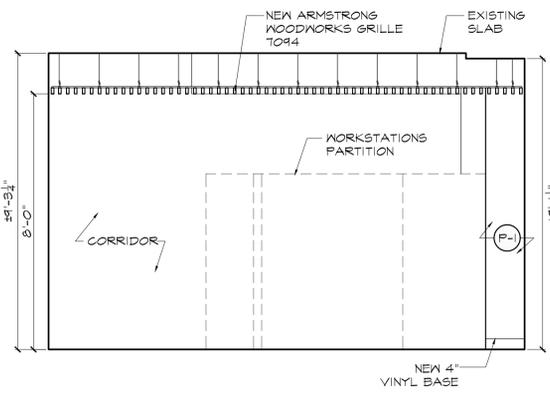
3 CELLAR CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



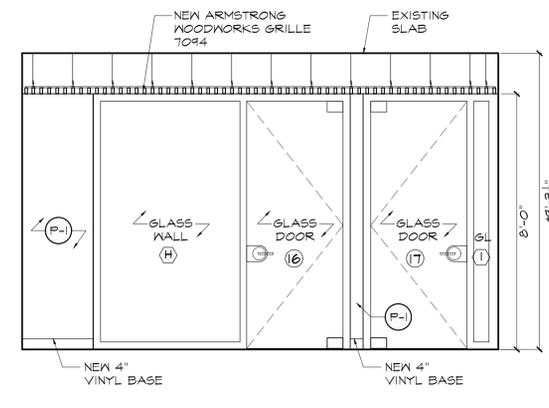
4 CELLAR STAIR C ELEVATION
SCALE: 3/8" = 1'-0"



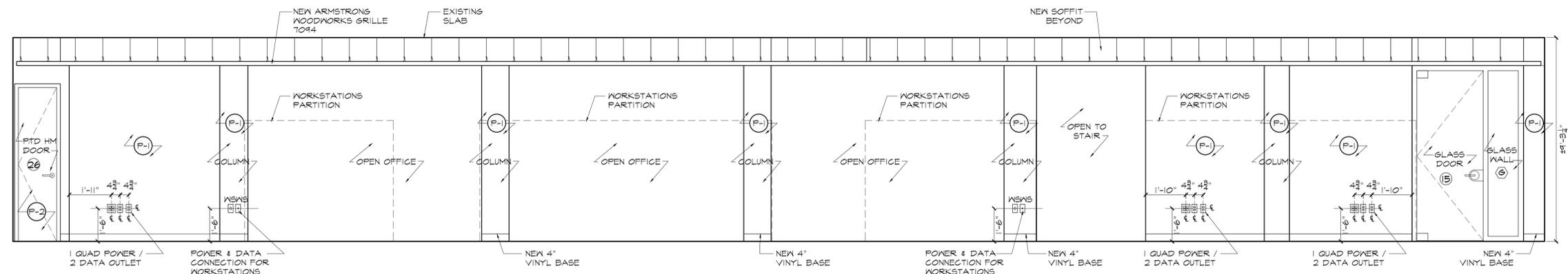
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SCALE: 3/8" = 1'-0"



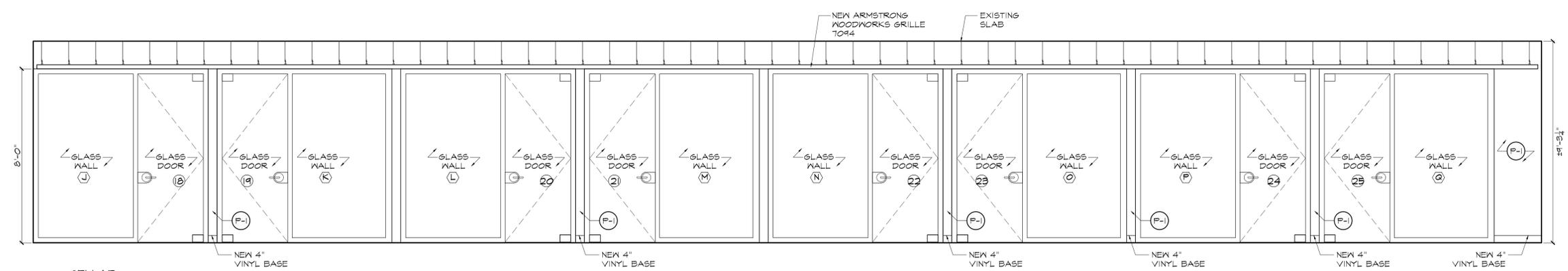
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SCALE: 3/8" = 1'-0"



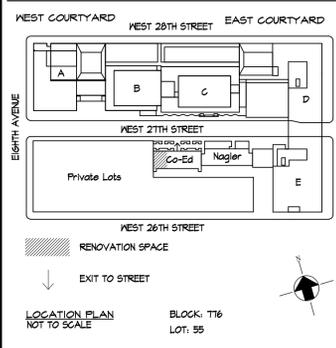
7 CELLAR CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



8 CELLAR CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



9 CELLAR CORRIDOR ELEVATION
SCALE: 3/8" = 1'-0"



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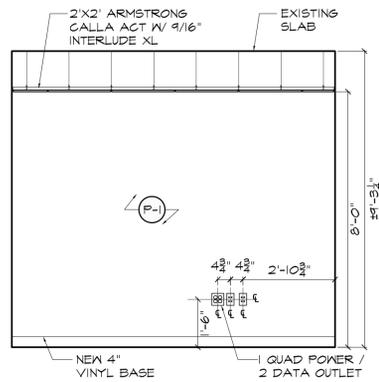
PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
**CELLAR
 INTERIOR ELEVATIONS**

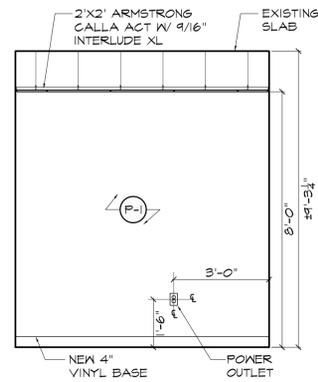
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 PROJECT No: 13284.154
 DRAWING BY: GD & TM
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 DWG No:

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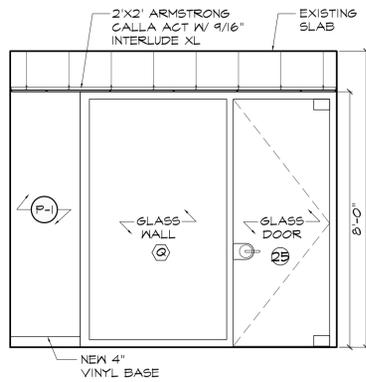
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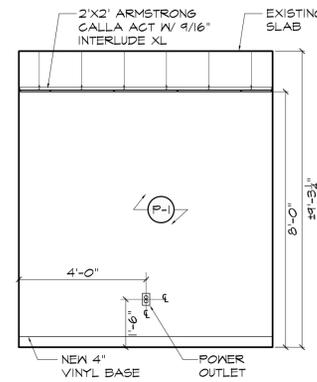
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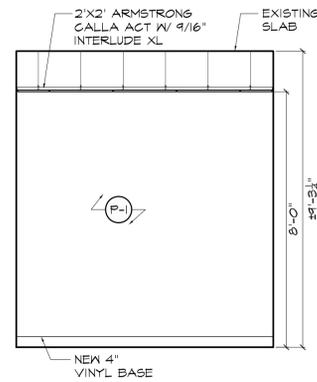
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SCALE: 3/8" = 1'-0"



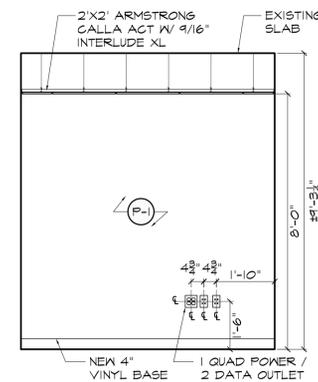
3 CELLAR OFFICE C31 ELEVATION
SCALE: 3/8" = 1'-0"



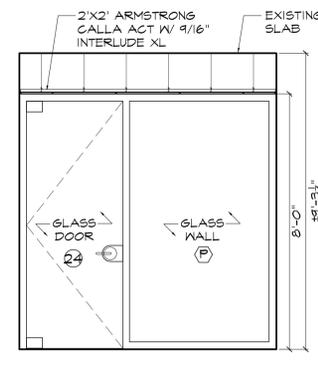
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SCALE: 3/8" = 1'-0"



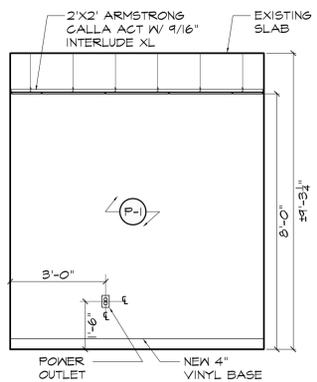
5 CELLAR OFFICE C30 ELEVATION
SCALE: 3/8" = 1'-0"



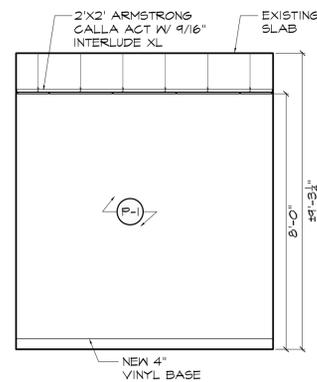
6 CELLAR OFFICE C30 ELEVATION
SCALE: 3/8" = 1'-0"



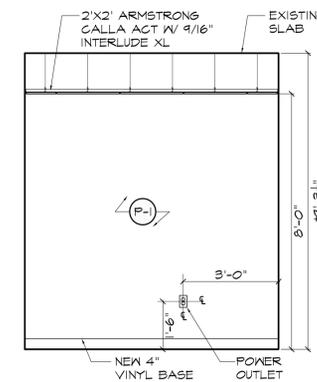
7 CELLAR OFFICE C30 ELEVATION
SCALE: 3/8" = 1'-0"



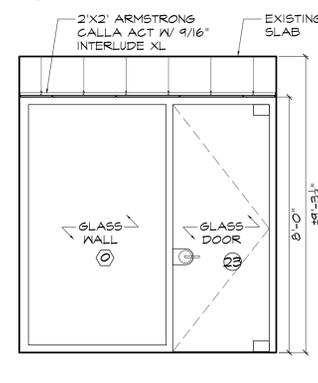
8 CELLAR OFFICE C30 ELEVATION
SCALE: 3/8" = 1'-0"



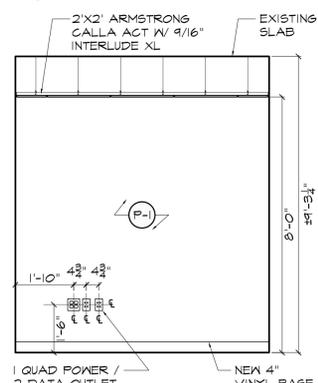
9 CELLAR OFFICE C29 ELEVATION
SCALE: 3/8" = 1'-0"



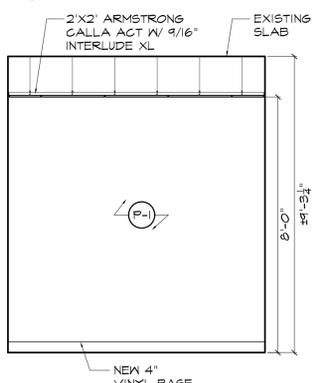
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SCALE: 3/8" = 1'-0"



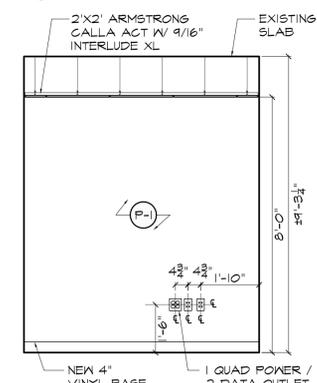
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SCALE: 3/8" = 1'-0"



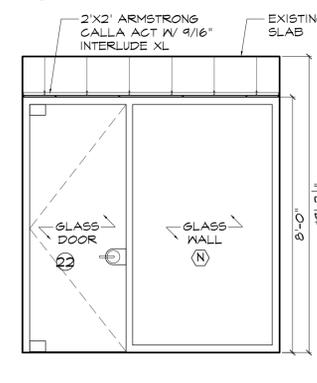
12 CELLAR OFFICE C29 ELEVATION
SCALE: 3/8" = 1'-0"



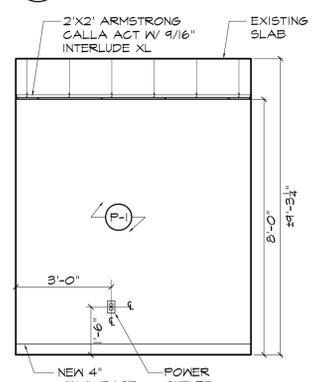
13 CELLAR OFFICE C28 ELEVATION
SCALE: 3/8" = 1'-0"



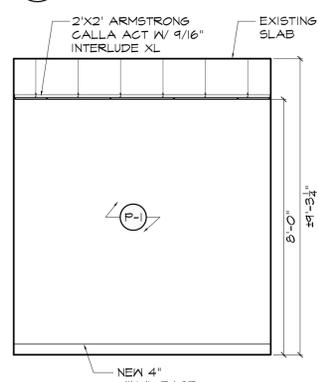
14 CELLAR OFFICE C28 ELEVATION
SCALE: 3/8" = 1'-0"



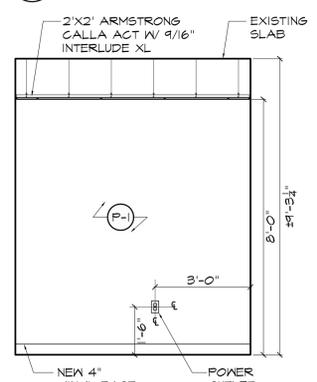
15 CELLAR OFFICE C28 ELEVATION
SCALE: 3/8" = 1'-0"



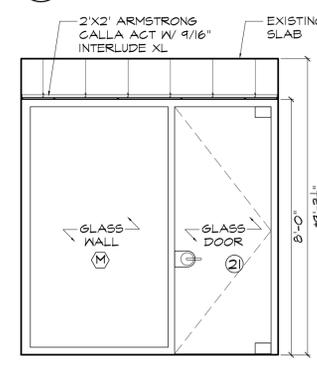
16 CELLAR OFFICE C28 ELEVATION
SCALE: 3/8" = 1'-0"



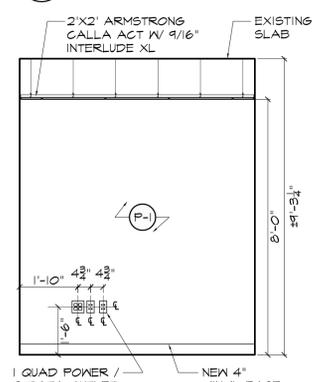
17 CELLAR OFFICE C27 ELEVATION
SCALE: 3/8" = 1'-0"



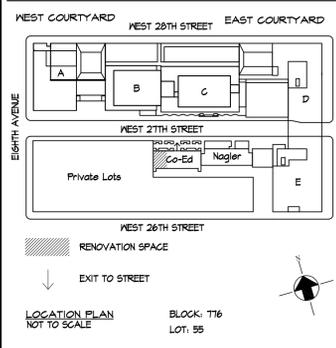
18 CELLAR OFFICE C27 ELEVATION
SCALE: 3/8" = 1'-0"



19 CELLAR OFFICE C27 ELEVATION
SCALE: 3/8" = 1'-0"



20 CELLAR OFFICE C27 ELEVATION
SCALE: 3/8" = 1'-0"



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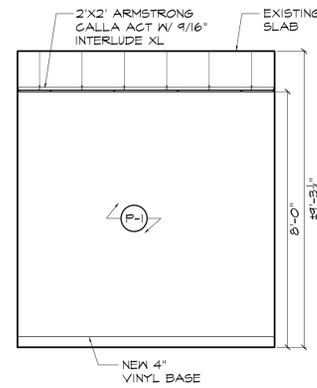
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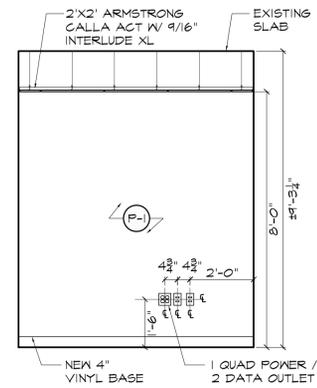
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DRAWING TITLE:
**CELLAR
 INTERIOR ELEVATIONS**

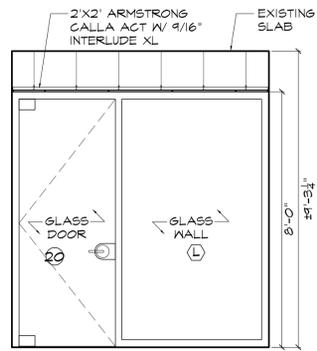
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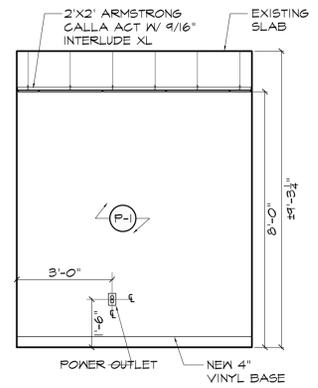
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SCALE: 3/8" = 1'-0"



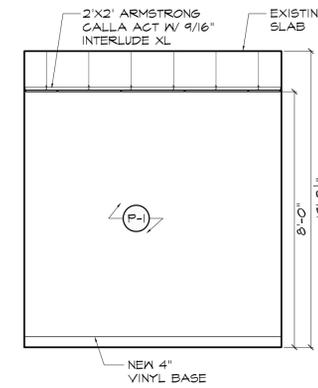
2 CELLAR OFFICE C26 ELEVATION
SCALE: 3/8" = 1'-0"



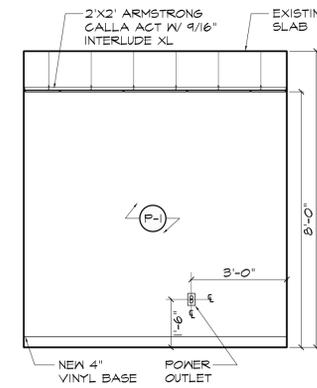
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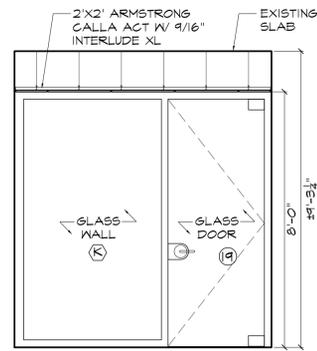
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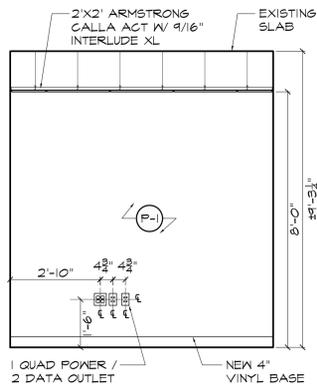
5 CELLAR OFFICE C25 ELEVATION
SCALE: 3/8" = 1'-0"



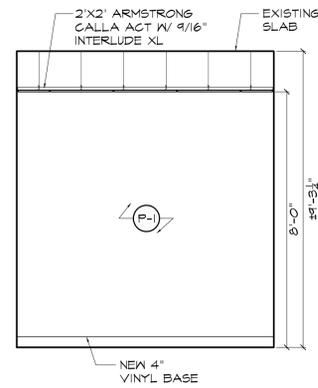
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SCALE: 3/8" = 1'-0"



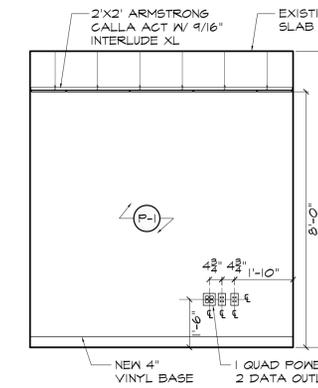
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SCALE: 3/8" = 1'-0"



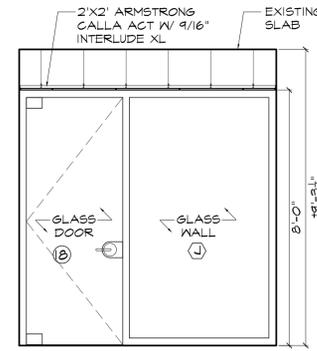
8 CELLAR OFFICE C25 ELEVATION
SCALE: 3/8" = 1'-0"



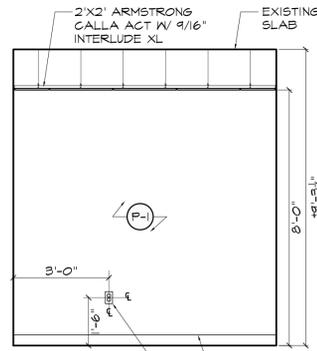
9 CELLAR OFFICE C24 ELEVATION
SCALE: 3/8" = 1'-0"



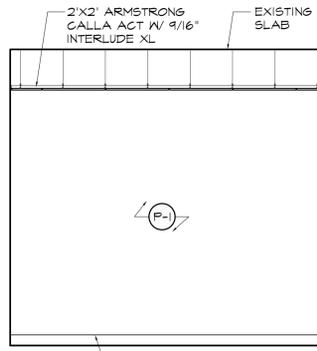
10 CELLAR OFFICE C24 ELEVATION
SCALE: 3/8" = 1'-0"



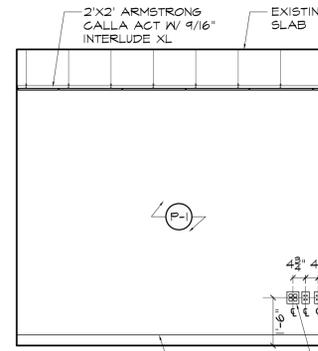
11 CELLAR OFFICE C24 ELEVATION
SCALE: 3/8" = 1'-0"



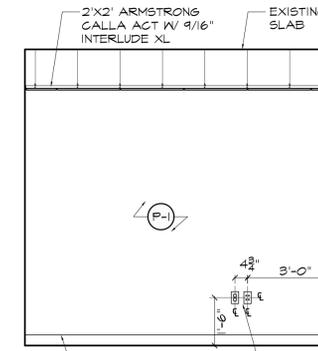
12 CELLAR OFFICE C24 ELEVATION
SCALE: 3/8" = 1'-0"



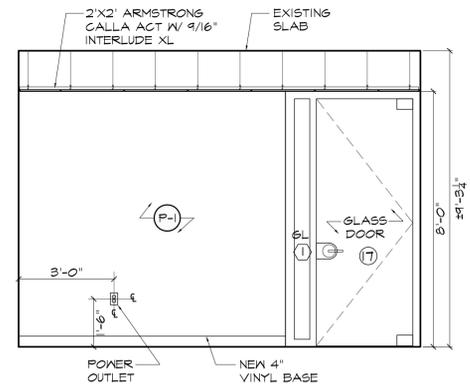
13 CELLAR OFFICE C23 ELEVATION
SCALE: 3/8" = 1'-0"



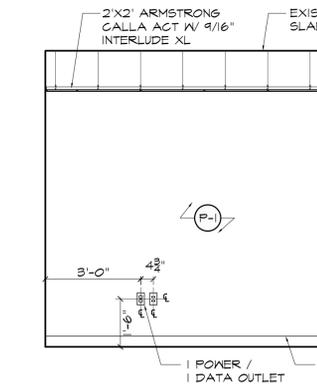
14 CELLAR OFFICE C23 ELEVATION
SCALE: 3/8" = 1'-0"



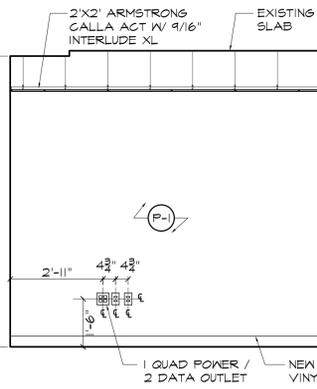
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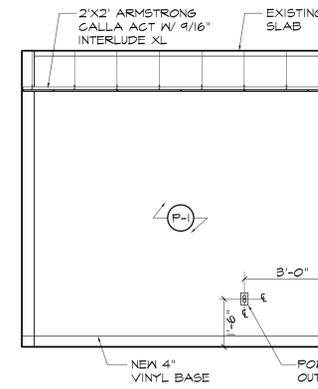
16 CELLAR OFFICE C23 ELEVATION
SCALE: 3/8" = 1'-0"



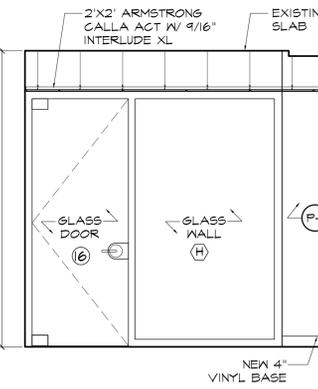
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SCALE: 3/8" = 1'-0"



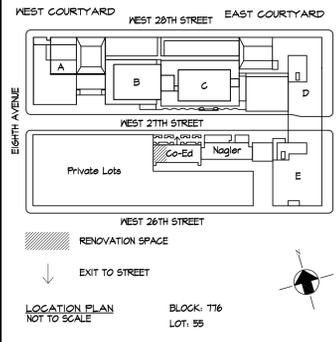
18 CELLAR OFFICE C22 ELEVATION
SCALE: 3/8" = 1'-0"



19 CELLAR OFFICE C22 ELEVATION
SCALE: 3/8" = 1'-0"



20 CELLAR OFFICE C22 ELEVATION
SCALE: 3/8" = 1'-0"



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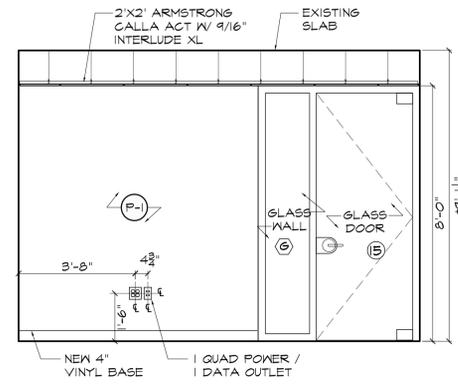
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 230 WEST 27TH ST
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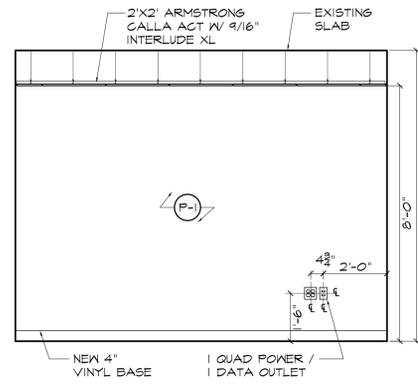
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**CELLAR
 INTERIOR ELEVATIONS**

SEAL & SIGNATURE: _____ DATE: 09.01.2022
 PROJECT No: 13284.154
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 DWG No: _____
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 SCALE: AS NOTED 33 of 61

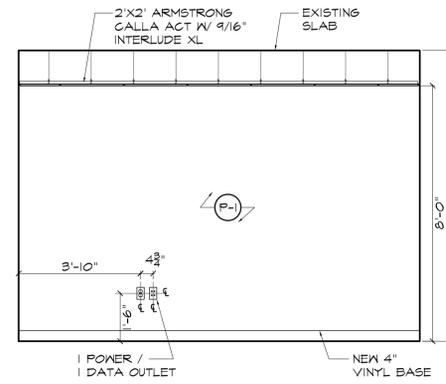
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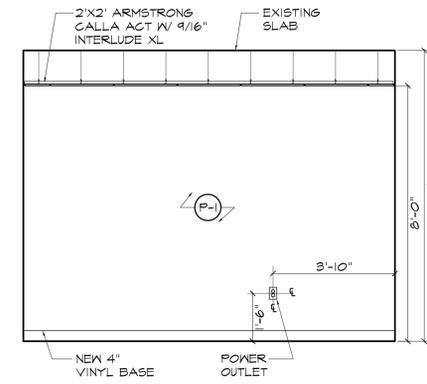
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SCALE: 3/8" = 1'-0"



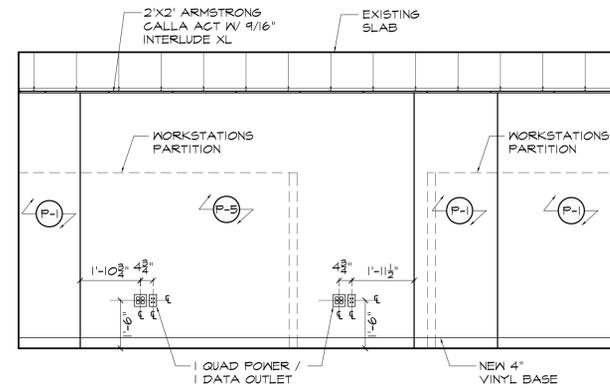
2 CELLAR OFFICE C21 ELEVATION
SCALE: 3/8" = 1'-0"



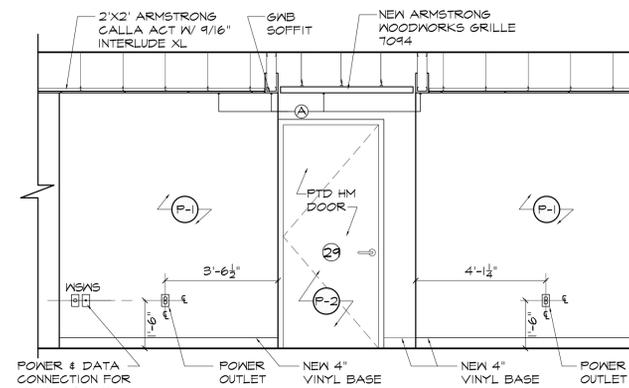
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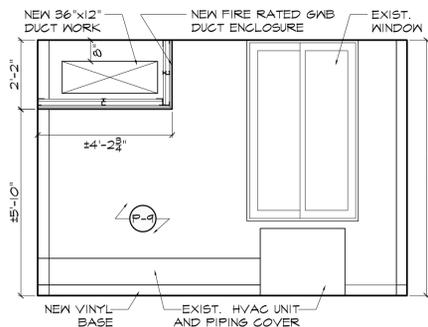
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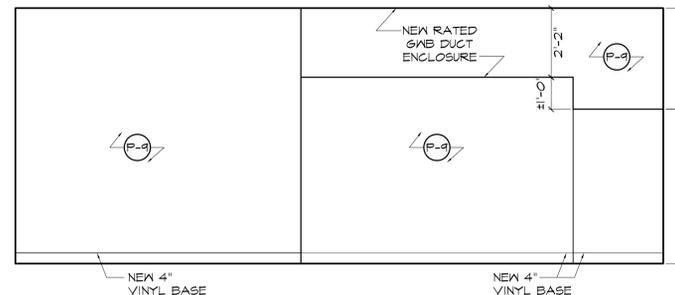
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SCALE: 3/8" = 1'-0"



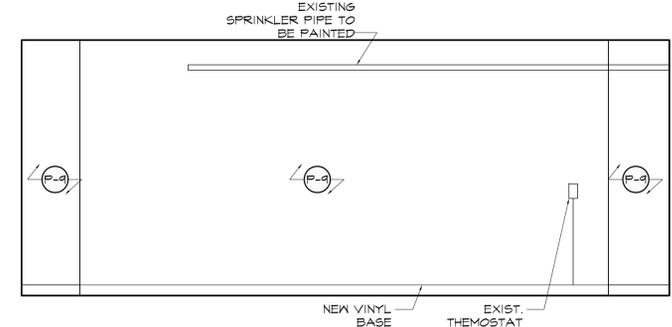
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SCALE: 3/8" = 1'-0"



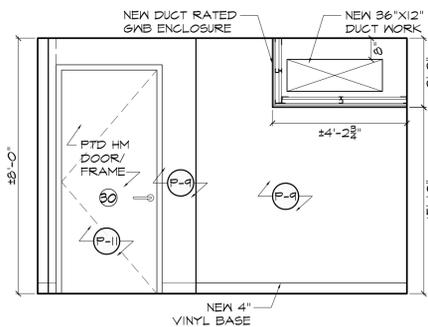
7 SECOND FLOOR ROOM 213 ELEVATION
SCALE: 3/8" = 1'-0"



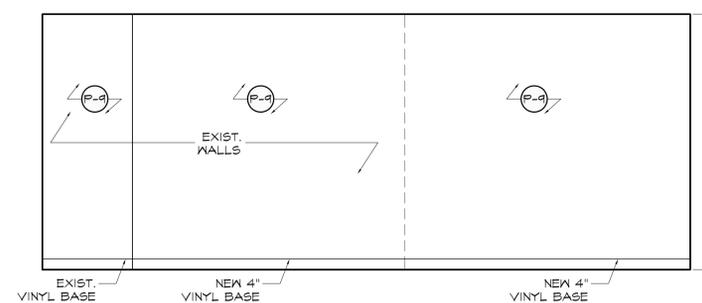
8 SECOND FLOOR ROOM 213 ELEVATION
SCALE: 3/8" = 1'-0"



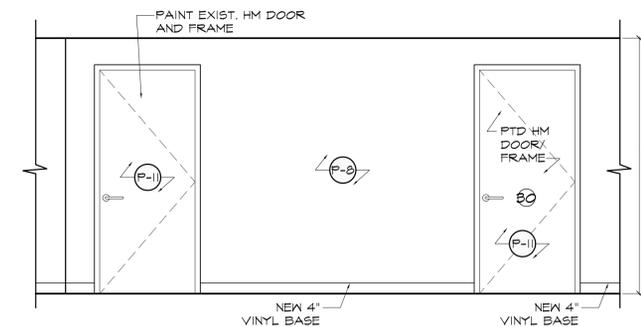
9 SECOND FLOOR ROOM 213 ELEVATION
SCALE: 3/8" = 1'-0"



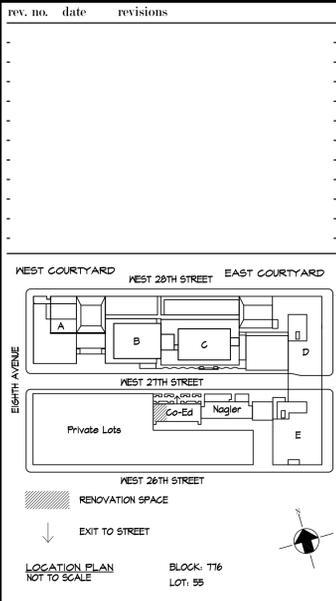
10 SECOND FLOOR ROOM 213 ELEVATION
SCALE: 3/8" = 1'-0"



11 SECOND FLOOR ROOM 211 ELEVATION
SCALE: 3/8" = 1'-0"



12 SECOND FLOOR ROOM 211 ELEVATION
SCALE: 3/8" = 1'-0"



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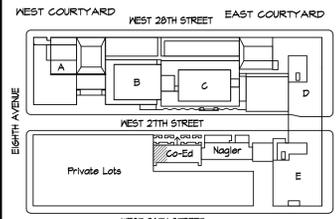
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DRAWING TITLE:
**CELLAR & SECOND FLOOR
INTERIOR ELEVATIONS**

SEAL & SIGNATURE: DATE: 09.01.2022
PROJECT No: 13284.154
DRAWING BY: GD & TM
CHK BY: DH & CK
DWG No:

A-309.00

SCALE: AS NOTED 34 of 61



WEST COURTYARD WEST 28TH STREET EAST COURTYARD
 EIGHTH AVENUE SEVENTH AVENUE
 Private Lots
 WEST 26TH STREET
 RENOVATION SPACE
 EXIT TO STREET
 LOCATION PLAN NOT TO SCALE
 BLOCK: T16
 LOT: 55

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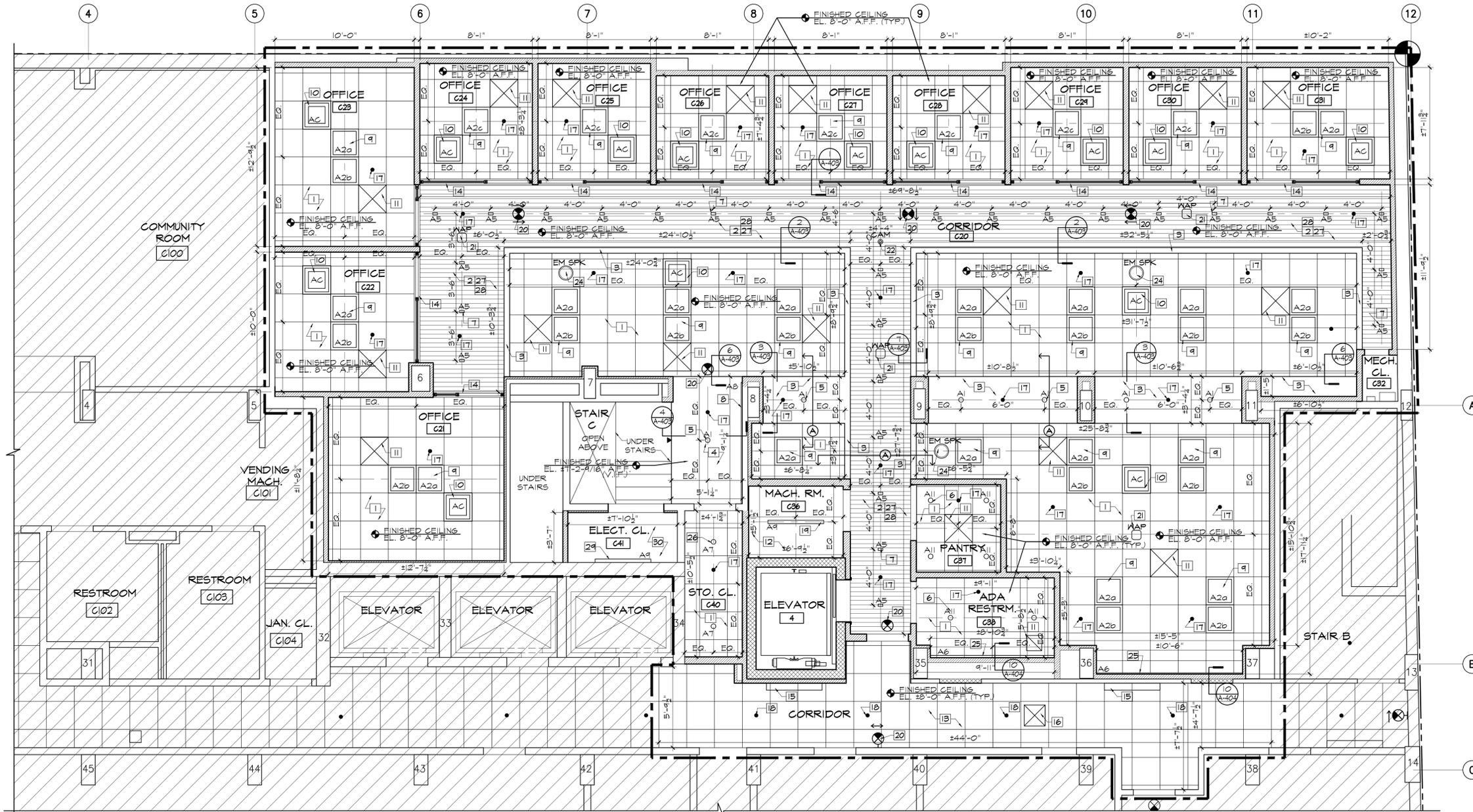
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 NEW YORK NY 10001

DRAWING TITLE:
CELLAR REFLECTED CEILING PLAN

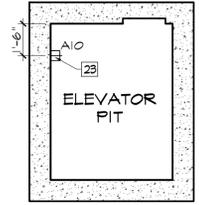
SEAL & SIGNATURE: _____
 DATE: 09.01.2022
 PROJECT No: 13284.154
 DRAWING BY: GD & TM
 CHK BY: DH & CK
 DWG No: **A-400.00**
 SCALE: AS NOTED 35 of 61



1 CELLAR REFLECTED CEILING PLAN
 SCALE: 1/4" = 1'-0"

- CONSTRUCTION NOTES
- 1 NEW 2'X2' ARMSTRONG "CALLA 2824" ACT CEILING WITH 9/16" INTERLUDE XL SUSPENSION SYSTEM.
 - 2 NEW ARMSTRONG WOODWORKS GRILLE 1094, BACKER ONLY, GRILLE WHITE FINISH.
 - 3 NEW GNB SOFFIT.
 - 4 NEW GNB CEILING.
 - 5 NEW TRIMLESS DOWNLIGHT IN GNB CLG.
 - 6 NEW MINI TRIMLESS ACOUSTICAL DOWNLIGHT.
 - 7 NEW MICRO RECTILINEAR DOWNLIGHT FOR WOODWORKS-VERTICAL SLATS. COORDINATE LOCATION WITH ARMSTRONG WOODWORKS GRILLE CEILING SYSTEM.
 - 8 NEW RECESSED WALL MOUNTED LINEAR LIGHT FIXTURE.
 - 9 NEW 2X2 LIGHT FIXTURE
 - 10 NEW 2X2 CEILING MOUNTED AC UNIT. COORDINATE LOCATION WITH CEILING LAYOUT. COORDINATE WITH MECHANICAL DRAWINGS.
 - 11 NEW DIFFUSER. COORDINATE LOCATION WITH CEILING LAYOUT. COORDINATE WITH MECHANICAL DRAWINGS.
 - 12 OPEN CEILING.
 - 13 REINSTALL EXISTING 2X2 ACT CEILING. REPLACE ANY DAMAGED TILE TO MATCH EXISTING. PROVIDE NEW CEILING GRID TO MATCH EXISTING.
 - 14 NEW GNB WALL ABOVE GLASS PARTITION & DOOR. SEE DRAWING A-102 FOR DETAILS.
 - 15 REINSTALL EXISTING WALL MOUNTED LIGHT FIXTURES.
 - 16 REINSTALL EXISTING DIFFUSER AND DEVICES.

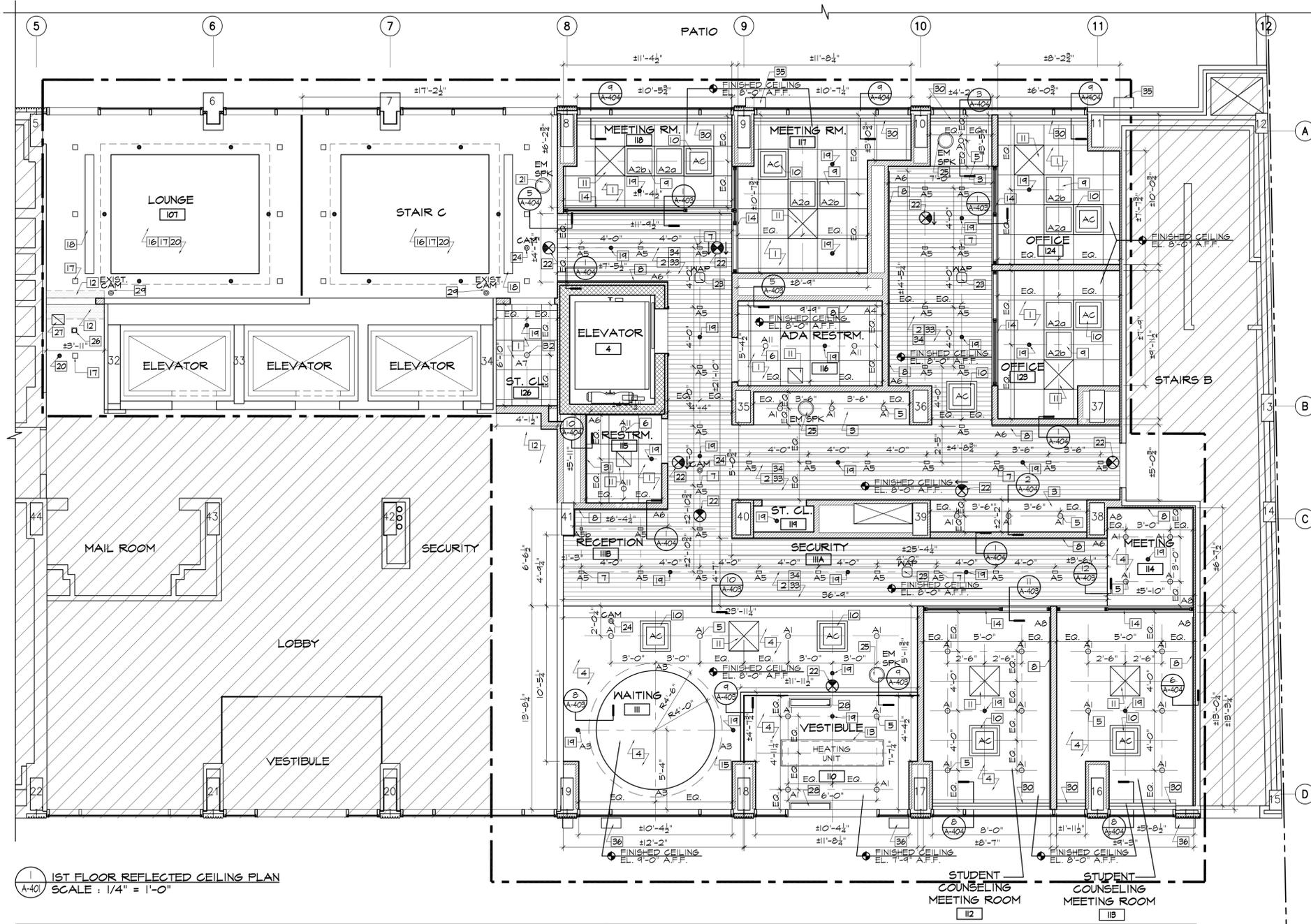
- 17 NEW SPRINKLERS. COORDINATE WITH SPRINKLER DRAWINGS.
- 18 REINSTALL EXISTING SPRINKLERS.
- 19 NEW PENDANT LIGHT FIXTURE.
- 20 NEW EXIT SIGN.
- 21 NEW WIRELESS ACCESS POINT.
- 22 NEW CAMERA.
- 23 NEW SURFACE MOUNTED LIGHT FIXTURE. FIXTURE TO BE MOUNTED 2'-6" A.F.F. MAX. COORDINATE WITH ELECTRICAL AND ELEVATOR DRAWINGS.
- 24 NEW RECESSED EMERGENCY SPEAKER.
- 25 NEW WALL MOUNTED LINEAR LIGHT FIXTURE. SEE DETAIL 10/A-404.
- 26 NEW DOWNLIGHT WITH TRIM.
- 27 ALL SURFACES AND EQUIPMENT ABOVE THE ARMSTRONG WOODWORKS GRILLE CEILING TO BE PAINTED P12 (TYP.)
- 28 PROVIDE NEW BONDED ACOUSTICAL COTTON (BLACK) ADHERED TO SLAB ABOVE ALL ARMSTRONG WOODWORKS GRILLE CEILINGS (TYP.)
- 29 NEW WALL MOUNTED FIXTURE. PROVIDE BLOCKING AS REQUIRED.
- 30 EXPOSED BOTTOM OF EXISTING STAIR TO BE PAINTED.



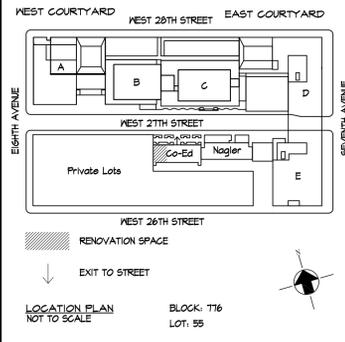
2 ELEVATOR PIT REFLECTED CEILING PLAN
 SCALE: 1/4" = 1'-0"

- LEGEND:
- LINEAR LIGHTING
 - DOWNLIGHT FIXTURE
 - RECESSED FIXTURE
 - 2X2 FIXTURE
 - CLG MOUNTED EXIT SIGN
 - WALL MOUNTED EXIT SIGN
 - SPRINKLER HEAD
 - ▶ WALL MOUNTED SPRINKLER HEAD
 - MAP CEILING MOUNTED WIRELESS ACCESS POINT
 - CAM CEILING MOUNTED SECURITY CAMERA
 - EM SPK CEILING RECESSED EMERGENCY SPEAKER
 - CEILING MOUNTED AC UNIT
 - LINEAR DIFFUSER REGISTER
 - RETURN AIR REGISTER
 - SUPPLY AIR REGISTER

ISSUED FOR BID 09.01.2022



1 1ST FLOOR REFLECTED CEILING PLAN
SCALE: 1/4" = 1'-0"



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PROJECT:
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 230 WEST 27TH ST
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DRAWING TITLE:
 1ST FLOOR
 REFLECTED CEILING PLAN

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CONSTRUCTION NOTES

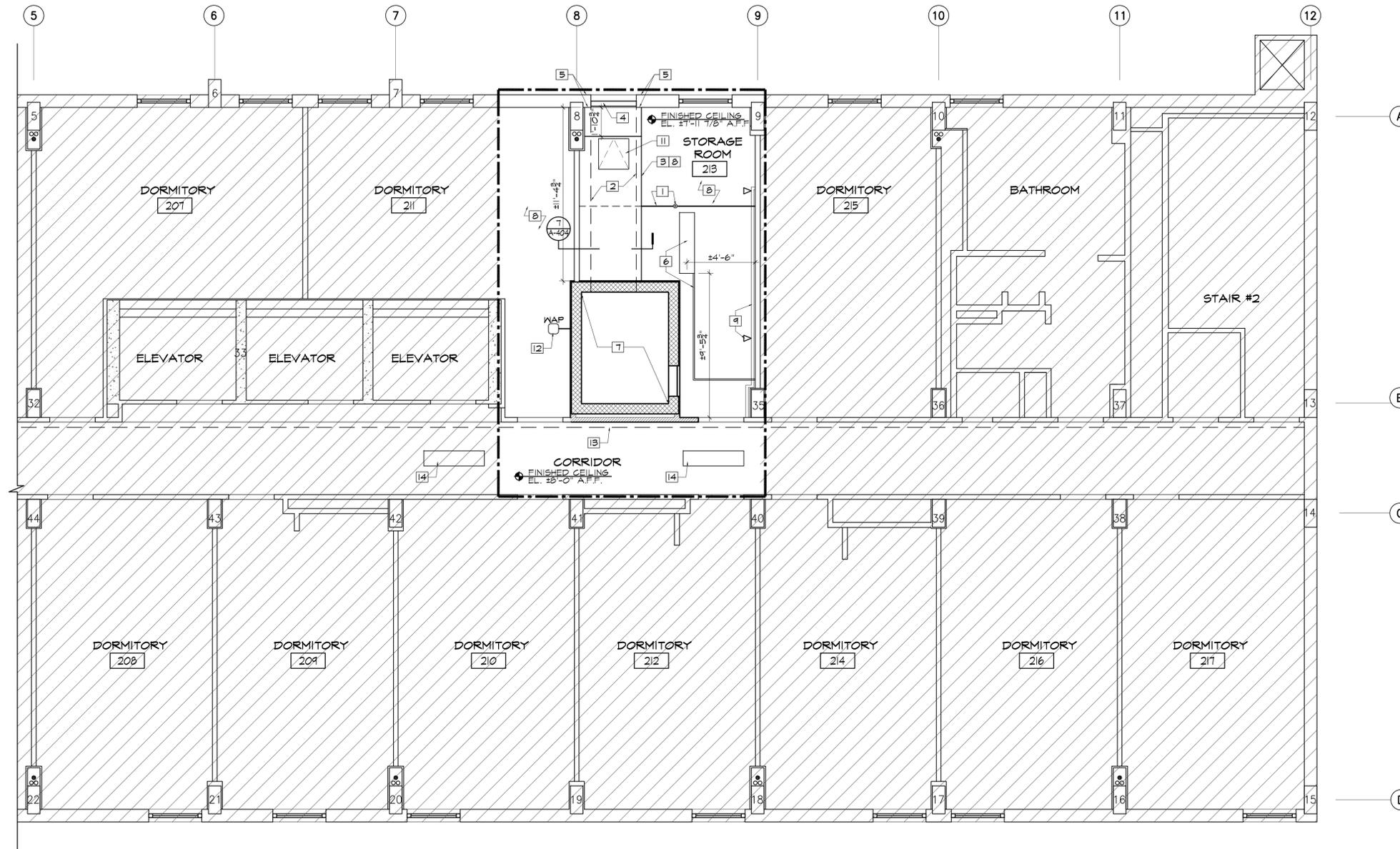
- 1 NEW 2'X2' ARMSTRONG "CALLA 2824" ACT CEILING WITH 9/16" INTERLUDE XL SUSPENSION SYSTEM.
- 2 NEW ARMSTRONG WOODWORKS GRILLE 1094, BACKER ONLY, GRILLE WHITE FINISH.
- 3 NEW GMB SOFFIT.
- 4 NEW GMB CEILING.
- 5 NEW TRIMLESS DOWNLIGHT IN GMB CLG.
- 6 NEW MINI TRIMLESS ACOUSTICAL DOWNLIGHT.
- 7 NEW MICRO RECTILINEAR DOWNLIGHT FOR WOODWORKS-VERTICAL SLATS. COORDINATE LOCATION WITH ARMSTRONG WOODWORKS GRILLE CEILING SYSTEM.
- 8 NEW RECESSED WALL MOUNTED LINEAR LIGHT FIXTURE.
- 9 NEW 2X2 LIGHT FIXTURE.
- 10 NEW 2X2 CEILING MOUNTED AC UNIT. COORDINATE LOCATION WITH CEILING LAYOUT. COORDINATE WITH MECHANICAL DRAWINGS.
- 11 NEW DIFFUSER. COORDINATE LOCATION WITH CEILING LAYOUT. COORDINATE WITH MECHANICAL DRAWINGS.
- 12 CLOSE, PATCH AND PAINT EXISTING GMB CEILING TO MATCH EXISTING.
- 13 VESTIBULE CEILING RECESSED HEATING UNIT. COORDINATE WITH MECHANICAL DRAWINGS.
- 14 NEW GMB WALL ABOVE GLASS PARTITION & DOOR. SEE DRAWING A-108 FOR DETAILS.
- 15 LIGHT COVE.
- 16 EXISTING GMB CEILING TO REMAIN. PATCH AND PAINT AS REQUIRED TO MATCH EXISTING.
- 17 EXISTING RECESSED DOWNLIGHTS TO REMAIN. EXISTING CONTROLS TO BE RELOCATED AS REQUIRED. COORDINATE WITH ELECTRICAL DRAWINGS.
- 18 EXISTING LINEAR DIFFUSER TO REMAIN. ZONE AND CONTROLS TO BE MODIFIED. COORDINATE WITH MECHANICAL DRAWINGS.

- 19 NEW SPRINKLER. COORDINATE WITH SPRINKLER DRAWINGS. SPRINKLER HEAR COVERS ON ALL ACT AND GMB CEILINGS TO BE WHITE FINISH. SPRINKLER HEAR COVERS ON ALL WOODWORKS GRILLE CEILINGS TO BE BLACK FINISH.
- 20 EXISTING SPRINKLER TO REMAIN. PROVIDE PROTECTION AS REQUIRED.
- 21 EXISTING RECESSED EM SPEAKER TO REMAIN. PROVIDE PROTECTION AS REQUIRED.
- 22 NEW EXIT SIGN.
- 23 NEW WIRELESS ACCESS POINT.
- 24 NEW CAMERA.
- 25 NEW RECESSED EMERGENCY SPEAKER.
- 26 RELOCATED SMOKE DETECTOR. COORDINATE WITH ELECTRICAL & FIRE ALARM DRAWINGS.
- 27 RELOCATED RETURNED DIFFUSER. COORDINATE WITH MECHANICAL DRAWINGS.
- 28 DOOR POWER OPERATOR RECESSED IN GMB CEILING NICHE. COORDINATE WITH HARDWARE FOR NICHE SIZE AND LOCATION. SEE DRAWING A-106 & A-107 FOR DETAILS.
- 29 EXISTING CAMERA TO REMAIN AND BE PROTECTED.
- 30 RECESSED WINDOW SHADE. PROVIDE SUPPORT FRAMING AND BLOCKING AS REQUIRED.
- 31 WALL SURFACE MOUNTED LINEAR FIXTURE. SEE DRAWING 10/A-404 FOR DETAIL.
- 32 NEW DOWNLIGHT WITH TRIM.
- 33 ALL SURFACES AND EQUIPMENT ABOVE THE ARMSTRONG WOODWORKS GRILLE CEILING TO BE PAINTED P12 (TYP)
- 34 PROVIDE NEW BONDED ACOUSTICAL COTTON (BLACK) ADHERED TO SLAB ABOVE ALL ARMSTRONG WOODWORKS GRILLE CEILINGS (TYP.)
- 35 RELOCATED EXISTING WALL MOUNTED EXTERIOR LIGHT. COORDINATE WITH ELECTRICAL DRAWINGS.
- 36 EXISTING TO REMAIN EXTERIOR WALL MOUNTED LIGHT FIXTURE. PROVIDE PROTECTION AS REQUIRED.

LEGEND:

- LINEAR LIGHTING
- DOWNLIGHT FIXTURE
- RECESSED FIXTURE
- 2X2 FIXTURE
- ⊗ CLG MOUNTED EXIT SIGN
- ⊙ WALL MOUNTED EXIT SIGN
- SPRINKLER HEAD
- ▶ WALL MOUNTED SPRINKLER HEAD
- MAP ○ CEILING MOUNTED WIRELESS ACCESS POINT
- CAM ⊙ CEILING MOUNTED SECURITY CAMERA
- EM SPK ○ CEILING RECESSED EMERGENCY SPEAKER
- ⊗ CEILING MOUNTED AC UNIT
- LINEAR DIFFUSER REGISTER
- ⊗ RETURN AIR REGISTER
- ⊗ SUPPLY AIR REGISTER

ISSUED FOR BID 09.01.2022



1 2ND FLOOR REFLECTED CEILING PLAN
A-402 SCALE: 1/4" = 1'-0"

CONSTRUCTION NOTES

- 1 EXISTING SURFACE MOUNTED SMOKE DETECTOR AND WIREMOLD TO REMAIN. PROVIDE FIRE STOPPING AT FIRE RATED SOFFIT.
- 2 NEW DUCT 8" BELOW EXISTING CEILING.
- 3 NEW 2 HOUR FIRE RATED GMB ENCLOSURE (TYPE I2) AROUND NEW DUCTWORK. SEE DRAWINGS A-700 FOR PARTITION TYPE. SEE DRAWING 1/A404 FOR DETAILS.
- 4 NEW EXTERIOR LOUVER. SEE DRAWING A-704 FOR DETAILS. COORDINATE WITH MECHANICAL DRAWING.
- 5 PATCH EXISTING CMU WALL.
- 6 RELOCATED 1X4 SURFACE MOUNTED LIGHT FIXTURE AND WIREMOLD.
- 7 NEW ELEVATOR SHAFT. SEE STRUCTURAL AND ELEVATOR DRAWINGS FOR DETAILS.
- 8 EXISTING CEILING AND NEW SOFFIT TO BE PAINTED.
- 9 EXISTING SURFACE MOUNTED SPRINKLER PIPING AND HEADS TO REMAIN AND BE PROTECTED AS REQUIRED.
- 10 NOT USED.
- 11 NEW 2 HOUR RATED ACCESS PANEL UNDER SOFFIT TO ACCESS FIRE DAMPER. COORDINATE LOCATION WITH LOCATION OF FIRE DAMPER AND WITH MECHANICAL DRAWING.
- 12 REINSTALL EXISTING CEILING MOUNTED WAP. PROVIDE NEW SURFACE MOUNTED WIREMOLD AS REQUIRED.
- 13 EXISTING CEILING SURFACE MOUNTED SPRINKLER PIPING AND WIREMOLDS IN THE CORRIDOR TO REMAIN AND BE PROTECTED (TYP.).
- 14 EXISTING SURFACE MOUNTED 1X4 LIGHT FIXTURES TO REMAIN AND BE PROTECTED (TYP.).

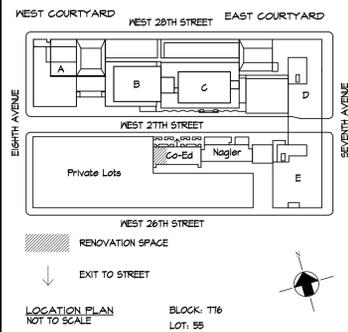
GENERAL NOTES:

1. ALL EXISTING FINISHES TO REMAIN TO BE PROTECTED AS REQUIRED.
2. ALL EXISTING EQUIPMENT TO REMAIN TO BE PROTECTED AS REQUIRED.

LEGEND:

- CLG MOUNTED EXIT SIGN
- WALL MOUNTED EXIT SIGN
- SPRINKLER HEAD
- WALL MOUNTED SPRINKLER HEAD
- WAP CEILING MOUNTED WIRELESS ACCESS POINT
- SURFACE MOUNTED 1X4 LIGHT FIXTURE

REV. NO. DATE REVISIONS



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PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 27TH ST
NEW YORK NY 10001

DRAWING TITLE:
**2ND FLOOR
REFLECTED CEILING PLAN**

SEAL & SIGNATURE: DATE: 09.01.2022
PROJECT No: 13284.154
DRAWING BY: GD & TM
CHK BY: DH & CK
DWG No:

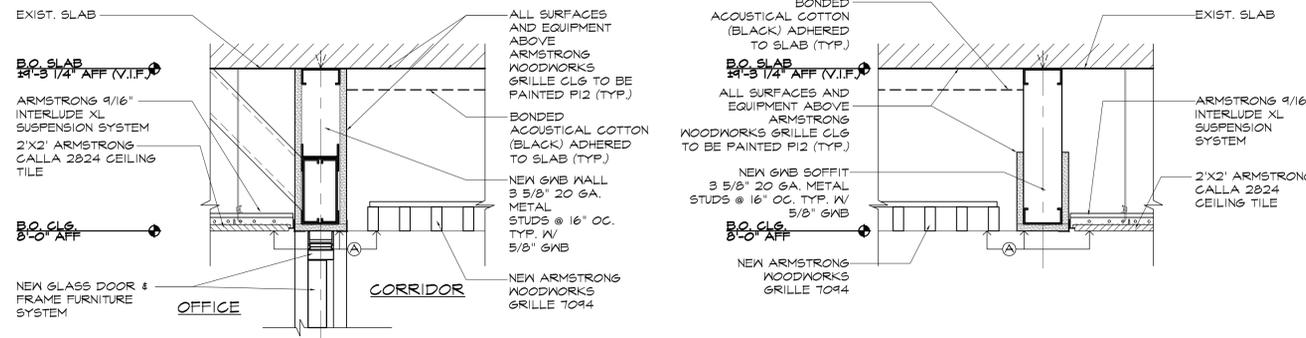
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SCALE: AS NOTED 37 of 61

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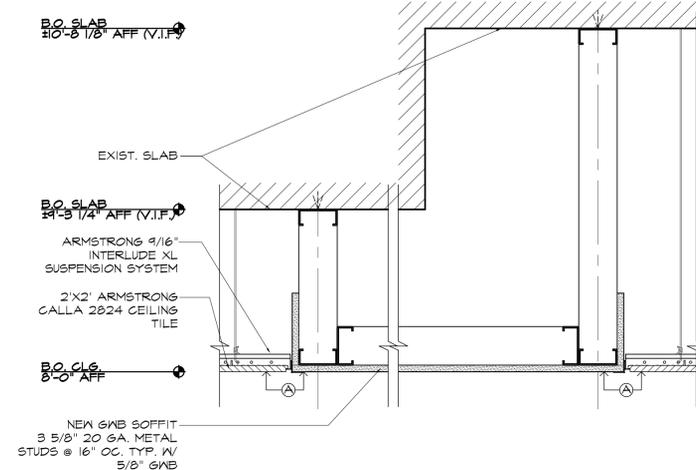
Lighting Fixture Schedule

TYPE	FIXTURE DESCRIPTION	MFR.	LAMP TYPE	CONTROL	MTG HEIGHT	COMMENTS
A1	B3RDL-09X3-35KH-40-S-WH-WH-FT-UNV-D22	USA1	LED	DIM	COORD. W/ RCP	TRIMLESS SPACKLED-IN
A2a	OCR-CONCAVE-2X2-LED-8-35-024L-UNV-B02-G32-KO-V04	VISCOR	LED	DIM	COORD. W/ RCP	
A2b	OCR-CONVEX-2X2-LED-8-35-024L-UNV-B02-G32-KO-V04	VISCOR	LED	DIM	COORD. W/ RCP	
A2C	OCR-CONCAVE-2X2-LED-8-35-034-UNV-B02-G32-KO-V04	VISCOR	LED	DIM	COORD. W/ RCP	
A3	KBX-SF-H-35K-IEFF-IEC LENGTH TO BE VERIFIED IN THE FIELD	OPTIC ARTS LUMINI	LED	DIM	COORD. W/ RCP	LENGTH OF FIXTURES TO BE COORDINATED WITH RCP
A4	P64-X-35-LOW-UNV-DB-W-T-4" R6-NA-X-TA LENGTH TO BE VERIFIED IN THE FIELD	CORONET	LED	DIM	COORD. W/ RCP	LENGTH OF FIXTURES TO BE COORDINATED WITH RCP AND EXISTING CONDITIONS. FIXTURE TO BE WALL MOUNTED AND RECESSED 4". COORDINATE WITH NEW ARMSTRONG DROP CEILING
A5	MD606-2IHI-35KH-35-WH-WH-NCVS-UNV-D6E-6L44-UA2	USA1	LED	DIM	COORD. W/ RCP	COORDINATE FIXTURE WITH ARMSTRONG WOODWORKS GRILLE VERTICAL SLATS FN1094B0. COORDINATE FINAL LOCATIONS WITH CEILING GRILLE.
A5b	MD6-02-08HI-35KH-35-WH-WH-NCVS-6L44-UA2	USA1	LED	DIM	COORD. W/ RCP	COORDINATE FIXTURE WITH ARMSTRONG WOODWORKS GRILLE VERTICAL SLATS FN1094B0. COORDINATE FINAL LOCATIONS WITH CEILING GRILLE.
A6	RUSH DN-X-35-MED-UNV-DB-W-WM-SD NA-NA-NA LENGTH TO BE VERIFIED IN THE FIELD	CORONET	LED	DIM	COORD. W/ RCP	LENGTH OF FIXTURES TO BE COORDINATED WITH RCP AND EXISTING CONDITIONS. FIXTURE TO BE WALL MOUNTED COORDINATE WITH NEW ARMSTRONG DROP CEILING
A7	B3RDF-09X3-35KH-40-S-WH-WH-FT-UNV-D22	USA1	LED	DIM	COORD. W/ RCP	
A8	RUSH REC-X-35-MED-UNV-DB-W-WMNT-SU-NA-NA-NA LENGTH TO BE VERIFIED IN THE FIELD	CORONET	LED	DIM	COORD. W/ RCP	LENGTH OF FIXTURES TO BE COORDINATED WITH RCP AND EXISTING CONDITIONS. FIXTURE TO BE WALL MOUNTED WITH MUD-IN INTO GNB CEILING.
A9	T56-4-L50-35-ACFNA-DIM-UNV	WILLIAMS	LED	DIM	COORD. W/ RCP	
A10	LED VAPORPROOF 02-12A-LED-W-F-06-01	CANLET	LED	DIM	COORD. W/ RCP	
A11	B3RDP-09X3-35KH-40-S-GW-FT-UNV-D22	USA1	LED	DIM	COORD. W/ RCP	USA1 TRIMLESS ACOUSTICAL LIGHTING PRODUCT MUST BE USED EXCLUSIVELY WITH PRE-CUT CEILING TILES BY ARMSTRONG CEILING SOLUTIONS. PRE-CUT TILE PART NUMBER 8935C35 PRE-CUT CEILING TILES MUST BE PURCHASED FROM ARMSTRONG CEILING SOLUTIONS. ELECTRICAL CONTRACTOR AND GENERAL CONTRACTOR TO COORDINATE ORDER OF PRE-CUT TILES.

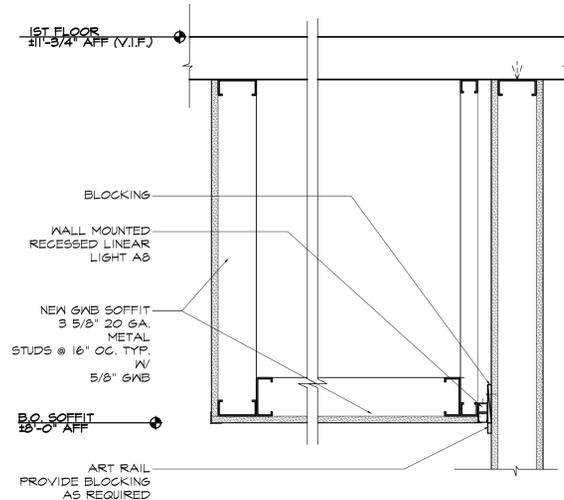


1 CEILING DETAIL SCALE: 1 1/2" = 1'-0"

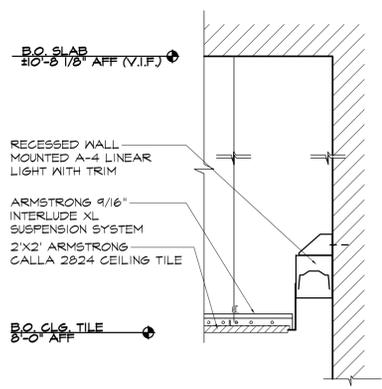
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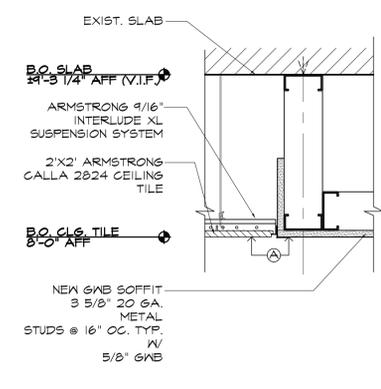
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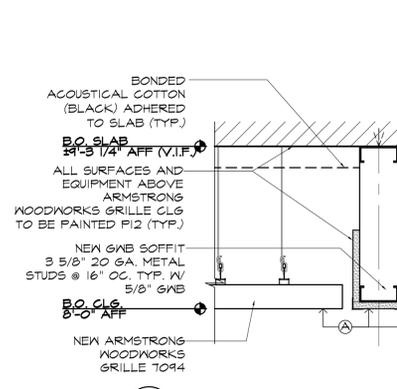
4 CEILING DETAIL SCALE: 1 1/2" = 1'-0"



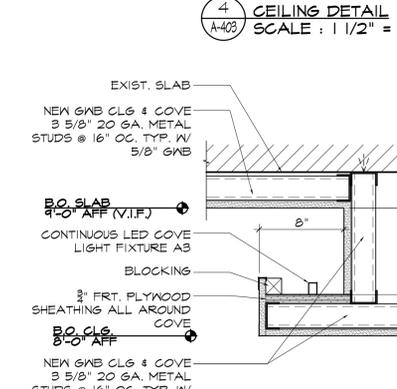
5 CEILING DETAIL SCALE: 1 1/2" = 1'-0"



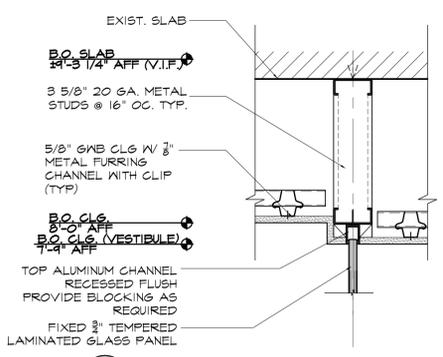
6 CEILING DETAIL SCALE: 1 1/2" = 1'-0"



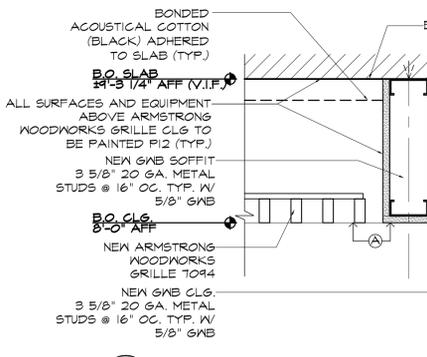
7 CEILING DETAIL SCALE: 1 1/2" = 1'-0"



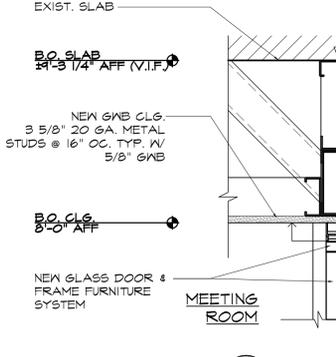
8 CEILING DETAIL SCALE: 1 1/2" = 1'-0"



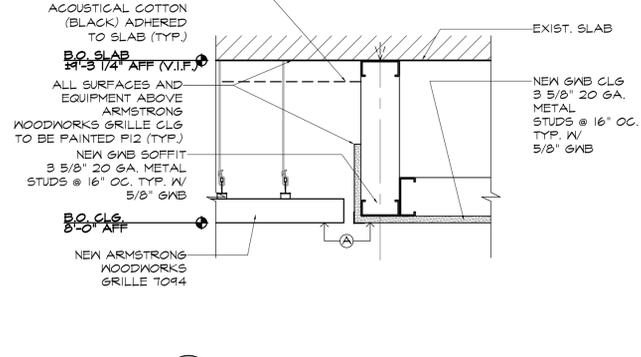
9 CEILING DETAIL SCALE: 1 1/2" = 1'-0"



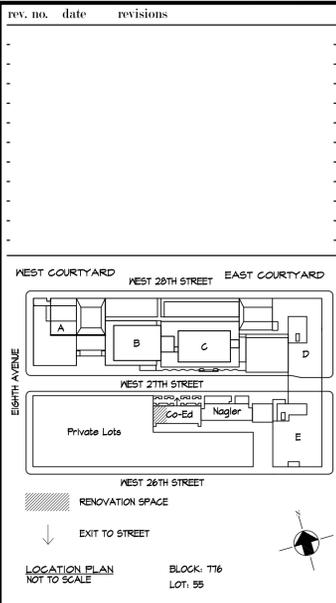
10 CEILING DETAIL SCALE: 1 1/2" = 1'-0"



11 CEILING DETAIL SCALE: 1 1/2" = 1'-0"



12 CEILING DETAIL SCALE: 1 1/2" = 1'-0"



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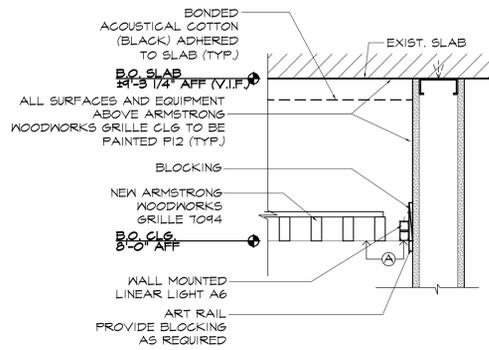
DRAWING TITLE:
**LIGHTING SCHEDULE
 & CEILING DETAILS**

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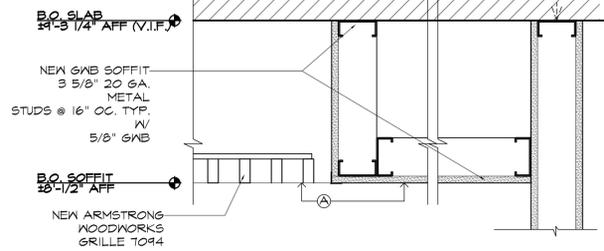
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SCALE: AS NOTED 38 of 61

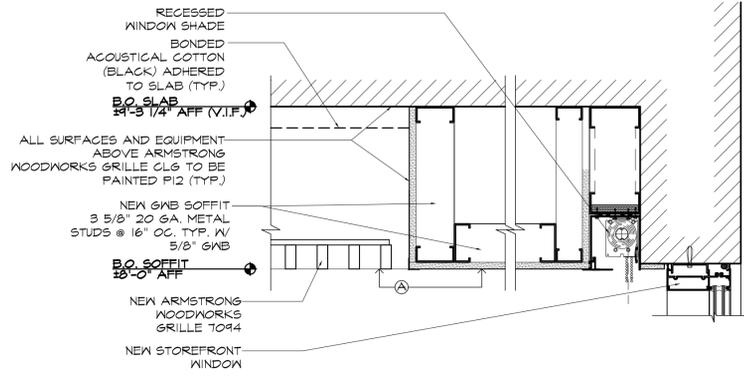
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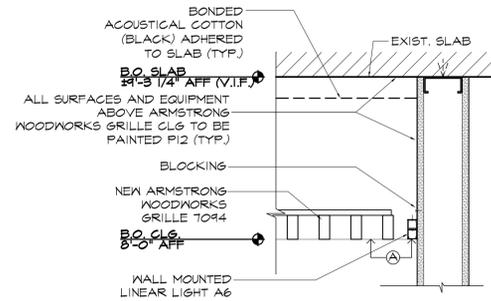
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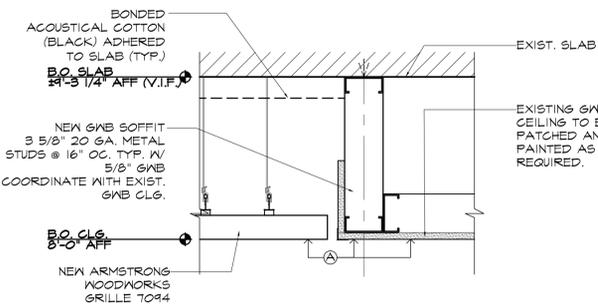
2 CEILING DETAIL SCALE: 1 1/2" = 1'-0"



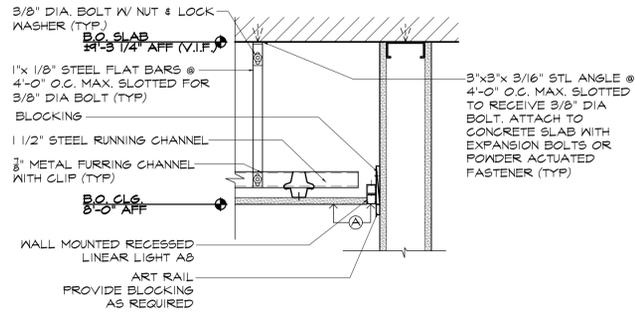
3 CEILING DETAIL SCALE: 1 1/2" = 1'-0"



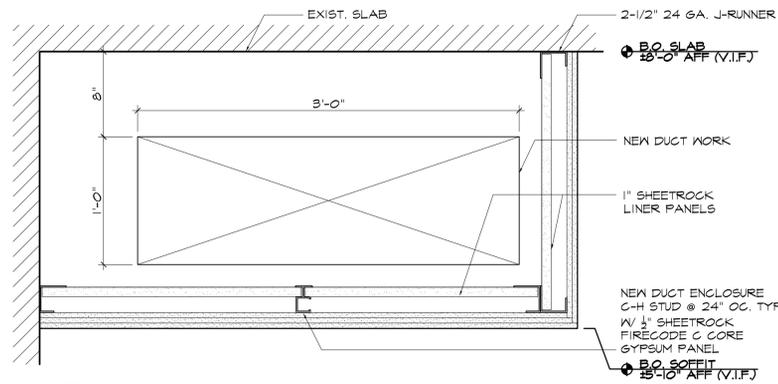
4 CEILING DETAIL SCALE: 1 1/2" = 1'-0"



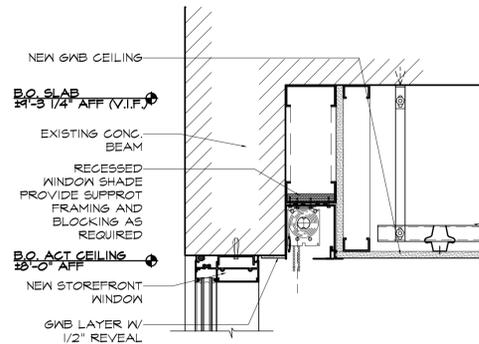
5 CEILING DETAIL SCALE: 1 1/2" = 1'-0"



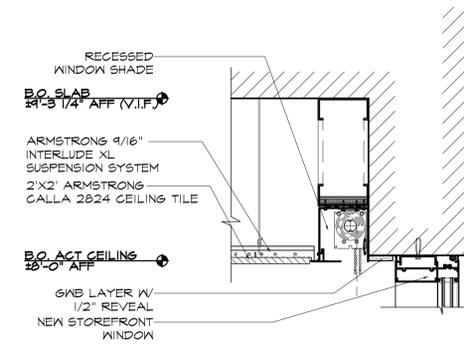
6 CEILING DETAIL SCALE: 1 1/2" = 1'-0"



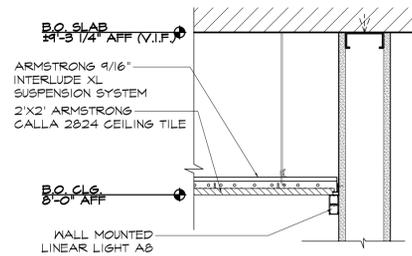
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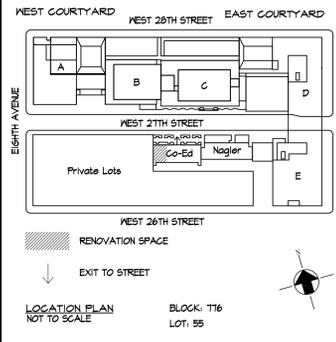
8 CEILING DETAIL SCALE: 1 1/2" = 1'-0"



9 CEILING DETAIL SCALE: 1 1/2" = 1'-0"



10 CEILING DETAIL SCALE: 1 1/2" = 1'-0"



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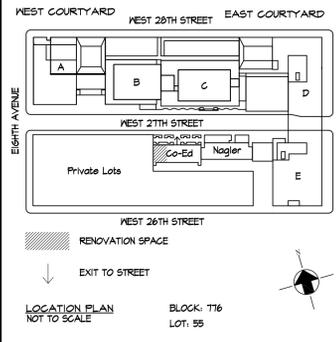
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443 Park Avenue South New York, NY 10016
 212 889 4045 Fax 212 889 3672

PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 CEILING DETAILS

SEAL & SIGNATURE: _____ DATE: 09.01.2022
 PROJECT No: 13284.154
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 CHK BY: DH & CK
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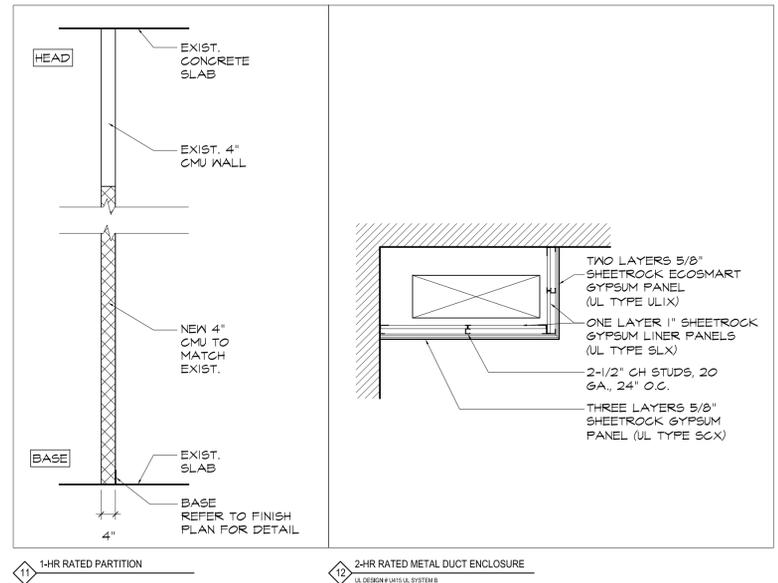
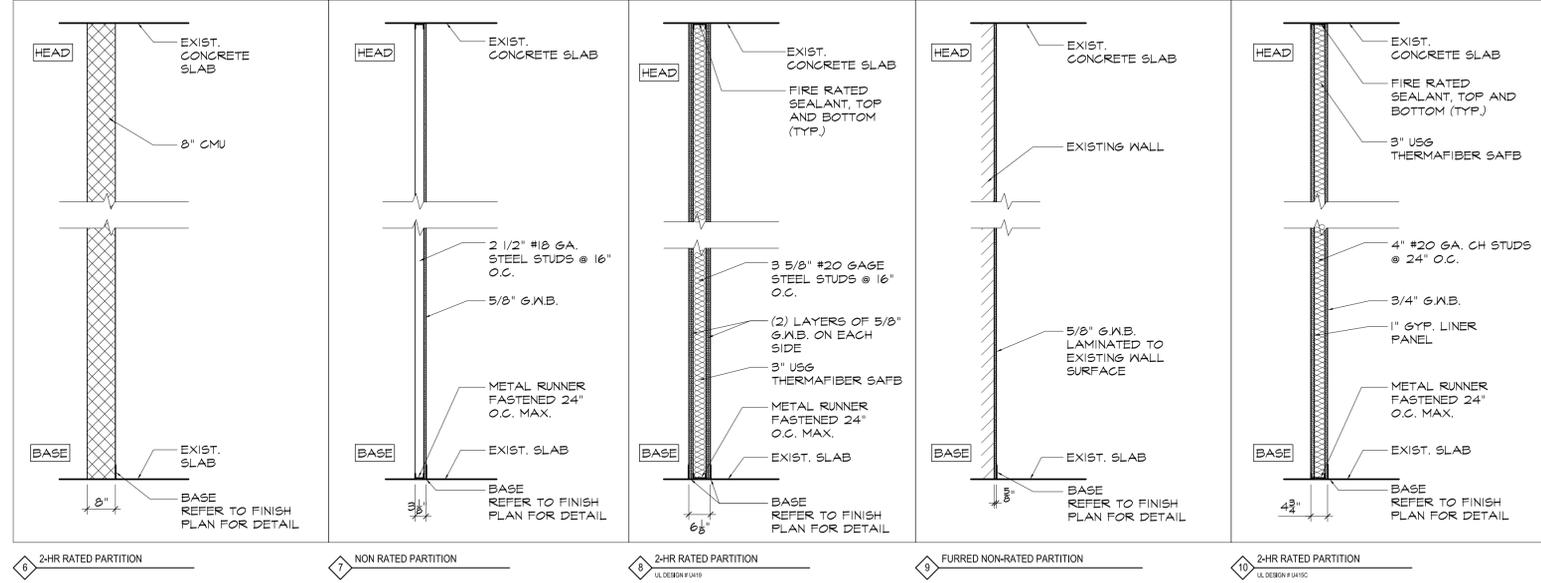
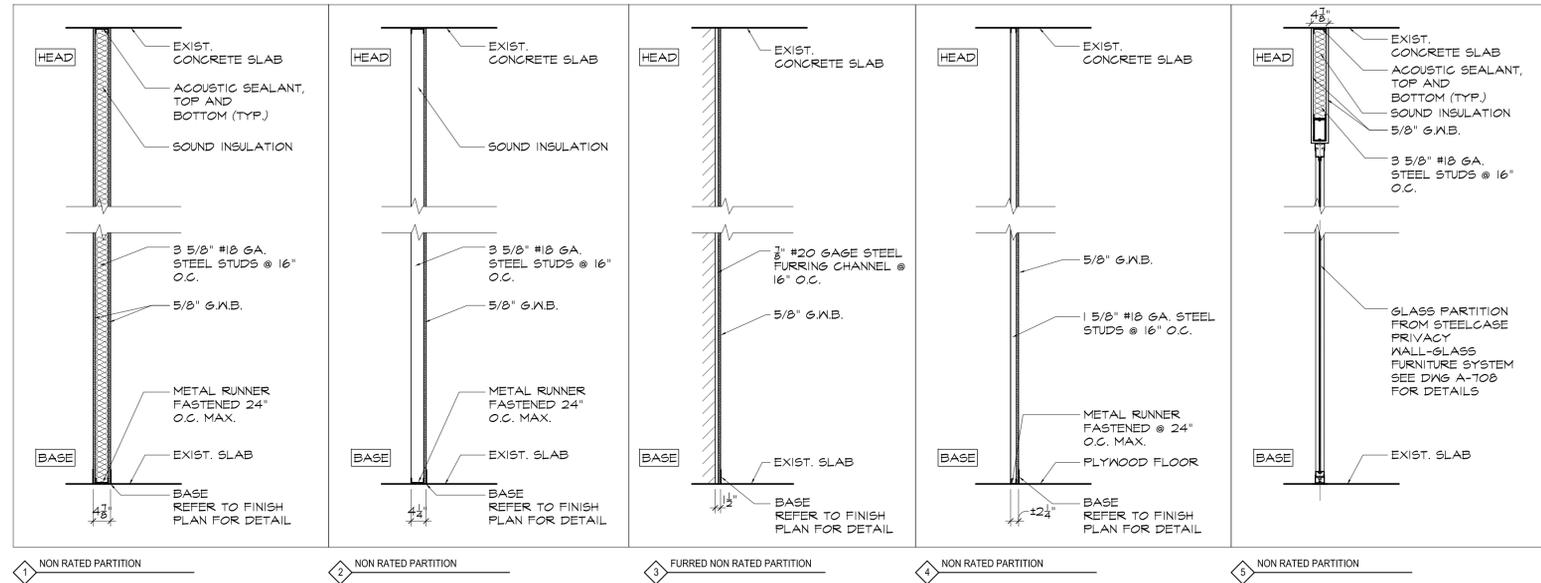
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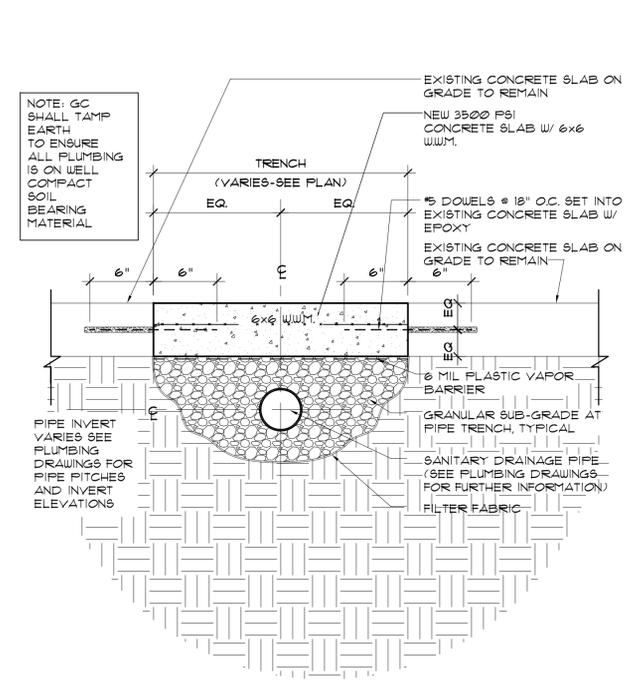
PROJECT:
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 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
**PARTITION SCHEDULE
 AND DETAILS**

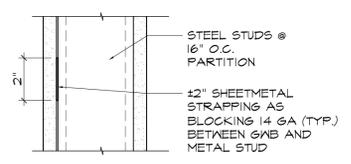
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	PROJECT No: 13284.154
	DRAWING BY: GD & TM
	CHK BY: DH & CK
	DWG No:
	A-700.00
	SCALE: AS NOTED 40 of 61



1 PARTITION SCHEDULE
 SCALE: 3/8" = 1'-0"



2 PIPE BEDDING & SLAB DETAIL (TYP.)
 SCALE: 1 1/2" = 1'-0"



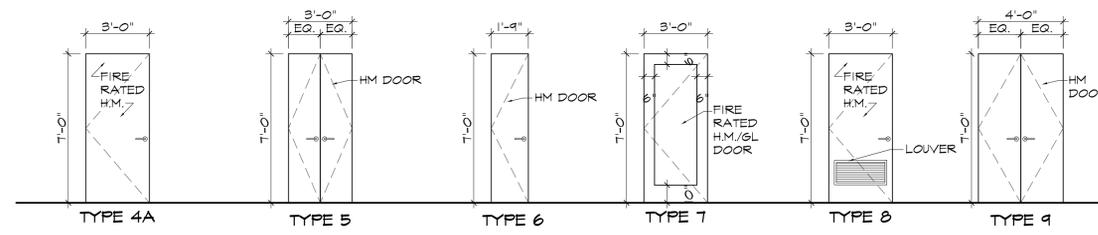
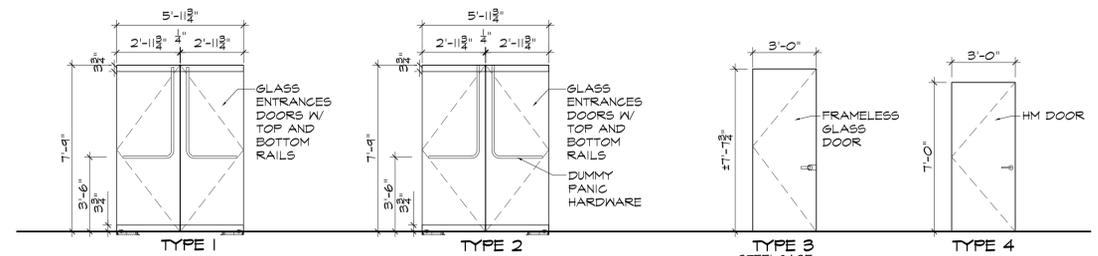
NOTE:
 1. GC TO PROVIDE STEEL STRAPPING BLOCKING FOR ALL PLUMBING FIXTURES, ACCESSORIES, WALL MOUNTED LIGHT FIXTURES AND AV EQUIPMENT (TYP.).
 2. GC TO COORDINATE DIMENSIONS AND LOCATIONS OF SHEETMETAL STRAPPING WITH ALL PLUMBING FIXTURES, ACCESSORIES, WALL MOUNTED LIGHT FIXTURES AND AV EQUIPMENT (TYP.).

3 PARTITION BLOCKING DETAIL (TYP.)
 SCALE: 3" = 1'-0"

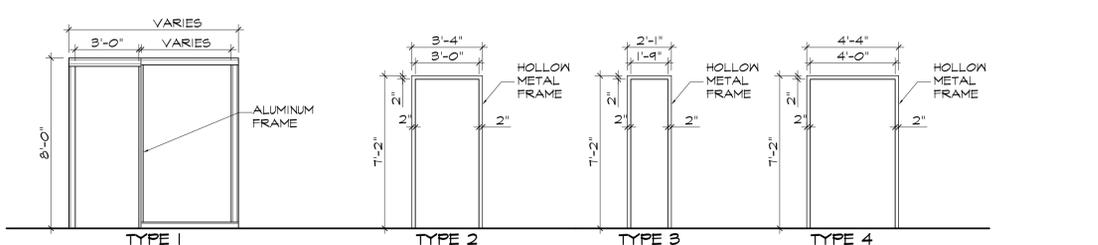
Door Schedule

#	DOOR		DOORS				FRAMES				LABEL	HARDWARE SET	REMARKS	
	FROM	TO	SIZE	THICK	MAT.	TYPE	MAT.	TYPE	JAMB	HEAD				SADDLE
1	STREET	VESTIBULE 110	6'-0"x1'-4"	3/4"	ALUM/GLASS	1	ALUM.	REFER TO DWGS A-103 TO A-107 FOR DETAILS				1	SEE DRAWINGS A-103 TO A-107 FOR DETAILS	
2	VESTIBULE 110	LOBBY	6'-0"x1'-4"	3/4"	ALUM/GLASS	2	ALUM.	REFER TO DWGS A-106 TO A-107 FOR DETAILS				2	SEE DRAWINGS A-106 TO A-107 FOR DETAILS	
3	CORRIDOR	COUNSELING ROOM 112	3'-0"x1'-7 1/2"	1/2"	GLASS	3	ALUM.	1	1C	2C	3C	-	3	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM PROVIDE 3/4" UNDERCUT
4	CORRIDOR	COUNSELING ROOM 113	3'-0"x1'-7 1/2"	1/2"	GLASS	3	ALUM.	1	1C	2C	3C	-	3	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM PROVIDE 3/4" UNDERCUT
5	CORRIDOR	RESTROOM 115	3'-0"x1'-0"	1-3/4"	HM	4	HM	2	1A	2A	3A	-	4	PROVIDE 3/4" UNDERCUT
6	CORRIDOR	ADA RESTROOM 116	3'-0"x1'-0"	1-3/4"	HM	4	HM	2	1A	2A	3A	-	4	PROVIDE 3/4" UNDERCUT
7	CORRIDOR	STAIR B	3'-0"x1'-0"	1-3/4"	HM	4A	HM	2	1B	2B	3B	15 HR	5	
8	CORRIDOR	OFFICE 123	3'-0"x1'-7 1/2"	1/2"	GLASS	3	ALUM.	1	1C	2C	3C	-	3	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM PROVIDE 3/4" UNDERCUT
9	CORRIDOR	OFFICE 124	3'-0"x1'-7 1/2"	1/2"	GLASS	3	ALUM.	1	1C	2C	3C	-	3	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM PROVIDE 3/4" UNDERCUT
10	CORRIDOR	MEETING ROOM 117	3'-0"x1'-7 1/2"	1/2"	GLASS	3	ALUM.	1	1C	2C	3C	-	3	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM PROVIDE 3/4" UNDERCUT
11	CORRIDOR	MEETING ROOM 118	3'-0"x1'-7 1/2"	1/2"	GLASS	3	ALUM.	1	1C	2C	3C	-	3	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM PROVIDE 3/4" UNDERCUT
12	STAIR C	STAIR C	3'-0"x1'-0"	1-3/4"	HM	4	HM	2	1A	2A	3A	-	5	
13	STAIR C	STAIR C	3'-0"x1'-0"	1-3/4"	HM	4	HM	2	1D	2D	3D	-	5	
14	CORRIDOR	OFFICE C21	3'-0"x1'-7 1/2"	1/2"	GLASS	3	ALUM.	1	1C	2C	3D	-	3	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM PROVIDE 3/4" UNDERCUT
15	CORRIDOR	OFFICE C22	3'-0"x1'-7 1/2"	1/2"	GLASS	3	ALUM.	1	1C	2C	3D	-	3	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM PROVIDE 3/4" UNDERCUT
16	CORRIDOR	OFFICE C23	3'-0"x1'-7 1/2"	1/2"	GLASS	3	ALUM.	1	1C	2C	3D	-	3	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM PROVIDE 3/4" UNDERCUT
17	CORRIDOR	OFFICE C24	3'-0"x1'-7 1/2"	1/2"	GLASS	3	ALUM.	1	1C	2C	3D	-	3	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM PROVIDE 3/4" UNDERCUT
18	CORRIDOR	OFFICE C25	3'-0"x1'-7 1/2"	1/2"	GLASS	3	ALUM.	1	1C	2C	3D	-	3	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM PROVIDE 3/4" UNDERCUT
19	CORRIDOR	OFFICE C26	3'-0"x1'-7 1/2"	1/2"	GLASS	3	ALUM.	1	1C	2C	3D	-	3	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM PROVIDE 3/4" UNDERCUT
20	CORRIDOR	OFFICE C27	3'-0"x1'-7 1/2"	1/2"	GLASS	3	ALUM.	1	1C	2C	3D	-	3	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM PROVIDE 3/4" UNDERCUT
21	CORRIDOR	OFFICE C28	3'-0"x1'-7 1/2"	1/2"	GLASS	3	ALUM.	1	1C	2C	3D	-	3	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM PROVIDE 3/4" UNDERCUT
22	CORRIDOR	OFFICE C29	3'-0"x1'-7 1/2"	1/2"	GLASS	3	ALUM.	1	1C	2C	3D	-	3	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM PROVIDE 3/4" UNDERCUT
23	CORRIDOR	OFFICE C30	3'-0"x1'-7 1/2"	1/2"	GLASS	3	ALUM.	1	1C	2C	3D	-	3	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM PROVIDE 3/4" UNDERCUT
24	CORRIDOR	OFFICE C31	3'-0"x1'-7 1/2"	1/2"	GLASS	3	ALUM.	1	1C	2C	3D	-	3	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM PROVIDE 3/4" UNDERCUT
25	CORRIDOR	MECH. CL. C32	1'-4"x1'-0"	1-3/4"	HM	6	HM	3	1A	2A	3E	-	5	
26	CORRIDOR	MECH. ROOM C36	3'-0"x1'-0"	1-3/4"	HM	6	HM	2	1E	2E	3F	15 HR	6	PROVIDE LOWER W/ FUSIBLE LINK FOR 90 MINUTE FIRE RATINGS LOWER TO BE FACTORY PAINTED TO MATCH DOOR
27	CORRIDOR	ADA RESTROOM C38	3'-0"x1'-0"	1-3/4"	HM	4	HM	2	1A	2A	3G	-	4	
28	ADM. OFF. CORRIDOR	MAIN CORRIDOR	3'-0"x1'-0"	1-3/4"	HM	4A	HM	2	1E	2E	3H	15 HR	9	
29	CORRIDOR	STORAGE ROOM 213	3'-0"x1'-0"	1-3/4"	HM	4A	HM	2	1F	2F	3K	15 HR	7	
30	CORRIDOR	LOUNGE 107	3'-0"x1'-0"	2-1/2"	HM/GLASS	7	HM	2	1F	2F	3K	15 HR	10	SAFTIFIRST 6PX BUILDER'S SERIES GLASS PROVIDE POWERED DOOR OPENER & MAG. DOOR HOLDER
31	STAIR C	ELECTRICAL CL. C41	4'-0"x1'-0"	1-3/4"	HM	9	HM	4	1H	2H	3J	-	11	

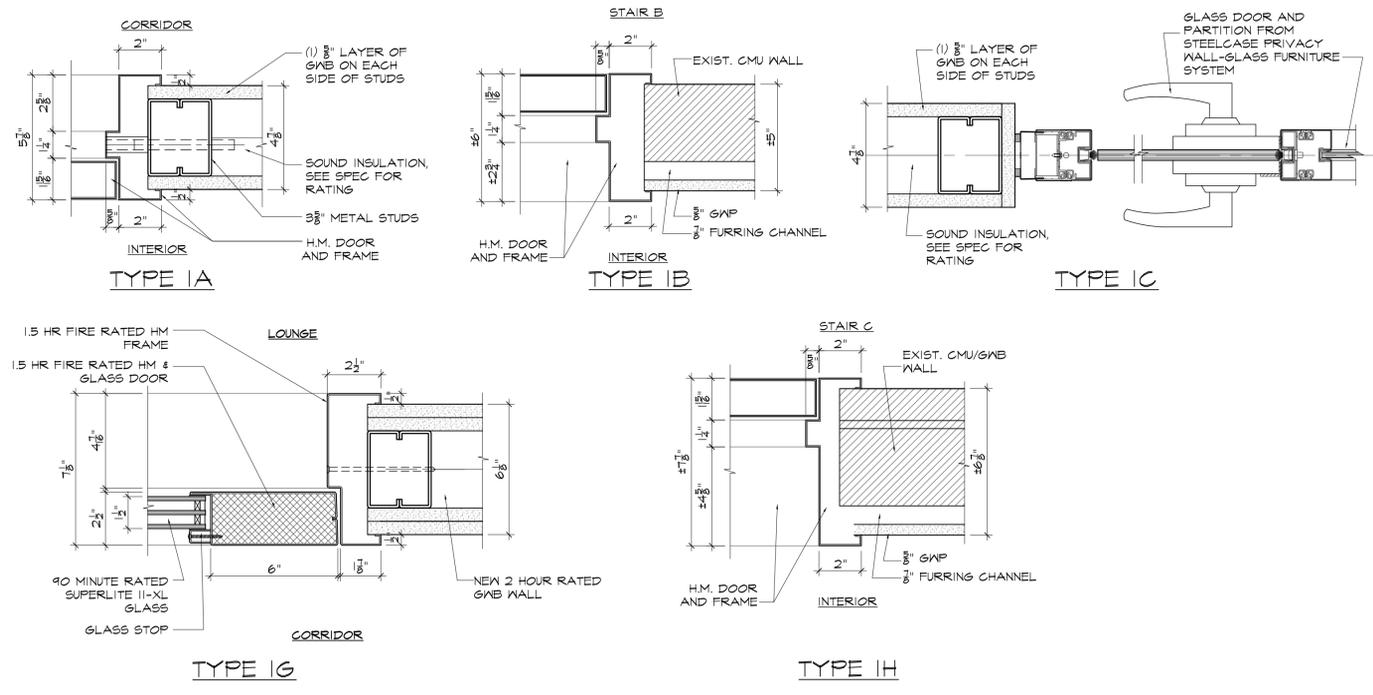
- NOTES:
- SEE DRAWING A-102 FOR HEAD AND SADDLE DETAILS.
 - COORDINATE WITH STEELCASE FURNITURE SYSTEM FOR GLASS DOOR & GLASS PARTITION. SEE DRAWING A-106 FOR ADDITIONAL DETAILS.
 - REFER TO DRAWINGS A-103 TO A-105 FOR ENTRY DOOR DETAILS.
 - REFER TO DRAWINGS A-106 TO A-107 FOR VESTIBULE DOOR DETAILS.
 - SEE SPECIFICATIONS FOR FRAME AND HARDWARE INFORMATION.
 - REFER TO ELECTRICAL DRAWINGS FOR DOOR SECURITY SYSTEM DETAILS.



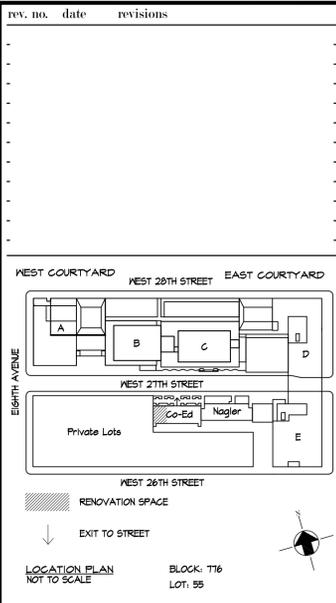
1 DOOR TYPE SCALE: 1/4" = 1'-0"



2 FRAME TYPE SCALE: 1/4" = 1'-0"



3 JAMB DETAILS SCALE: 3" = 1'-0"



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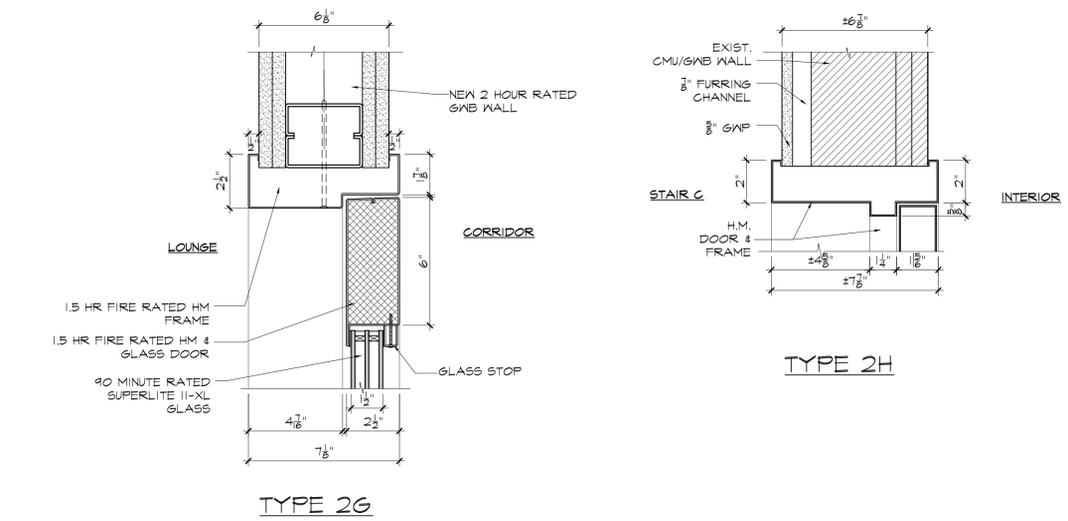
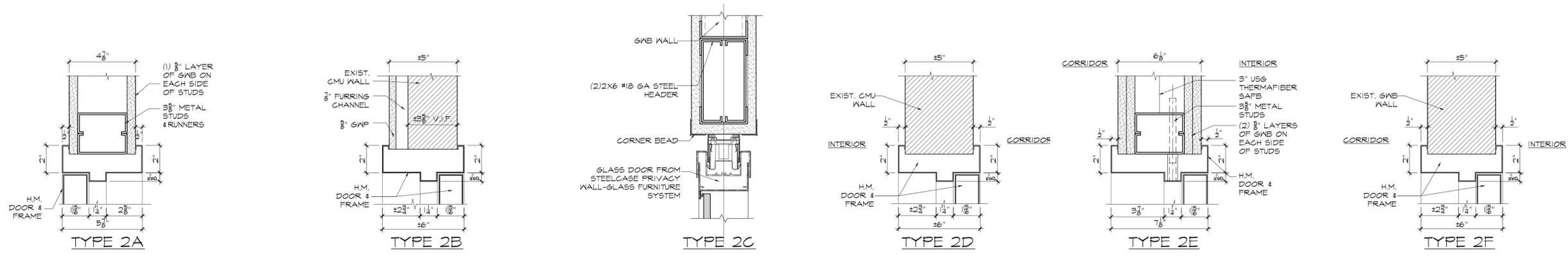
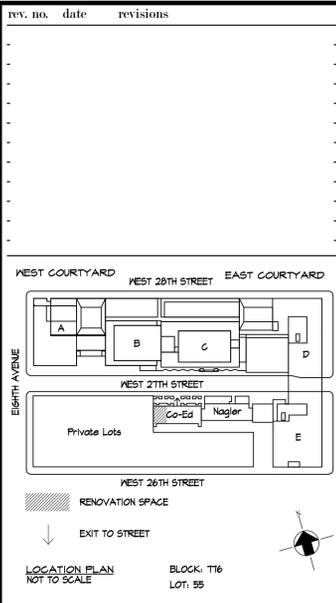
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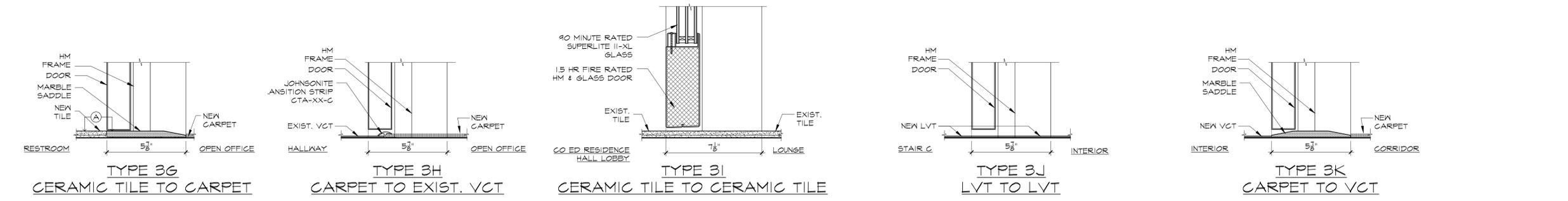
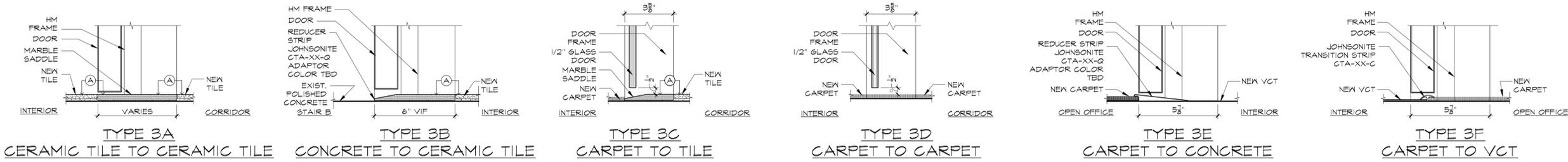
PROJECT:
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 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
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DRAWING TITLE:
DOOR SCHEDULE AND DETAILS

SEAL & SIGNATURE: _____ DATE: 09.01.2022
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 SCALE AS NOTED 41 of 61



1 HEADER DETAILS
SCALE: 3" = 1'-0"



2 SADDLE DETAILS
SCALE: 3" = 1'-0"

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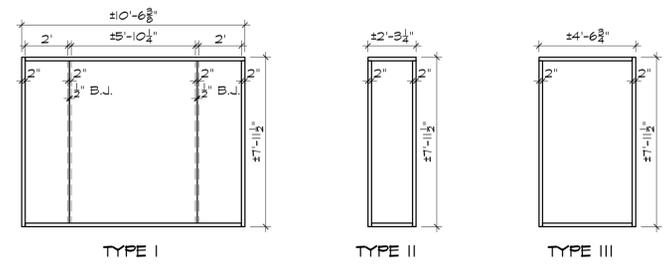
SCALE: AS NOTED 42 of 61

ISSUED FOR BID 09.01.2022

Window Schedule

#	LOCATION	TYPE	WIDTH	HEIGHT	AREA	JAMB	HEAD	SILL	MAT.	REMARKS
1	WAITING III	I	±10'-6 3/8" V.I.F.	±7'-11 1/2" V.I.F.	±89.81 s.f.	1/A-105 2/A-105 3/A-105	4/A-104	5/A-104	ALUM.	VERIFY ALL DIMENSIONS IN FIELD, FINISH TO MATCH EXISTING WINDOWS AT LOBBY. OLDCASTLE SERIES 6000 THERMAL MULTIPLANE.
2	VESTIBULE IIO	II	±2'-8 1/4" V.I.F.	±7'-11 1/2" V.I.F.	±8.07 s.f.	3/A-105 4/A-105	4/A-104	5/A-104	ALUM.	VERIFY ALL DIMENSIONS IN FIELD, FINISH TO MATCH EXISTING WINDOWS AT LOBBY. OLDCASTLE SERIES 6000 THERMAL MULTIPLANE.
3	VESTIBULE IIO	II	±2'-8 1/4" V.I.F.	±7'-11 1/2" V.I.F.	±8.07 s.f.	3/A-105 4/A-105	4/A-104	5/A-104	ALUM.	VERIFY ALL DIMENSIONS IN FIELD, FINISH TO MATCH EXISTING WINDOWS AT LOBBY. OLDCASTLE SERIES 6000 THERMAL MULTIPLANE.
4	STUDENT COUNSELING MEETING ROOM I12 & I13	I	±10'-6 3/4" V.I.F.	±7'-11 1/2" V.I.F.	±89.81 s.f.	3/A-105 2/A-105	4/A-104	5/A-104	ALUM.	VERIFY ALL DIMENSIONS IN FIELD, FINISH TO MATCH EXISTING WINDOWS AT LOBBY. OLDCASTLE SERIES 6000 THERMAL MULTIPLANE.
5	STUDENT COUNSELING MEETING ROOM I13	III	±4'-6 3/4" V.I.F.	±7'-11 1/2" V.I.F.	±56.30 s.f.	3/A-105 6/A-105	4/A-104	5/A-104	ALUM.	VERIFY ALL DIMENSIONS IN FIELD, FINISH TO MATCH EXISTING WINDOWS AT LOBBY. OLDCASTLE SERIES 6000 THERMAL MULTIPLANE.
6	OFFICE 124 & 125A	I	±10'-6 3/4" V.I.F.	±7'-11 1/2" V.I.F.	±89.81 s.f.	1/A-105 2/A-105 3/A-105	4/A-104	5/A-104	ALUM.	VERIFY ALL DIMENSIONS IN FIELD, FINISH TO MATCH EXISTING WINDOWS AT LOBBY. OLDCASTLE SERIES 6000 THERMAL MULTIPLANE.
7	MEETING ROOM I17	I	±10'-6 3/4" V.I.F.	±7'-11 1/2" V.I.F.	±89.81 s.f.	3/A-105 2/A-105	4/A-104	5/A-104	ALUM.	VERIFY ALL DIMENSIONS IN FIELD, FINISH TO MATCH EXISTING WINDOWS AT LOBBY. OLDCASTLE SERIES 6000 THERMAL MULTIPLANE.
8	MEETING ROOM I18	I	±10'-6 3/4" V.I.F.	±7'-11 1/2" V.I.F.	±89.81 s.f.	3/A-105 2/A-105 4/A-105	4/A-104	5/A-104	ALUM.	VERIFY ALL DIMENSIONS IN FIELD, FINISH TO MATCH EXISTING WINDOWS AT LOBBY. OLDCASTLE SERIES 6000 THERMAL MULTIPLANE.

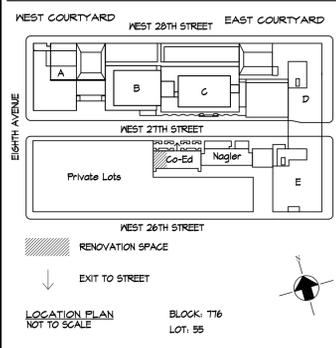
- NOTE:
- SEE DRAWING A-104 FOR REAR WINDOWS PLAN, ELEVATION AND DETAILS.
 - SEE DRAWING A-105 FOR WINDOW DETAILS.
 - CONTRACTOR TO VERIFY ALL DIMENSIONS IN THE FIELD.
 - NEW WINDOWS TO MATCH EXISTING LOBBY WINDOWS.
 - SEE SPECIFICATIONS FOR FRAME AND GLASS INFORMATION.



WINDOW TYPE SCALE: 1/4" = 1'-0"

GENERAL NOTES:

- ALUMINUM STOREFRONT CONSTRUCTION BY OLD CASTLE BUILDING ENVELOPE PRODUCTS- FG-6000 SERIES ALUMINUM STOREFRONT CONSTRUCTION W/ INSULATED DOUBLE GLAZING AND THERMAL BREAK TO WITHSTAND THE MAXIMUM WINDOW LOADS FOR THE NYC REGION AND COMPLY WITH NYC ENERGY CODE REQUIREMENTS. VESTIBULE GLAZING TO BE FG-3000 SERIES SINGLE GLAZED. GC SHALL SUBMIT MANUFACTURERS FABRICATION (SHOP) DRAWING SIGNED AND SEALED BY AN ENGINEER.
- GC SHALL PROVIDE TO ARCHITECT A MOCK UP OF STOREFRONT TO INCLUDE FRAME, GLAZING AND SEALANTS PRIOR TO CONSTRUCTION.



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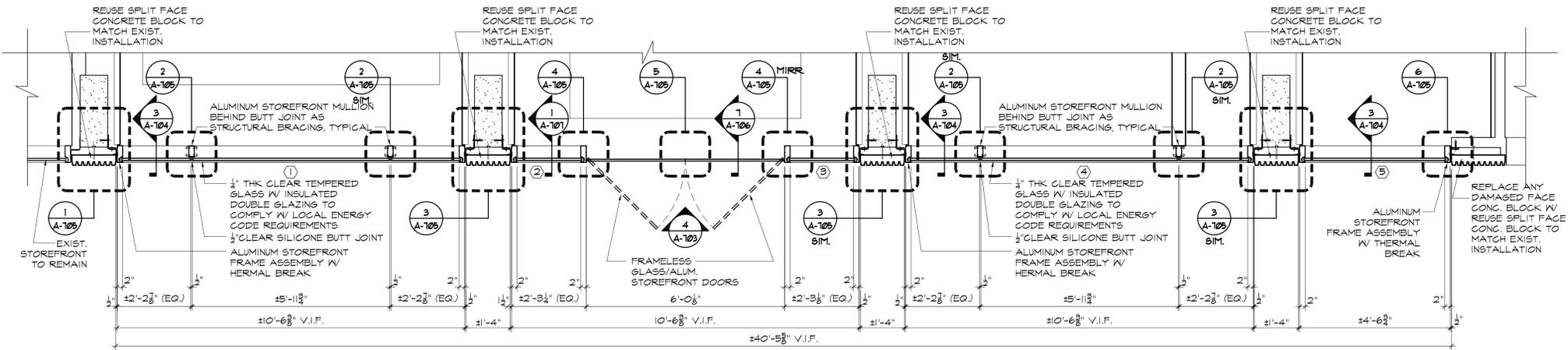
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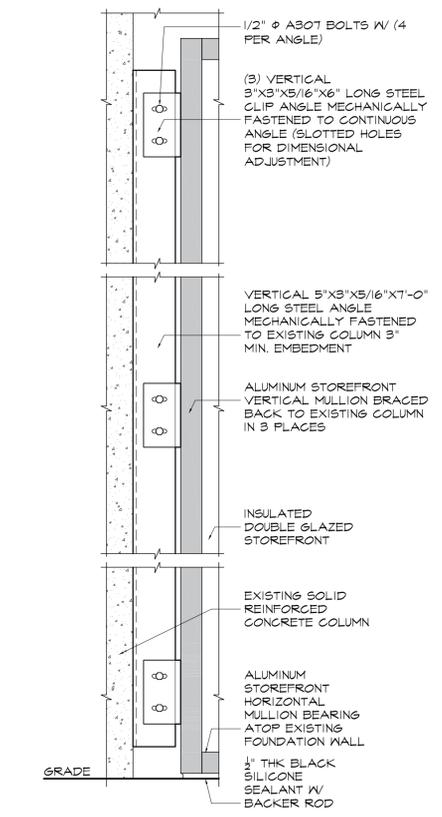
DRAWING TITLE:
WINDOW SCHEDULE
FRONT FACADE WINDOWS
PLAN, ELEVATION & DETAILS

SEAL & SIGNATURE: _____ DATE: 09.01.2022
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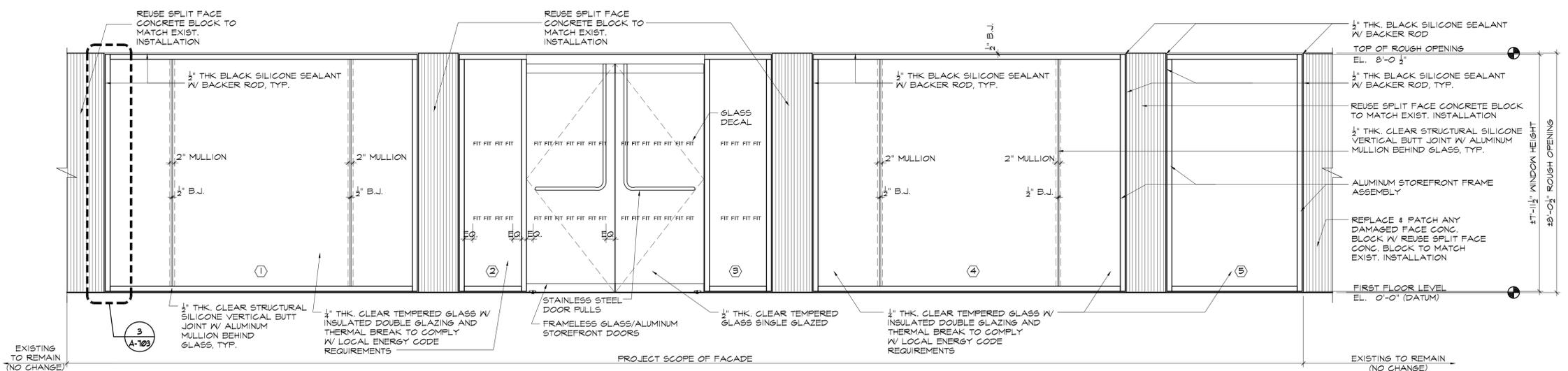
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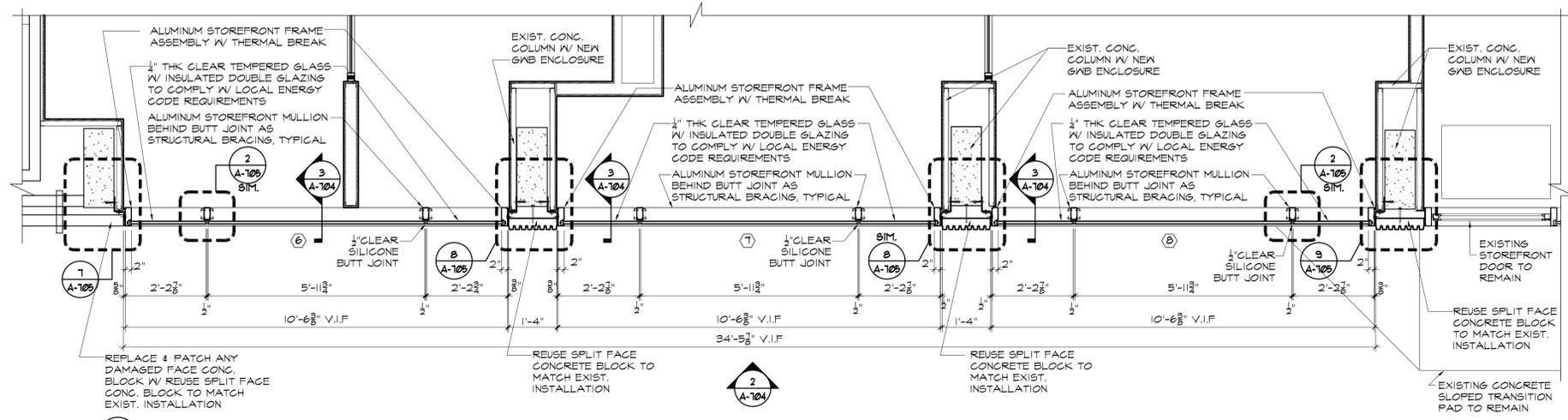
FRONT FACADE ENLARGED STOREFRONT PLAN SCALE: 1/2" = 1'-0"



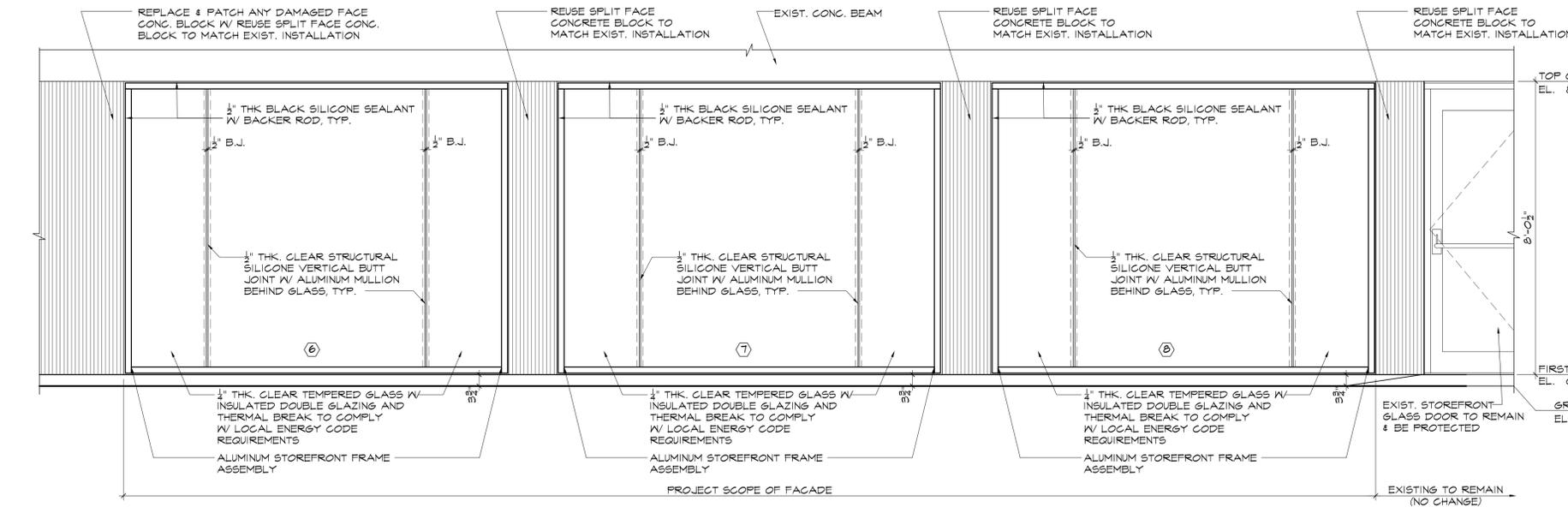
DETAIL ELEVATION STOREFRONT ATTACHMENT SCALE: 1-1/2" = 1'-0"



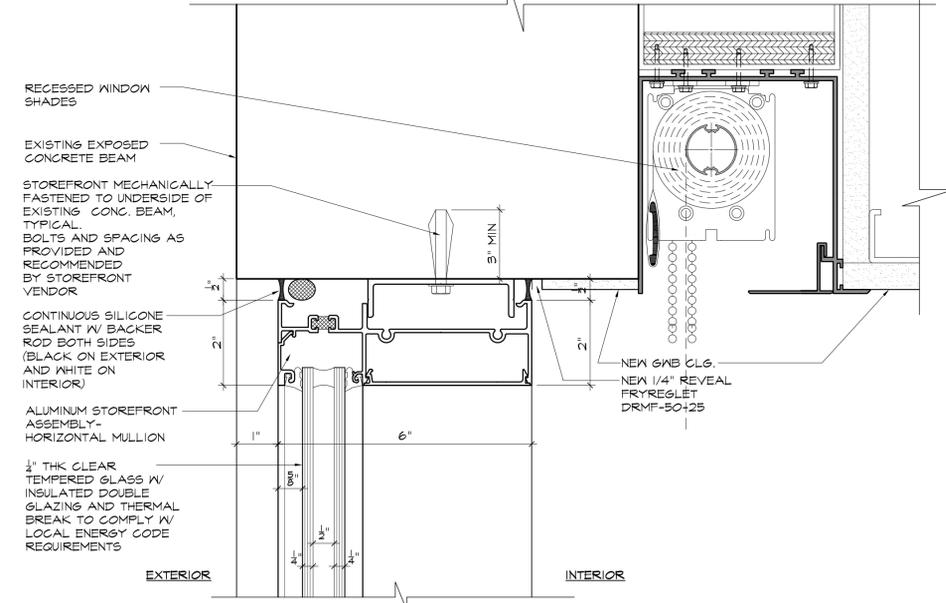
FRONT FACADE ENLARGED STOREFRONT ELEVATION SCALE: 1/2" = 1'-0"



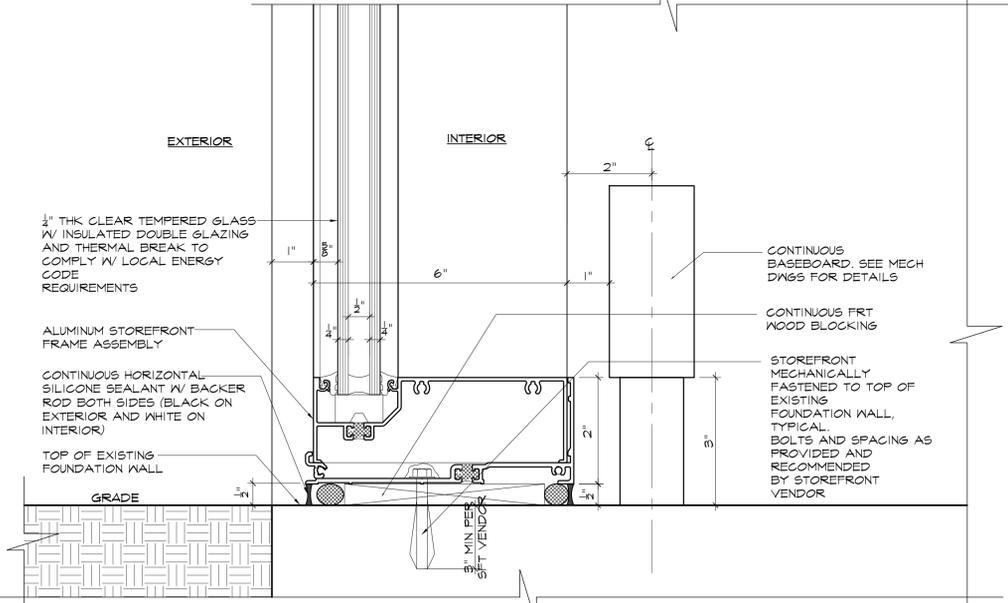
1 ENLARGED STOREFRONT PLAN - REAR FAÇADE
SCALE: 1/2" = 1'-0"



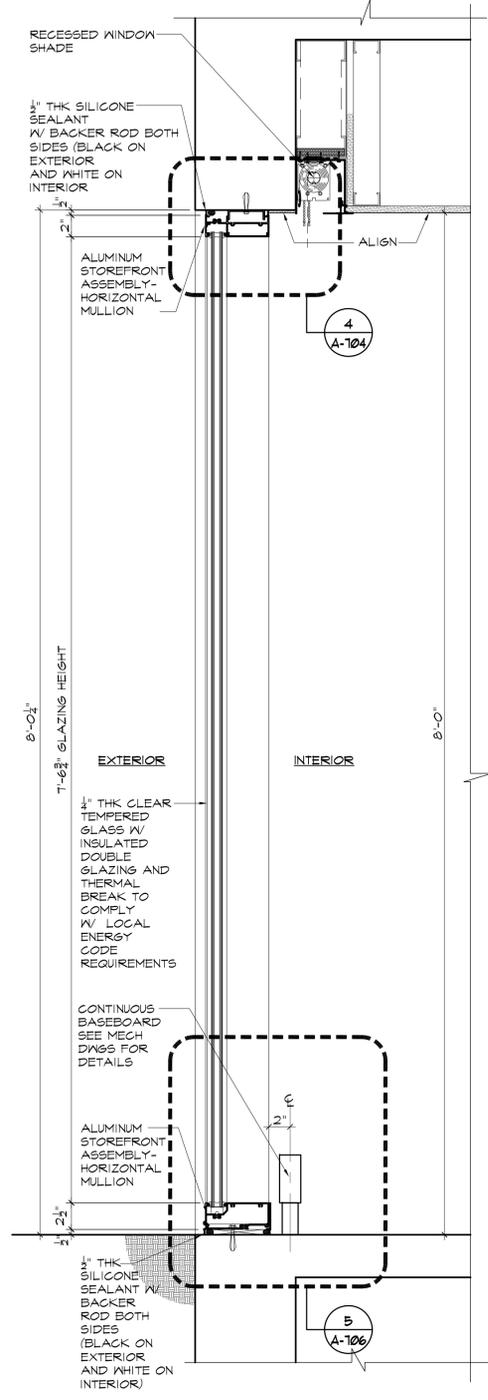
2 ENLARGED STOREFRONT ELEVATION - REAR FAÇADE
SCALE: 1/2" = 1'-0"



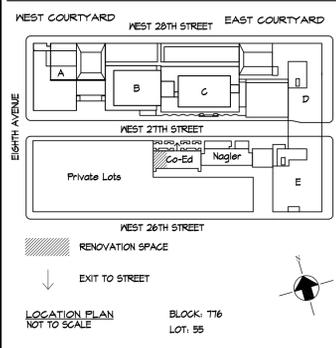
4 WINDOW HEAD DETAIL (TYP.)
SCALE: 6" = 1'-0"



5 WINDOW BASE DETAIL (TYP.)
SCALE: 6" = 1'-0"



3 WINDOW SECTION (TYP.)
SCALE: 1-1/2" = 1'-0"



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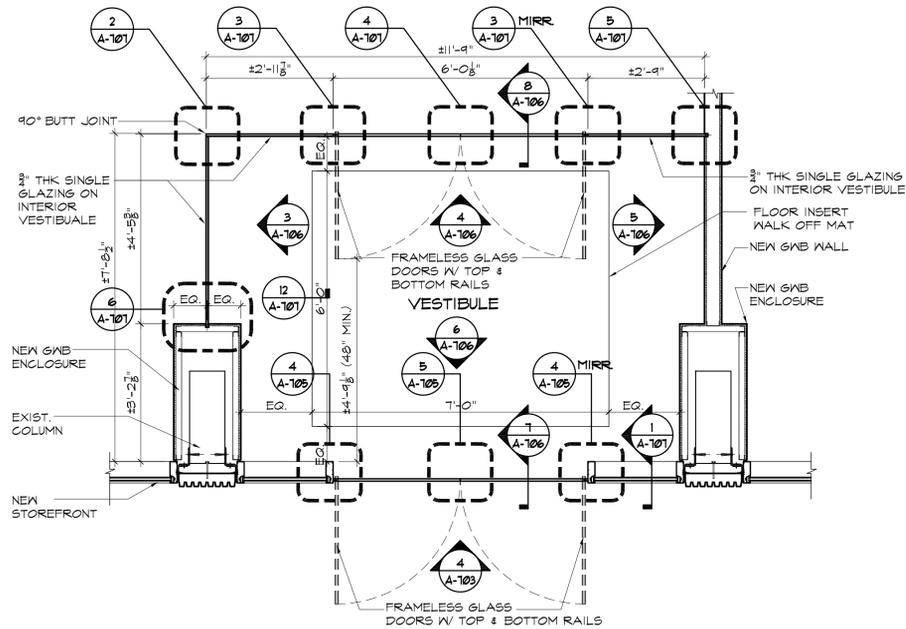
PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 27TH ST
NEW YORK NY 10001

DRAWING TITLE:
REAR FAÇADE WINDOWS
PLAN, ELEVATION, SECTION
& DETAILS

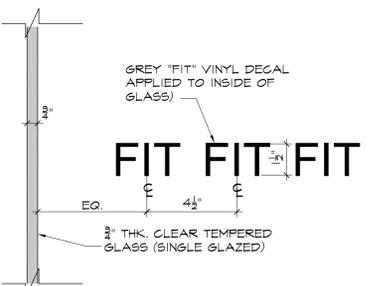
SEAL & SIGNATURE: DATE: 09.01.2022
PROJECT No: 13284.154
DRAWING BY: GD & TM
CHK BY: DH & CK
DWG No:

A-704.00

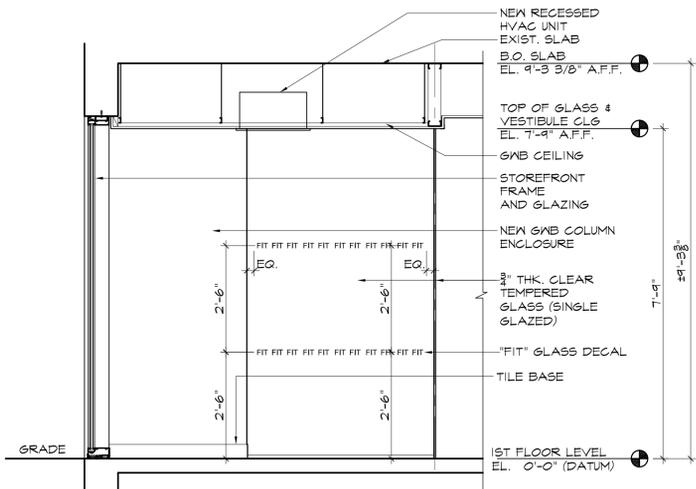
SCALE AS NOTED 44 of 61



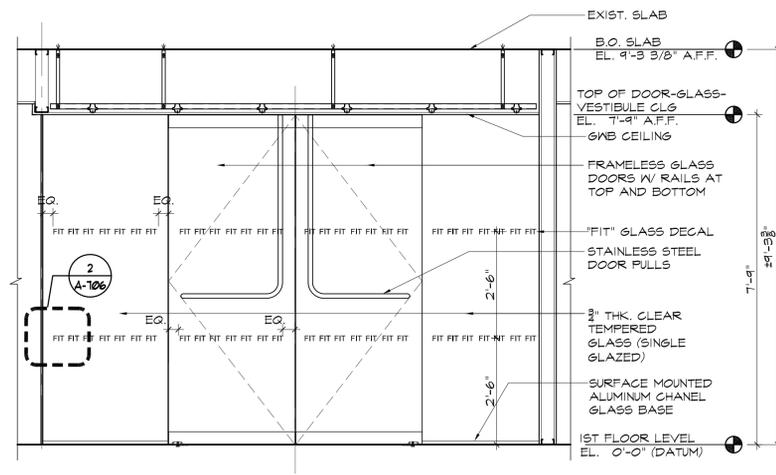
1 VESTIBULE ENLARGED PLAN
SCALE: 1/2" = 1'-0"



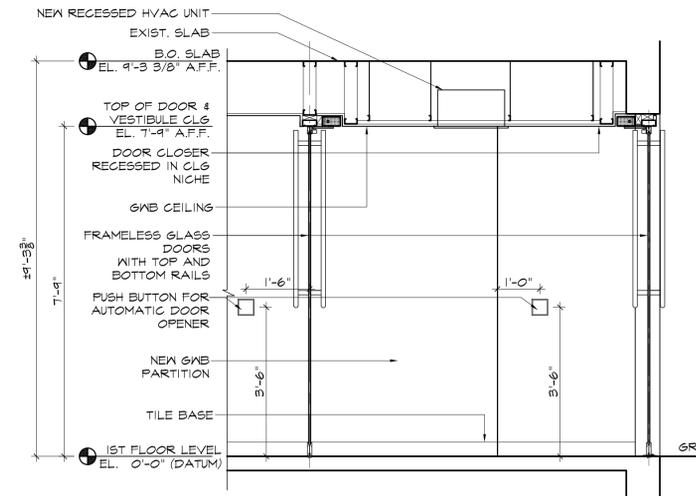
2 DECAL DETAIL
SCALE: 1/2" = 1'-0"



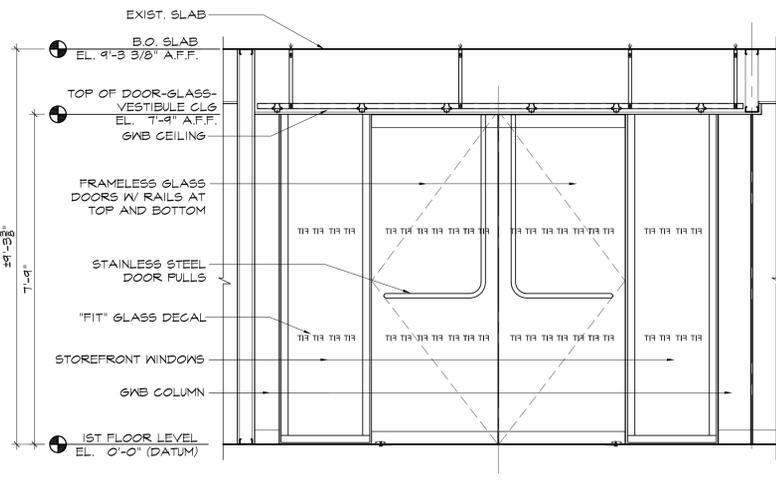
3 VESTIBULE ENLARGED SECTION/ELEVATION
SCALE: 1/2" = 1'-0"



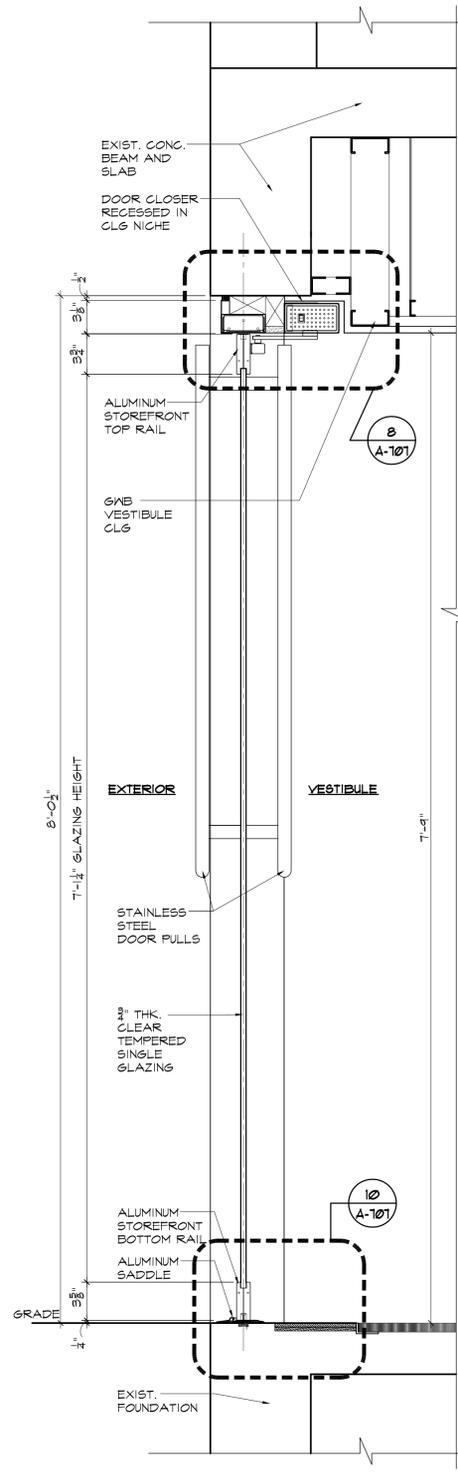
4 VESTIBULE ENLARGED SECTION/ELEVATION
SCALE: 1/2" = 1'-0"



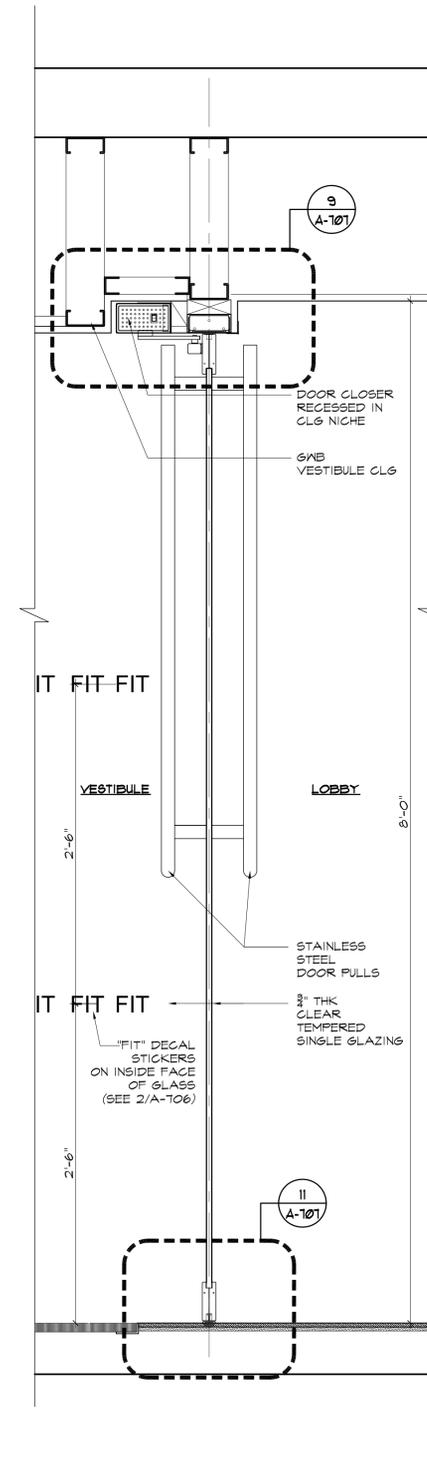
5 VESTIBULE ENLARGED SECTION/ELEVATION
SCALE: 1/2" = 1'-0"



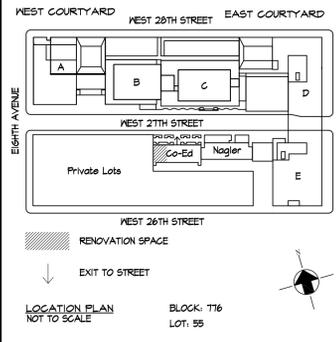
6 VESTIBULE ENLARGED SECTION/ELEVATION
SCALE: 1/2" = 1'-0"



7 SECTION AT VESTIBULE DOOR
SCALE: 1-1/2" = 1'-0"



8 SECTION AT VESTIBULE DOOR
SCALE: 1-1/2" = 1'-0"



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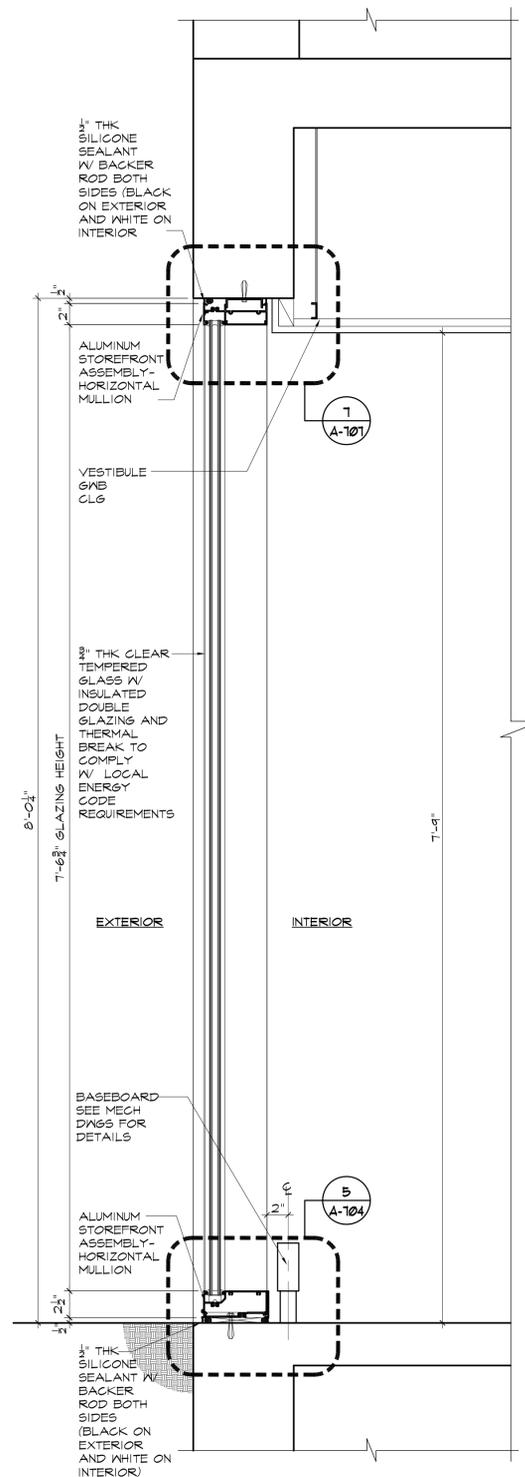
DRAWING TITLE:
VESTIBULE PLAN
ELEVATIONS AND DETAILS

SEAL & SIGNATURE: DATE: 09.01.2022
PROJECT No: 13284.154
DRAWING BY: GD & TM
CHK BY: DH & CK
DWG No:

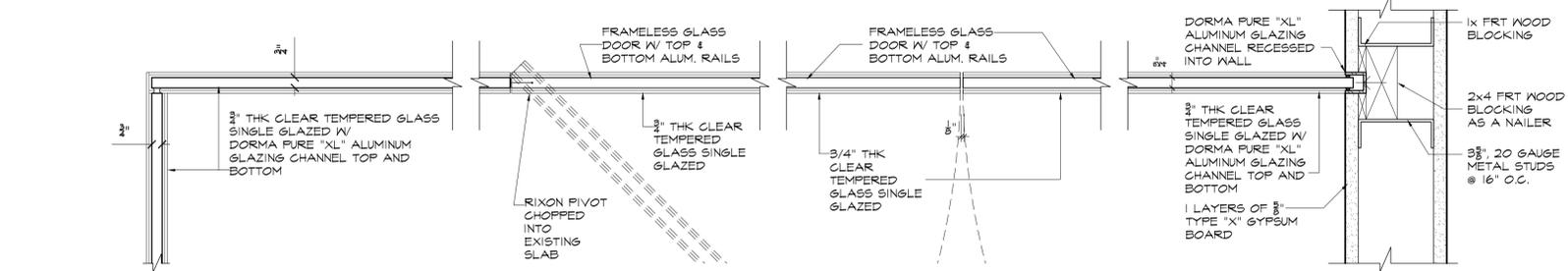
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SCALE AS NOTED 46 of 61

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1 SECTION AT VESTIBULE WINDOW
SCALE: 3" = 1'-0"

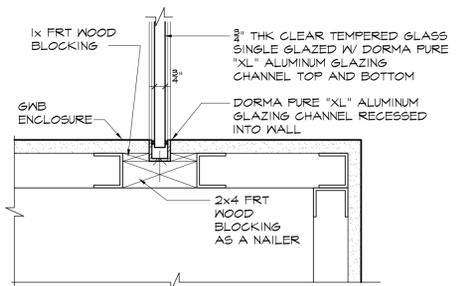


2 VESTIBULE DETAIL
SCALE: 3" = 1'-0"

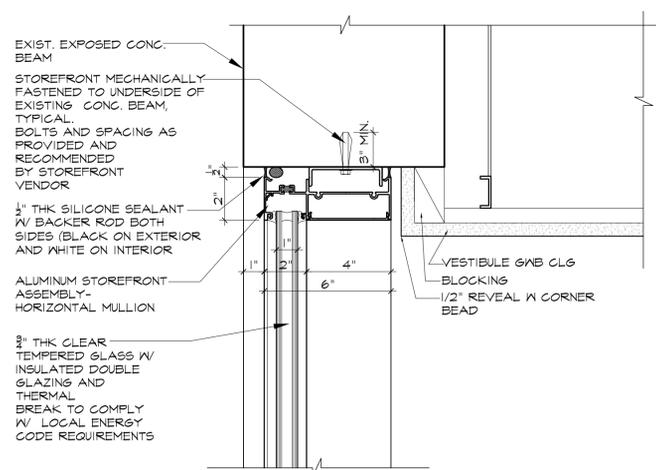
3 VESTIBULE DETAIL
SCALE: 3" = 1'-0"

4 VESTIBULE DETAIL
SCALE: 3" = 1'-0"

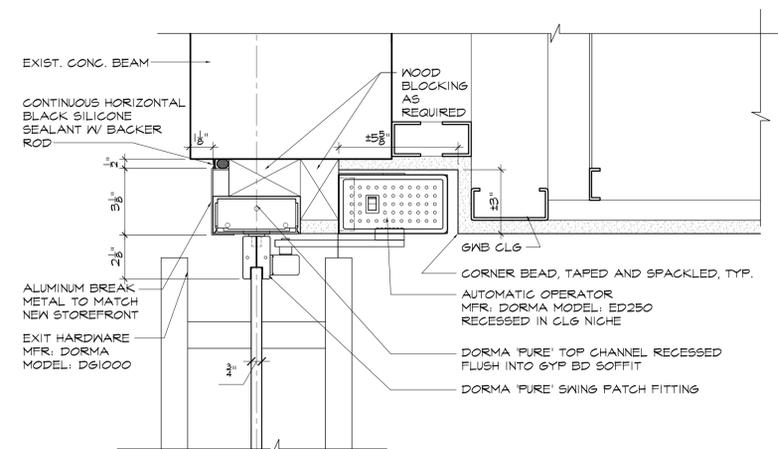
5 VESTIBULE DETAIL
SCALE: 3" = 1'-0"



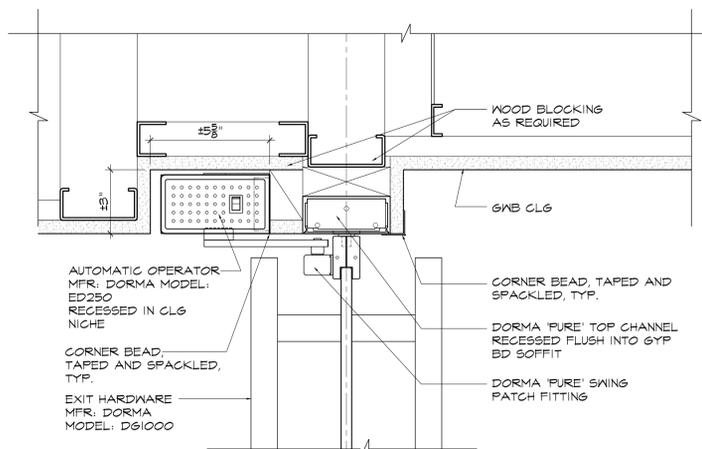
6 VESTIBULE DETAIL
SCALE: 3" = 1'-0"



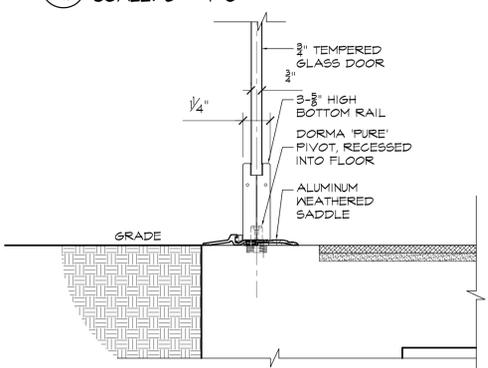
7 VESTIBULE WINDOW HEAD DETAIL
SCALE: 3" = 1'-0"



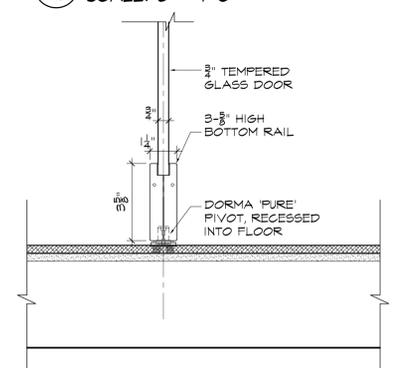
8 DETAIL OF ENTRY DOOR
SCALE: 3" = 1'-0"



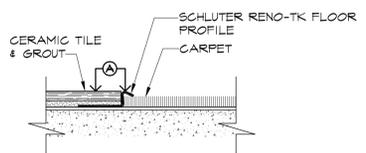
9 DETAIL OF ENTRY DOOR
SCALE: 3" = 1'-0"



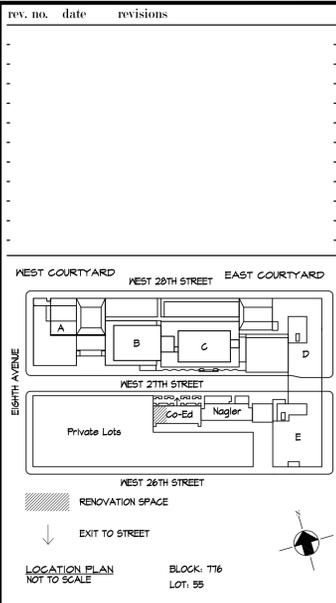
10 DETAIL OF ENTRY DOOR
SCALE: 3" = 1'-0"



11 DETAIL OF ENTRY DOOR
SCALE: 3" = 1'-0"



12 DETAIL OF INSERT MAT
SCALE: 6" = 1'-0"



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DRAWING TITLE:
VESTIBULE SECTION & DETAILS

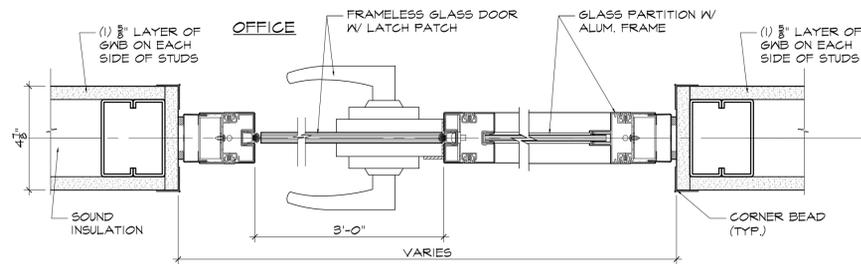
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A-707.00
SCALE AS NOTED 47 of 61

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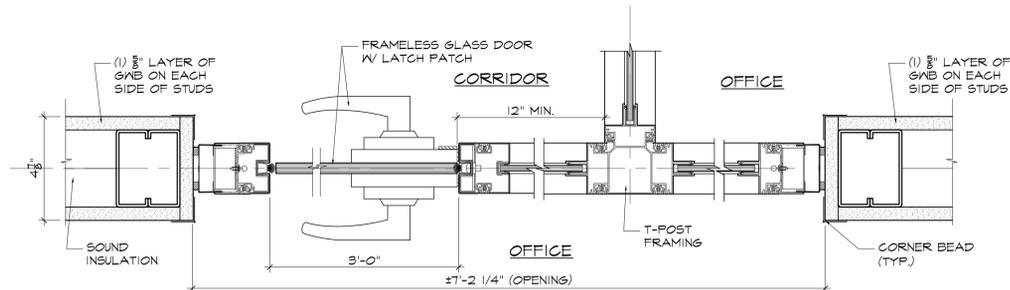
Interior Glass Partition Schedule

WINDOW		SIZE		OVERALL OPENING		DETAILS			MAT.	REMARKS
#	LOCATION	TYPE	WIDTH	HEIGHT	JAMB	HEAD	BASE			
A	STUDENT COUNSELING MEETING ROOM 112	I	15'-2"	8'-0"	±0'-7" W X 8'-0" H	2/A-708	3/A-708 4/A-708	3/A-708 4/A-708	ALUM. GLASS	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM, STEELCASE SMOOTH METALLIC STERLING METALLIC 479B
B	STUDENT COUNSELING MEETING ROOM 113	I	15'-0"	8'-0"	±1'-3" W X 8'-0" H	2/A-708	3/A-708 4/A-708	3/A-708 4/A-708	ALUM. GLASS	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM, STEELCASE SMOOTH METALLIC STERLING METALLIC 479B
C	OFFICE 123	I	14'-4"	8'-0"	±7'-9" W X 8'-0" H	2/A-708	3/A-708 4/A-708	3/A-708 4/A-708	ALUM. GLASS	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM, STEELCASE SMOOTH METALLIC STERLING METALLIC 479B
D	OFFICE 124	I	16'-7 1/4"	8'-0"	±6'-7 1/4" W X 8'-0" H	2/A-708	3/A-708 4/A-708	3/A-708 4/A-708	ALUM. GLASS	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM, STEELCASE SMOOTH METALLIC STERLING METALLIC 479B
E	MEETING ROOM 117	II	15'-9 1/4"	8'-0"	±7'-2 1/4" W X 8'-0" H	2/A-708	3/A-708 4/A-708	3/A-708 4/A-708	ALUM. GLASS	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM, STEELCASE SMOOTH METALLIC STERLING METALLIC 479B
F	MEETING ROOM 118	I	11'-6 1/2"	8'-0"	±11'-6 1/2" W X 8'-0" H	2/A-708	3/A-708 4/A-708	3/A-708 4/A-708	ALUM. GLASS	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM, STEELCASE SMOOTH METALLIC STERLING METALLIC 479B
G	OFFICE C21	I	11'-8"	8'-0"	±5'-1" W X 8'-0" H	2/A-708	3/A-708 4/A-708	3/A-708 4/A-708	ALUM. GLASS	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM, STEELCASE SMOOTH METALLIC STERLING METALLIC 479B
H	OFFICE C22	I	14'-6" V.I.F.	8'-0"	±7'-11" W X 8'-0" H	2/A-708	3/A-708 4/A-708	3/A-708 4/A-708	ALUM. GLASS	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM, STEELCASE SMOOTH METALLIC STERLING METALLIC 479B
I	OFFICE C23	I	11'-0" V.I.F.	8'-0"	±4'-5" W X 8'-0" H	2/A-708	3/A-708 4/A-708	3/A-708 4/A-708	ALUM. GLASS	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM, STEELCASE SMOOTH METALLIC STERLING METALLIC 479B
J	OFFICE C24	I	14'-8" V.I.F.	8'-0"	±8'-1" W X 8'-0" H	2/A-708	3/A-708 4/A-708	3/A-708 4/A-708	ALUM. GLASS	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM, STEELCASE SMOOTH METALLIC STERLING METALLIC 479B
K	OFFICE C25	I	14'-8" V.I.F.	8'-0"	±8'-1" W X 8'-0" H	2/A-708	3/A-708 4/A-708	3/A-708 4/A-708	ALUM. GLASS	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM, STEELCASE SMOOTH METALLIC STERLING METALLIC 479B
L	OFFICE C26	I	14'-8" V.I.F.	8'-0"	±8'-1" W X 8'-0" H	2/A-708	3/A-708 4/A-708	3/A-708 4/A-708	ALUM. GLASS	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM, STEELCASE SMOOTH METALLIC STERLING METALLIC 479B
M	OFFICE C27	I	14'-8" V.I.F.	8'-0"	±8'-1" W X 8'-0" H	2/A-708	3/A-708 4/A-708	3/A-708 4/A-708	ALUM. GLASS	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM, STEELCASE SMOOTH METALLIC STERLING METALLIC 479B
N	OFFICE C28	I	11'-0" V.I.F.	8'-0"	±8'-1" W X 8'-0" H	2/A-708	3/A-708 4/A-708	3/A-708 4/A-708	ALUM. GLASS	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM, STEELCASE SMOOTH METALLIC STERLING METALLIC 479B
O	OFFICE C29	I	14'-8" V.I.F.	8'-0"	±8'-1" W X 8'-0" H	2/A-708	3/A-708 4/A-708	3/A-708 4/A-708	ALUM. GLASS	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM, STEELCASE SMOOTH METALLIC STERLING METALLIC 479B
P	OFFICE C30	I	14'-8" V.I.F.	8'-0"	±8'-1" W X 8'-0" H	2/A-708	3/A-708 4/A-708	3/A-708 4/A-708	ALUM. GLASS	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM, STEELCASE SMOOTH METALLIC STERLING METALLIC 479B
Q	OFFICE C31	I	14'-8" V.I.F.	8'-0"	±8'-1" W X 8'-0" H	2/A-708	3/A-708 4/A-708	3/A-708 4/A-708	ALUM. GLASS	STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM, STEELCASE SMOOTH METALLIC STERLING METALLIC 479B

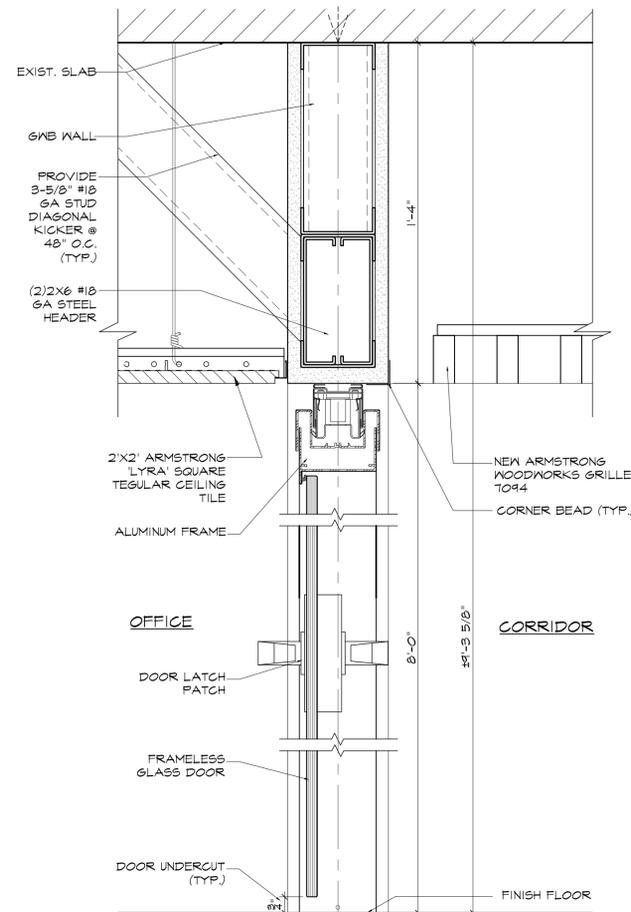
- NOTE:
 1. ALL GLASS PARTITIONS AND GLASS DOORS TO BE PROVIDED AND INSTALLED BY FIT'S FURNITURE VENDOR.
 2. ALL GLASS PARTITIONS AND GLASS DOORS TO BE STEELCASE PRIVACY WALL-GLASS FURNITURE SYSTEM.
 3. FURNITURE VENDOR TO VERIFY ALL DIMENSIONS IN THE FIELD.
 4. CONTRACTOR TO PROVIDE A FINISHED OPENING AS INDICATED IN THE SCHEDULE AND DETAILS.
 5. CONTRACTOR TO PROVIDE AND INSTALL DOOR LOCK HARDWARE.
 6. SEE SPECIFICATIONS FOR DOOR HARDWARE.



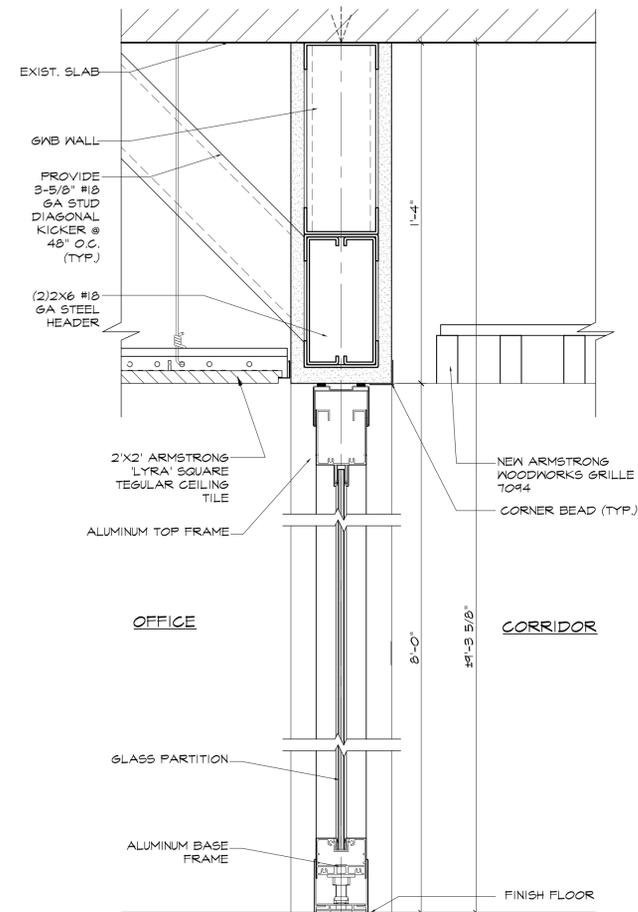
1 JAMB SECTION DETAIL
SCALE: 3" = 1'-0"



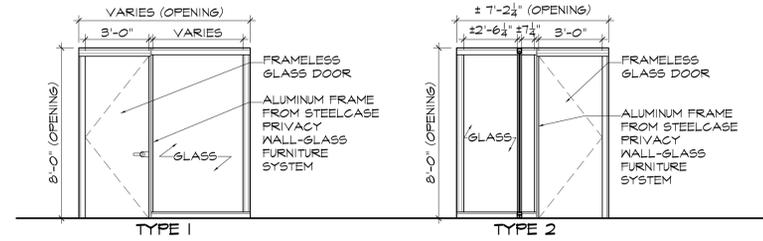
2 JAMB SECTION DETAIL
SCALE: 3" = 1'-0"



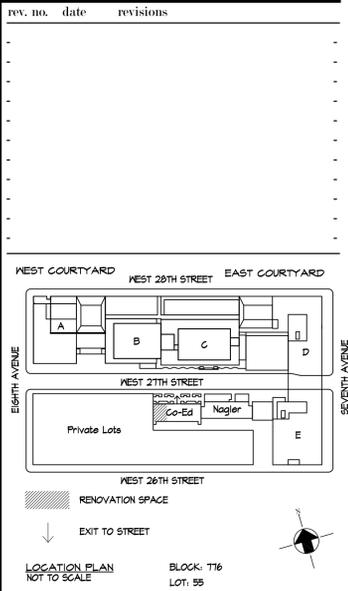
3 SECTION DETAIL AT DOOR
SCALE: 3" = 1'-0"



4 SECTION DETAIL AT GLASS PARTITION
SCALE: 3" = 1'-0"



1 PARTITION TYPE
SCALE: 1/4" = 1'-0"



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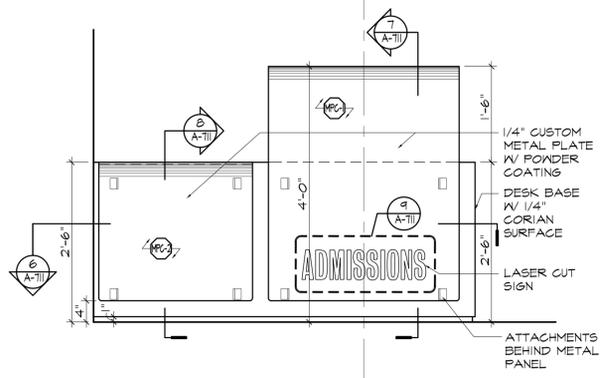
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DRAWING TITLE:
 INTERIOR GLASS PARTITION
 SCHEDULE & DETAILS

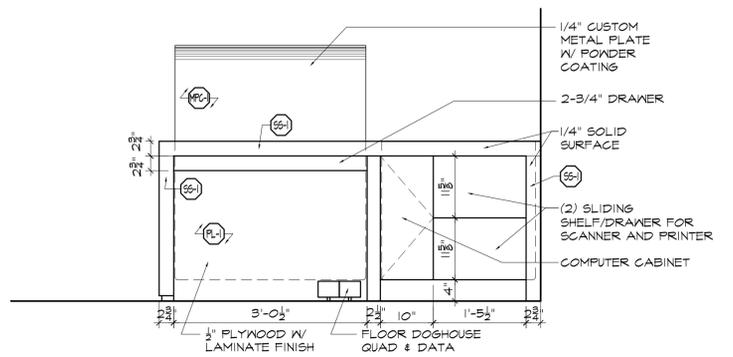
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 PROJECT No: 13284.154
 DRAWING BY: GD & TM
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 DWG No:

A-708.00

SCALE AS NOTED 48 of 61

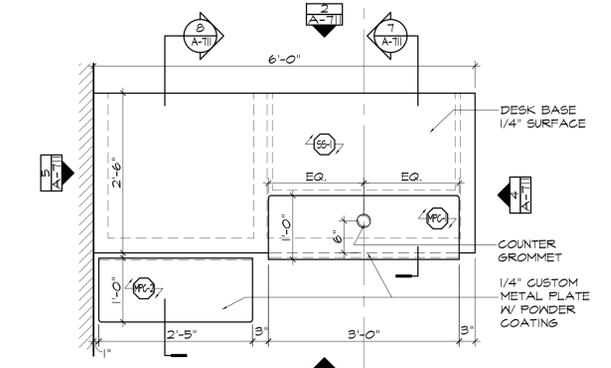


1 RECEPTION DESK FRONT ELEVATION SCALE: 3/4" = 1'-0"

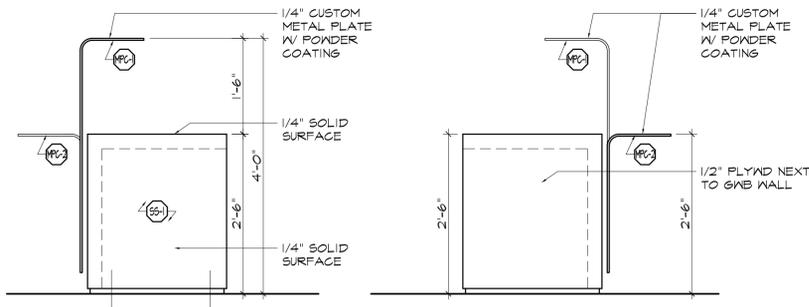


2 RECEPTION DESK REAR ELEVATION SCALE: 3/4" = 1'-0"

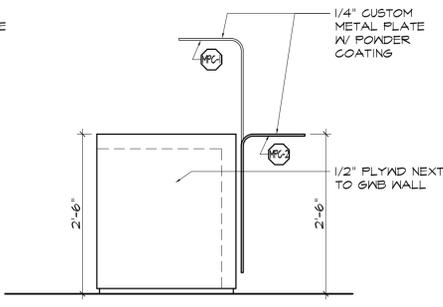
Millwork Finish Legend		
PLASTIC LAMINATE	SOLID SURFACE	METAL PANEL COLOR
(R1) MFR: WILSONART COLOR: DESIGNER WHITE NO: D354-60 FINISH: MATTE	(SS-1) (SECURITY / RECEPTION DESK) MFR: WILSONART COLOR: SVALBARD Q404T SIZE: 1/4"	(MC-1) MFR: BENJAMIN MOORE NO: 1601 COLOR: HEARTHSTONE FINISH: POWDER COATED
	(SS-2) (KITCHENETTE COUNTERTOP) MFR: CAMBERIA COLOR: SEATTLE RAIN SIZE: 1"	(MC-2) MFR: BENJAMIN MOORE NO: 748 COLOR: BLUE SUEDE SHOES FINISH: POWDER COATED



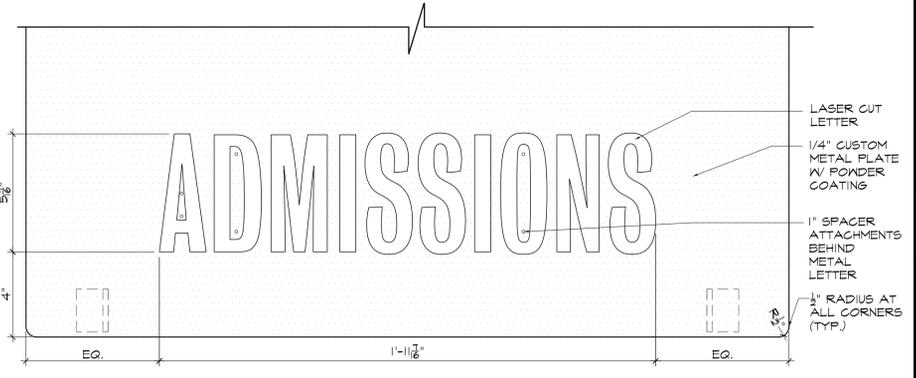
3 RECEPTION DESK TOP VIEW SCALE: 3/4" = 1'-0"



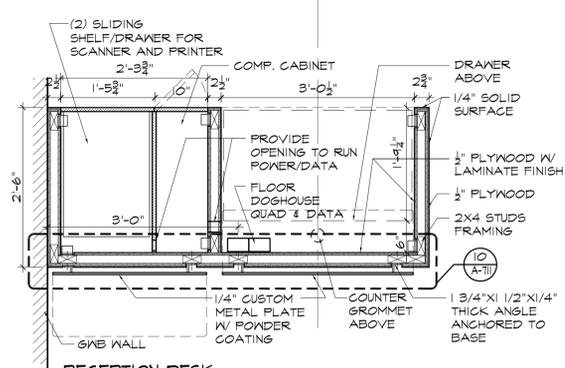
4 RECEPTION DESK SIDE ELEVATION SCALE: 3/4" = 1'-0"



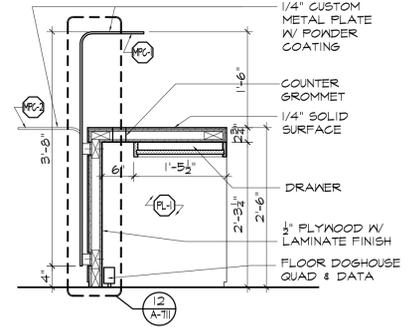
5 RECEPTION DESK SIDE ELEVATION SCALE: 3/4" = 1'-0"



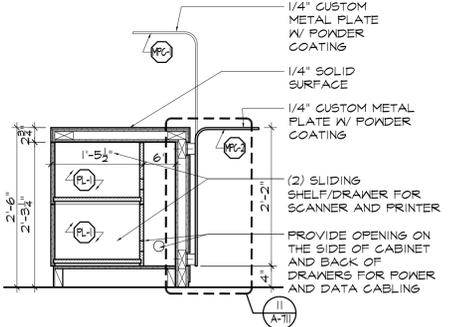
9 SIGN DETAIL SCALE: 3" = 1'-0"



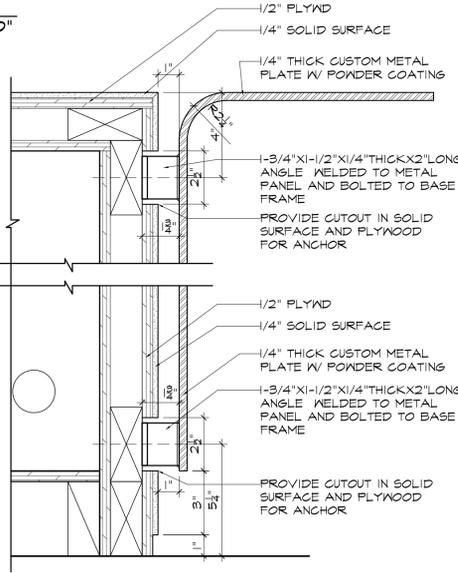
6 RECEPTION DESK SECTION SCALE: 3/4" = 1'-0"



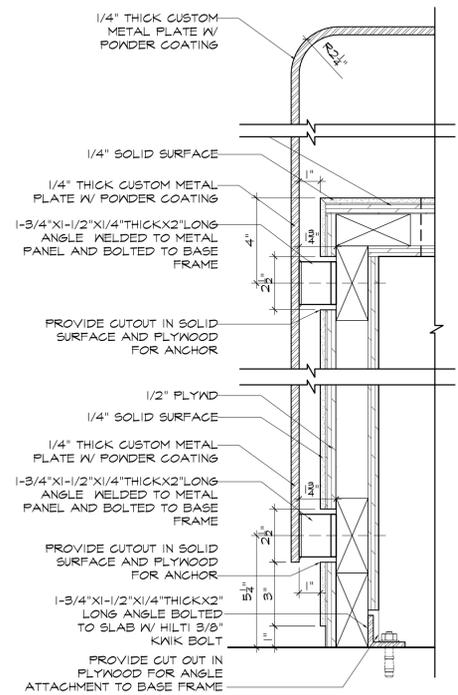
7 RECEPTION DESK SECTION SCALE: 3/4" = 1'-0"



8 RECEPTION DESK SECTION SCALE: 3/4" = 1'-0"

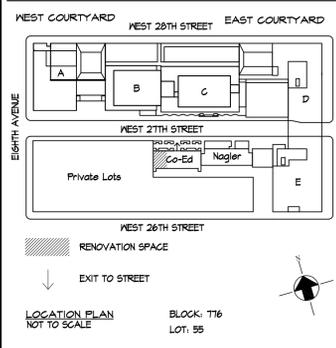


10 DESK DETAIL SCALE: 3" = 1'-0"



11 DESK DETAIL SCALE: 3" = 1'-0"

12 DESK DETAIL SCALE: 3" = 1'-0"



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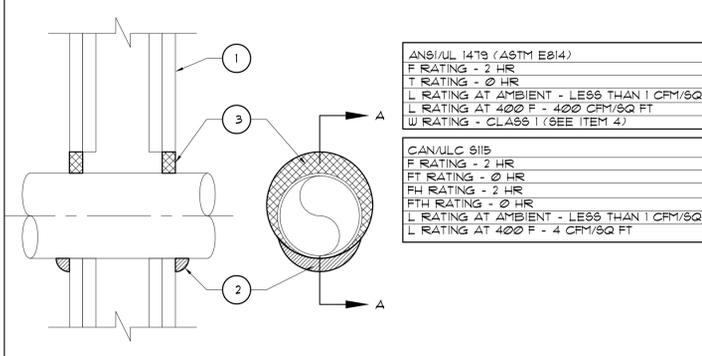
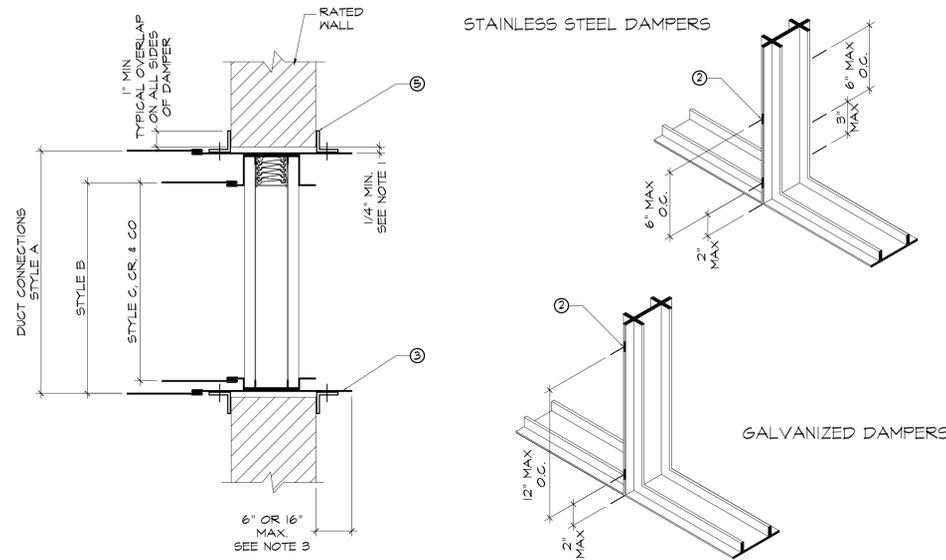
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 CHK BY: DH & CK
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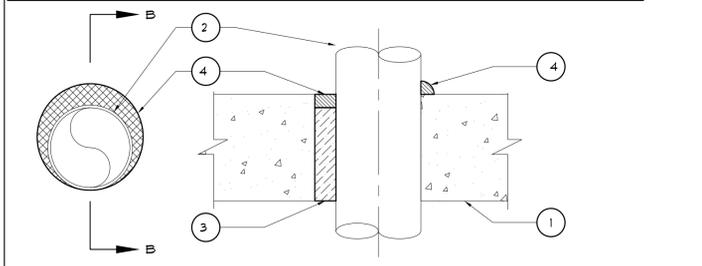


- WALL ASSEMBLY - THE 1 OR 2 HR FIRE RATED WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES.
 - STUDS - WALL FRAMING SHALL CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. LUMBER SPACED 16 IN. O.C. STEEL TO BE MIN 2-1/2 IN. WIDE AND SPACED MAX 24 IN. O.C.
 - GYPSON BOARD - NOM 5/8 IN. THICK, 4 FT WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSON WALLBOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES DESIGN IN THE FIRE RESISTANCE DIRECTORY. MAX DIAM OF OPENING IS 9-1/2 IN. THE HOURLY F AND T RATINGS OF THE FIRESTOP SYSTEM IS EQUAL TO THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED.
- THROUGH PENETRANT - ONE METALLIC TUBING OR CONDUIT INSTALLED CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. TUBE OR CONDUIT TO BE RIGIDLY SUPPORTED ON BOTH SIDERS OF WALL ASSEMBLY. THE ANNULAR SPACE BETWEEN THE TUBE OR CONDUIT AND PERIPHERY OF THE STEEL SLEEVE SHALL BE MIN 0 IN. (POINT CONTACT) TO MAX 1 IN. THE FOLLOWING TYPES AND SIZES OF METALLIC TUBE OR CONDUIT MAY BE USED:
 - CONDUIT - NOM 4 IN. DIAM (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR STEEL CONDUIT.
- FILL VOID OR CAVITY MATERIAL - PUTTY, MIN 5/8 IN. THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH BOTH SURFACES OF WALL. AT POINT CONTACT LOCATION BETWEEN PENETRANT AND WALL, A 1/4 IN. GROUN OF FILL MATERIAL SHALL BE APPLIED AT THE CONDUIT/WALL INTERFACE ON BOTH SIDERS OF THE ASSEMBLY, LAPPING 1/2 IN. ON THE CONDUIT AND 1/4 IN. BEYOND THE PERIPHERY OF THE OPENING. HILTI INC - CP618 PUTTY STICK

2 FIRESTOPPING DETAIL - RATED WALLS HILTI FIRE RATED SYSTEM NO. W-L-1175

SCALE: 3" = 1'-0"

ANSI/UL 1479 (ASTM E814)	F RATING - 2 HR	T RATING - 0 HR	L RATING AT AMBIENT - LESS THAN 1 CFM/SQ FT	W RATING - CLASS 1 (SEE ITEM 4)
CAN/ULC 919	F T RATING - 0 HR	FH RATING - 2 HR	FT H RATING - 0 HR	L RATING AT 400 F - 4 CFM/SQ FT

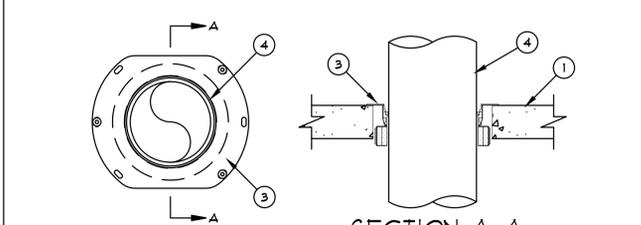


- FLOOR OR WALL ASSEMBLY - MIN 4-1/2 IN. (114 MM) THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (120-150 PCF OR 1600-2400 KG/M³) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS, MAX DIAM OF OPENINGS IS 12 IN. (305MM) SEE CONCRETE BLOCKS (CAZT) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.
 - THROUGH PENETRANTS - ONE METALLIC PIPE, CONDUIT OR TUBING TO BE INSTALLED WITHIN THE FIRESTOP SYSTEM. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDERS OF FLOOR OR WALL ASSEMBLY. THE ANNULAR SPACE SHALL BE 0 IN. (POINT CONTACT) TO MAX 1-1/4 IN. (32 MM). THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:
 - STEEL PIPE - NOM 10 IN. (254 MM) DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE
 - IRON PIPE - NOM 10 IN. (254 MM) DIAM (OR SMALLER) CAST OR DUCTILE IRON PIPE.
 - CONDUIT - NOM 4 IN. (102 MM) DIAM (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR STEEL CONDUIT.
 - COPPER TUBING - NOM 4 IN. (102 MM) (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
 - COPPER PIPE - NOM 4 IN. (102 IN.) DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
 - PACKING MATERIAL - MIN 3 IN. (76 MM) THICKNESS OF MIN 4 PCF (64 KG/M³) MINERAL WOOL BATT INSULATION FOR NOM 4 IN. DIAM (AND SMALLER) PIPES, CONDUITS OR TUBINGS AND A MIN 4 IN. (102 MM) THICKNESS OF MIN 4 PCF (64 KG/M³) MINERAL WOOL BATT INSULATION FOR PIPE GREATER THAN NOM 4 IN. DIAM. FIRMLY PACKED INTO OPENING AS A PENETRANT FORM. PACKING MATERIAL TO BE RECESSED FROM TOP SURFACE OF FLOOR OR FROM BOTH SURFACES OF WALL TO ACCOMMODATE THE REQUIRED THICKNESS OF FILL MATERIAL.
 - FILL, VOID OR CAVITY MATERIAL - SEALANT - MIN 1/2 IN. (13 MM) THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH THE TOP SURFACE OF FLOOR OR BOTH SURFACES OF WALL. AT POINT CONTACT LOCATION BETWEEN PIPE AND CONCRETE, A MIN 1/2 IN. (13 MM) DIAM BEAD OF FILL MATERIAL SHALL BE APPLIED AT THE CONCRETE/PIPE INTERFACE ON THE TOP SURFACE OF FLOOR AND ON BOTH SURFACES OF WALL. UL RATINGS APPLIES ONLY WHEN CP9-9 SIL G5, CP9-9 SIL SL (FLOORS ONLY), CP6019, CP604 SEALANT OR F8-ONE MAX INTUMESCENT SEALANT IS USED. FOR W RATING WHEN F8-ONE MAX IS USED, PACKING MATERIAL TO BE A MIN 4 IN. (102 MM) THICKNESS OF MIN 4 PCF (64KG/M³) MINERAL WOOL BATT INSULATION. HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC - CP6019, CP604, CP6-5 SIL SL (FLOORS ONLY), CP600 OR F8-ONE SEALANT OR F8-ONE MAX INTUMESCENT SEALANT.
- *INDICATES SUCH PRODUCTS SHALL BEAR THE UL OR CUL CERTIFICATION MARK FOR JURISDICTIONS EMPLOYING THE UL OR SUI CERTIFICATION (SUCH AS CANADA), RESPECTIVELY.

3 FIRESTOPPING DETAIL - CONCRETE SLAB OR WALL HILTI FIRE RATED SYSTEM NO. C-JA-1149

SCALE: 3" = 1'-0"

ANSI/UL 1479 (ASTM E814)	F RATING - 2 HR	T RATING - 0 HR	L RATING AT AMBIENT - LESS THAN 1 CFM/SQ FT	W RATING - CLASS 1 (SEE ITEM 4)
CAN/ULC 919	F T RATING - 0 HR	FH RATING - 2 HR	FT H RATING - 0 HR	L RATING AT 400 F - 4 CFM/SQ FT



- FLOOR ASSEMBLY - MIN 2-1/2 IN. (64 MM) TO MAX 8 IN. (203 MM) THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (120-150 PCF OR 1600-2400 KG/M³) CONCRETE. WHEN CONCRETE THICKNESS IS MIN 4-1/2 IN. (114 MM), THE F AND FH RATINGS ARE 3 HR.
 - FLOOR ASSEMBLY - (OPTIONAL, NOT SHOWN) - THE FIRE RATED CONCRETE AND STEEL DECK FLOOR ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL D100, D200 OR D300 SERIES DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND AS SUMMARIZED BELOW:
 - CONCRETE - MIN 2-1/2 IN. (64 MM) TO MAX 8 IN. (203 MM) THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (120-150 PCF OR 1600-2400 KG/M³) CONCRETE AS MEASURED OVER CREST OF FLUTED STEEL DECK. WHEN CONCRETE TOPPING THICKNESS IS MIN 4-1/2 IN. (114 MM), F AND FH RATINGS ARE 3 HR.
 - STEEL FLOOR AND FORM UNITS - COMPOSITE OR NON-COMPOSITE MAX 3 IN. (76 MM) DEEP GALV STEEL FLUTED UNITS AS SPECIFIED IN THE INDIVIDUAL FLOOR-CEILING DESIGN.
- METALLIC SLEEVE - (OPTIONAL, NOT SHOWN) - NOM 4, 5 OR 6 IN. (102, 127 OR 152 MM) DIAM SCHEDULE 10 (OR HEAVIER) STEEL SLEEVE CAST OR GROUNTED INTO FLOOR ASSEMBLY. FLUSH WITH FLOOR SURFACES. WHEN METALLIC SLEEVE IS USED, THE T, FT AND FT H RATINGS ARE 0 HR.
 - STEEL METAL SLEEVE - (OPTIONAL, NOT SHOWN) - NOM 4, 5, 6 OR 9 IN. (102, 127, 152 OR 229 MM) DIAM, MIN 26 GA GALV STEEL PROVIDED WITH A 26 GA GALV STEEL SQUARE FLANGE SPOT WELDED TO THE SLEEVE AT APPROX MID-HEIGHT, OR FLUSH WITH BOTTOM OF SLEEVE IN FLOORS, AND SIZED TO BE MIN OF 2 IN. (51 MM) LARGER THAN THE SLEEVE DIAM. THE SLEEVE IS TO BE CAST IN PLACE AND MAY EXTEND A MAX OF 4 IN. (102 MM) BELOW THE BOTTOM OF THE DECK AND FLUSH WITH THE TOP SURFACE OF THE CONCRETE FLOOR. WHEN SHEET METAL SLEEVE IS USED, THE T, FT AND FT H RATINGS ARE 0 HR.
- FIRESTOP DEVICE - DROP-IN FIRESTOP DEVICE INSTALLED IN CORE-DRILLED OR SLEEVED OPENING IN CONCRETE FLOOR ASSEMBLY IN ACCORDANCE WITH ACCOMPANYING INSTALLATION INSTRUCTIONS. THE FIRESTOP DEVICE FLANGE SHOULD BE SECURED TO THE TOP SURFACE OF THE FLOOR WITH THREE 1/4 IN. (6 MM) DIAM BY MIN 1-1/4 IN. (32 MM) LONG STEEL EXPANSION BOLTS OR SCREW ANCHORS (INSTALLED IN A TRIANGULAR FASHION THROUGH HOLES PROVIDED); AS ALTERNATES TO THE ANCHORS SPECIFIED ABOVE, HILTI 1/4 IN. (6 MM) DIAM BY 1-1/4 IN. (32 MM) LONG KWIK-CON 11+ CONCRETE SCREW ANCHOR, HILTI 1/4 IN. (6 MM) DIAM BY 1-3/4 IN. (45 MM) LONG KWIK-BOLT 3 STEEL EXPANSION ANCHOR OR HILTI 1/4 IN. (6 MM) BY 3/4 IN. (19 MM) LONG METAL HIT ANCHOR MAY BE USED. IN ADDITION, FOR NOM 2 IN. (51 MM), 3 IN. (76 MM) AND 4 IN. (102 MM) FIRESTOP DEVICES, FOUR 1/16 IN. (16 MM) LONG HILTI X-GH F18 X-GH STEEL FASTENERS MAY BE INSTALLED THROUGH THE STEEL FLANGE, TWO ON EACH SIDE. THE FIRESTOP DEVICES SHALL BE INSTALLED AS DETAILED IN THE FOLLOWING TABLE:

CORE HOLE OR SLEEVE DIAM.	FIRESTOP DEVICE	NOM. DIAM. OF THROUGH PENETRANT
4" (102 MM)	CF8-DID 2" MD	2" (51 MM) OR SMALLER
5" (127 MM)	CF8-DID 3" MD	3" (76 MM)
6" (152 MM)	CF8-DID 4" MD	4" (102 MM)
8" (203 MM)	CF8-DID 6" MD	5" (127 MM)

- FOR PIPE SMALLER THAN NOM 2 IN. (51 MM) DIAM, ADAPTER AND TOP SEAL PLUG IS REQUIRED TO BE USED. HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC - CF8-DID 2" MD, CF8-DID 3" MD, CF8-DID 4" MD, CF8-DID 6" MD
 - FIRESTOP DEVICE - WATER BARRIER MODULE - (OPTIONAL, NOT SHOWN) - USED IN COMBINATION WITH THE CF8-DID DEVICE AND SUPPLIED BY DEVICE MANUFACTURER. MODULE IS THREADED ON TO TOP OF DEVICE. W RATING AND L RATING APPLY ONLY WHEN WATER BARRIER MODULE IS USED. HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC - WATER BARRIER MODULE
 - THROUGH PENETRANT - ONE METALLIC PIPE, CONDUIT OR TUBING TO BE INSTALLED WITHIN THE FIRESTOP DEVICE. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDERS OF FLOOR ASSEMBLY. THE FOLLOWING TYPES OF PIPE, CONDUIT OR TUBING MAY BE USED:
 - STEEL PIPE - NOM 6 IN. (152 MM) DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
 - IRON PIPE - NOM 6 IN. (152 MM) DIAM (OR SMALLER) CAST OR DUCTILE IRON PIPE.
 - CONDUIT - NOM 6 IN. (152 MM) DIAM (OR SMALLER) RIGID STEEL CONDUIT.
 - CONDUIT - NOM 4 IN. (102 MM) DIAM (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING.
 - COPPER TUBING - NOM 6 IN. (152 MM) DIAM (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
 - COPPER PIPE - NOM 6 IN. (152 MM) DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
- *BEARING THE UL CLASSIFICATION MARK

4 FIRESTOPPING DETAIL - SLAB HILTI FIRE RATED SYSTEM NO. F-A-1128

SCALE: 3" = 1'-0"

- OPENING CLEARANCE - THE OPENING IN THE WALL OR FLOOR SHALL BE LARGER THAN THE DAMPER/SLEEVE ASSEMBLY TO PERMIT INSTALLATION OR EXPANSION. FOR TWO ANGLE INSTALLATIONS THE OPENING SHALL BE A MINIMUM OF 1/2" PER FOOT LARGER THAN THE OVERALL SIZE OF THE DAMPER/SLEEVE ASSEMBLY. THE MAXIMUM OPENING SIZE SHALL NOT EXCEED 1/2" PER FOOT PLUS 2", NOR SHALL THE OPENING BE LESS THAN 1/4" LARGER THAN THE DAMPER/SLEEVE ASSEMBLY. FOR ONE ANGLE INSTALLATIONS, THE OPENING SHALL BE A MINIMUM OF 1/4" TO A MAXIMUM OF 1" LARGER THAN THE OVERALL SIZE OF THE DAMPER/SLEEVE ASSEMBLY. THE OPENING MAY BE AS MUCH AS 2" LARGER THAN THE DAMPER/SLEEVE ASSEMBLY IF 16 GA MOUNTING ANGLES ARE UTILIZED.
- FASTENERS AND MULTIPLE SECTION ASSEMBLY - USE NO. 10 BOLTS OR SCREWS, 3/8" RIVETS, TACK WELDS OR SPOT WELDS AS DEPICTED IN FIGURES 3 AND 4 AND SPACED AS FOLLOWS WHEN JOINING INDIVIDUAL DAMPERS TO MAKE MULTIPLE SECTION DAMPER ASSEMBLIES OR WHEN FASTENING DAMPER TO THE SLEEVE:

VERTICAL MOUNT (IN WALL)	12" SPACING
GALVANIZED STEEL DAMPERS	6" SPACING
STAINLESS STEEL DAMPERS	6" SPACING
HORIZONTAL MOUNT (IN FLOOR)	6" SPACING

MULTIPLE SECTION HORIZONTAL MOUNT DAMPERS REQUIRE A 1/4 GAGE THICK X 4 1/2" WIDE STEEL REINFORCING PLATE SANDWICHED BETWEEN THE DAMPER FRAMES WITH 1/2" LONG WELDS STAGGERED INTERMITTENTLY AND SPACED ON MAXIMUM 6" CENTERS. THE REINFORCING PLATE MUST BE THE SAME MATERIAL AS THE DAMPERS. THE LENGTH MUST BE EQUAL TO THE DAMPER WIDTH OF TWO OR MORE ADJOINING DAMPER SECTIONS. REINFORCING PLATES ARE NOT REQUIRED FOR ASSEMBLIES CONSISTING OF TWO DAMPERS ATTACHED END-TO-END OR THREE DAMPERS ATTACHED SIDE-TO-SIDE AS DEPICTED IN FIGURE 5.
- DAMPER SLEEVE - SLEEVE THICKNESS MUST BE EQUAL TO OR THICKER THAN THE DUCT CONNECTED TO IT. SLEEVE GAGE REQUIREMENTS ARE LISTED IN THE SMACNA FIRE, SMOKE AND RADIATION DAMPER INSTALLATION GUIDE FOR HVAC SYSTEMS AND IN NFPA 90A, IF A BREAKAWAY STYLE DUCT/SLEEVE CONNECTION IS NOT USED. THE SLEEVE SHALL BE A MINIMUM OF 1/16 GAGE FOR DAMPERS UP TO 36" WIDE BY 24" HIGH AND 1/4 GAGE FOR DAMPERS EXCEEDING 36" WIDE BY 24" HIGH. DAMPER SLEEVE SHALL NOT EXTEND MORE THAN 6" BEYOND THE FIRE WALL OR PARTITION UNLESS DAMPER IS EQUIPPED WITH A FACTORY INSTALLED ACCESS DOOR. SLEEVE MAY EXTEND UP TO 16" BEYOND THE FIRE WALL OR PARTITION ON SIDES EQUIPPED WITH A FACTORY INSTALLED ACCESS DOOR. SLEEVE SHALL TERMINATE AT BOTH SIDE OF WALL WITHIN DIMENSIONS SHOWN.
- DAMPER ORIENTATION - USE "AIR FLOW" AND "MOUNT WITH ARROW UP" LABELS ON DYNAMIC D1BD AND D1BDX MODELS FOR PROPER DAMPER ORIENTATION. FOR STATIC IBD MODELS USE ONLY "MOUNT WITH ARROW UP" LABEL ON DAMPER FOR PROPER DAMPER ORIENTATION. STATIC AND DYNAMIC DAMPERS MUST BE INSTALLED WITH LEADING EDGE OF THE CLOSED BLADES WITHIN THE WALL OR FLOOR.
- MOUNTING ANGLES - MOUNTING ANGLES SHALL BE A MINIMUM OF 1 1/4" X 1 1/4" X 20 GAGE STEEL. FOR OPENINGS IN METAL STUD, WOOD STUD WALLS OR CONCRETE/MASONRY WALLS AND FLOORS OF SIZES 30"X49" OR 49"X90" AND LESS MOUNTING ANGLES ARE ONLY REQUIRED ON ONE SIDE OF THE WALL OR TOP SIDE OF THE FLOOR AND MUST BE ATTACHED TO BOTH THE SLEEVE AND THE WALL OR FLOOR. MOUNTING ANGLES MAY BE INSTALLED DIRECTLY TO THE METAL STUD UNDER THE WALL BOARD ON METAL STUD WALL INSTALLATIONS ONLY. LARGER OPENINGS REQUIRE MOUNTING ANGLES ON BOTH SIDERS OF THE PARTITION AND MUST BE ATTACHED ONLY TO THE SLEEVE. MOUNTING ANGLES MUST OVERLAP THE PARTITION A MINIMUM OF 1". DO NOT WELD OR FASTEN ANGLES TOGETHER AT CORNERS OF DAMPERS. RUSKIN FIRE DAMPERS MAY BE INSTALLED USING RUSKIN FAST ANGLE FOR ONE ANGLE INSTALLATION OR RUSKIN FRMA FOR TWO ANGLE INSTALLATIONS.
 - MOUNTING ANGLE FASTENERS

SLEEVE: #10 BOLTS OR SCREWS, 3/8" STEEL RIVETS OR 1/2" LONG WELDS.

MASONRY/WALL OR FLOOR: #10 SELF-TAPPING CONCRETE SCREWS

WOOD/STEEL STUD WALL: #10 SCREWS
 - MOUNTING ANGLE FASTENER SPACING

FOR ONE ANGLE INSTALLATIONS THE SLEEVE FASTENERS SHALL BE SPACED AT 6" O.C. AND THE WALL OR FLOOR FASTENERS SHALL BE SPACED AT 12" O.C. WITH A MINIMUM OF 2 FASTENERS ON EACH SIDE, TOP AND BOTTOM. SCREW FASTENERS USED IN METAL STUD MUST ENGAGE THE METAL STUD A MINIMUM OF 1/2". SCREW FASTENERS USED IN WOOD STUD MUST ENGAGE THE WOOD STUD A MINIMUM OF 3/4". SCREW FASTENERS USED IN MASONRY WALLS OR FLOORS MUST ENGAGE THE WALL A MINIMUM OF 1 1/2". FOR TWO ANGLE INSTALLATIONS THE FASTENERS SHALL BE SPACED AT 8" O.C.
- DUCT/SLEEVE CONNECTIONS
 - BREAK-AWAY DUCT/SLEEVE CONNECTIONS - RECTANGULAR DUCTS MUST USE ONE OR MORE OF THE CONNECTIONS DEPICTED:

PLAIN "S" CLIP	HEMMED "S" CLIP	DOUBLE "S" CLIP	INSIDE SLIP JOINT	STANDING S
STANDING S (ANGLE REINFORCED)	STANDING (ALT.)	STANDING S (BAR REINFORCED)	STANDING S (ANGLE REINFORCED)	DRIVE SLIP JOINT

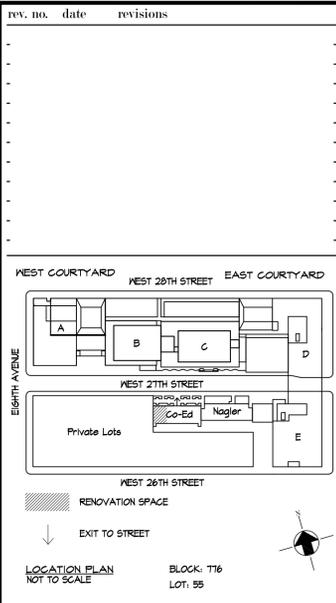
A MAXIMUM OF TWO #10 SHEET METAL SCREWS ON EACH SIDE AND THE BOTTOM, LOCATED IN THE CENTER OF THE SLIP POCKET AND PENETRATING BOTH SIDERS OF THE SLIP POCKET MAY BE USED. CONNECTIONS USING THESE SLIP JOINTS ON THE TOP AND BOTTOM WITH FLAT DRIVE SLIPS UP TO 20" LONG ON THE SIDES MAY ALSO BE USED.
 - ROUND AND OVAL BREAK-AWAY CONNECTIONS - ROUND AND FLAT OVAL BREAK-AWAY CONNECTIONS MUST USE EITHER A 4" WIDE DRAWBAND OR #10 SHEET METAL SCREWS SPACED EQUALLY AROUND THE CIRCUMFERENCE OF THE DUCT AS FOLLOWS:
 - DUCT DIAMETERS 22" AND SMALLER - MAXIMUM 3 SCREWS
 - DUCT DIAMETERS OVER 22" AND INCLUDING 36" - MAXIMUM 5 SCREWS
 - DUCT DIAMETERS OVER 36" AND UP TO AND INCLUDING 18" TOTAL PERIMETER - MAXIMUM 8 SCREWS. FOR FLAT OVAL DUCTS, THE DIAMETER IS CONSIDERED THE LARGEST (MAJOR) DIMENSION OF THE DUCT.

NOTE: WHEN OPTIONAL SEALING OF THESE JOINTS IS DESIRED, THE FOLLOWING SEALANTS MAY BE APPLIED IN ACCORDANCE WITH THE SEALANT MANUFACTURER'S INSTRUCTIONS:

DESIGN POLYMERIC S - DP1010	PRECISION - PA2084T	HARDCAST, INC. - IRON GRIP 601	ECO DUCT SEAL 44-92
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 - FLANGED BREAK-AWAY STYLE DUCT SLEEVE CONNECTIONS - FLANGED CONNECTION SYSTEMS MANUFACTURED BY DUCTMATE, NEXUS, OR WARD ARE APPROVED BREAK-AWAY CONNECTIONS WHEN INSTALLED AS SHOWN ON THE FLANGED SYSTEM BREAKAWAY CONNECTIONS SUPPLEMENT, TDC AND TDF ROLL-FORMED FLANGED CONNECTIONS USING 3/8" STEEL BOLTS AND NUTS, AND METAL CLEATS, AS TESTED BY SMACNA, AS APPROVED BREAK-AWAY CONNECTIONS WHEN INSTALLED AS SHOWN ON THE FLANGED SYSTEM BREAKAWAY CONNECTIONS SUPPLEMENT.
 - NON-BREAK-AWAY DUCT/SLEEVE CONNECTIONS - IF OTHER DUCT SLEEVE CONNECTIONS ARE USED, THE SLEEVE SHALL BE A MINIMUM OF 1/16 GAGE FOR DAMPERS UP TO 36" WIDE X 24" HIGH AND 1/4 GAGE FOR DAMPERS EXCEEDING 36" WIDE X 24" HIGH.
- INSTALLATION AND MAINTENANCE - TO ENSURE OPTIMUM OPERATION AND PERFORMANCE, THE DAMPER MUST BE INSTALLED SO IT IS SQUARE AND FREE FROM RACKING. EACH FIRE DAMPER SHOULD BE MAINTAINED AND TESTED ON A REGULAR BASIS AND IN ACCORDANCE WITH THE LATEST EDITIONS OF NFPA 90A AND LOCAL CODES. CARE SHOULD BE EXERCISED TO ENSURE THAT SUCH TESTS ARE PERFORMED SAFELY AND DO NOT CAUSE SYSTEM DAMAGE.

1 FIRESTOPPING DETAIL - DAMPER RUSKIN FIRE RATED SYSTEM NO. UL-R5531

SCALE: 1 1/2" = 1'-0"



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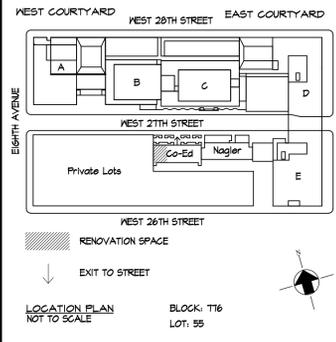
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DRAWING TITLE:
FIRESTOPPING DETAILS

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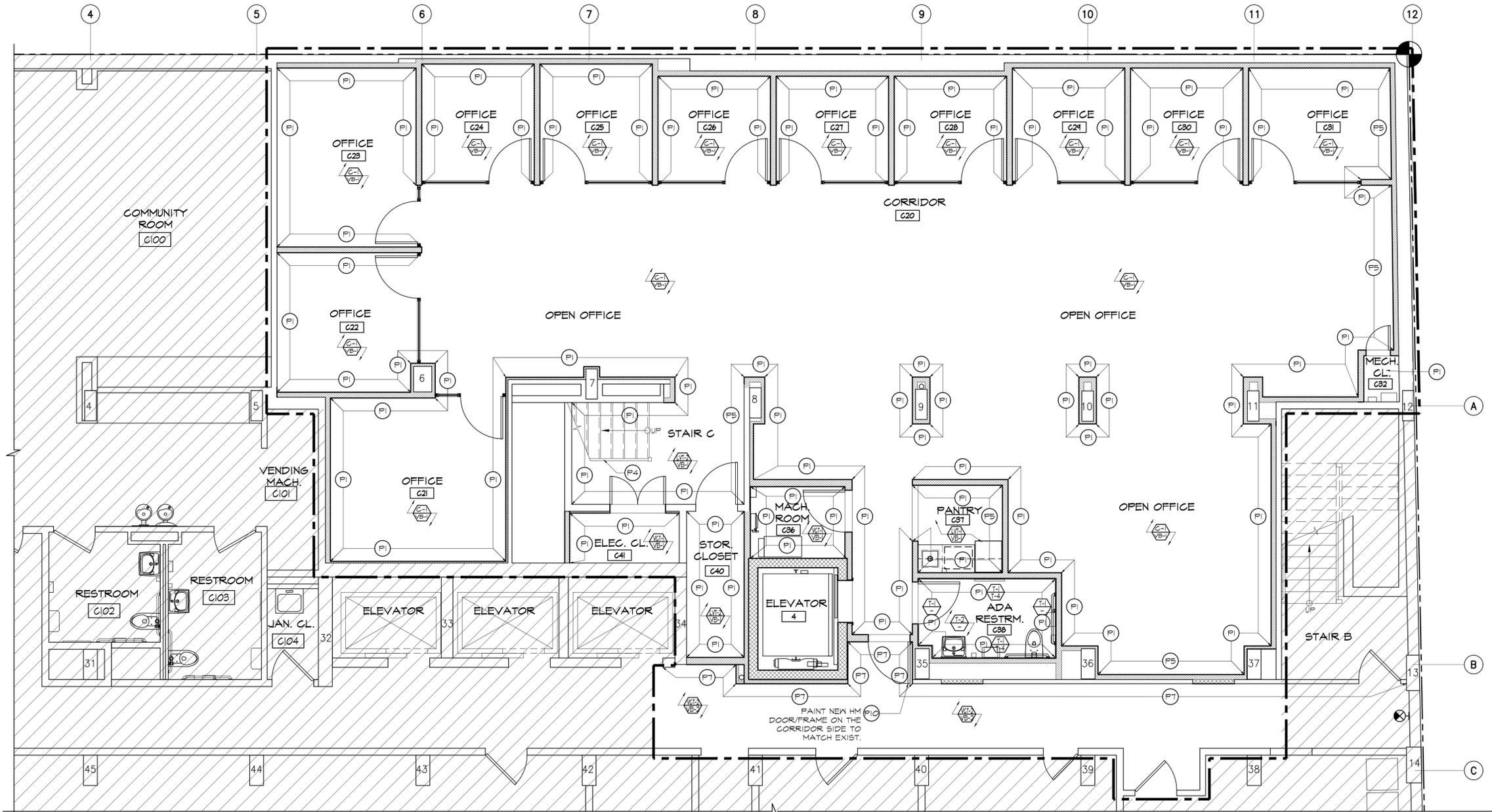
PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 CELLAR FINISH FLOOR PLAN

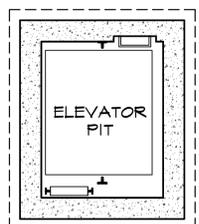
SEAL & SIGNATURE: _____
 DATE: 09.01.2022
 PROJECT No: 13284.154
 DRAWING BY: GD & TM
 CHK BY: DH & CK
 DWG No: _____

A-300.00

SCALE: AS NOTED 53 of 61

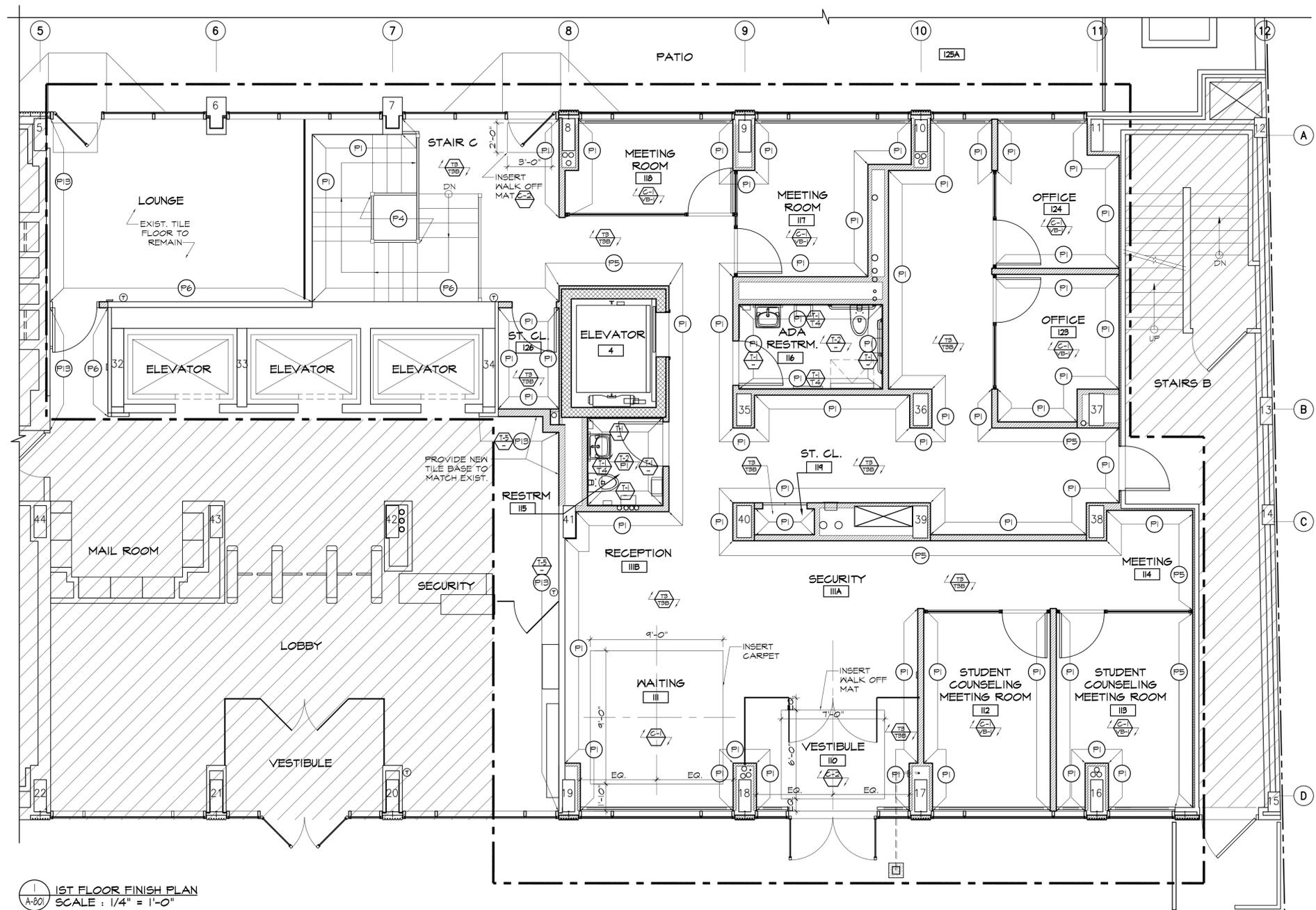


1 CELLAR FINISH FLOOR PLAN
 SCALE: 1/4" = 1'-0"



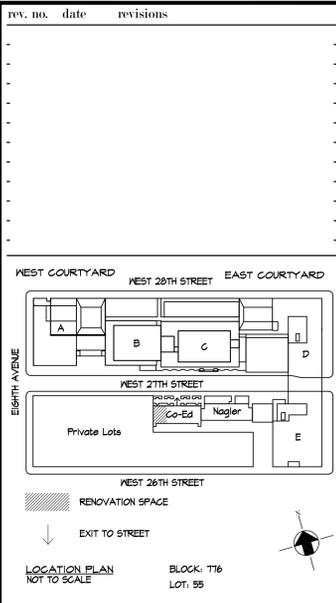
2 ELEVATOR PIT FINISH FLOOR PLAN
 SCALE: 1/4" = 1'-0"

- FINISH NOTES:**
- SEE A-306 FOR FINISH SCHEDULE & FINISH LEGEND.
 - GROUT FOR WALLS TO BE LATICRETE, TSD.
 - GROUT FOR FLOORS TO BE LATICRETE, TBD.
 - SPACING BETWEEN WALL TILES TO BE 1/8" TYP.
 - SPACING BETWEEN FLOOR TILES TO BE 3/16" TYP.
 - ALL EXPOSED EDGES OF WALL TILES TO RECEIVE SCHLUTER QUADREC - SATIN ANODIZED FINISH. REFER TO DRAWING A-109 FOR DETAILS.
 - P2 TO BE USED ON ALL HM DOORS & FRAMES. FINISH IS TO BE SEMI-GLOSS.
 - P3 TO BE USED ON ALL GNB SOFFITS AND CEILINGS.
 - P4 TO BE USED ON EXISTING STAIR C. FINISH IS TO BE SEMI-GLOSS.
 - TB3 TO BE USED FOR TILE WALL BASE. SEE DRAWING 14/A-109 FOR DETAIL.
 - WHERE FINISHES ARE TO MATCH EXISTING, GC TO SUBMIT SAMPLES TO ARCHITECT FOR APPROVAL.
 - REFER TO ELEVATIONS FOR LOCATION AND DIMENSIONS OF ALL ACCENT TILES.
 - PI2 TO BE USED ON ALL SURFACES AND EQUIPMENT ABOVE ARMSTRONG WOODWORKS GRILLE CEILINGS. FINISH IS TO BE MATTE.
 - TS TO BE USED FOR TILE WALL BASE AT THE COED LOBBY. INSTALLATION TO MATCH EXISTING.



1 1ST FLOOR FINISH PLAN
A-801 SCALE: 1/4" = 1'-0"

- FINISH NOTES:
- SEE A-806 FOR FINISH SCHEDULE & FINISH LEGEND.
 - GROUT FOR WALLS TO BE LATICRETE, TBD.
 - GROUT FOR FLOORS TO BE LATICRETE, TBD.
 - SPACING BETWEEN WALL TILES TO BE 1/8" TYP.
 - SPACING BETWEEN FLOOR TILES TO BE 3/16" TYP.
 - ALL EXPOSED EDGES OF WALL TILES TO RECEIVE SCHLUTER QUADEC - SATIN ANODIZED FINISH. REFER TO DRAWING A-1091 FOR DETAILS.
 - P2 TO BE USED ON ALL HM DOORS & FRAMES. FINISH IS TO BE SEMI-GLOSS.
 - P3 TO BE USED ON ALL GNB SOFFITS AND CEILINGS.
 - P4 TO BE USED ON EXISTING STAIR C. FINISH IS TO BE SEMI-GLOSS.
 - TB TO BE USED FOR TILE WALL BASE. SEE DRAWING 14/A-1091 FOR DETAIL.
 - WHERE FINISHES ARE TO MATCH EXISTING, GC TO SUBMIT SAMPLES TO ARCHITECT FOR APPROVAL.
 - REFER TO ELEVATIONS FOR LOCATION AND DIMENSIONS OF ALL ACCENT TILES.
 - PI2 TO BE USED ON ALL SURFACES AND EQUIPMENT ABOVE ARMSTRONGS WOODWORKS GRILLE CEILINGS. FINISH IS TO BE MATTE.
 - TS TO BE USED FOR TILE WALL BASE AT THE COED LOBBY. INSTALLATION TO MATCH EXISTING.



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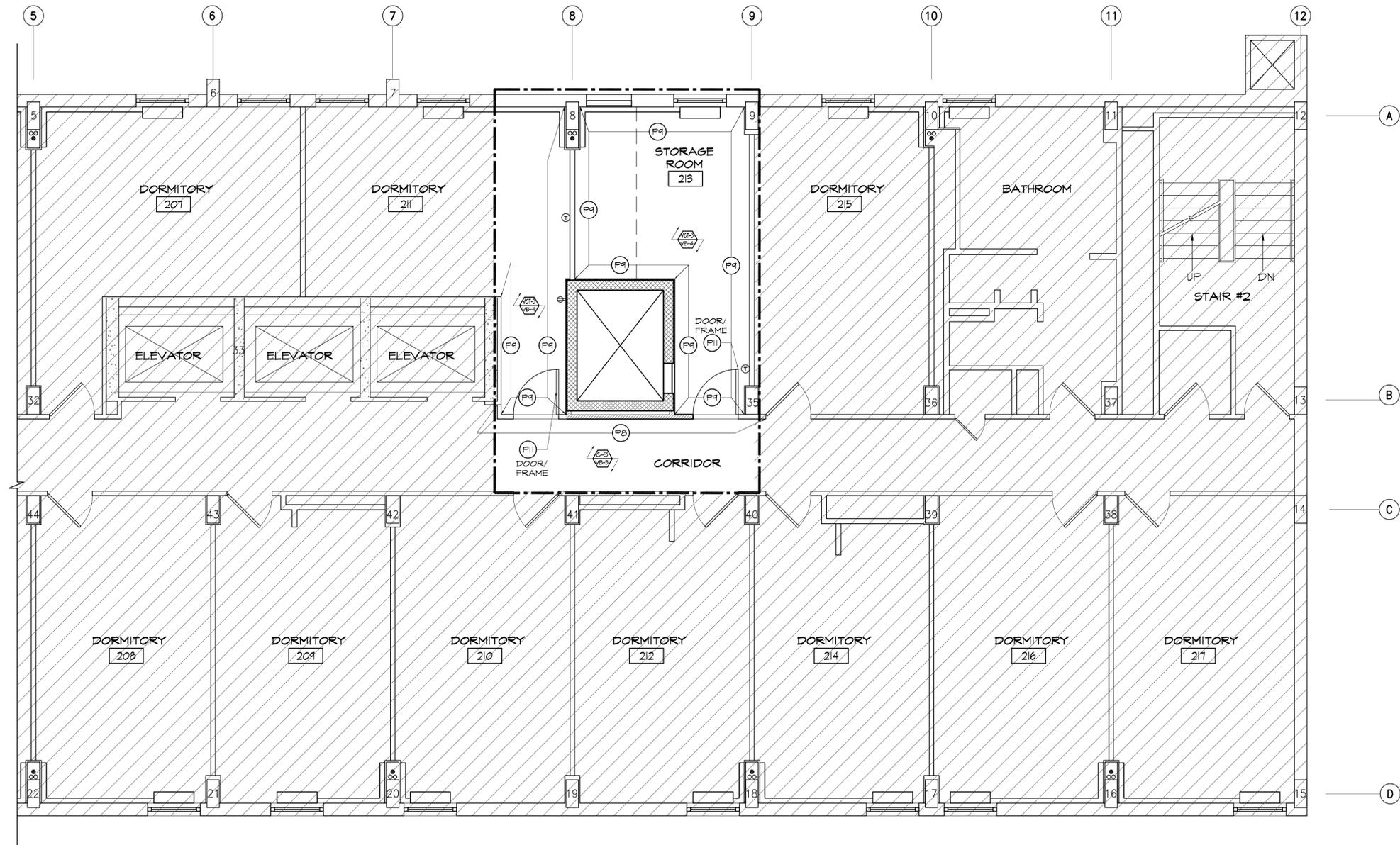
PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 1ST FLOOR FINISH PLAN

SEAL & SIGNATURE: _____ DATE: 09.01.2022
 PROJECT No: 13284.154
 DRAWING BY: GD & TM
 CHK BY: DH & CK
 DWG No: _____

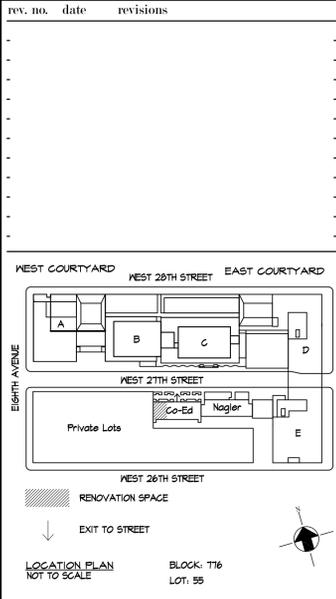
A-801.00

SCALE: AS NOTED 54 of 61



1 2ND FLOOR FINISH PLAN
A-802 SCALE: 1/4" = 1'-0"

- FINISH NOTES:
- SEE A-806 FOR FINISH SCHEDULE & FINISH LEGEND.
 - GROUT FOR WALLS TO BE LATICRETE, TBD.
 - GROUT FOR FLOORS TO BE LATICRETE, TBD.
 - SPACING BETWEEN WALL TILES TO BE 1/8" TYP.
 - SPACING BETWEEN FLOOR TILES TO BE 3/16" TYP.
 - ALL EXPOSED EDGES OF WALL TILES TO RECEIVE SCHLUTER QUADEC - SATIN ANODIZED FINISH. REFER TO DRAWING A-104 FOR DETAILS.
 - P2 TO BE USED ON ALL HM DOORS & FRAMES. FINISH IS TO BE SEMI-GLOSS.
 - P3 TO BE USED ON ALL GAB SOFFITS AND CEILINGS.
 - P4 TO BE USED ON EXISTING STAIR C. FINISH IS TO BE SEMI-GLOSS.
 - T3B TO BE USED FOR TILE WALL BASE. SEE DRAWING 14/A-104 FOR DETAIL.
 - WHERE FINISHES ARE TO MATCH EXISTING, GC TO SUBMIT SAMPLES TO ARCHITECT FOR APPROVAL.
 - REFER TO ELEVATIONS FOR LOCATION AND DIMENSIONS OF ALL ACCENT TILES.
 - P12 TO BE USED ON ALL SURFACES AND EQUIPMT ABOVE ARMSTRONGS WOODWORKS GRILLE CEILINGS. FINISH IS TO BE MATTE.
 - T5 TO BE USED FOR TILE WALL BASE AT THE COED LOBBY. INSTALLATION TO MATCH EXISTING.



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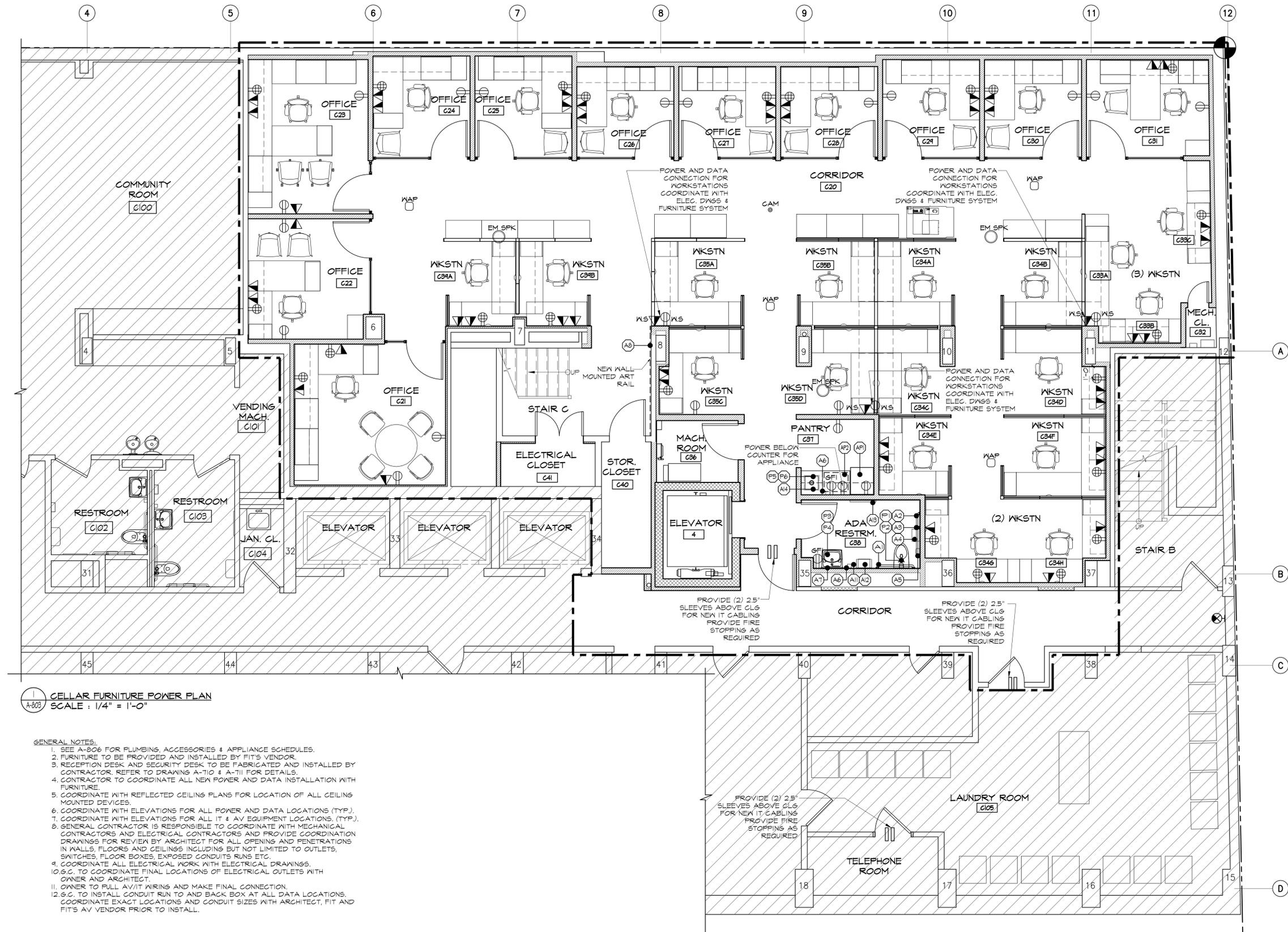
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PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 2ND FLOOR FINISH PLAN

SEAL & SIGNATURE:	DATE: 09.01.2022
	PROJECT No: 13284.154
	DRAWING BY: GD & TM
	CHK BY: DH & CK
	DWG No:
	A-802.00
	SCALE: AS NOTED 55 of 61

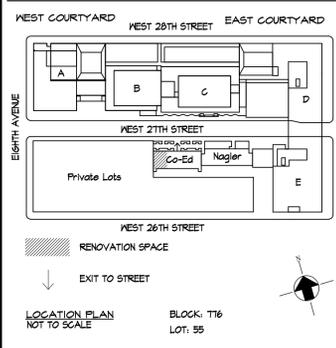


CELLAR FURNITURE POWER PLAN
 SCALE: 1/4" = 1'-0"

- GENERAL NOTES:**
- SEE A-206 FOR PLUMBING, ACCESSORIES & APPLIANCE SCHEDULES.
 - FURNITURE TO BE PROVIDED AND INSTALLED BY FIT'S VENDOR.
 - RECEPTION DESK AND SECURITY DESK TO BE FABRICATED AND INSTALLED BY CONTRACTOR. REFER TO DRAWING A-710 & A-711 FOR DETAILS.
 - CONTRACTOR TO COORDINATE ALL NEW POWER AND DATA INSTALLATION WITH FURNITURE.
 - COORDINATE WITH REFLECTED CEILING PLANS FOR LOCATION OF ALL CEILING MOUNTED DEVICES.
 - COORDINATE WITH ELEVATIONS FOR ALL POWER AND DATA LOCATIONS (TYP).
 - COORDINATE WITH ELEVATIONS FOR ALL IT & AV EQUIPMENT LOCATIONS (TYP).
 - GENERAL CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH MECHANICAL CONTRACTORS AND ELECTRICAL CONTRACTORS AND PROVIDE COORDINATION DRAWINGS FOR REVIEW BY ARCHITECT FOR ALL OPENING AND PENETRATIONS IN WALLS, FLOORS AND CEILINGS INCLUDING BUT NOT LIMITED TO OUTLETS, SWITCHES, FLOOR BOXES, EXPOSED CONDUITS RUNS ETC.
 - COORDINATE ALL ELECTRICAL WORK WITH ELECTRICAL DRAWINGS.
 - S.C. TO COORDINATE FINAL LOCATIONS OF ELECTRICAL OUTLETS WITH OWNER AND ARCHITECT.
 - OWNER TO PULL AV/IT WIRING AND MAKE FINAL CONNECTION.
 - S.C. TO INSTALL CONDUIT RUN TO AND BACK BOX AT ALL DATA LOCATIONS. COORDINATE EXACT LOCATIONS AND CONDUIT SIZES WITH ARCHITECT, FIT AND FIT'S AV VENDOR PRIOR TO INSTALL.

LEGEND

⊕	SWITCH	▼	DATA
⊕	OUTLET	▼EX	EXISTING DATA
⊕EX	EXISTING OUTLET	▼CLG	CEILING MOUNTED DATA
⊕PS	POWER CONNECTION FOR WORKSTATIONS	▼PS	DATA CONNECTION FOR WORKSTATIONS
⊕	QUAD	W	CLG MOUNTED WIRELESS ACCESS POINT
⊕EX	EXISTING QUAD	WEX	CLG MOUNTED WIRELESS CAMERA
		EM SPK	RECESSED EMERGENCY SPEAKER



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PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
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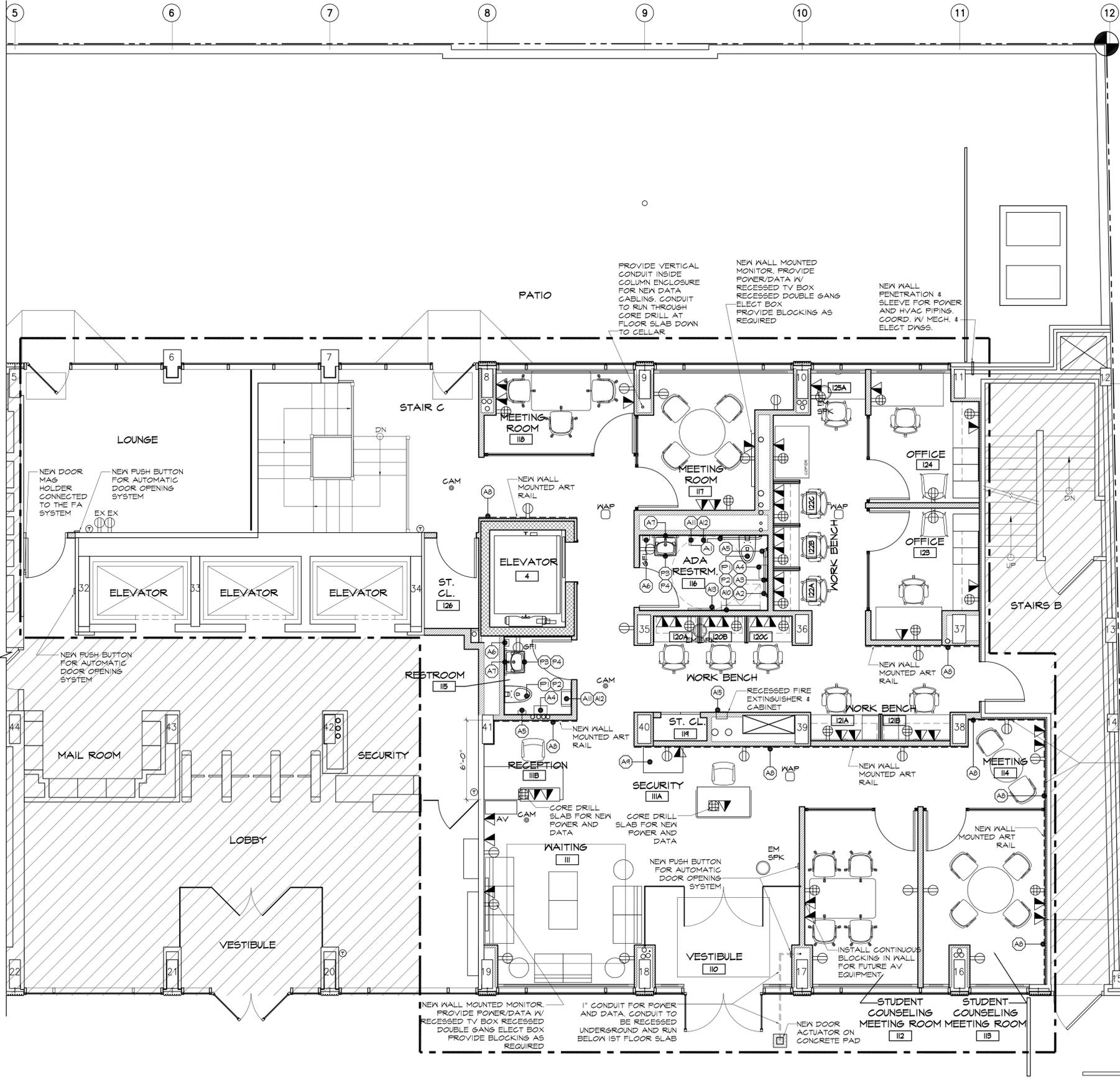
DRAWING TITLE:
 CELLAR FURNITURE/POWER PLAN

SEAL & SIGNATURE:

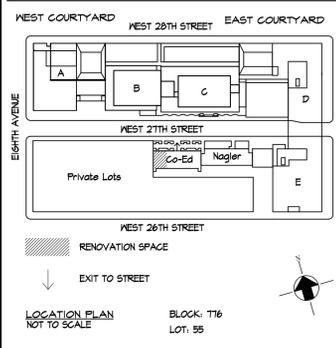
DATE: 09.01.2022
 PROJECT No: 13284.154
 DRAWING BY: GD & TM
 CHK BY: DH & CK
 DWG No:

A-803.00

SCALE: AS NOTED 56 of 61



- GENERAL NOTES:**
- SEE A-806 FOR PLUMBING, ACCESSORIES & APPLIANCE SCHEDULES.
 - FURNITURE TO BE PROVIDED AND INSTALLED BY FIT'S VENDOR.
 - RECEPTION DESK AND SECURITY DESK TO BE FABRICATED AND INSTALLED BY CONTRACTOR. REFER TO DRAWING A-T10 & A-T11 FOR DETAILS.
 - CONTRACTOR TO COORDINATE ALL NEW POWER AND DATA INSTALLATION WITH FURNITURE.
 - COORDINATE WITH REFLECTED CEILING PLANS FOR LOCATION OF ALL CEILING MOUNTED DEVICES.
 - COORDINATE WITH ELEVATIONS FOR ALL POWER AND DATA LOCATIONS (TYP).
 - COORDINATE WITH ELEVATIONS FOR ALL IT & AV EQUIPMENT LOCATIONS (TYP).
 - GENERAL CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH MECHANICAL CONTRACTORS AND ELECTRICAL CONTRACTORS AND PROVIDE COORDINATION DRAWINGS FOR REVIEW BY ARCHITECT FOR ALL OPENING AND PENETRATIONS IN WALLS, FLOORS AND CEILINGS INCLUDING BUT NOT LIMITED TO OUTLETS, SWITCHES, FLOOR BOXES, EXPOSED CONDUITS RUNS ETC.
 - COORDINATE ALL ELECTRICAL WORK WITH ELECTRICAL DRAWINGS.
 - G.C. TO COORDINATE FINAL LOCATIONS OF ELECTRICAL OUTLETS WITH OWNER AND ARCHITECT.
 - OWNER TO PULL AV/IT WIRING AND MAKE FINAL CONNECTION.
 - G.C. TO INSTALL CONDUIT RUN TO AND BACK BOX AT ALL DATA LOCATIONS. COORDINATE EXACT LOCATIONS AND CONDUIT SIZES WITH ARCHITECT, FIT AND FITS AV VENDOR PRIOR TO INSTALL.



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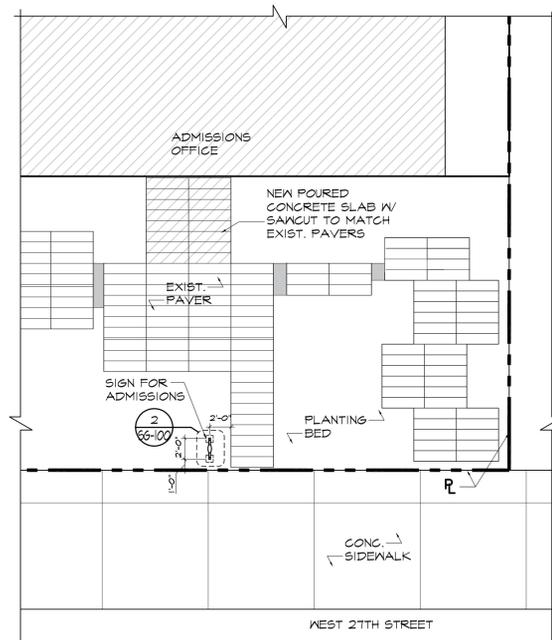
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PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
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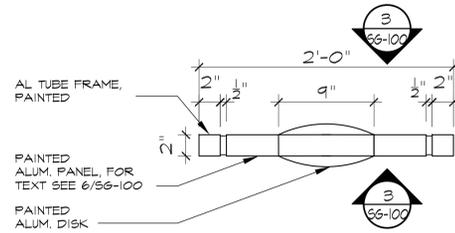
DRAWING TITLE:
 1ST FLOOR FURNITURE/POWER PLAN

SEAL & SIGNATURE: _____
DATE: 09.01.2022
PROJECT No: 13284.154
DRAWING BY: GD & TM
CHK BY: DH & CK
DWG No: _____
A-804.00
 SCALE: AS NOTED 57 of 61

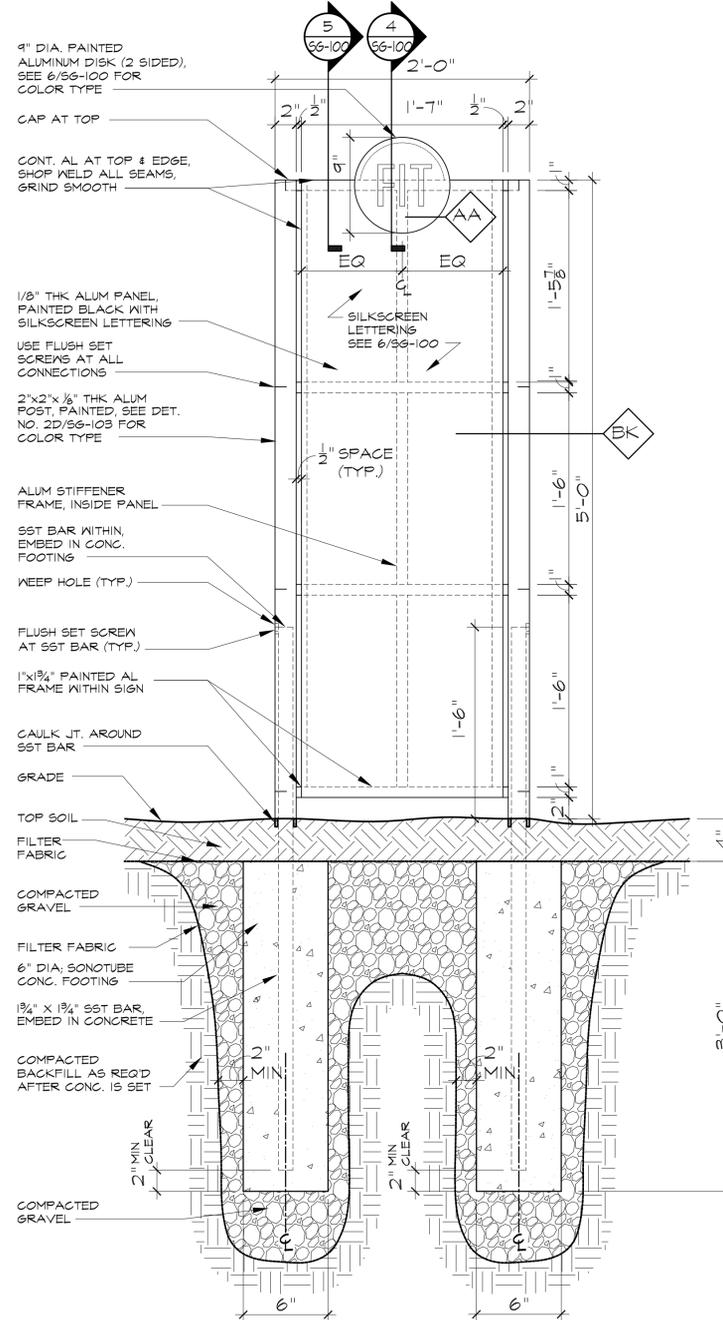
1 1ST FLOOR FURNITURE/POWER PLAN
 A-804 SCALE: 1/4" = 1'-0"



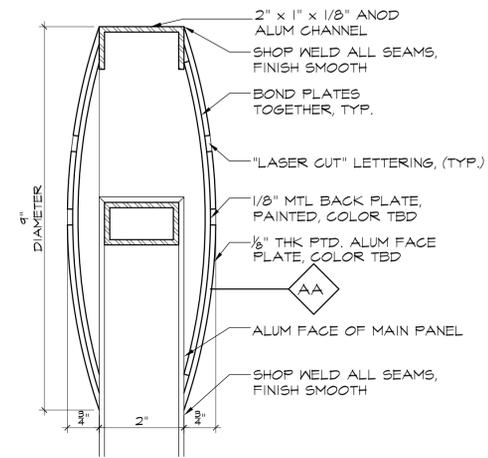
1
66-100
ADMISSIONS OFFICE
PLAN DETAILS
SCALE: 1/8" = 1'-0"



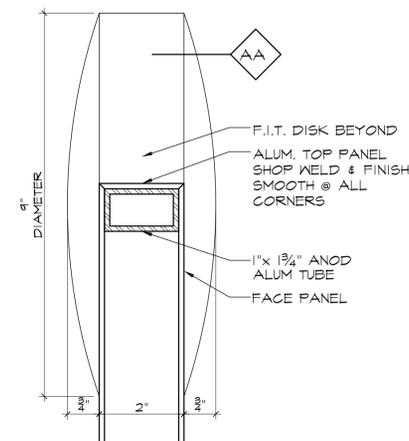
2
66-100
ADMISSIONS OFFICE
2 SIDED SIGN - PLAN
SCALE: 1 1/2" = 1'-0"



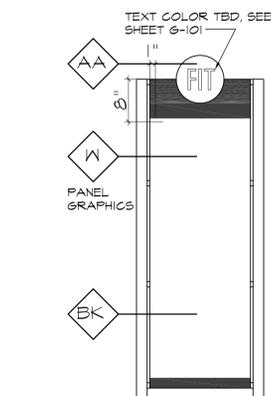
3
66-100
ADMISSIONS OFFICE
2 SIDED SIGN - ELEVATION
SCALE: 1 1/2" = 1'-0"



4
66-100
SECTION @ 2 SIDED DISK
SCALE: 6" = 1'-0"



5
66-100
SECTION @ METAL PANELS
SCALE: 6" = 1'-0"



6
66-100
ADMISSIONS OFFICE 2 SIDED SIGN -
BUILDING COLORS & TEXT
SCALE: 3/4" = 1'-0"

NOTES:

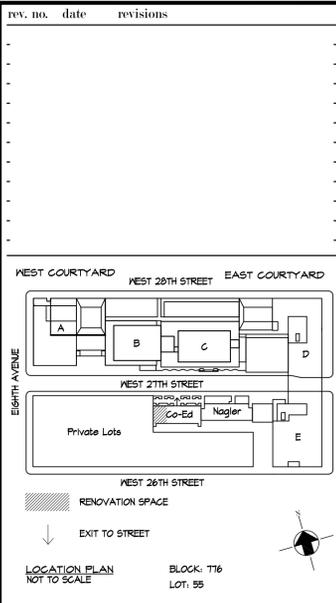
1. GRAPHIC DESIGNER WILL PROVIDE ELECTRONIC TEMPLATES AND/OR ARTWORK FOR ALL TEXT & FONT SIZES.
2. SIGN FABRICATOR IS RESPONSIBLE FOR TYPESETTING.
3. COORDINATE W/MOCK UP SCHEDULE IN PROJECT MANUAL.

COLOR SCHEDULE

MP CODE	COLOR NAME	COLOR MATCH
G	GREEN	BENJAMINE MOORE PAINT, # 421
P	PURPLE	BENJAMINE MOORE PAINT, # 1406
B	BLUE	BENJAMINE MOORE PAINT, # 741 ATHENS BLUE
O	ORANGE	BENJAMINE MOORE PAINT, # 2016-20 CITRUS ORANGE
R	RED	BENJAMINE MOORE PAINT, # 2001-10 RUBY RED
Y	YELLOW	BENJAMINE MOORE PAINT, # 249 FIREFLY
GY1	GREY 1 LIGHT	20% BLACK
GY2	GREY 2 MEDIUM	40% BLACK
GY3	GREY 3 DARK	60% BLACK
GY4	GREY 4 EXTRA DARK	80% BLACK
BK	BLACK	BLACK
W	WHITE	WHITE
LS	LIMESTONE	TO MATCH LIMESTONE FAGADE
AA	BRUSHED ALUMINUM COLOR PAINT	TO MATCH ALUMINUM
TBD	TO BE DETERMINED	MOCK-UP REQUIRED FOR COLORS CONSIDERED

FINISHES

MP CODE	FINISH NAME
VY	CUSTOM COLOR VINYL
PE	PORCELAIN ENAMEL
PC	POWDER COAT
PT	AUTOMOTIVE PAINT
SKG	SILKSCREENED GRAPHICS
BRH	HORIZONTAL #4 BRUSH
BRR	RADIAL #4 BRUSH
AF	ANODIZED FINISH
EGF	ETCH AND COLORFILLED GRAPHICS



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PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 21TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 EXTERIOR SIGNAGE

SEAL & SIGNATURE:	DATE: 09.01.2022
	PROJECT No: 13284.154
	DRAWING BY: GD & TM
	CHK BY: DH & CK
	DWG No:
	SG-100.00
	SCALE: AS NOTED 61 of 61

- GENERAL NOTES:**
CODE CONFORMANCE:
 1. 2014 EDITION OF THE NEW YORK CITY BUILDING CODE.
 2. BUILDING CODE REQUIREMENTS FOR STRUCTURAL STEEL (AISC 316-10)
 3. BUILDING CODE REQUIREMENTS FOR MASONRY (ACI 530)

PROFESSIONAL STATEMENT:
 TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT, ALL WORK PURSUANT TO THIS PROJECT IS IN COMPLIANCE WITH THE NYC BUILDING CODE 2014 EDITION SECTION 1604 AND THE ADMINISTRATIVE CODE SECTION 107.2. SEE TABLE OF DESIGN CRITERIA FOR LOADING SCHEDULE.

- ALTERNATION NOTES:**
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MEANS AND METHODS OF BRICK SUPPORT AND REPAIR. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY SHORING AND BRACING REQUIRED FOR PLUMBNESS, STRUCTURAL STABILITY, AND SAFETY WHENEVER REQUIRED TO SUPPORT LOADS AS MAY BE IMPOSED UPON THE STRUCTURE DURING CONSTRUCTION. BRACING AND SHORING AND SEQUENCES OF SUCH WORK SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND HIS/HER N.Y.S. LICENSED ENGINEER. ALL SUBMITTALS SHALL BEAR THIS ENGINEER'S SEAL AND SIGNATURE.
 - THE CONTRACTOR SHALL REPAIR AND/OR REPLACE ALL ITEMS DISTURBED OR BROKEN BECAUSE OF HIS WORK TO THE SATISFACTION OF THE OWNER.
 - THE CONTRACTOR SHALL BE AWARE OF HIS OBLIGATION TO PROPERLY COORDINATE ALL SEQUENCES OF THE ALTERATION, SUCH AS STAIR AND WALL REMOVALS, NEW BEAM INSTALLATIONS, MATERIAL ORDERING, ETC. SUPERINTENDENT, ERECTION AND BRACING PROCEDURES ARE THE RESPONSIBILITY OF THE CONTRACTOR.
 - THE CONTRACTOR SHALL SUBMIT DRAWINGS TO THE STRUCTURAL ENGINEER FOR APPROVAL FOR ALL TEMPORARY SHORING AND BRACING.
 - DIMENSIONS OF EXISTING CONSTRUCTION GIVEN IN THE DRAWINGS ARE BASED ON INFORMATION IN VARIOUS DESIGN AND CONSTRUCTION DOCUMENTS PROVIDED BY THE OWNER AND LIMITED FIELD OBSERVATIONS AND MEASUREMENTS. THE CONTRACTOR SHALL VERIFY ALL INFORMATION PERTAINING TO EXISTING CONDITIONS BY ACTUAL MEASUREMENT AND OBSERVATION ON SITE PRIOR TO ANY WORK.
 - THE CONTRACTOR SHALL REPORT ANY DISCREPANCIES TO THE STRUCTURAL ENGINEER.
 - THE CONTRACTOR SHALL COORDINATE WORK WITH BUILDING OWNER PRIOR TO COMMENCING ANY WORK.
 - THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL. CONSTRUCTION SHALL NOT COMMENCE UNTIL SHOP DRAWINGS HAVE BEEN APPROVED.
 - THE CONTRACTOR TO PROTECT AT ALL TIMES EQUIPMENT, PIPES AND OTHER EXPOSED OR EMBEDDED ITEMS ON THE SITE AGAINST DAMAGE. COORDINATE WITH ARCHITECTURAL AND MEP DRAWINGS AND REROUTE AS REQUIRED.
 - ALL WORKS SHALL BE SUBJECT TO SPECIAL INSPECTION BY AN APPROVED SPECIAL INSPECTION AGENCY.
 - SEE ARCH. FOR WATERPROOFING DETAIL.

- MASONRY NOTES:**
- THE CONTRACTOR SHALL DESIGN, PROVIDE, AND INSTALL BRACING THAT WILL ASSURE STABILITY OF ALL MASONRY DURING CONSTRUCTION. THE CONTRACTOR SHALL KEEP A BRACING PLAN ON SITE DURING ALL MASONRY CONSTRUCTION. BRACING PLANS SHALL CONSIDER WIND LOADS, INITIAL AND INTERMEDIATE MASONRY STRENGTHS, AND THE CONTRACTOR'S ABILITY TO EVACUATE THE SITE. CONSTRUCTION BRACING FOR WALLS WITHIN A DISTANCE LESS THAN THEIR HEIGHT FROM ADJOINING PROPERTIES OR OTHER UNPROTECTED AND UNCONTROLLED AREAS SHALL BE DESIGNED FOR CODE PRESCRIBED WIND LOADS AND THE BRACING PLAN SHALL BE SIGNED AND SEALED BY A LICENSED PROFESSIONAL ENGINEER.
 - RESTORE AND OR REPLACE ALL DEFICIENT MASONRY. REPOINT DEFICIENT MORTAR JOINTS AND STITCH ALL CRACKED/LOOSE OR MISSING MASONRY. MORTAR SHALL BE COMPATIBLE WITH EXISTING MORTAR COMPOSITION AND SHALL PENETRATE A MINIMUM OF 3/4" INTO MASONRY OR FURTHER WHERE DEEPER DEGRADATION EXISTS. REPLACE CRACKED BRICK. PROVIDE NEW BRICKS AT HOLD-UP SECTIONS AND WHERE MASONRY IS MISSING. NEW BRICK TO MATCH EXISTING IN SIZE, COLOR AND TEXTURE. TYPICAL AT ALL WALLS.
 - GROUT FOR LOAD BEARING MASONRY SHALL CONFIRM TO ASTM C476-6, WITH A MINIMUM COMPRESSIVE STRENGTH OF 2,000 PSI.
 - SOLID MASONRY UNITS SHALL BE LAID WITH FULL AND BED JOINTS.
 - ALL AUTHORIZED FITTINGS OF MASONRY SHALL INCLUDE THAT REQUIRED TO ACCOMMODATE THE WORK OF OTHER TRADES. SHALL BE DONE WITH MASONRY SAWS. THE NEW OPENING IN THE EXTERIOR MASONRY WALL SHALL BE CUT IN A MANNER DESIGNED TO INDUCE NO SHOCK TO THE EXIST. STRUCTURE.
 - THE USE OF A JACK HAMMER OR A PNEUMATIC BREAKER SHALL NOT BE PERMITTED.
 - ALL PARAPET OR SOLID BRICK WALLS (MORE THAN ONE WYTHE) SHALL BE FULLY MORTARED. SOLID WITH NO VOIDS ALLOWED IN ANY JOINTS. WALL SHALL BE BONDED TO MATCH EXIST. ALL REBARS WITH PARAPET WALL SHALL BE EPOXY COATED. FOR WALL WATERPROOFING AND FINISHES, SEE ARCH. DWGS.

- STRUCTURAL STEEL NOTES:**
- STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING UNLESS OTHERWISE NOTED ON PLAN. ALL ANGLE AND CHANNEL SHALL CONFORM TO ASTM A36. ALL WIDE FLANGE SHALL CONFORM TO A992 50 KSI MIN. ALL HSS SHALL CONFORM TO ASTM A500 GR. B/C 46 KSI MIN. ALL STEEL PLATES SHALL CONFORM TO ASTM A572 GR. 50.
 - BOLTED CONNECTIONS SHALL USE ASTM A325 BOLTS AND ASTM 563DH NUTS, UNLESS OTHERWISE NOTED. ALL BOLTS AND NUTS SHALL BE HDG UNLESS OTHERWISE NOTED. BOLTS SHALL BE 3/4" DIAMETER, UNLESS OTHERWISE NOTED. BOLTED CONNECTIONS SHALL BE SNUG TIGHT INSTALLED. SNUG TIGHT IS ATTAINED BY THE FULL EFFORT OF THE INSTALLER USING A SPREADER WRENCH OR BY RUNNING THE NUT DOWN UNTIL AN AIR OR ELECTRIC-OPERATED WRENCH FIRST START TO IMPACT.
 - ALL WELDING SHALL BE EXECUTED IN ACCORDANCE WITH THE LATEST EDITION OF THE AMERICAN WELDING SOCIETY (AWS) D1.1. ALL WELDS SHALL BE CONTINUOUS WHERE LENGTH IS NOT GIVEN, UNLESS OTHERWISE NOTED.
 - WELDING ELECTRODES SHALL BE ASTM A323 E70XX WITH DUCTILITY OF 20 FT LBS AT 000° F; CHIPPY NOTCH TOUGHNESS.
 - STEEL DETAILS SHALL BE IN ACCORDANCE WITH THE LATEST SPECIFICATION OF THE LATEST EDITION OF AISC.
 - FILLET WELDS SHALL BE 1/4" MINIMUM, UNLESS OTHERWISE NOTED.
 - ANCHOR BOLTS/RODS SHALL CONFORM TO ASTM F-1554 GR. 55 WITH WELD ABILITY SUPPLEMENT S1, UNLESS OTHERWISE NOTED. SUBMIT GRADE CERTIFICATIONS FOR RECORD. STEEL SUPPLIER SHALL SUPPLY RIGID STEEL TEMPLATES FOR ANCHOR ROD INSTALLATION.
 - THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO THE STRUCTURAL ENGINEER FOR APPROVAL BEFORE COMMENCEMENT OF FABRICATION.
 - FIELD ASSEMBLY AND WELDING SHALL BE EXECUTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE LATEST SPECIFICATIONS OF THE AISC.
 - THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TEMPORARY GUYING AND BRACING REQUIRED TO ERECT AND HOLD THE STEEL IN ALIGNMENT.
 - ALL EXPOSED STEEL MEMBERS SHALL BE HOT DIPPED GALVANIZED G90 (9oz/FT²).

- CONCRETE (POURED IN PLACE) NOTES:**
- ALL CONCRETE SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 4000 P.S.I. CONCRETE SHALL BE NORMAL WEIGHT (STONE) (150 Lbs/Ft³) AS SPECIFIED ON DWG.
 - CONCRETE MIXES SHALL CONFORM TO THE REQUIREMENTS OF THE N.Y.C. BUILDING CODE.
 - LOAD OF CONCRETE SHALL BE CERTIFIED BY THE PRODUCER TO THE OWNER, WHETHER PRODUCED AT A READY-MIX PLANT OR SITE-MIXED, AS TO THE CONCRETE STRENGTH AND ACTUAL QUANTITIES PER CUBIC YARD OF EACH MATERIAL, INCLUDING WATER CONTAINED THEREIN. A COPY OF SUCH CERTIFICATE SHALL BE AVAILABLE TO THE OWNER DURING THE PROGRESS OF THE WORK AND FOR TWO YEARS THEREAFTER.
 - THE CONTRACTOR SHALL VERIFY DIMENSIONS AND LOCATIONS OF ALL OPENINGS, PIPE SLEEVES, ANCHOR BOLTS, ETC. AS REQUIRED BY TRADES BEFORE CONCRETE IS POURED.
 - ALL STRUCTURAL DRAWINGS TO BE WORKED WITH ARCHITECTURAL AND ANY DIFFERENCES SHALL BE COORDINATED BY THE ARCHITECT.
 - THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO THE STRUCTURAL ENGINEER FOR APPROVAL BEFORE CONSTRUCTION IS STARTED.
 - THE CONTRACTOR SHALL PROVIDE SLAB BOLSTERS, HIGH CHAIRS, AND ALL ACCESSORIES REQUIRED FOR PROPER PLACEMENT OF WIRE MESH AND REINFORCING AS PER A.C.I. & C.R.S.I. STANDARDS.
 - ALL TOP OF NEW AND EXISTING CONCRETE SURFACES AND NEW CUT CONCRETE FACES TO BE AS PER ARCHITECT'S REQUIREMENT AND ARCHITECTURAL FINISH SPECIFICATIONS.
 - ALL CONCRETE WORK TO COMPILE WITH ARCHITECTURAL CONCRETE SPECIFICATIONS.

- REINFORCING NOTES:**
- REINFORCING BARS TO BE DEFORMED TYPE, INTERMEDIATE GRADE, NEW BILLET STEEL CONFIRMING TO A.S.T.M. GRADE 60. SUPPLIER SHALL SUBMIT AFFIDAVIT OF THE PRODUCER OF STEEL CERTIFYING TO RESPECTIVE A.S.T.M. REQUIREMENTS.
 - DETAILING OF REINFORCEMENT AND CONCRETE PROTECTION FOR REINFORCEMENT TO BE IN CONFORMANCE WITH A.C.I. AND C.R.S.I. STANDARDS.
 - WELDED PLAIN WIRE FABRIC SHALL CONFORM TO "SPECIFICATION FOR STEEL WELDED WIRE REINFORCEMENT, PLAIN, FOR CONCRETE" (A.S.T.M. A185) AND HAVE A MINIMUM YIELD STRENGTH OF 70,000 P.S.I.
 - PRIOR TO PLACING CONCRETE, ALL REINFORCING SHALL BE FREE OF LOOSE FLAKY RUST, MUD, OIL OR OTHER COATING THAT WILL DESTROY, REDUCE OR HAMPER FULL BOND CAPACITY.

- FOUNDATION AND EXCAVATION NOTES:**
- A GEOTECHNICAL INVESTIGATION WAS CONDUCTED BY RA ENGINEERING. THE ASSOCIATED GEOTECHNICAL REPORT DATED JULY 22, 2022 SHALL BE REFERENCED. ALL REQUIREMENTS IN THE ABOVE REPORT SHALL BE REQUIRED AND INCLUDED DURING THE WORK.
 - ALL MATERIAL, FABRICATION, INSTALLATION, AND INSPECTION REQUIREMENTS RELATING TO THE FOUNDATION SHALL CONFORM TO THE NEW YORK CITY BUILDING CODE.
 - ALL STRUCTURAL WORK SHALL BE COORDINATED AND VERIFIED WITH THE ARCHITECTURAL, MECHANICAL, ELECTRICAL, AND PLUMBING REQUIREMENTS.
 - THE CONTRACTOR SHALL DEMOLISH AND REMOVE EXISTING ELEMENTS AS INDICATED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL REMOVE, TRANSPORT, AND DISPOSE OF ALL DEBRIS PROMPTLY.
 - DEMOLITION SHALL BE DONE CAREFULLY. TAKE SPECIAL CARE NOT TO DAMAGE ANY EXISTING UNDERSLAB UTILITIES OR OTHER ELEMENTS NOT DESIGNATED FOR REMOVAL.
 - EXCAVATION SHALL BE PERFORMED SO AS NOT TO DISTURB EXISTING ADJACENT BUILDINGS, STREETS, AND UTILITY LINES. VERIFY LOCATION OF ALL UTILITIES PRIOR TO COMMENCEMENT OF WORK. HAND EXCAVATE AROUND AND RESURFICE UTILITIES AS REQUIRED.
 - THE CONTRACTOR SHALL PROTECT ALL EXCAVATIONS FROM FLOODING AND EXISTING WATER TABLE AND PROVIDE CONTINUOUS PUMPING AS REQUIRED FOR PERFORMANCE OF WORK. THE DEPTH OF EXCAVATION SHALL NOT BE CARRIED DEEPER THAN SPECIFIED IN THE CONTRACT DOCUMENTS WITHOUT THE ENGINEER OF RECORD'S CONSENT.
 - THE SUBGRADE FOR FOOTINGS AND SLABS SHALL BE INSPECTED AND APPROVED BY THE SPECIAL INSPECTOR OR SPECIAL INSPECTION AGENCY IMMEDIATELY PRIOR TO PLACING FOUNDATION CONCRETE. THE SPECIAL INSPECTOR OR SPECIAL INSPECTION AGENCY SHALL BE ACCEPTABLE TO THE ARCHITECT AND OWNER AND PRODUCE REPORTS SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW YORK WHICH SHALL BE SUBMITTED TO THE ARCHITECT OUTLINING WORK PERFORMED AND TEST RESULTS.
 - FOOTING SUBGRADES SHOULD BE THOROUGHLY CLEARED OF ALL MUD, DEBRIS, AND LOOSE MATERIAL PRIOR TO THE PLACEMENT OF CONCRETE OR CRUSHED STONE.
 - THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO CONTROL ICE, FROST, SURFACE, AND SUBSURFACE WATER SO THAT THE FOUNDATION WORK IS PERFORMED ON DRY SUBGRADE.
 - THE CONCRETE FOR EACH FOOTING OR MAT FOUNDATION SHALL BE PLACED IN ONE (2) CONTINUOUS PLACEMENT.
 - ALL UNDERPINNING, SHEETING, SHORING, OR OTHER SIMILAR CONSTRUCTION REQUIRED SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE SUBJECT TO INSPECTIONS AS REQUIRED BY THE NEW YORK CITY BUILDING CODE. THE CONTRACTOR SHALL RETAIN A LICENSED PROFESSIONAL ENGINEER TO PROVIDE ALL NECESSARY DESIGNS, REQUIRED INSPECTIONS, AND SUBMITTALS CONFORMING TO THE BUILDING CODE OF THE CITY OF NEW YORK.
 - ALL UNDERPINNING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND HIS/HER PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW YORK. CONTRACTOR TO SUBMIT ALL UNDERPINNING DESIGNS AND PROCEDURES, SIGNED AND SEALED BY HIS/HER LICENSED PROFESSIONAL ENGINEER, TO THE GEOTECHNICAL ENGINEER FOR REVIEW. CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLETE UNDERPINNING DESIGN, INCLUDING A FULL SURVEY OF ALL EXISTING CONDITIONS INCLUDING THOSE AT NEIGHBORING WALLS AND ADJACENT AREAS. SEE GEOTECHNICAL REPORT FOR DETAILS AND ADDITIONAL REQUIREMENTS.
 - DO NOT PLACE CONCRETE WITHOUT FAVORABLY REVIEWED STRUCTURAL SHOP DRAWINGS AND MECHANICAL/ARCHITECTURAL SHOP DRAWINGS RELATED TO THE CONCRETE CONSTRUCTION AREA.
 - THE CONTRACTOR SHALL PROVIDE ALL MEASURES AND PRECAUTIONS NECESSARY TO PREVENT DAMAGE AND SETTLEMENT (HORIZONTAL AND VERTICAL) OF EXISTING OR NEW CONSTRUCTION, INSIDE OR OUTSIDE THE PROJECT LIMITS.
 - NEW EXCAVATION SHALL NOT UNDERMINE NOR DISTURB ANY EXISTING ADJACENT FOOTINGS. NEW FOOTINGS SHALL BE SUPPORTED IN A MANNER TO MAINTAIN AN EXCAVATION SLOPE OF ONE VERTICAL TO TWO HORIZONTAL (U.O.N. IN GEOTECHNICAL REPORT) BETWEEN THE BOTTOM OF FOOTINGS AND EXCAVATION (UNLESS UNDERPINNING IS PROVIDED). REROUTE ANY UNDERGROUND UTILITIES IF REQUIRED. PROVIDE 2'-0"x2'-0" MIN. CONC. PIER WITH (8) #6 VERT. AND #4@12" TIES AT THE NEW FOOTING IF REQUIRED TO MAINTAIN THE SLOPE BETWEEN NEW AND EXISTING CONSTRUCTION.
 - FILL REQUIRED BELOW ANY PORTION OF THE STRUCTURE SHALL BE COMPACTED IN 8" LIFT TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY PER ASTM D698 AND D-1557. REMOVE UNSUITABLE FILL AND REPLACE WITH CONTROLLED FILL AS REQUIRED FOR SOUND PLACEMENT OF FOUNDATIONS. NEW CONTROLLED FILL SHALL BE CRUSHED STONE, RECYCLED CONCRETE AGGREGATE OR GRANULAR SAND AND GRAVEL WITH LESS THAN 35% PASSING THE #200 SIEVE. SEE GEOTECHNICAL REPORT FOR ADDITIONAL REQUIREMENTS.
 - PROVIDE CONTINUOUS WATERSTOPS IN ALL EXTERIOR WALL CONSTRUCTION, CONTROL, AND EXPANSION JOINTS. SEE ARCHITECTURAL DRAWINGS INSTALLATION AND SPLICING OF WATERSTOP SHALL BE IN ACCORDANCE WITH RECOMMENDATIONS OF MANUFACTURER. COORDINATE WITH ARCHITECT FOR WATERSTOP INSTALLATION DETAILS.
 - SEE ARCHITECTURAL DRAWINGS FOR ALL WATERPROOFING, DAMPROOFING, PROTECTION BOARDS, AND INSULATION DETAILS.
 - FOUNDATION WALL AND FOOTING DESIGN MAY REQUIRE MODIFICATION AFTER EXISTING SOIL BEARING CAPACITY AND SUBSURFACE CONDITIONS HAVE BEEN FIELD VERIFIED BY THE GEOTECHNICAL ENGINEER.
 - UNLESS OTHERWISE NOTED ON PLAN, SOIL SUPPORTED FOOTINGS/MAT FOUNDATION SHALL BE FOUNDED UPON UNDISTURBED NATURAL SUBGRADE (OR CONTROLLED COMPACTED FILL) WITH A MINIMUM BEARING CAPACITY OF 1.5 TONS (3 KSF) PER SQUARE FOOT AS FIELD VERIFIED AND APPROVED BY THE SPECIAL INSPECTOR OR SPECIAL INSPECTION AGENCY. THE BOTTOM OF THE FOOTING SHAFTS AND BEARING CAPACITIES AS SHOWN ON THE DRAWINGS ARE ESTIMATED AND WILL REQUIRE VERIFICATION. FINAL, EXACT ELEVATIONS AND BEARING CAPACITIES SHALL BE FIELD DETERMINED AND VERIFIED BY THE SPECIAL INSPECTOR OR SPECIAL INSPECTION AGENCY.
 - THE PERIMETER OF THE GENERAL EXCAVATION SHALL BE RETAINED BY A TEMPORARY SOIL RETENTION SYSTEM. THE DESIGN, INSTALLATION, MAINTENANCE, AND REMOVAL OF SUCH A SYSTEM (WHERE REQUIRED) SHALL BE THE COMPLETE AND SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL PROVIDE ALL MEASURES AND PRECAUTIONS NECESSARY TO PREVENT DAMAGE AND SETTLEMENT OF EXISTING OR NEW CONSTRUCTION INSIDE OR OUTSIDE THE PROJECT LIMITS. ANY DAMAGE TO NEW OR EXISTING CONSTRUCTION INSIDE OR OUTSIDE THE PROJECT LIMITS, IS THE RESPONSIBILITY OF THE CONTRACTOR.
 - DO NOT BACKFILL AGAINST FOUNDATION WALLS UNTIL ALL SUPPORTING SLABS (OR BRACING) HAS BEEN PLACED AND THE CONCRETE HAS OBTAINED FULL 28-DAY DESIGN STRENGTH.
 - ALL PERIMETER CONCRETE WALLS REMAIN LATERALLY BRACED UNTIL ALL FRAMING IS INSTALLED. NO BACKFILLING SHALL BE PERFORMED AGAINST ANY UNBRACED WALLS OR WALLS WITHOUT FRAMING. BACKFILLING SHALL BE DONE SIMULTANEOUSLY ON BOTH SIDES OF THE WALL(S).
 - THE CONTRACTOR SHALL COORDINATE ALL ELEMENTS OF THE SOIL RETENTION SYSTEM WITH ALL ELEMENTS OF THE PERMANENT BUILDING.
 - WRITTEN PERMISSION SHALL BE SECURED BY THE CONTRACTOR FROM OWNER OF ADJACENT PROPERTIES FOR ANY WORK AFFECTING THEIR PROPERTIES PRIOR TO COMMENCING WORK.
 - ALL EXCAVATION SHALL BE BASED ON ENGINEERING DRAWINGS PREPARED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NEW YORK AND RETAINED BY THE CONTRACTOR AS REQUIRED. THE DRAWINGS SHALL INCLUDE PLANS AND SECTIONS OF EXCAVATION SEQUENCES. THE EXCAVATION SEQUENCES SHALL BE CONTROLLED TO MATCH THE REQUIREMENTS OF THE DESIGN OF THE SOIL RETENTION SYSTEM.
 - THE GENERAL EXCAVATION SHALL CONSIST OF EXCAVATING AND REMOVING THE EXISTING SURFICIAL FILL MATERIALS TO REACH THE DESIRED SUBGRADE LEVEL. THE EXPOSED SUBGRADE SHOULD BE PROOF ROLLED AND COMPACTED TO A FIRM AND UNYIELDING CONSISTENCY. THE EXCAVATION FOR FOOTINGS, PITS, ETC. SHALL BE EXCAVATED ON AN INDIVIDUAL, LOCALIZED BASIS DOWN FROM THE SLAB-ON-GRADE SUBGRADE LEVEL. EACH EXCAVATION SHALL BE A TRIM, LEVEL SURFACE.
 - THE CONTRACTOR SHALL PROVIDE POSITIVE PROTECTION (MATS/SHEET COVERINGS) FOR ALL EXCAVATION SLOPES TO PROTECT SLOPES FROM INSTABILITY AND DETERIORATION DUE TO RAIN, WIND OR SNOW/ICE.
 - CONCRETE FOR FOUNDATIONS SHALL BE POURED ON THE SAME DAY THE SUBGRADE IS APPROVED BY THE SPECIAL INSPECTOR OR SPECIAL INSPECTION AGENCY.
 - UTILITY LINES SHALL NOT BE PLACED THROUGH OR BELOW FOUNDATIONS.

- INSPECTIONS NOTES:**
 SPECIAL INSPECTIONS SHALL BE IN ACCORDANCE WITH CHAPTER 17 OF THE NEW YORK CITY BUILDING CODE.
 REQUIRED SPECIAL INSPECTIONS:
 1. STRUCTURAL STEEL - WELDING
 2. STRUCTURAL STEEL - DETAILS
 3. CONCRETE - CAST-IN-PLACE
 4. MASONRY
 5. STRUCTURAL STABILITY - EXISTING BUILDINGS
 6. POST-INSTALLED ANCHORS
 7. CONCRETE DESIGN MIX
 8. CONCRETE SAMPLING AND TESTING
 9. SUBGRADE INSPECTION
 10. EXCAVATIONS - SHEETING, SHORING, AND BRACING
 REQUIRED PROGRESS INSPECTIONS:
 1. FINAL

- NEW SLAB OPENING:**
- CONTRACTOR SHALL PROVIDE ALL TEMPORARY SHORING AND BRACING REQUIRED FOR PLUMBNESS, STABILITY, AND SAFETY WHENEVER REQUIRED TO SUPPORT LOADS AS MAY BE IMPOSED UPON THE STRUCTURE DURING CONSTRUCTION. BRACING AND SHORING SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND HIS/HER PROFESSIONAL ENGINEER.
 - CONTRACTOR SHALL INSTALL TEMPORARY SHORING AND BRACING AND SEALED BY A NYS PROFESSIONAL ENGINEER PRIOR TO REMOVING EXISTING CONCRETE SLAB.
 - THE NEW OPENING SHALL BE CUT IN A MANNER DESIGNED TO INDUCE NO SHOCK TO THE EXISTING STRUCTURE.
 - IN ORDER TO ELIMINATE POTENTIAL OVER-CUTTING, ALL CORNERS OF NEWLY CUT OPENINGS MUST BE MADE USING A SERIES OF 4" CORES IN COMBINATION WITH LOW IMPACT PNEUMATIC METHODS.
 - THE USE OF A JACK HAMMER OR A PNEUMATIC BREAKER SHALL NOT BE PERMITTED.

- CONCRETE ANCHOR BOLTS:**
- ANCHOR BOLTS TYPES AND SIZES SHALL BE AS NOTED ON PLANS AND DETAILS.
 - ALL BOLTS SHALL BE INSTALLED AS PER THE MANUFACTURER'S INSTRUCTION TAKING CAREFUL NOTE OF DRILL BIT TYPE & CLEANING HOLE.
 - BOLT HOLES SHALL BE ACCURATELY SET USING A TEMPLATE AND FIXED DRILL GUIDE. USE SMALL PILOT HOLES AS REQUIRED TO INSURE A PERFECT FIT.
 - THE ANCHOR INSTALLATION SHALL BE SUBJECT TO SPECIAL INSPECTION.

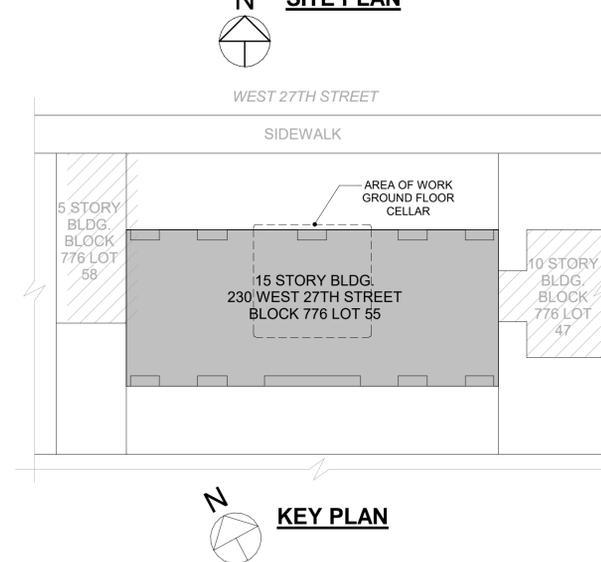
- TENANT SAFETY NOTES (2014):**
- CONSTRUCTION WILL BE CONFINED TO THE AREA OF WORK AND WILL NOT CREATE DUST, DIRT OR OTHER SUCH INCONVENIENCE TO OTHER TENANTS WITHIN THE BUILDING.
 - CONSTRUCTION OPERATION WILL NOT BLOCK HALLWAYS OR MEANS OF DEGREES FOR TENANTS OF THIS BUILDING.
 - CONSTRUCTION WILL NOT INVOLVE INTERRUPTION OF HEATING, WATER, ELECTRICAL, GAS, SPRINKLER, TO OTHER TENANTS OF THE BUILDING, UNLESS PRIOR NOTIFICATION IS MADE TO THE OWNER AND APPROVAL SECURED FROM SAME.
 - CONSTRUCTION OPERATIONS WILL BE CONFINED TO NORMAL BUSINESS HOURS OF 8 A.M. TO 5 P.M. MONDAYS THROUGH FRIDAY, EXCEPT LEGAL HOLIDAYS UNLESS APPROVED BY THE BUILDING MANAGEMENT.
 - ALL PRECAUTIONS TO BE OBSERVED IN THE BUILDING TO MAINTAIN FIRE SAFETY DURING CONSTRUCTION.
 - THE STRUCTURAL INTEGRITY OF THE BUILDING TO BE PROTECTED AT ALL TIMES AND NOT TO BE DISTURBED.
 - CONSTRUCTION NOISE WILL BE KEPT TO A MINIMUM AND CEASE AFTER NORMAL WORKING HOURS (UNLESS APPROVED BY THE BUILDING MANAGEMENT).
 - BUILDING SECURITY TO BE MAINTAINED TO PREVENT UNAUTHORIZED PERSONS FROM ENTERING THE CONSTRUCTION AREA.
 - FLOOR SHALL NOT BE OVERLOADED WITH CONSTRUCTION MATERIAL BEYOND THAT PERMITTED.
 - BEFORE SPRINKLER SYSTEM IS TURNED OFF THE FIRE DEPARTMENT IS TO BE NOTIFIED.
 - ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE 2014 EDITION OF THE N.Y. CITY BUILDING CODE.

- DEPARTMENT OF BUILDING NOTES:**
- WORK SHALL BE EXECUTED IN FULL COMPLIANCE WITH THE APPLICABLE PROVISIONS OF ALL LAWS, BY-LAWS, STATUTES, ORDINANCES, CODES, RULES, REGULATIONS AND LAWFUL ORDERS OF PUBLIC AUTHORITIES BEARING ON THE DESIGN AND EXECUTION OF THE WORK. WORK SHALL BE IN CONFORMANCE WITH THE 2014 CONSTRUCTION CODES. THE CONTRACTOR SHALL PROMPTLY NOTIFY THE AUTHORITY OF ANY PORTIONS OF THE WORK, IN THE CONTRACT DOCUMENTS THAT ARE AT VARIANCE WITH THE ABOVE.
 - ALL MATERIALS, ASSEMBLIES, FORMS OF CONSTRUCTION AND SERVICE EQUIPMENT REGULATED BY CODE SHALL MEET THE FOLLOWING REQUIREMENTS: (a) THEY SHALL HAVE BEEN ACCEPTABLE PRIOR TO THE EFFECTIVE DATE OF THE CODE BY THE BOARD OF STANDARDS AND APPEALS OR MEA; (b) THEY SHALL HAVE BEEN ACCEPTED FOR THE USE UNDER THE PRESCRIBED TEST METHODS BY THE COMMISSIONER (OR); (c) APPROVED BY THE OFFICE OF TECHNICAL CERTIFICATION AND RESEARCH (OTCR); (d) SHALL BE LISTED AND LABELED BY DOB RECOGNIZED AGENCY TO MEET REQUIRED STANDARD.
 - MATERIALS OR ASSEMBLIES REQUIRED TO HAVE A FIRE RESISTANCE RATING SHALL COMPLY WITH ONE OF THE FOLLOWING: (a) THEY SHALL CONFORM WITH CHAPTER 7 OF THE 2014 NYC BUILDING CODE; (b) THEY SHALL HAVE BEEN TESTED IN ACCORDANCE WITH ASTM E119, STANDARD METHODS OF FIRE TESTS OF BUILDING CONSTRUCTION AND MATERIALS BY A NATIONALLY RECOGNIZED AGENCY; (c) THEY SHALL HAVE BEEN ACCEPTABLE PRIOR TO THE EFFECTIVE DATE OF THE CODE. ALL MASONRY UNITS AND MASONRY CONSTRUCTION SHALL CONFORM TO NYC BUILDING CODE CHAPTER 21.
 - THE VARIOUS OCCUPANCIES REQUIRED TO BE SEPARATED FROM EACH OTHER BY FIRE SEPARATION SHALL BE IN ACCORDANCE WITH BC 508.3 AND TABLE 508.3.3. FIRE SEPARATIONS FOR INCIDENTAL USE AREAS SHALL BE IN ACCORDANCE WITH BC 508.2 AND TABLE 508.2.
 - THE FOLLOWING AS REQUIRED SHALL BE MADE UNDER SEPARATE APPLICATION BY THE CONTRACTOR'S LICENSED PROFESSIONAL IN ACCORDANCE WITH SECTION 28-104.2.6 OF TITLE 28: (a) SIDEWALK SHEDS; (b) CONSTRUCTION FENCES; (c) SCAFFOLDS.
 - THE CONTRACTOR'S LICENSED PROFESSIONAL IS RESPONSIBLE FOR FILING APPLICATION AND OBTAINING PERMITS FOR SCAFFOLDING, SIDEWALK BRIDGING, ANY OTHER CONSTRUCTION EQUIPMENT OR PUBLIC PROTECTIVE EQUIPMENT REQUIRED TO ENSURE SAFETY OF OPERATION AND THE PUBLIC AS PER NYC CONSTRUCTION CODE, CHAPTER 33, SECTION BC 3307. THE CONTRACTOR IS ALSO RESPONSIBLE FOR OBTAINING LETTER OF COMPLETION. APPLICATION FOR CONSTRUCTION PERMITS SHALL BE PROCESSED THROUGH AGENCIES HAVING JURISDICTION.
 - THESE DRAWINGS HAVE BEEN PREPARED BY OR AT THE DIRECTION OF THE UNDERSIGNED AND TO THE BEST OF THE UNDERSIGNED'S KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGEMENT ARE IN COMPLIANCE WITH THE NYC BUILDING CODES 2014 EDITION.

- WATERPROOFING ADDITIVE NOTES:**
- CONCRETE FOR ELEVATOR PIT AND WALLS SHALL CONTAIN WATERPROOFING ADMIXTURE AS RECOMMENDED BY THE MANUFACTURER'S DOSING REQUIREMENTS.
 - WATERPROOFING ADMIXTURE SUBJECT TO APPROVAL BY THE ENGINEER.
 - WHERE CALLED FOR ON THE CONCRETE DESIGN REQUIREMENTS CHART, SUBJECT TO ENGINEER'S APPROVAL.

- DEWATER NOTES:**
- GEOTECHNICAL REPORT DATED JULY 22, 2022, PREPARED BY RA ENGINEERING SHALL BE REFERENCED FOR GROUND WATER CONTROL DURING EXCAVATION. THE CONTRACTOR SHALL PROVIDE, MAINTAIN AND OPERATE ALL NECESSARY PUMPING AND DEWATERING EQUIPMENT, AND BE RESPONSIBLE FOR THE REMOVAL OF ANY SOURCE OF CAUSE, BY WHATEVER MEANS AND EQUIPMENT NECESSARY, AND AS LONG AS MAY BE REQUIRED TO PROPERLY PERFORM THE FOUNDATION WORK. WATER SHALL BE CONDUCTED AWAY FROM EXCAVATIONS AND ALL NECESSARY PRECAUTIONS SHALL BE TAKEN TO PREVENT SETTLEMENT, EROSION OR ANY OTHER DAMAGE TO EXISTING STRUCTURE DUE TO LOSS OF GROUND WATER.

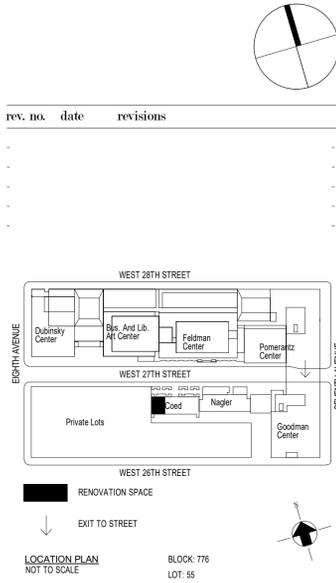
DESIGN CRITERIA		
RISK CATEGORY	II	
DEAD	SELF-WEIGHT OF STRUCTURAL MEMBERS	
	1ST FLOOR COLLATERAL	100 PSF
LIVE	2ND COLLATERAL	30 PSF
	1ST FLOOR	100 PSF
SNOW	2ND	40 PSF
	ELEVATOR	SEE PLAN AND ELEVATOR SHOP
WIND	GROUND SNOW LOAD	N/A
	FLAT ROOF SNOW LOAD	N/A
SEISMIC	SNOW EXPOSURE FACTOR	N/A
	SNOW IMPORTANCE FACTOR	N/A
WIND	BASIC WIND SPEED (3-SEC GUEST)	N/A
	WIND EXPOSURE CATEGORY	N/A
SEISMIC	WIND IMPORTANCE FACTOR	N/A
	SEISMIC IMPORTANCE FACTOR	Ie = 1.0
WIND	SITE CLASS	D
	MAPPED MAX. SPECTRAL RESPONSE COEFFICIENT	SDS = 0.281g SD1 = 0.073g
SEISMIC	DESIGN CATEGORY	B
	RESPONSE MODIFICATION COEFFICIENT	R = N/A
WIND	COMPONENT AMPLIFICATION FACTOR	ap = N/A
	SYSTEM OVERSTRENGTH FACTOR	Q = N/A



ABBREVIATIONS	
ADJ	ADJACENT
B/O	BOTTOM OF
BHD	BULKHEAD
BLDG	BUILDING LINE
BLM	BUILDING
BE	BEAM
BW	BEARING WALL
CL	CENTER LINE
CLR	CLEAR
CML	CONCRETE MASONRY UNIT
COL	COLUMN
CONC	CONCRETE
DIA	DIAMETER
DN	DOWN
DWG	DRAWING
EIFS	EXTERIOR INSULATION AND FINISH SYSTEM
EL	ELEVATION
EQ	EQUAL
EXIST	EXISTING
EXT	EXTERIOR
FDN	FOUNDATION
FL	FLOOR
FTG	FOOTING
INT	INTERIOR
MISC	MISCELLANEOUS
N.T.S.	NOT TO SCALE
PL	PLATE, PLAN, PROPERTY LINE
REIN	REINFORCING
REQD	REQUIRED
SCH	SCHEDULE
SECT	SECTION
SIM	SIMILAR
SPEC	SPECIFICATION
STD	STANDARD
STI	STRUCTURAL
STRUC	STRUCTURAL
SW	SHEAR WALL
SYM	SYMMETRICAL
T/O	TOP OF
TYP	TYPICAL
U.O.N.	UNLESS OTHERWISE NOTED
V.I.F.	VERIFY IN FIELD
W.W.F.	WELD WIRE FABRIC
W.W.M.	WELD WIRE MESH
W/	WITH
W/O	WITHOUT

DRAWING INDEX	
S-100.00	KEY PLAN & GENERAL NOTES
S-110.00	FLOOR FRAMING PART PLAN
S-120.00	ELEVATIONS AND SECTIONS
S-130.00	TYPICAL DETAILS AND SECTIONS

DOB APPLICATION REFERENCES	
Architectural DOB NOW Job #	M00741948-1
Mechanical DOB NOW Job #	M07997506-11
Structural DOB NOW Job #	M07997517-11
Plumbing DOB NOW Job #	M07997511-11



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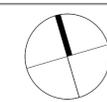
David Smotrich & Partners LLP
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PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
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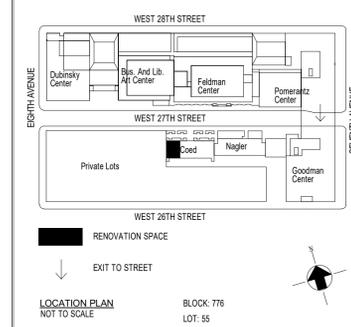
DRAWING TITLE:
KEY PLANS & GENERAL NOTES

DEPARTMENT OF BUILDING JOB #
 M07997517-11

SEAL & SIGNATURE: _____ DATE: 09.09.2022
 PROJECT No:13284.154
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rev. no. date revisions



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DRAWING TITLE:

FLOOR FRAMING PART PLAN

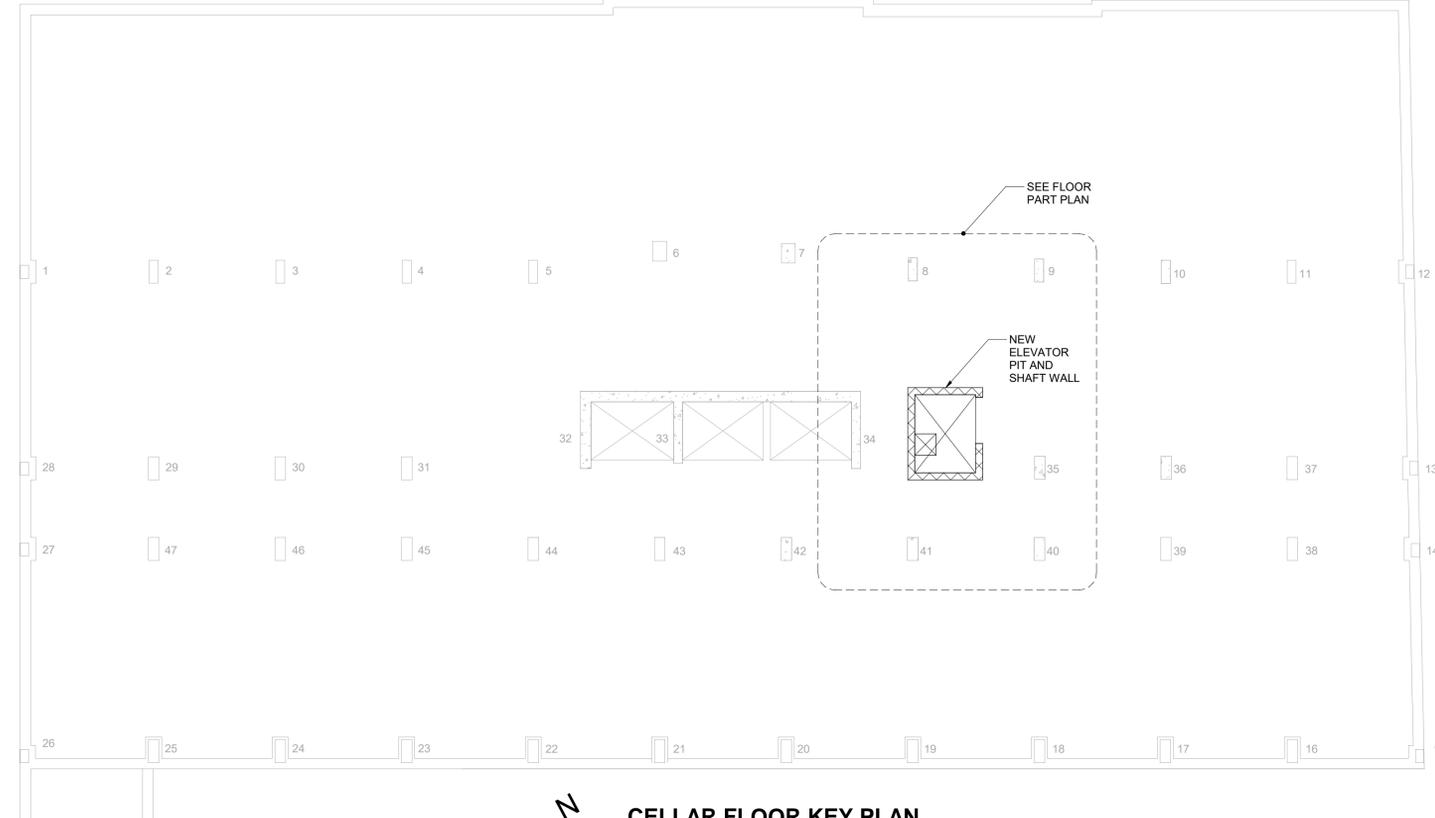
DEPARTMENT OF BUILDING JOB #
 M07997517-11

SEAL & SIGNATURE: _____ **DATE:** 09.09.2022
DRAWING BY: _____ **PROJECT No:** 13284.154
CHK BY: _____ **DWG No:** _____
S-110.00
SCALE: AS NOTED **2 OF 4**

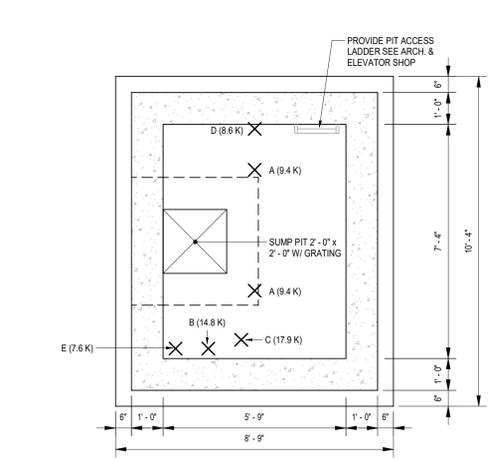
CONCRETE MIX SCHEDULE

NOTES:
 1. MIX DESIGNER IS RESPONSIBLE FOR ENSURING THE PLACABILITY OF THE MIX.
 2. DOSAGE OF ALL ADDITIVES SHALL BE PER MANUFACTURER'S RECOMMENDATION.
 3. MIX DESIGN TO CONSULT WITH CONTRACTOR TO UNDERSTAND THE METHOD OF PLACEMENT AND FINISHING.
 4. THE MIX DESIGNER MAY PROPOSE ADDITIONAL ALTERNATIVE ADDITIVES TO MEET THE CONTRACTOR'S REQUIREMENTS.
 5. FOR CONCRETE EXPOSED TO FREEZE/THAW AND/OR DEICING CHEMICALS, AIR CONTENT TO BE 6%.
 6. WHERE CORROSION INHIBITOR IS CALLED FOR PROVIDE 3 GALLONS/ CUBIC YARD OF CONCRETE.

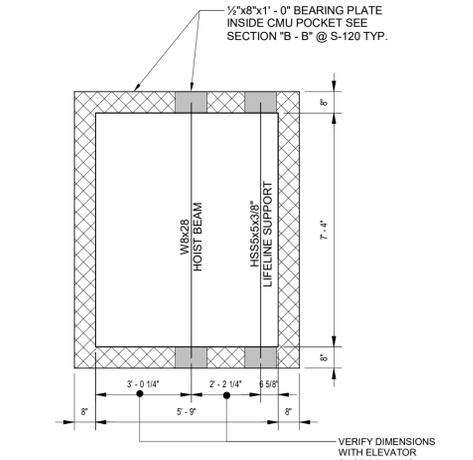
MIX	LOCATION	STRENGTH REQUIRED	AT AGE	UNIT WEIGHT	MASS CONCRETE	WATER/PROOFING ADMIXTURE	CORROSION INHIBITOR	MICRO FIBERS	MACRO FIBERS	EXPOSED TO FREEZE/THAWING	EXPOSED TO DEICING CHEMICALS
A	ELEVATOR PIT	4000 PSI	28 DAYS	150	NO	YES	NO	NO	NO	NO	NO



CELLAR FLOOR KEY PLAN
 SCALE: 1/8" = 1'-0"



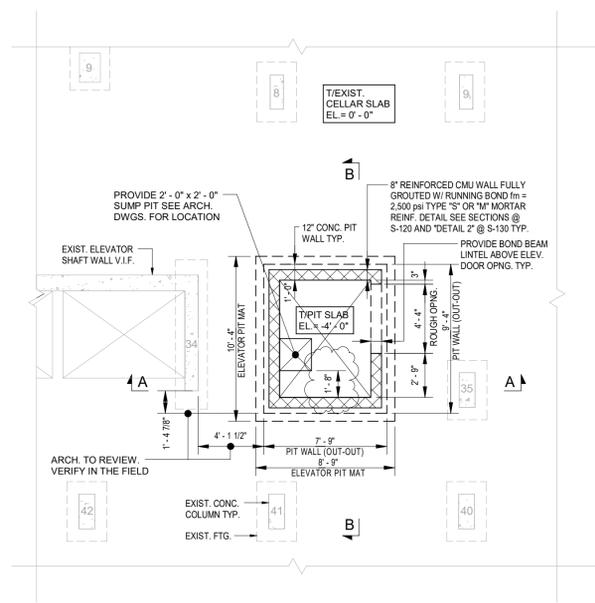
CELLAR FLOOR PART PLAN AT ELEVATOR PIT
 SCALE: 3/8" = 1'-0"
NOTES:
 1. SEE DETAIL OF REINFORCING AT WALL OR GRADE BEAM CORNERS @ S-130 FOR REINFORCING DETAILS.
 2. X (X.X K) DENOTES ELEVATOR MANUFACTURER SPECIFIED POINT LOADS. SEE ELEVATOR SHOP DRAWING FOR DETAIL.



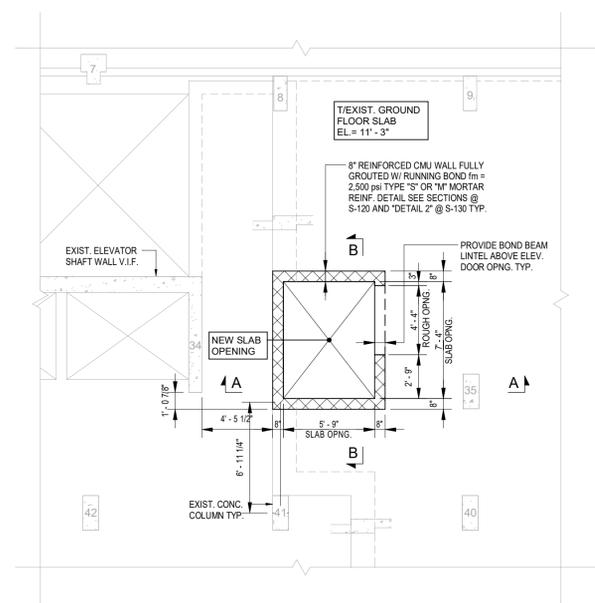
2ND FLOOR PART PLAN AT ELEVATOR HOIST BEAM
 SCALE: 3/8" = 1'-0"
NOTES:
 1. CONTRACTOR TO VERIFY LOCATIONS AND ELEVATIONS OF HOIST BEAM AND LIFELINE SUPPORT BEAM WITH ELEVATOR SHOP DRAWING PRIOR TO INSTALLATION.

SLAB NEW OPENING NOTES:

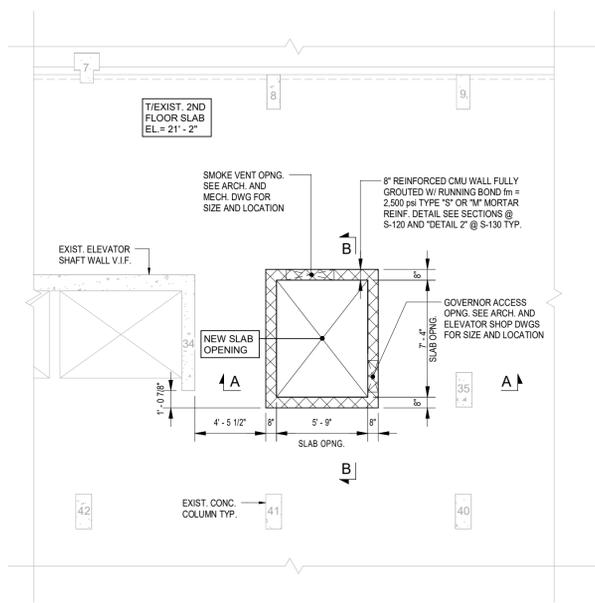
- CONTRACTOR SHALL PROVIDE ALL TEMPORARY SHORING AND BRACING REQUIRED FOR PLUMBNESS, STABILITY, AND SAFETY WHENEVER REQUIRED TO SUPPORT LOADS AS MAY BE IMPOSED UPON THE STRUCTURE DURING CONSTRUCTION. BRACING AND SHORING SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND HIS/HER PROFESSIONAL ENGINEER.
- CONTRACTOR SHALL INSTALL TEMPORARY SHORING AS PER SHORING PLAN SIGNED AND SEALED BY A NYS PROFESSIONAL ENGINEER PRIOR TO REMOVING EXISTING CONCRETE SLAB.
- THE NEW OPENING SHALL BE CUT IN A MANNER DESIGNED TO INDUCE NO SHOCK TO THE EXISTING STRUCTURE.
- IN ORDER TO ELIMINATE POTENTIAL OVER-CUTTING, ALL CORNERS OF NEWLY CUT OPENINGS MUST BE MADE USING A SERIES OF 4" CORES IN COMBINATION WITH LOW IMPACT PNEUMATIC METHODS.
- THE USE OF A JACK HAMMER OR A PNEUMATIC BREAKER SHALL NOT BE PERMITTED.



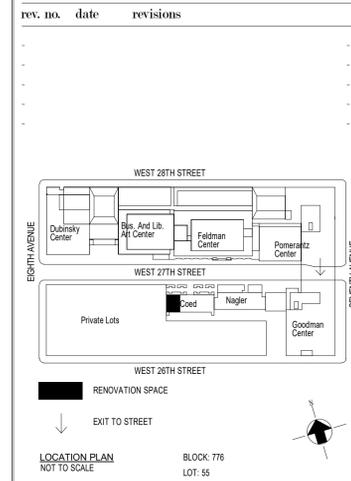
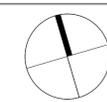
CELLAR FRAMING PART PLAN
 SCALE: 3/16" = 1'-0"
NOTES:
 1. ARCH. TO VERIFY SLAB OPENING SIZE AND LOCATION.
 2. SEE ARCH. DWG. FOR REQUIRED ELEVATOR DOOR OPENING WIDTH AND HEIGHT.
 3. CONTRACTOR TO VERIFY ELEVATOR SHAFT LOCATION WITH ARCH. PRIOR TO CUTTING SLAB OPENING.



GROUND FLOOR FRAMING PART PLAN
 SCALE: 3/16" = 1'-0"
NOTES:
 1. ARCH. TO VERIFY SLAB OPENING SIZE AND LOCATION.
 2. SEE ARCH. DWG. FOR REQUIRED ELEVATOR DOOR OPENING WIDTH AND HEIGHT.
 3. CONTRACTOR TO VERIFY ELEVATOR SHAFT LOCATION WITH ARCH. PRIOR TO CUTTING SLAB OPENING.



2ND FLOOR FRAMING PART PLAN
 SCALE: 3/16" = 1'-0"
NOTES:
 1. ARCH. TO VERIFY SLAB OPENING SIZE AND LOCATION.
 2. SEE ARCH. DWG. FOR REQUIRED ELEVATOR DOOR OPENING WIDTH AND HEIGHT.
 3. CONTRACTOR TO VERIFY ELEVATOR SHAFT LOCATION WITH ARCH. PRIOR TO CUTTING SLAB OPENING.



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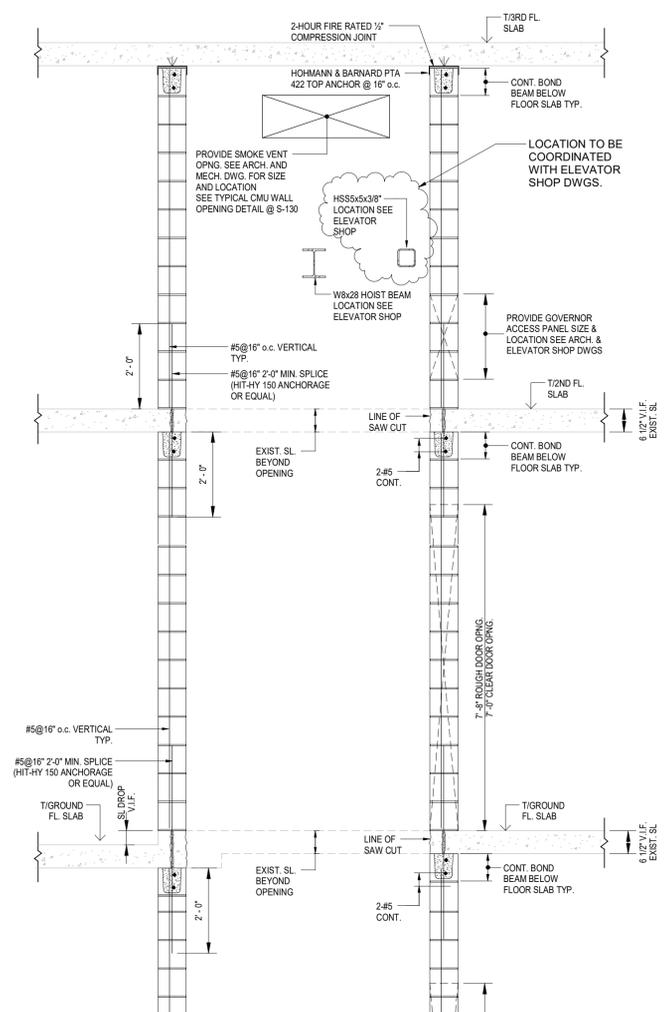
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DRAWING TITLE:
ELEVATIONS AND SECTIONS

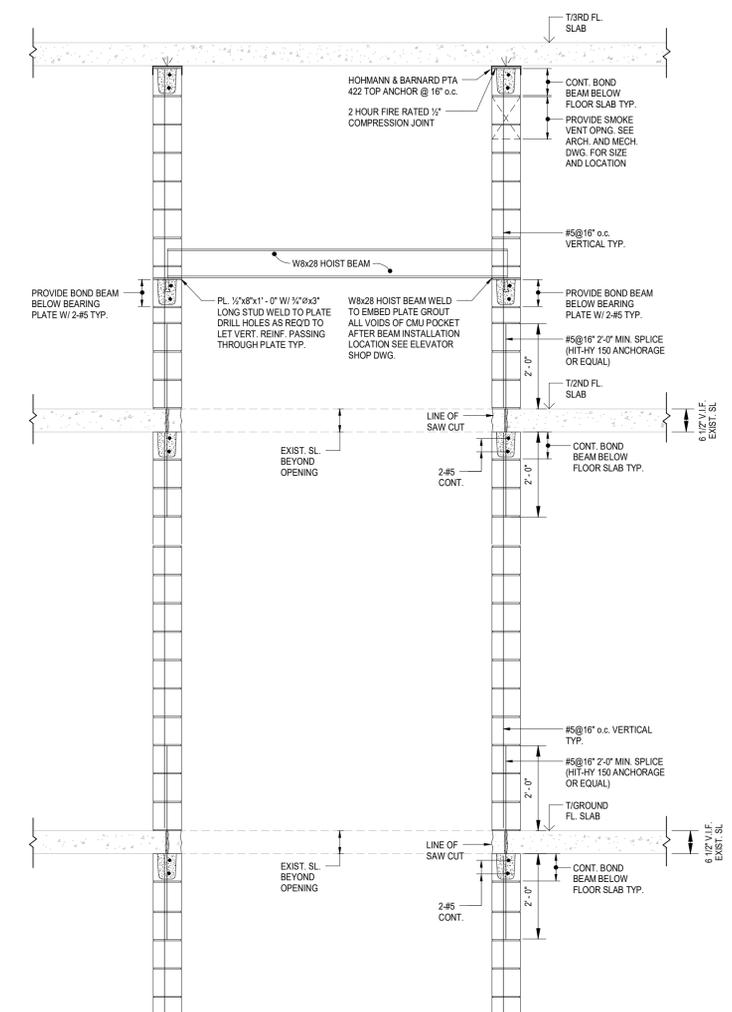
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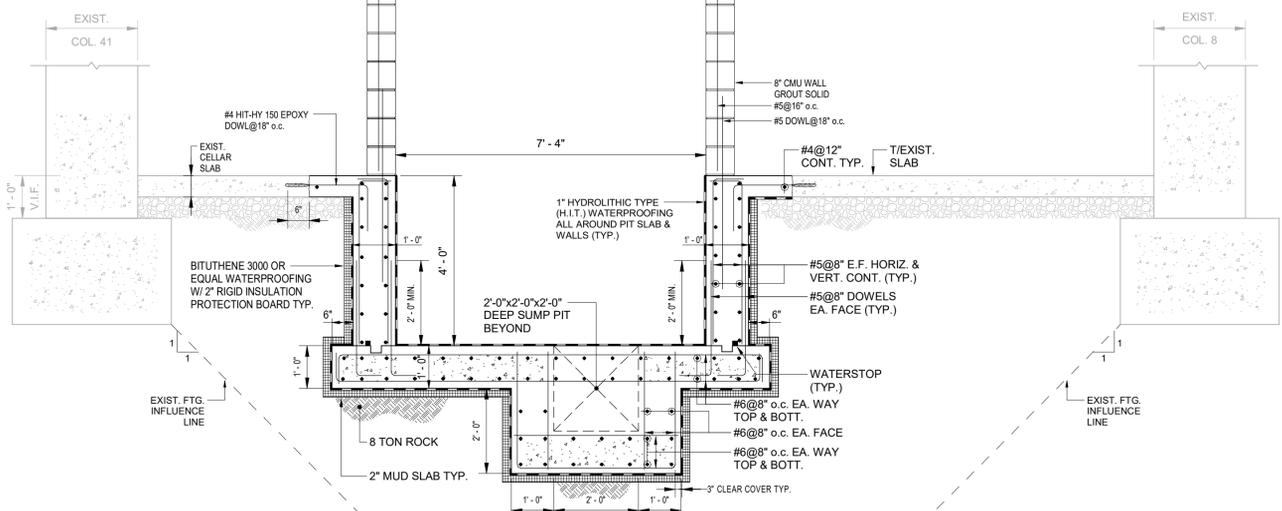
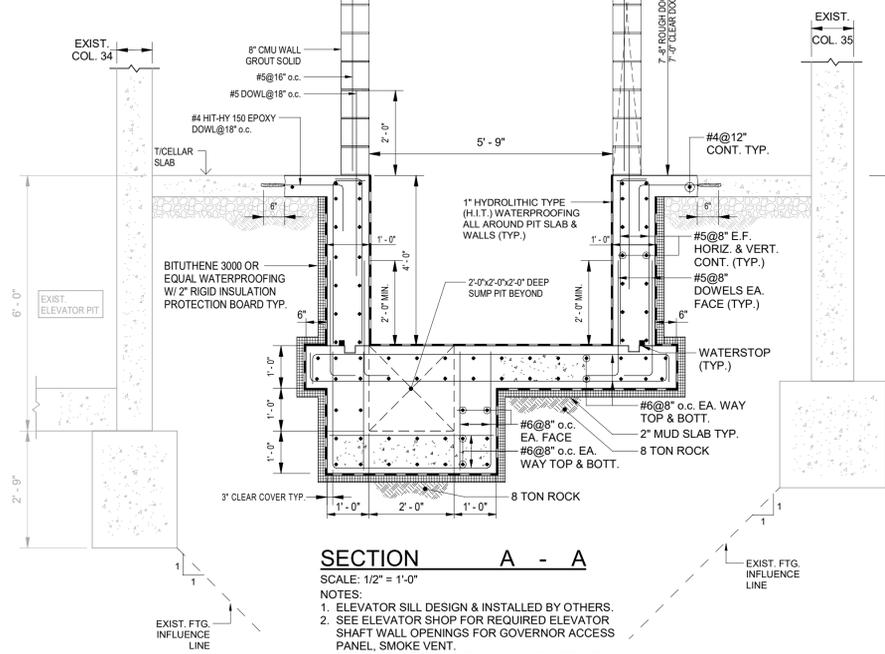
SECTION A - A

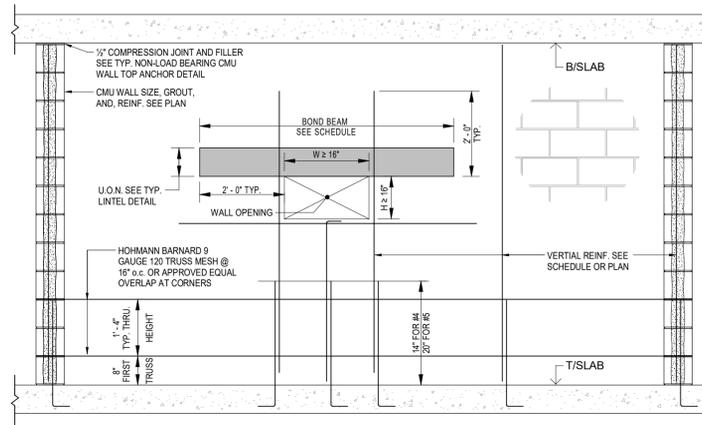
SCALE: 1/2" = 1'-0"
NOTES:
1. ELEVATOR SILL DESIGN & INSTALLED BY OTHERS.
2. SEE ELEVATOR SHOP FOR REQUIRED ELEVATOR SHAFT WALL OPENINGS FOR GOVERNOR ACCESS PANEL, SMOKE VENT.
3. SEE TYPICAL TYPICAL CMU WALL ELEVATION @ S-130 FOR WALL OPENING DETAILS.



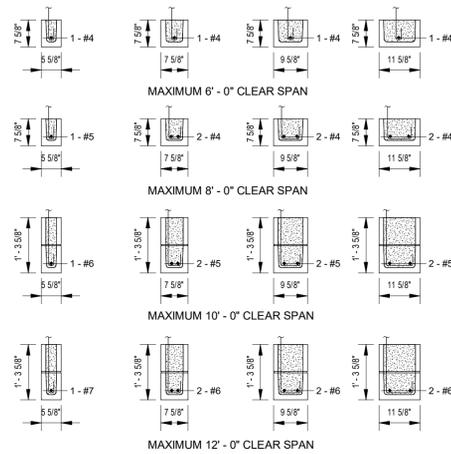
SECTION B - B

SCALE: 1/2" = 1'-0"
NOTES:
1. ELEVATOR SILL DESIGN & INSTALLED BY OTHERS.
2. SEE ELEVATOR SHOP FOR REQUIRED ELEVATOR SHAFT WALL OPENINGS FOR GOVERNOR ACCESS PANEL, SMOKE VENT.
3. SEE TYPICAL TYPICAL CMU WALL ELEVATION @ S-130 FOR WALL OPENING DETAILS.



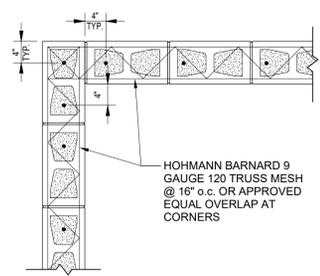


DETAIL 1
TYPICAL CMU WALL ELEVATION
SCALE: 1/2" = 1'-0"

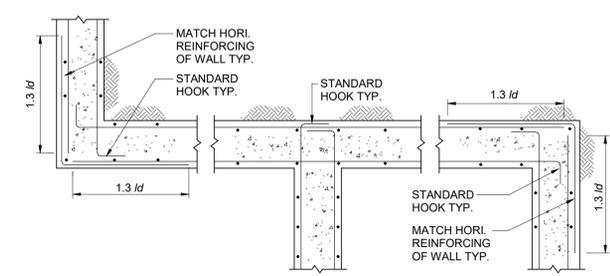


DETAIL 4
TYPICAL MASONRY INTERIOR WALL BOND BEAM LINTEL DETAILS
SCALE: 1/2" = 1'-0"

- NOTES:
1. NON-LOAD BEARING INTERIOR CMU WALL LINTEL SHALL BE SIZED FOLLOWING THIS DETAIL UNLESS OTHERWISE NOTED ON PLAN.
 2. LINTELS ARE DESIGNED TO CARRY CONCRETE BLOCK OR LIGHTER WALL CONSTRUCTION ONLY.
 3. LINTELS ARE NOT DESIGNED TO CARRY ANY FLOOR OR ROOF LOAD.
 4. LINTELS ARE DESIGNED TO CARRY RUNNING BOND CONSTRUCTION ONLY.
 5. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTRACT THE ENGINEER OF RECORD REGARDING EXTERIOR BOND BEAMS PRIOR TO BID.



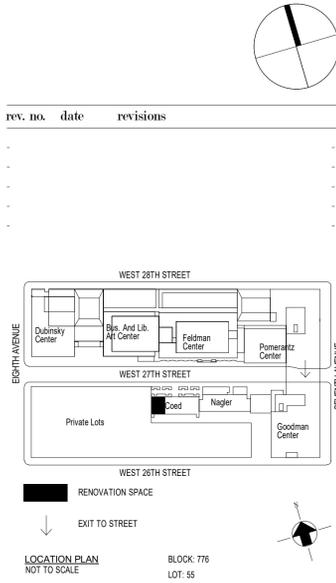
DETAIL 2
TYPICAL MASONRY WALL CORNER DETAIL
SCALE: 3/4" = 1'-0"



DETAIL 3
TYP. DETAIL AT FOUNDATION WALL CORNER
SCALE: 1/2" = 1'-0"

DETAIL 5
LINTEL AT ELEVATOR DOOR
SCALE: 3/4" = 1'-0"

- NOTES:
1. ALL BARS AND BEAMS ARE TO EXTEND 24" BEYOND THE OPENING.



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DRAWING TITLE:
TYPICAL DETAILS AND SECTIONS

DEPARTMENT OF BUILDING JOB #
M07997517-11

SEAL & SIGNATURE: _____ DATE: 09.09.2022
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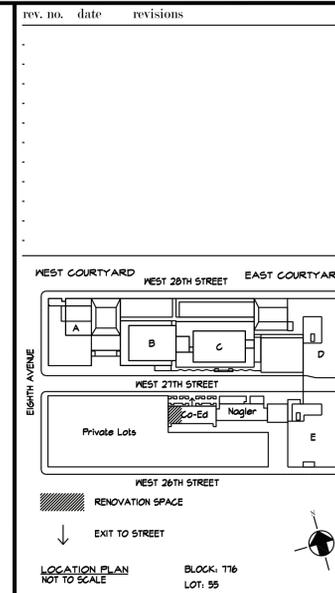
BUILDING MECHANICAL SYSTEMS				
	PROVISIONS	ITEM DESCRIPTION	PROPOSED DESIGN VALUE	SUPPORTING DOCUMENTATION
C403.1	GENERAL	MECHANICAL SYSTEMS AND EQUIPMENT SERVING THE BUILDING.		SYSTEMS SHALL COMPLY WITH SECTIONS C403.2 AND SHALL COMPLY WITH SECTIONS C403.3, AND C403.4.
C403.2	PROVISIONS APPLICABLE TO ALL MECHANICAL SYSTEMS (MANDATORY)			
C403.2.1	CALCULATION OF HEATING AND COOLING LOADS	DESIGN LOAD		SHALL BE DETERMINED ACCORDING TO ASHRAE STANDARD 183. SEE LOAD CALCULATION REPORT.
C403.2.2	EQUIPMENT AND SYSTEM SIZING	OUTPUT CAPACITY OF EQUIPMENT		SHALL NOT EXCEED THE LOAD CALCULATED ON SECTION C403.2.1. SEE EXCEPTIONS.
C403.2.3	HVAC EQUIPMENT PERFORMANCE REQUIREMENTS	MINIMUM EFFICIENCY REQUIREMENTS. LIST PROJECT EQUIPMENT.		SEE VALUES OF TABLES C403.2.3(1), ..., C403.2.3(12)
	WATER-COOLED CENTRIFUGAL CHILLING PACKAGES	EQUIPMENT NOT DESIGNED FOR AHRI STANDARD 550/590		SHALL HAVE LOAD RATING REQUIREMENTS ADJUSTED ... SEE CALCULATIONS. SEE EXCEPTIONS.
	POSITIVE DISPLACEMENT (AIR- AND WATER-COOLED) CHILLING PACKAGES	EQUIPMENT WITH LEAVING FLUID TEMPERATURE HIGHER THAN 32 DEG F.		SHALL MEET TABLE C403.2.3(7)
C403.2.4	HVAC SYSTEM CONTROLS	EACH HEATING AND COOLING SYSTEM SHALL BE PROVIDED WITH THERMOSTATIC CONTROLS.		SYSTEMS SHALL HAVE THERMOSTATIC CONTROLS AS SPECIFIED IN SECTIONS: C403.2.4.1, C403.2.4.1.3, C403.2.4.2, C403.2.4.3, C403.3.1, C403.4, C403.4.1 OR C403.4.4
C403.2.4.1	THERMOSTATIC CONTROLS	SUPPLY ENERGY TO EACH ZONE		SHALL BE CONTROLLED BY INDIVIDUAL THERMOSTATIC CONTROL. SEE EXCEPTIONS.
	HEAT PUMP SUPPLEMENTARY HEAT	HEAT PUMP WITH SUPPLEMENTARY ELECTRIC HEAT		SHALL HAVE CONTROL TO PREVENT ELECTRIC HEATING WHEN HEAT PUMP CAN MEET THE LOAD.
C403.2.4.1.2	DEADBAND	ZONE THERMOSTATIC CONTROLS USED TO CONTROL BOTH HEATING AND COOLING		SHALL BE CAPABLE OF PROVIDING A TEMPERATURE RANGE OF DEADBAND OF AT LEAST 5°F. SEE EXCEPTIONS.
C403.2.4.1.3	SETPPOINT OVERLAP RESTRICTION	ZONE THERMOSTATIC FOR HEATING AND COOLING		SHALL PROVIDE A DEADBAND OF 5°F.
C403.2.4.2	OFF-HOUR CONTROLS	ZONE THERMOSTATIC CONTROL.		SHALL BE PROVIDED WITH AUTOMATIC TIME CLOCK OR PROGRAMMABLE CONTROL. SEE EXCEPTIONS.
C403.2.4.2.1	THERMOSTATIC SETBACK CAPABILITIES	THERMOSTATIC CONTROLS		SHALL HAVE THE CAPABILITY TO SET BACK TO 55°F OR UP TO 85°F.
C403.2.4.2.2	AUTOMATIC SETBACK AND SHUTDOWN CAPABILITIES	AUTOMATIC TIME CLOCK OR PROGRAMMABLE CONTROLS		SHALL BE CAPABLE TO FOLLOW THE 7 DIFFERENT PROGRAMMABLE DAILY SCHEDULES AND MANUAL OVERRIDES.
C403.2.4.2.3	AUTOMATIC START CAPABILITIES	HVAC SYSTEM		SHALL BE PROVIDED WITH CONTROLS CAPABLE AUTOMATICALLY ADJUSTING DAILY START TIME OF THE HVAC SYSTEM
C403.2.6	VENTILATION	NATURAL OR MECHANICAL VENTILATION		SHALL BE PROVIDED ACCORDING TO THE MECHANICAL CODE
C403.2.9	DUCT AND PLENUM INSULATION AND SEALING	SUPPLY AND RETURN DUCTS		SHALL BE INSULATED WITH MINIMUM R-6 IN UNCONDITIONED SPACES INSIDE AND A MINIMUM R-8 INSULATION WHERE LOCATED OUTSIDE. SEE EXCEPTIONS.
C403.2.9.1	DUCT CONSTRUCTION	DUCTWORK		SHALL BE CONSTRUCTED IN ACCORDANCE WITH NEW YORK CITY MECHANICAL CODE
C403.2.9.1.1	LOW PRESSURE DUCT SYSTEMS	ALL DUCTS AND PLENUM OPERATING AT A STATIC PRESSURE LESS THAN 2 INCHES OF WATER.		SHALL BE SECURELY FASTENED AND SEALED. SEE EXCEPTIONS.
	HIGH PRESSURE DUCT SYSTEMS	DUCT OPERATING AT A STATIC PRESSURE IN EXCESS OF 3 INCHES OF WATER.		SHALL BE INSULATED AND SEALED ACCORDING TO SECTION C403.2.9.
C403.2.10	PIPING INSULATION	PIPES SERVING THE HEATING OR COOLING SYSTEMS		SHALL BE THERMALLY INSULATED IN ACCORDANCE TO TABLE C403.2.10. SEE EXCEPTIONS.
C403.2.10.1	PROTECTION OF PIPING INSULATION	PIPING INSULATION EXPOSED TO WEATHER		SHALL BE PROTECTED FROM DAMAGE.
C403.2.11	MECHANICAL SYSTEMS COMMISSIONING AND COMPLETION REQUIREMENTS	MECHANICAL SYSTEMS		SHALL BE COMMISSIONED IN ACCORDANCE WITH SECTION C408.2
C403.2.12	AIR SYSTEM DESIGN AND CONTROL	EACH HVAC SYSTEM WITH FAN SYSTEM MOTOR EXCEEDING 5 HP.		SHALL MEET SECTION C403.2.12.1 THROUGH C403.2.12.3.
C403.2.14	REFRIGERATION EQUIPMENT PERFORMANCE	EQUIPMENT PERFORMANCE		SHALL HAVE AN ENERGY USE IN KW/HOUR NOT GREATER THAN VALUES OF TABLES C403.2.14(1) AND C403.2.14(2).

PROGRESS INSPECTIONS FOR ENERGY CODE COMPLIANCE COMMERCIAL BUILDINGS				
	Inspection/Test	Periodic (Minimum)	Reference Standard (See ECC Chapter 6) or Other Criteria	ECC or Other Citation
IIB Mechanical and Service Water Heating Inspections				
IIB2	Shutoff dampers: Dampers for stair and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the building envelope shall be visually inspected to verify that such dampers, except where permitted to be gravity dampers, comply with approved construction drawings. Manufacturer's literature shall be reviewed to verify that the product has been tested and found to meet the standard.	As required during installation.	Approved construction documents: AMCA 500D	C403.2.4.4
IIB3	HVAC and service water heating equipment: Equipment sizing, efficiencies and other performance factors of all major equipment units, as determined by the applicant of record, and no less than 15% of minor equipment units, shall be verified by visual inspection and, where necessary, review of manufacturer's data.	Prior to final plumbing and construction inspection.	Approved construction documents.	C403.2, C404.2, C404.7, C406.2
IIB4	HVAC and service water heating system controls: No less than 20% of each type of required controls and economizers shall be verified by visual inspection and tested for functionality and proper operation. Such controls shall include, but are not limited to: - Thermostatic - Set point overlap restriction - Off-hour - Shutoff damper - Zones Controls with seasonally dependent functionality: Controls whose complete operation cannot be demonstrated due to prevailing weather conditions typical of the season during which progress inspections will be performed shall be permitted to be signed off for the purpose of a Temporary Certificate of Occupancy with only a visual inspection, provided, however, that the progress inspector shall perform a supplemental inspection where the controls are visually inspected and tested for functionality and proper operation during the next immediate season thereafter. The owner shall provide full access to the progress inspector within two weeks of the progress inspector's request for such access to perform the progress inspection. For such supplemental inspections, the Department shall be notified by the approved progress inspection approved agency of any unresolved deficiencies in the installed work within 180 days of such supplemental inspection.	After installation and prior to final electrical and construction inspection, except that for controls with seasonally dependent functionality, such testing shall be performed before sign-off for issuance of a Final Certificate of Occupancy.	Approved construction documents including control system narratives; ASHRAE Guideline 1: The HVAC Commissioning Process where applicable	C403.2.4, C403.2.5.1, C403.2.11, C403.3, C403.4, C404.3, C404.6, C404.7,
IIB5	HVAC insulation and sealing: Installed duct and piping insulation shall be visually inspected to verify proper insulation placement and values. Joints, longitudinal and transverse seams and connections in ductwork shall be visually inspected for proper sealing.	After installation and prior to closing shafts, ceilings and walls.	Approved construction documents; SMACNA Duct Construction Standards, Metal and Flexible.	C403.2.7, C403.2.8, C404.5, MC 603.9
ID OTHER				
IID1	Maintenance information: Maintenance manuals for mechanical, service hot water and electrical equipment and systems requiring preventive maintenance shall be reviewed for applicability to installed equipment and systems before such manuals are provided to the owner. Labels required for such equipment or systems shall be inspected for accuracy and completeness.	Prior to sign-off or issuance of Final Certificate of Occupancy.	Approved construction documents, including electrical drawings where applicable; ASHRAE Guideline 4; Preparation of Operating and Maintenance Documentation for Building Systems.	C303.3, C408.2.5.2

COMPLIANCE WITH 2020 NEW YORK CITY ENERGY CONSTRUCTION CODE TO THE BEST OF OUR KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT THIS APPLICATION IS IN COMPLIANCE WITH 2020 NYC E.C.C.

NEW YORK CITY BUILDING DEPARTMENT APPROVAL NOTE
THIS PLAN IS APPROVED ONLY FOR WORK INDICATED ON THE APPLICATION SPECIFICATION SHEET. ALL OTHER MATTERS SHOWN ARE NOT TO BE RELIED UPON OR TO BE CONSIDERED AS EITHER BEING APPROVED OR IN ACCORDANCE WITH APPLICABLE CODES.

NEW YORK CITY ENERGY CONSERVATION CODE
TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2020 NEW YORK CITY ENERGY CONSERVATION CODE.



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ENERGY COMPLIANCE

DOB NOE JOB#
SEAL & SIGNATURE: _____ DATE: 2022.09.01
PROJECT No: 12284.154
DRAWING BY: AB
CHK BY: DN
DWG No: EN-001.00
SCALE: N.T.S. 1 OF 1

ISSUED FOR BID 09/01/2022

SYMBOL LIST AND ABBREVIATIONS		
ABBREV.	SYMBOL	DESCRIPTIONS
(E)		EXISTING WORK TO REMAIN
		NEW WORK
		EXISTING WORK TO BE REMOVED
		DIRECTION OF FLOW
		RETURN OR EXHAUST DUCT DOWN
		RETURN OR EXHAUST DUCT UP
		SUPPLY DUCT DOWN
		SUPPLY DUCT UP
		MOTORIZED DAMPER
		DUCT TURNING VANES
		ACOUSTICALLY LINED DUCT
MD		MOTORIZED DAMPER
FSD/AD, FD/AD, SD/AD		FIRE & SMOKE DAMPERS W/ACCESS DOOR IN DUCT AT WALL
		SUPPLY AIR
		RETURN AIR
FC		FLEXIBLE CONNECTION
VD		VOLUME DAMPER
CD		CEILING DIFFUSER
CR, CG		CEILING REGISTER, CEILING GRILLE
CD		3-WAY BLOW CEILING DIFFUSER
CD-A		CEILING DIFFUSER TYPE A W/150 CFM SUPPLY AIR
TR		SUPPLY TOP REGISTER 300 CFM
TR		RETURN TOP REGISTER 300 CFM
LD		LINEAR DIFFUSER 400 CFM
		DUCT MOUNTED SMOKE DETECTOR W/AD
		VARIABLE VOLUME BOX TYPE A WIREHEAT COIL
		THERMOSTAT
		STATIC PRESSURE SENSOR
		TEMPERATURE SENSOR
		AUTOMATIC TEMPERATURE CONTROL PANEL FOR OR #4
		PNEUMATIC ACTUATOR
		CONNECT NEW TO EXISTING WORK
		POINT OF DISCONNECTION, CAP IF NOT TO BE RECONNECTED
		THERMOMETER
		WATER PRESSURE GAUGE
AAV		AUTOMATIC AIR VENT
CV		TWO WAY CONTROL VALVE
		THREE WAY CONTROL VALVE
		NEEDLE VALVE
		BUTTERFLY VALVE
		GATE VALVE / SHUT-OFF VALVE
		GLOBE VALVE
		CHECK VALVE
		BALL VALVE
		PLUG VALVE
		COMBINATION MEASURING, BALANCING & SHUT-OFF VALVE
		STRAINER WITH CAPPED BLOW-DOWN VALVE
		PIPE ANCHOR
		PIPE GUIDE
		UNION

SYMBOL LIST AND ABBREVIATIONS		
ABBREV.	SYMBOL	DESCRIPTIONS
		CHILLED WATER RETURN
		DUAL TEMP WATER SUPPLY
		DUAL TEMP WATER RETURN
		PIPE DOWN
		PIPE UP
		END CAP
		PUMP
		DRAIN
		VENT
(300)		300 CUBIC FEET OF AIR PER MINUTE
ABV		ABOVE
AC-1		AIR CONDITIONING UNIT #1
AD		ACCESS DOOR
AFF		ABOVE FINISHED FLOOR
AFM		AIR FLOW MEASURING STATION
AL		ACOUSTICAL LINING
ALD		AUTOMATIC LOUVERED DAMPER
ATC		AUTOMATIC TEMPERATURE CONTROL
APD		AIR PRESSURE DROP
BAS		BUILDING AUTOMATION SYSTEM
BOD		BOTTOM OF DUCT
BOP		BOTTOM OF PIPE
BMS		BUILDING MANAGEMENT SYSTEM
BDD		BACKDRAFT DAMPER
BTU		BRITISH THERMAL UNIT
CFM		CUBIC FEET PER MINUTE
DDC		DIRECT DIGITAL CONTROL
DET		DETAIL
DP		DIFFERENTIAL PRESSURE
DN		DOWN
DWG		DRAWING
(E)		EXISTING
EA		EXHAUST AIR
EAT		ENTERING AIR TEMPERATURE
EF-1		EXHAUST FAN #1
ELEV		ELEVATION
ENT		ENTERING
EWT		ENTERING WATER TEMPERATURE
EXH		EXHAUST
FIN		FINISHED
FD		FIRE DAMPER W/ACCESS DOOR
FSD		FIRE SMOKE DAMPER W/ACCESS DOOR
FC		FIRE SMOKE DAMPER W/ACCESS DOOR
FLEX		FLEXIBLE
FPM		FEET PER MINUTE
FT		FEET
GAL		GALLON
GPM		GALLON PER MINUTE
HC		HEATING COIL
HP		HORSE POWER
HTG		HEATING
KW		KILOWATT
LAT		LEAVING AIR TEMPERATURE

ABBREVIATIONS	
ABBREV.	DESCRIPTIONS
LRA	LOCKED ROTOR AMPS
LWT	LEAVING WATER TEMPERATURE
AHU-1	AIR HANDLING UNIT # 1
MAX	MAXIMUM
MBH	THOUSANDS BTU PER HOUR
MD	MOTORIZED DAMPER
MECH	MECHANICAL
MER	MECHANICAL EQUIPMENT ROOM
MIN	MINIMUM
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NK	NECK
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OAI	OUTSIDE AIR INTAKE
OBD	OPPOSED BLADE DAMPER
RA	RETURN AIR
RF-1	RETURN FAN #1
RG	RETURN GRILLE
RHC	REHEAT COIL
RHC-4-16	REHEAT COIL #16 ON 4TH FLOOR
RPM	REVOLUTIONS PER MINUTE
RR	RETURN REGISTER
SA	SUPPLY AIR
SD	SMOKE DAMPER W/ACCESS DOOR
SF-1	SUPPLY FAN #1
TG	TOP GRILLE
TOD	TOP OF DUCT
TR	TOP REGISTER
VAV	VARIABLE AIR VOLUME
VFD	VARIABLE FREQUENCY DRIVE
WMS	WIRE MESH SCREEN
WWMS	WITH WIRE MESH SCREEN
WPD	WATER PRESSURE DROP
WT	WEIGHT
(N)	NEW
(E)	EXISTING

BUILDING DEPARTMENT NOTES

- THE OWNER SHALL ENGAGE THE SERVICES OF AN AGENCY APPROVED BY THE NYC DEPARTMENT OF BUILDINGS TO PERFORM ALL REQUIRED SPECIAL INSPECTIONS (BC 1704) AND PROGRESS INSPECTIONS (BC 110), SPECIAL AND PROGRESS INSPECTIONS SHALL BE PAID FOR BY THE OWNER. THE FOLLOWING ITEMS REQUIRE SPECIAL INSPECTION (CODE REFERENCES ARE TO THE DECEMBER 31, 2014 CODE):
 - FIRE ALARM TEST BC 907, BC 1704.13
 - MECHANICAL SYSTEMS BC 1704.16
 - FIRESTOP, DRAFT STOP AND FIREBLOCK SYSTEMS BC 1704.27
 - ENERGY CODE COMPLIANCE INSPECTIONS BC 110.3.5
 - FINAL 28-116.2.4.2 AND BC 110.5 AND DIRECTIVE 14 OF 1975 BC 110.3.4
- UPON COMPLETION OF THE WORK, A TEST SHALL BE CONDUCTED IN THE PRESENCE AND UNDER DIRECTION OF A LICENSED PROFESSIONAL ENGINEER OR REGISTERED ARCHITECT, RETAINED BY THE CONTRACTOR QUALIFIED TO CONDUCT SUCH TESTS. THE TEST SHALL SHOW COMPLIANCE WITH THE CODE REQUIREMENTS FOR VENTILATION AND THE PROPER FUNCTIONING OF ALL OPERATING DEVICES, BEFORE THE SYSTEM IS APPROVED (BC 1704).
- ALL INSPECTIONS AND TESTS WILL BE MADE IN COMPLIANCE WITH BC 1704.
- VENTILATION FOR ALL AREAS COMPLIES WITH THE MINIMUM CODE REQUIREMENTS OF MC 401, MC 402 AND MC 403.
- CERTIFICATES OF COMPLIANCE (BC 110.6 AND 28-116.4) SHALL BE OBTAINED AND PAID FOR BY THE CONTRACTOR.
- ALL HVAC SYSTEMS AND EQUIPMENT COMPLY WITH THE REQUIREMENTS OF THE ENERGY CONSERVATION CONSTRUCTION CODE OF THE STATE OF NEW YORK (MC 301.2).
- THE FOLLOWING WORK ITEMS, COMPONENTS, MATERIALS, CAPACITIES, ETC. SHALL COMPLY WITH THE FOLLOWING CODE REFERENCES:

WORK ITEM/MATERIALS CODE SECTION	CODE
A. DUCT CONSTRUCTION	MC 603
B. ELECTRIC WIRING & EQUIPMENT	MC 301.7
C. CONTROLS	MC 405
D. INDOOR CRITERIA LEVELS	BC 1207
E. PIPING INSULATION	MC 1204
F. PLENUMS AND CORRIDORS	MC 602, MC 601
- REFER TO ARCHITECTURAL DRAWINGS FOR THE RATED WALLS AND PARTITIONS.
- MINIMUM TEMPERATURE TO BE MAINTAINED DURING HEATING SEASON: BC 1204- WHEN 13 DEG F OUTSIDE.
- A STATEMENT WILL BE FILED BY THE OWNER OR TENANT IN POSSESSION THAT THE VENTILATING SYSTEM WILL BE KEPT IN CONTINUOUS OPERATION DURING NORMAL OCCUPANCY OF THE PREMISES.
- EQUIPMENT SHALL BE LISTED AND APPROVED AS REQUIRED MC 107, MC 102.
- ALL BUILDING DEPARTMENT FORMS REQUIRED, INCLUDING THOSE REQUIRED FOR SPECIAL INSPECTIONS, PROGRESS INSPECTIONS, CERTIFICATE OF COMPLIANCE, SERVICE EQUIPMENT PERMIT OR OTHER REASONS WITH REGARD TO THIS PROJECT SHALL BE COMPLETED AND FILED WITH THE NYC BUILDING DEPARTMENT BY THE OWNER. THE OWNER SHALL ENGAGE THE SERVICES OF A NYS LICENSED PROFESSIONAL ENGINEER AND AGENCIES APPROVED FOR SPECIAL INSPECTIONS TO SIGN AND SEAL ALL REQUIRED BUILDING DEPARTMENT FORMS AND DRAWINGS.

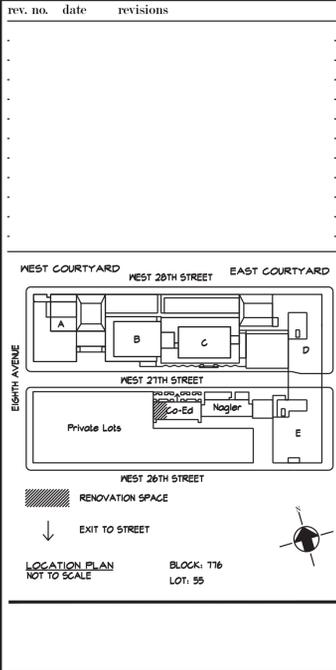
GENERAL DEMOLITION NOTES

- DEMOLITION OF HVAC ITEMS SHALL BE PERFORMED UNDER THE HVAC CONTRACT.
- LOCATION OF THE EXISTING DUCTWORK & PIPING AS SHOWN ON DRAWINGS IS APPROXIMATE.
- PROVIDE TEMPORARY SUPPORTS WHERE REQUIRED.
- DURING DEMOLITION, PROPERLY CAP AND PROTECT ALL DUCTWORK, EQUIPMENT, AND PIPING THAT WILL REMAIN IN OPERATION.
- WHERE EXISTING INSULATION TO REMAIN IS DAMAGED BY THE REQUIREMENTS OF THE WORK, REPLACE ANY DAMAGED INSULATION TO MATCH EXISTING.
- DEMOLISH ALL EQUIPMENT AS INDICATED, FIXTURES AND/OR MISCELLANEOUS ARTICLES IN THEIR ENTIRETY INCLUDING AUXILIARY EQUIPMENT, PIPING, WIRING, CONDUIT AND DUCTWORK.
- MATERIALS RESULTING FROM THE DEMOLITION OPERATIONS SHALL NOT BE ALLOWED TO ACCUMULATE ON THE FLOORS AND ROOF SURFACES, EXTERIOR GRADE SURFACES OR OTHER PARTS OF THE PREMISES, AND SHALL BE PROMPTLY REMOVED AND DISPOSED OF AWAY FROM THE PREMISES.
- INCLUDE ALL DEMOLITION OF SYSTEMS AND COMPONENTS WHERE SYSTEMS SHALL BE REPLACED BY NEW WORK. REFER TO THE DRAWINGS AND SPECIFICATIONS FOR THE SCOPE OF NEW AND RECONNECTED WORK. THE INTENT OF THIS REQUIREMENT IS TO HAVE THE CONTRACTOR DISCONNECT, DEMOLISH AND REMOVE ALL EXPOSED AND CONCEALED WORK WHERE BEING REPLACED OR CONNECTED TO THE NEW LAYOUTS.
- COORDINATE ELECTRICAL POWER DISCONNECTION PRIOR TO DEMOLITION WITH ELECTRICAL CONTRACTOR.
- PROTECT ALL HVAC WORK AND WORK OF OTHER TRADES WHICH IS TO REMAIN, FROM DAMAGE DURING DEMOLITION.
- ALL PIPING AND DUCTWORK TO REMAIN SHALL HAVE ENDS TERMINATED IN A NEAT MANNER READY FOR CONNECTION OF NEW WORK. ALL EXPOSED ENDS OF PIPING AND DUCTWORK SHALL BE CAPPED. SCREWED PIPING SHALL END ON A SCREWED JOINT. FLANGED PIPE SHALL END WITH A FLANGED JOINT. WELDED PIPING SHALL BE MECHANICALLY CUT, CLEANED OF BURRS AND A CAP WELDED TO THE PIPE. DUCTWORK SHALL BE CAPPED WITH SHEET METAL CONNECTED TO THE DUCT TO REMAIN.
- REMOVAL OF EQUIPMENT, PIPING AND DUCTWORK SHALL INCLUDE ALL HANGERS & SUPPORT ASSOCIATED WITH THE EQUIPMENT, PIPING AND DUCTWORK TO BE REMOVED.

GENERAL NOTES:

- ALL PIPING AND DUCTWORK SHALL BE SUSPENDED FROM BUILDING STRUCTURE ONLY, EXCEPT AS SPECIFICALLY ALLOWED IN THE SPECIFICATIONS. HVAC CONTRACTOR SHALL PROVIDE SUPPLEMENTARY STEEL AS NECESSARY TO SUPPORT PIPES AND DUCTS FROM BUILDING STRUCTURE. THE ARCHITECT AND STRUCTURAL ENGINEER SHALL BE THE SOLE DETERMINANT AS TO PERMISSIBILITY OF HANGING NEW WORK FROM BUILDING STRUCTURE AND SLABS.
- PIPING AND DUCTWORK PROVIDED UNDER THIS CONTRACT SHALL BE COORDINATED UNDER THIS CONTRACT WITH WORK BEING PROVIDED BY OTHER TRADES.
- FINAL LOCATION OF ALL CEILING DIFFUSERS, RETURN REGISTERS AND CEILING GRILLES SHALL BE AS SHOWN ON THE ARCHITECTURAL DRAWINGS. QUANTITIES OF THESE DEVICES SHALL BE PROVIDED AS SHOWN ON THE HVAC DRAWINGS. ANY DISCREPANCIES BETWEEN THE HVAC DRAWINGS AND THE ARCHITECTURAL DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT FOR RESOLUTION PRIOR TO BID.
- WHILE THE DRAWINGS SHALL BE ADHERED TO AS CLOSELY AS POSSIBLE, THE ARCHITECT'S RIGHT IS RESERVED TO VARY THE RUN AND SIZE OF DUCTS DURING THE PROGRESS OF THE WORK IF REQUIRED TO MEET CEILING HEIGHTS, TO MEET STRUCTURAL AND FIELD CONDITIONS. CONTRACTOR SHALL PROVIDE REDRAWING OF SHOP DRAWINGS AS NECESSARY TO ACCOMMODATE THE ARCHITECT'S REQUIREMENTS, AT NO ADDITIONAL COST TO THE OWNER. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR REQUIRED CEILING HEIGHTS.
- INSTALL ALL DUCTWORK IN STRICT ADHERENCE TO THE CEILING HEIGHTS INDICATED ON THE ARCHITECT'S DRAWINGS. CONSULT WITH OTHER CONTRACTORS AND IN CONJUNCTION WITH THE OTHER CONTRACTORS, ESTABLISH THE NECESSARY SPACE REQUIREMENTS FOR EACH TRADE.
- THE SHEET METAL DUCTWORK SHALL, WHETHER INDICATED OR NOT, RISE AND/OR DROP AND/OR CHANGE IN SHAPE TO CLEAR ANY AND ALL OTHER DUCTWORK, CONDUITS, LIGHTING FIXTURES, PLUMBING AND HEATING/COOLING DEVICES TO MAINTAIN THE DESIRED CEILING HEIGHTS AND TO PROVIDE ADEQUATE MAINTENANCE ROOM AND HEADROOM IN MECHANICAL EQUIPMENT ROOMS. THE DRAWINGS, IN GENERAL, DO NOT SHOW ALL RISES, DROPS AND DUCT TRANSITIONS REQUIRED. THE DRAWINGS SHOW GENERAL ROUTING REQUIREMENTS ONLY.
- ALL RECTANGULAR DUCTWORK, UNLESS OTHERWISE NOTED, SHALL BE BUILT FROM GALVANIZED SHEET STEEL AND THOROUGHLY BRACED AND STIFFENED. SEE SPECIFICATIONS FOR DUCTS REQUIRED TO BE FABRICATED OF ALUMINUM AND STAINLESS STEEL. ALL DUCTS WITH ROOMS WITH OPEN TANKS SHALL BE STAINLESS STEEL.
- PROVIDE 12" x 12" ACCESS DOORS EVERY 50'-0" RUN OF SUPPLY AND RETURN AIR DUCT FOR CLEANING PURPOSES, EXCEPT IN DUCT ABOVE SOUND CONTROL CEILING. PROVIDE 18" x 18" ACCESS DOORS UPSTREAM AND DOWNSTREAM OF EACH REHEAT COIL, AT EACH FIRE AND FIRE/SMOKE DAMPER AT EACH MOTORIZED DAMPER, AT EACH CV AND VAV TERMINAL BOX AND WHEREVER ELSE INDICATED IN THE SPECIFICATION. IF THE DUCT IS TOO SMALL TO PROVIDE AN 18" x 18" ACCESS DOOR, A 12" x 12" ACCESS DOOR SHALL BE PROVIDED. SEE SPECIFICATIONS FOR ADDITIONAL ACCESS DOOR REQUIREMENTS.
- SEE SPECIFICATION FOR DUCTS REQUIRED TO BE ACOUSTICALLY LINED. ALSO, LINE DUCTS WHERE SPECIFICALLY INDICATED ON THE PLANS. DIMENSIONS GIVEN ON PLANS FOR LINED DUCTS ARE INSIDE CLEAR DIMENSIONS. INCREASE SIZE OF SHEET METAL DUCT TO PROVIDE THE SPECIFIED INSIDE CLEAR DIMENSIONS WITH ACOUSTICAL LINING ADDED.
- PROVIDE A MANUAL VOLUME DAMPER UPSTREAM OF EACH VAV/CAV TERMINAL BOX WHETHER INDICATED OR NOT ON THE DRAWINGS. PROVIDE AN ACCESS DOOR LOCATED BETWEEN VAV/CAV TERMINAL BOX AND VOLUME DAMPER. PROVIDE ACCESS DOOR IMMEDIATELY DOWNSTREAM OF ANY VAV/CAV BOX REHEAT COIL, WITH BOX BEING PROVIDED WITH AD UPSTREAM OF HEAT COIL.
- ALL VALVES, REHEAT COIL, TERMINAL BOXES (VAV AND CV), DAMPERS AND OTHER EQUIPMENT LOCATED ABOVE THE CEILING, WHICH REQUIRE MAINTENANCE, SHALL BE LOCATED SO AS TO PERMIT MAINTENANCE, IN HIGH FLOOR TO FLOOR AREAS. THIS EQUIPMENT SHALL BE LOCATED AS LOW AS POSSIBLE IN THE CEILING CAVITY FOR EASIER ACCESS. LOCATE SUCH EQUIPMENT ABOVE ACCESSIBLE CEILING TO THE EXTENT POSSIBLE TO AVOID ACCESS DOORS IN THE CEILING.
- ALL BIDDERS ARE REQUIRED TO REFER TO ARCHITECTURAL DRAWINGS FOR LOCATIONS OF ALL MEPP COMPONENTS FOR FULL INTEGRATION INTO ARCHITECTURAL DESIGN. BIDDERS ARE TO IMMEDIATELY CALL TO THE ARCHITECT'S ATTENTION ANY DISCREPANCIES IN QUANTITIES, TYPES AND SCOPE FOR ALL DISCIPLINES/TRADES.
- SEE ARCHITECTURAL REFLECTED CEILING PLAN (RCP), DRAWINGS AND FLOOR PLANS FOR LOCATION OF ALL CEILING MOUNTED DEVICES. SEE ARCHITECTURAL DRAWINGS FOR LOCATION OF ALL WALL MOUNTED DEVICES.
- SYMBOLS AND ABBREVIATIONS SHOWN ON THE DRAWINGS ARE FOR MECHANICAL DRAWINGS ONLY. SEE ARCHITECTURAL DRAWING AND OTHER TRADES DRAWINGS FOR THEIR RESPECTIVE SYMBOLS AND ABBREVIATIONS.

MECHANICAL DRAWING LIST	
DWG No.	DRAWING TITLE
EN-001.00	MECHANICAL ENERGY COMPLIANCE
M-001.00	MECHANICAL SYMBOL LIST, ABBREVIATIONS & NOTES
M-101.00	CELLAR MECHANICAL PLAN
M-102.00	1ST FLOOR MECHANICAL PLAN
M-103.00	2ND FLOOR MECHANICAL PLAN
M-104.00	MECHANICAL ROOF PLAN
M-501.00	MECHANICAL DETAILS 1
M-502.00	MECHANICAL DETAILS 2
M-503.00	MECHANICAL DETAILS 3
M-701.00	MECHANICAL SCHEDULE 1
M-702.00	MECHANICAL SCHEDULE 2
M-703.00	MECHANICAL SCHEDULE 3
M-801.00	AC-1G MECHANICAL CONTROLS
M-802.00	AC-2G & EXHAUST FANS MECHANICAL CONTROLS
M-803.00	BMS ARCHITECTURE AND UNIT CONTROLS MECHANICAL CONTROLS
M-804.00	ACCU-1 REFRIGERANT SYSTEM PIPING SCHEMATIC AND CONTROLS
M-805.00	ACCU-2 REFRIGERANT SYSTEM PIPING SCHEMATIC
M-901.00	MECHANICAL CELLAR DEMOLITION PLAN
M-902.00	MECHANICAL 1ST FLOOR DEMOLITION PLAN
M-903.00	MECHANICAL ROOF DEMOLITION PLAN



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PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 27TH ST
NEW YORK NY 10001

DRAWING TITLE:
SYMBOL LIST, ABBREVIATIONS
& NOTES

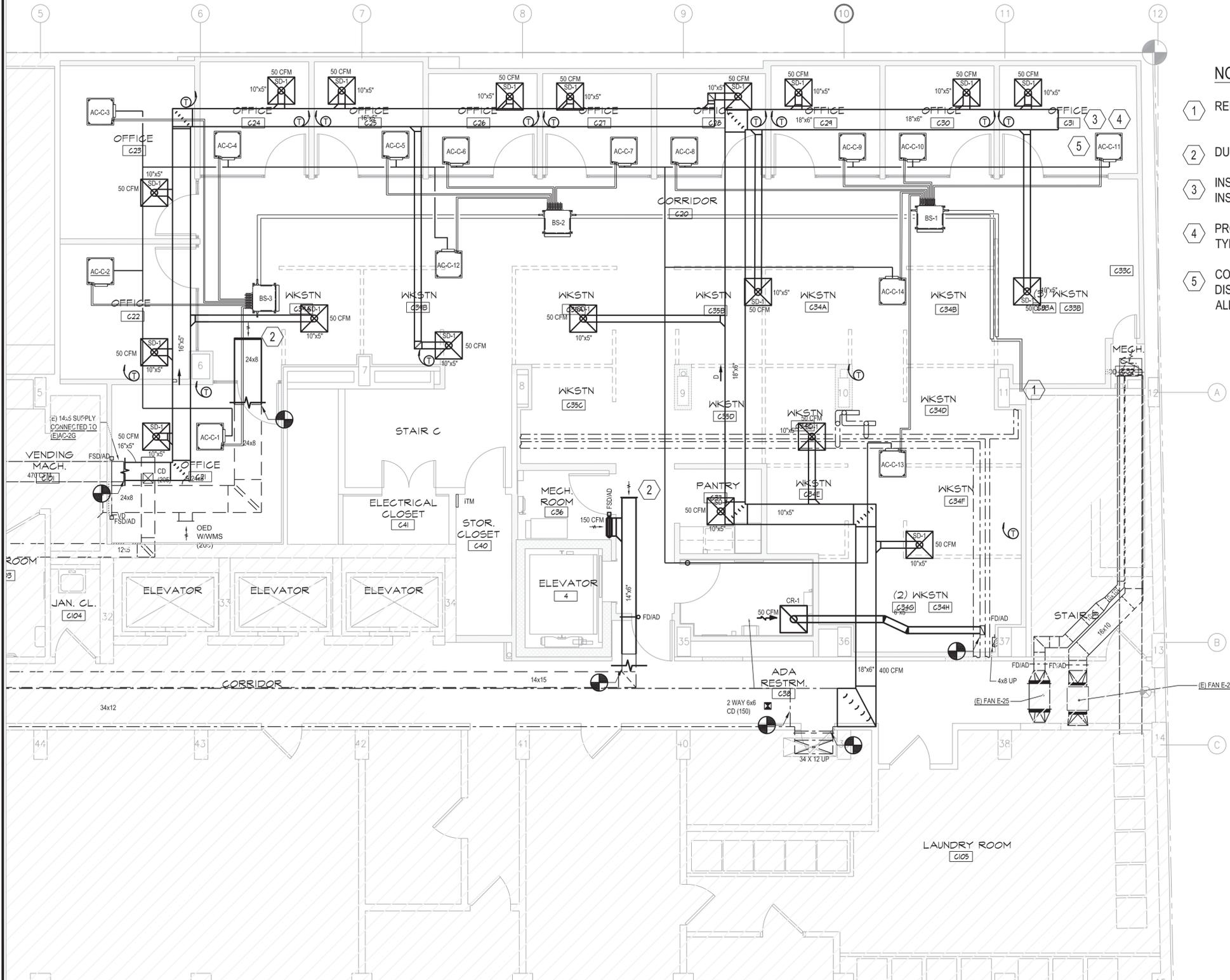
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 SCALE: N.T.S. 1 OF 19

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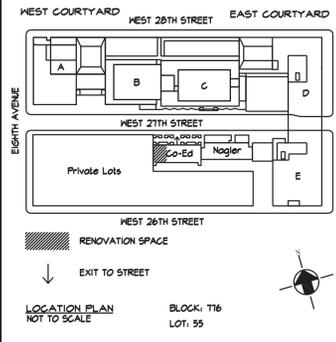


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NOTES:

- ① REFRIGERANT PIPES FROM 1ST FLOOR FROM ACCU-1
- ② DUCT OPENING WITH WIRE MESH ABOVE CEILING
- ③ INSTALL ALL VRF INDOOR UNITS AS PER MANUFACTURER INSTRUCTIONS.
- ④ PROVIDE ROOM TEMPERATURE SENSORS WITHOUT DISPLAY TYPICAL FOR ALL AC INDOOR UNITS.
- ⑤ CONNECT ALL THE CONDENSATE DRAINS AND ROUTE TO DISCHARGE IN THE DRAIN IN RESTROOM C38. TYPICAL FOR ALL AC INDOOR UNITS.



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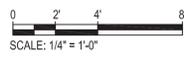
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PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 21TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 CELLAR
 MECHANICAL
 PLAN

DOB NOW JOB#
 SEAL & SIGNATURE: _____ DATE: 2022.09.01
 PROJECT No: 12224.154
 DRAWING BY: AB
 CHK BY: DN
 DWG No: M-101.00
 SCALE: 1/4"=1' 2 OF 19

① CELLAR MECHANICAL PLAN
 1/4" = 1'-0"



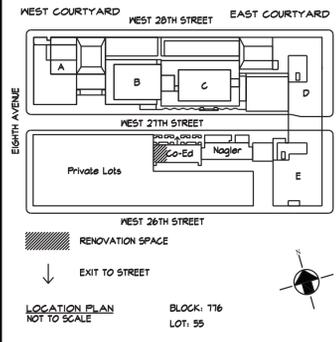
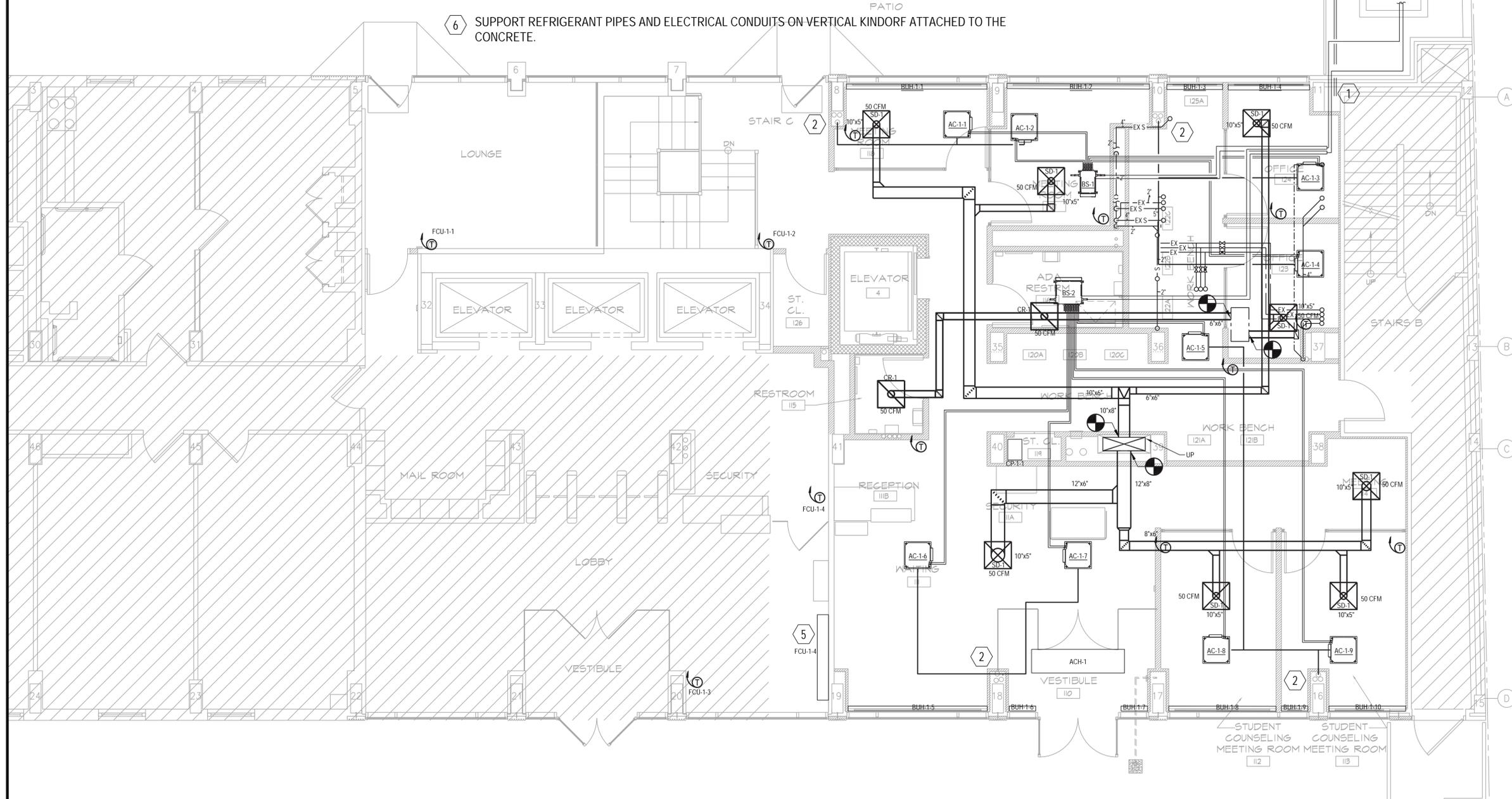
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NOTES:

- ① REFRIGERANT PIPES TO CELLAR FROM ACCU-1
- ② VRF CONDENSATE DRAIN TO CONNECT TO THE EXISTING FAN COIL DRAIN RISER. TYPICAL FOR ALL VRF INDOOR UNITS.
- ③ INSTALL ALL VRF INDOOR UNITS AS PER MANUFACTURER INSTRUCTIONS. PROVIDE ROOM TEMPERATURE SENSORS WITHOUT DISPLAY.
- ④ REFRIGERANT PIPES SHALL BE SIZED AS PER MANUFACTURER SIZING CHART. SUBMIT PIPE SHOP DRAWING FOR APPROVAL.
- ⑤ CONNECT SUPPLY, RETURN AND DRAIN PIPES TO THE LOOP IN THE CELLAR LOCATED BELOW THE FAN COIL.
- ⑥ SUPPORT REFRIGERANT PIPES AND ELECTRICAL CONDUITS ON VERTICAL KINDORF ATTACHED TO THE CONCRETE.



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PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
1ST FLOOR
MECHANICAL
PLAN

DOB NOW JOB#

SEAL & SIGNATURE:	DATE: 2022.09.01
	PROJECT No: 12224.154
	DRAWING BY: AB
	CHK BY: DN
	DWG No:
	M-102.00
	SCALE: 1/4" = 1'-0"
	3 OF 19

1ST FLOOR MECHANICAL PLAN
 1/4" = 1'-0"



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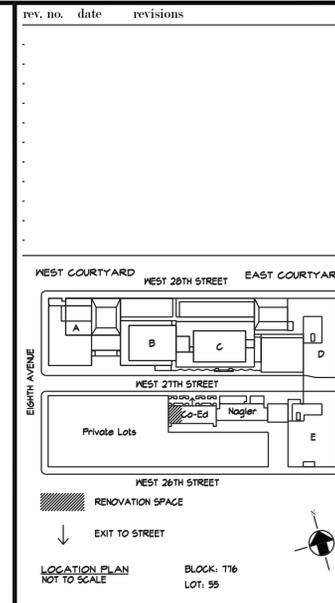
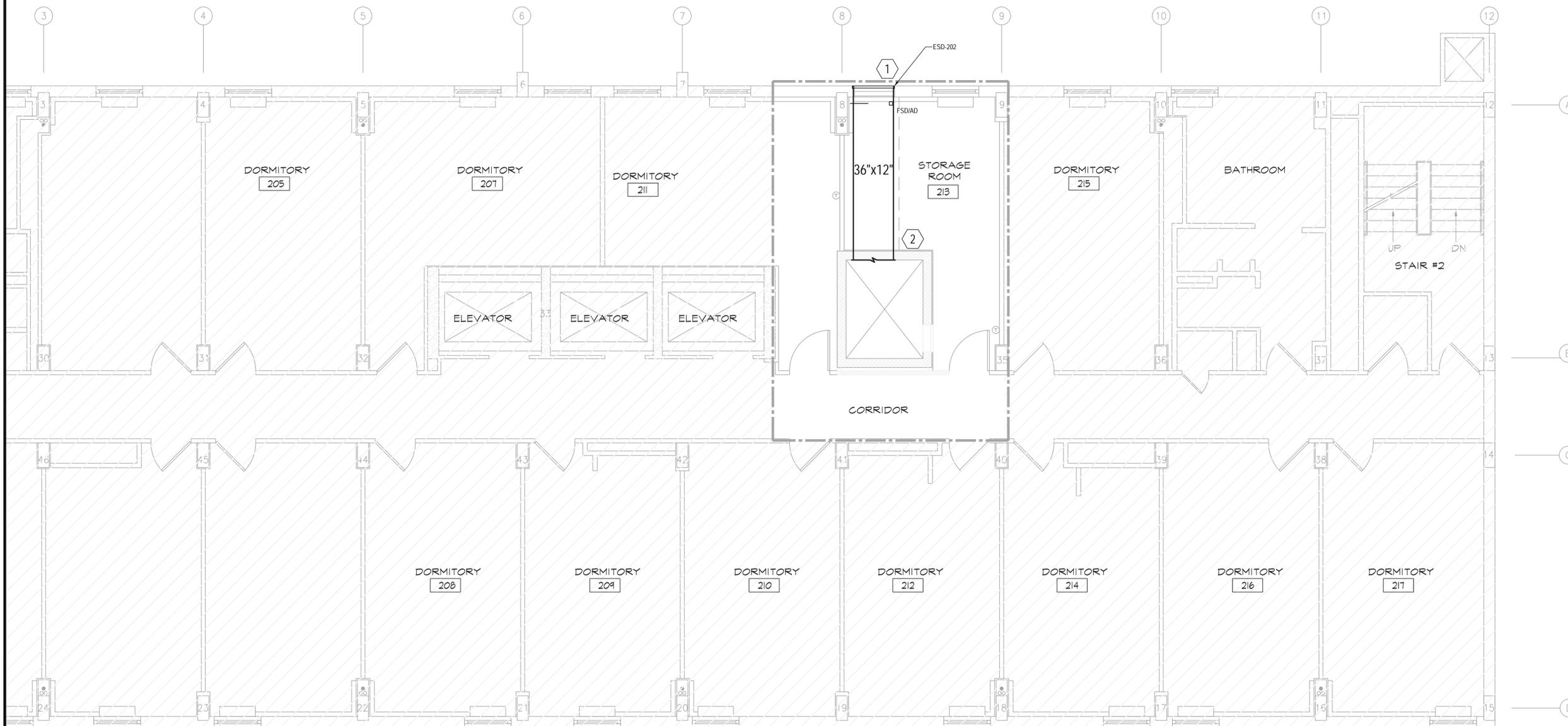
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ISSUD FOR BID 09/01/2022

NOTES:

- ① INSTALL FSD WITH ACTUATOR INSIDE THE DUCT. LABEL THE OUTSIDE OF THE DUCT: FSD ACTUATOR.
INSTALL LOUVER 36 X 36 GREENHECK ESD 202 AS PER MANUFACTURER INSTRUCTION. SEE DETAILS FOR ADDITIONAL INFORMATION.
- ② INSTALL THE 36 X 12 DUCT TO THE TOP OF SHAFT OPENING. SEE ARCHITECTURAL DETAILS.



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Cost Concepts
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David Smotrich & Partners LLP
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 443 Park Avenue South New York, NY 10016
 212 889 4045 Fax 212 889 3672

PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 21TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 2ND FLOOR
 MECHANICAL
 PLAN

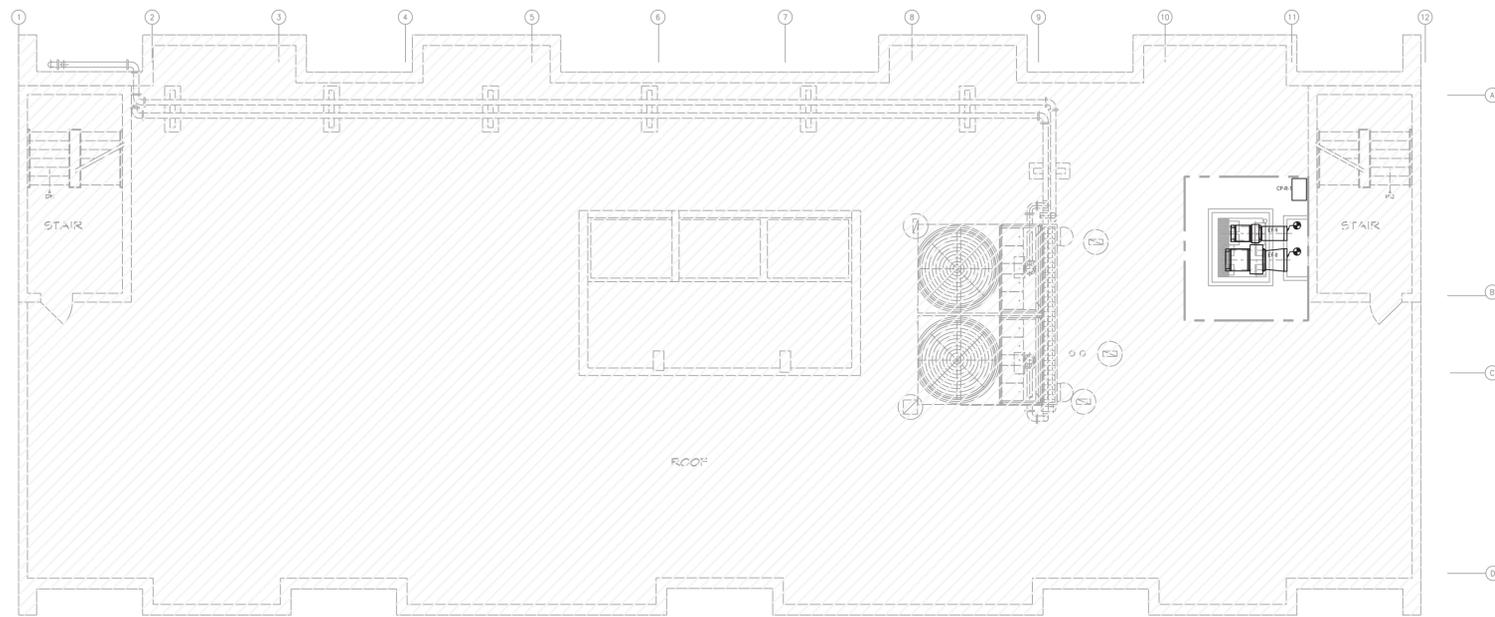
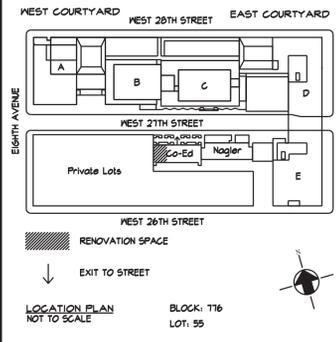
DOB NOW JOB#
 SEAL & SIGNATURE: _____ DATE: 2022.09.01
 PROJECT No: 12284.154
 DRAWING BY: AB
 CHK BY: DN
 DWG No: _____
M-103.00
 SCALE: 1/4"=1' **4 OF 19**

③ 2ND FLOOR MECHANICAL PLAN
 1/4" = 1'-0"
 SCALE: 1/4" = 1'-0"

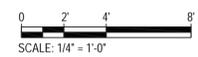
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④ ROOF MECHANICAL PLAN
 1/4" = 1'-0"



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PROJECT:
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DRAWING TITLE:
 MECHANICAL
 ROOF PLAN

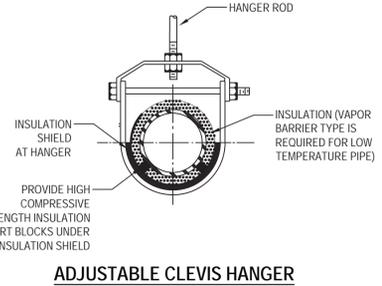
DOB NOW JOB#

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	PROJECT No: 12284.154
	DRAWING BY: AB
	CHK BY: DN
	DWG No:
	M-104.00
	SCALE: 1/8"=1'
	5 OF 19

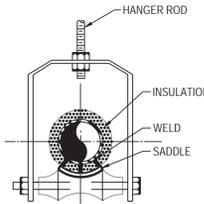
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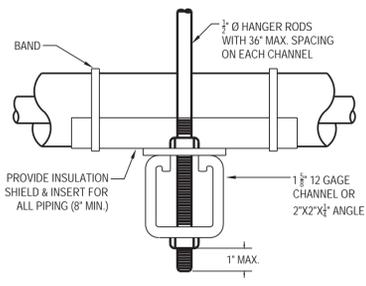




ADJUSTABLE CLEVIS HANGER
NTS



ADJUSTABLE ROLLER HANGER
NTS



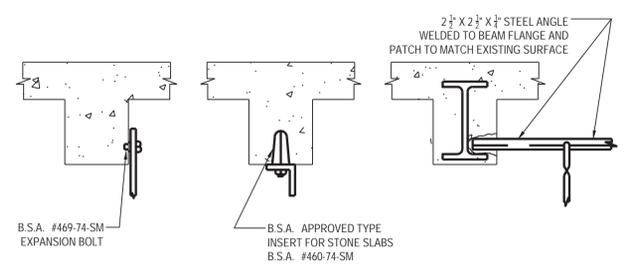
TRAPEZE HANGER FOR UP TO 1000 LBS UNIFORM LOAD
NTS

		TYPICAL PIPE HANGERS																
		MAXIMUM PIPE / TUBING SUPPORT SPACING, FEET																
NOM. SIZE	THRU 3/4"	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14	16	18	20	24
PIPE	7 FT	7	7	9	10	11	12	14	16	17	19	22	23	25	27	28	30	32
TUBING	5 FT	6	7	8	8	9	10	12	13	14	16	-	-	-	-	-	-	-

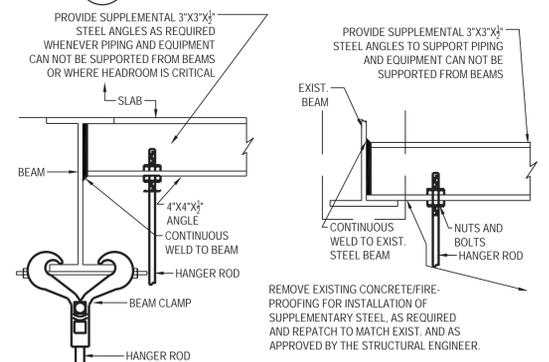
NOTE: FOR TRAPEZE HANGER TAKE SPACING OF SMALLEST SIZE OF TRAPEZE.

INTERPRETATION OF SINGLE LINE DUCTWORK		
WHERE DUCTWORK IS SHOWN SINGLE LINE, FOLLOWING SHALL APPLY FOR ACTUAL DUCT CONSTR.		
SINGLE LINE	ACTUAL CONSTRUCTION	
ELBOW	DOUBLE THICKNESS TURNING VANES (EITHER TYPE ELBOW AT CONTR. OPTION SUBJECT TO SPACE CONDITIONS).	
SPLIT OR TAKE-OFF	A, B SHALL BE PROPORTIONAL TO AIR QUANTITY. 4" (10cm) MIN. IF A OR B IS LESS THAN 4" (10cm), USE TAP DETAIL. VOLUME DAMPER IS IN SHORTER BRANCH.	CONSTANT VOL. SYST. / VARIABLE VOL. SYST.
TAP TAKE-OFF	VOLUME DAMPER SUPPLY	
RISE OR DROP	OFFSET IN VERTICAL PLANE SHALL BE MADE WITH SMOOTH FITTINGS.	
HORIZONTAL OFFSET	OFFSET IN HORIZONTAL PLANE SHALL BE MADE WITH SMOOTH FITTINGS.	
FD	ACCESS DOOR IN DUCT	
FIRE RATED WALL	FD MOUNTING TYPE DEPENDS ON AIR VELOCITIES AND DUCT SIZE - SEE SPECIFICATIONS.	
FIRE DAMPER	FLARE/TRANSITION DUCT TO ACCOMMODATE COIL	
HTG. COIL	COIL WITH FLANGED CONNECTION ALL AROUND ACCESS DOORS	
HEATING COIL		

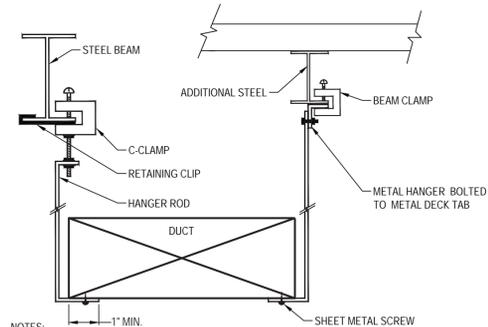
2 INTERPRETATION OF SINGLE LINE DUCTWORK



3 METHOD OF HANGING DUCTWORK



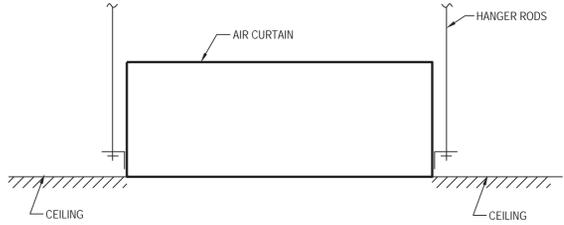
4 PIPE AND DUCT SUPPORT DETAIL



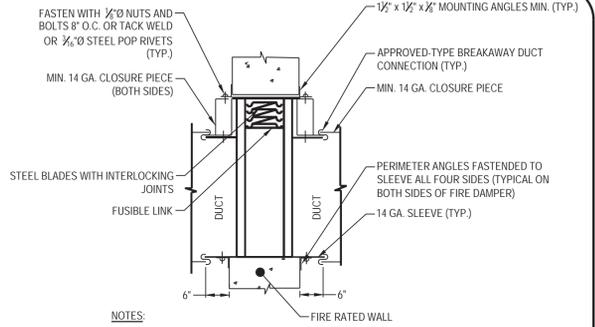
- NOTES:
- HANGERS SHALL BE OF METAL NOT LESS THAN 1/8" FOR DUCTS 2 SQ.FT. & LESS, AND NOT LESS THAN 1/4" FOR DUCTS LARGER THAN 2 SQ.FT.
 - WHERE CROSS-SECTIONAL AREA OF DUCT EXCEEDS 8 SQ.FT., HANGERS SHALL BE SPACED NOT MORE THAN 4 FT. ON CENTERS.
 - C-CLAMP FOR DUCTS UP TO 36" MAXIMUM DIMENSION.

5 DUCT SUPPORT ATTACHMENT TO STRUCTURE

HALF OF DUCT PERIMETER	DUCT SUPPORT SCHEDULE							
	PAIR AT 10 FT. SPACING		PAIR AT 8 FT. SPACING		PAIR AT 5 FT. SPACING		PAIR AT 4 FT. SPACING	
	STRAP	WIRE/ROD	STRAP	WIRE/ROD	STRAP	WIRE/ROD	STRAP	WIRE/ROD
30"	1" x 22 GA	10 GA (.135)	1" x 22 GA	10 GA (.135)	1" x 22 GA	12 GA (.155)	1" x 22 GA	12 GA (.155)
72"	1" x 18 GA	3/8"	1" x 20 GA	1/4"	1" x 22 GA	1/4"	1" x 22 GA	1/4"
96"	1" x 16 GA	3/8"	1" x 18 GA	3/8"	1" x 20 GA	3/8"	1" x 22 GA	1/4"
120"	10" x 16 GA	1/2"	1" x 16 GA	3/8"	1" x 18 GA	3/8"	1" x 20 GA	1/4"
168"	10" x 16 GA	1/2"	10" x 16 GA	1/2"	1" x 16 GA	3/8"	1" x 18 GA	3/8"
192"	-	1/2"	10" x 16 GA	1/2"	1" x 16 GA	3/8"	1" x 16 GA	3/8"

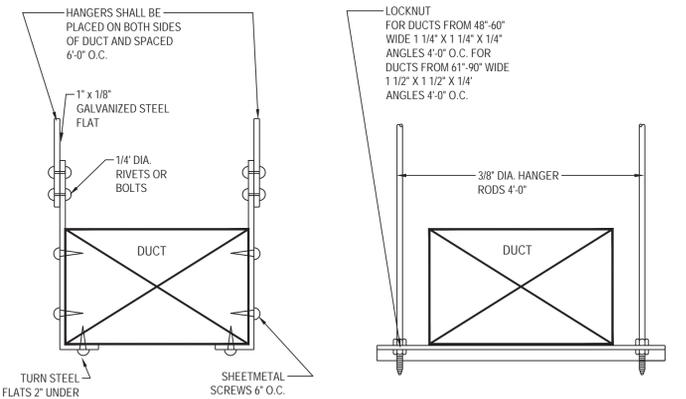


6 CEILING UNIT SUPPORT DETAIL
NTS

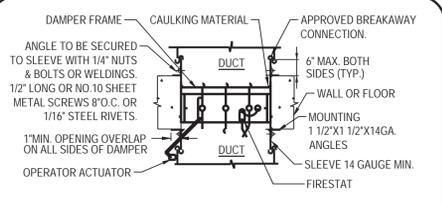


- NOTES:
- ACCESS DOORS FOR FIRE DAMPERS SHALL BE 12"x12" MIN. UNLESS NOTED OTHERWISE. FOR DUCTS SMALLER THAN 12", INCREASE DUCT WITH TRANSITION TO 12" IN ORDER TO ACCOMMODATE A 12"x12" ACCESS DOOR.
 - FIRE DAMPER INSTALLATION SHALL CONFORM WITH SMACNA & NFPA STANDARD.
 - DETAIL SHOWN IS FOR FIRE DAMPER IN HORIZONTAL DUCTWORK. FOR FIRE DAMPER IN VERTICAL DUCTWORK, DETAIL SHALL BE SIMILAR.
 - DAMPER BLADES SHALL BE OUT OF THE AIR STREAM.
 - INSTALLATION OF FIRE DAMPER MUST COMPLY WITH THE MANUFACTURER'S UL APPROVAL AND ASSOCIATED REQUIREMENTS.

7 FIRE DAMPER DETAIL
NTS
(SEE FLOOR PLAN FOR REQUIREMENTS AND LOCATIONS)

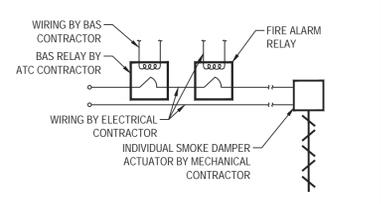


8 METHOD OF SUPPORTING DUCTS
N.T.S.



- NOTES:
- FIRE DAMPER MODE: WHEN TEMPERATURE IN EXCESS OF 165°F THE DAMPER WILL CLOSE AND LOCK DAMPER (NON REUSABLE TYPE)
 - SMOKE DAMPER MODE: ACTUATED BY SMOKE CONTROL IATC SYSTEM.
 - SECURE DAMPER TO SLEEVE USING 1/4" NUTS & BOLTS OR WELDING. 1/2" LONG OR NO. 10 SHEET METAL SCREWS 8" O.C. OR 3/16" STEEL RIVETS.
 - PROVIDE ACCESS DOOR IN DUCT UPSTREAM OR DOWNSTREAM OF THE FIRE DAMPER.
 - COORDINATE WITH U.L. AND MANUFACTURER'S INSTRUCTIONS.

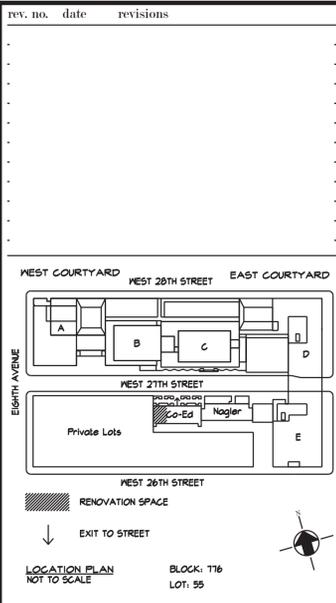
9 FIRE/SMOKE DAMPER VERTICAL OR HORIZONTAL INSTALLATION DETAIL
NTS



10 SMOKE DAMPER AND FIRE/SMOKE DAMPER WIRING DETAIL
NTS

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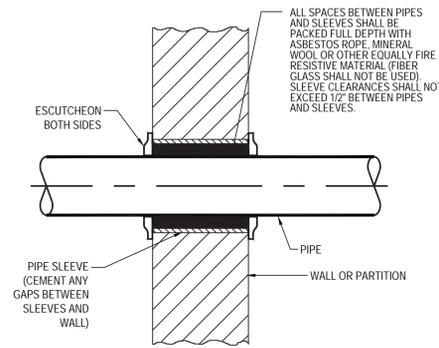
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212 889 4045 Fax 212 889 3672

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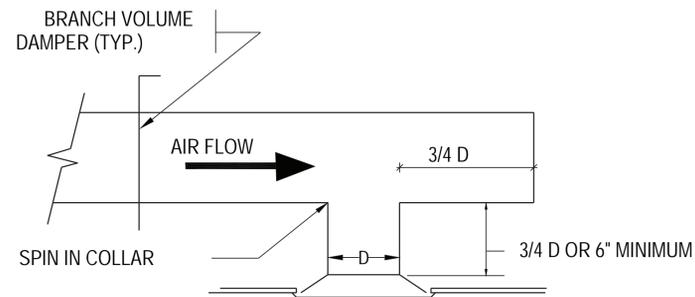
DRAWING TITLE:
MECHANICAL DETAILS 1

DOB NOW JOB#
SEAL & SIGNATURE:
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M-501.00
SCALE: N.T.S. 6 OF 19



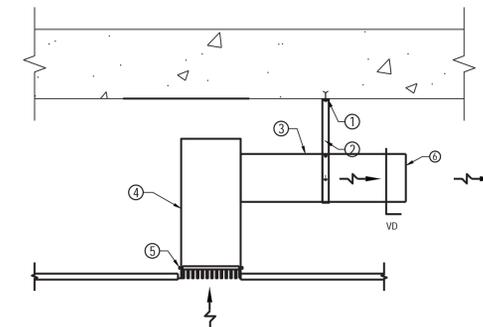
NOTES:
 1. REFER TO SPECIFICATIONS ARTICLE ENTITLED "SLEEVES & ESCUTCHEONS FOR PIPING"
 2. THIS DETAIL ALSO APPLICABLE TO INTERIOR NON-WATER PROOF FLOOR CONSTRUCTION. FOR WATER PROOF FLOOR CONSTRUCTION & OTHER FLOOR CONSTRUCTION SEE SPECIFICATIONS.

1 PIPING PIERCING REQUIRED
FIRE RATED PARTITIONS & WALLS
 NTS



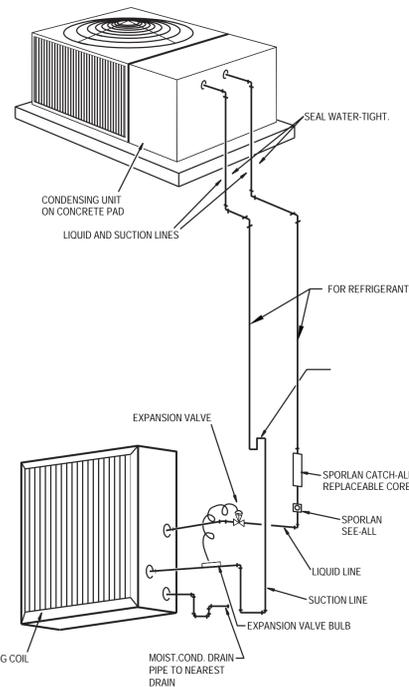
NOTE:
 EQUALIZING GRID IS TO BE INSTALLED FLUSH TO BOTTOM OF DUCT AND EQUALIZER BLADES PERPENDICULAR TO THE AIRFLOW.

2 TYPICAL DIFFUSER INSTALLATION

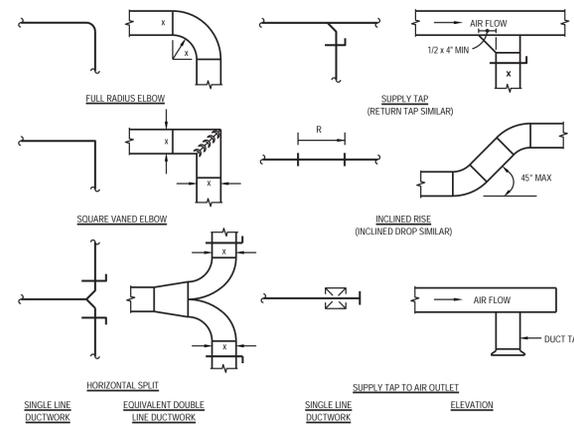


3 TYPICAL LINEAR EXHAUST/RETURN GRILLE CONNECTION
 NTS

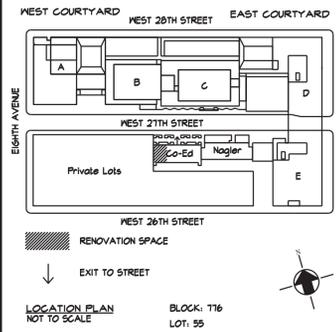
- ① PHILLIPS J514C (BSA APPROVAL NO. 39058 SM) OR EQUAL, OR FORCED ENTRY FASTENERS. (APPROVED ONLY IF ACCEPTABLE TO LOCAL CODE).
- ② SHEET METAL STRAP TWO SIDES, TURN UNDER DUCT WITH TEK SCREWS.
- ③ HORIZONTAL DUCT RUN (MINIMUM 16\"/>



4 REFRIGERANT PIPING DETAIL
 NTS



5 TYPICAL EXHAUST/RETURN DUCT CONNECTION
 NTS



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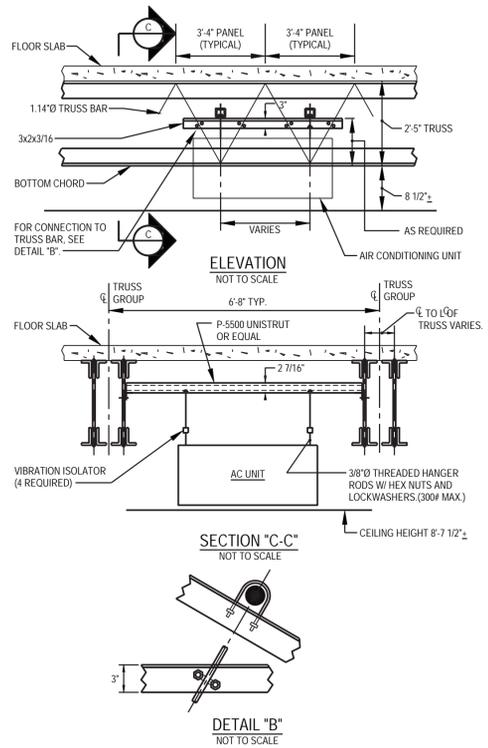
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	DWG No:
	M-502.00
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	7 OF 19

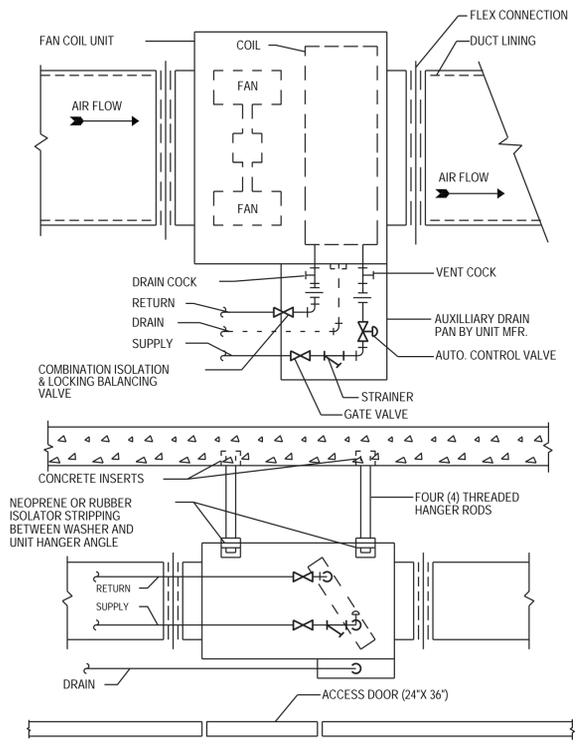
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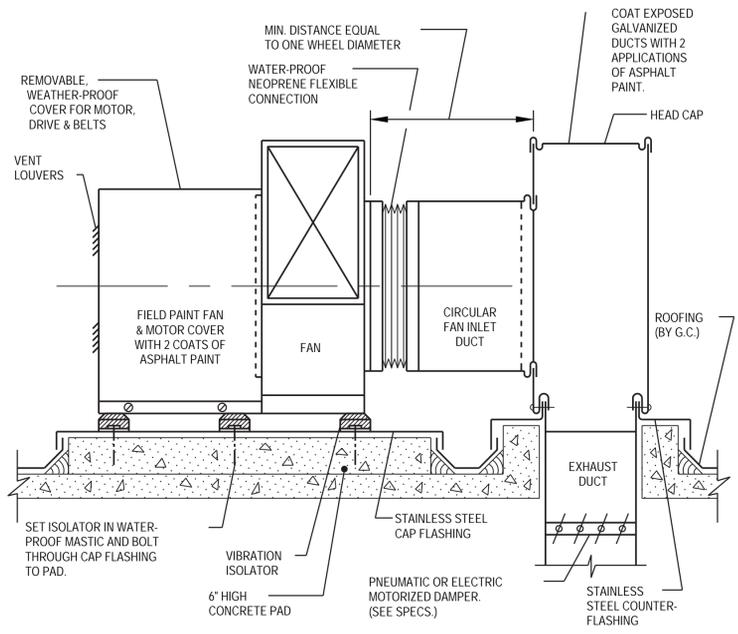




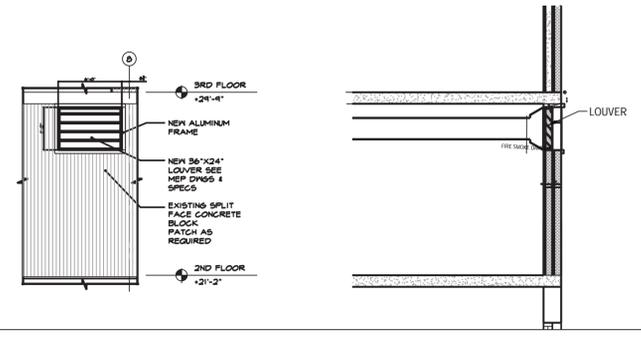
1 HANGING SUPPORT FOR AIR CONDITIONING UNIT
NOT TO SCALE



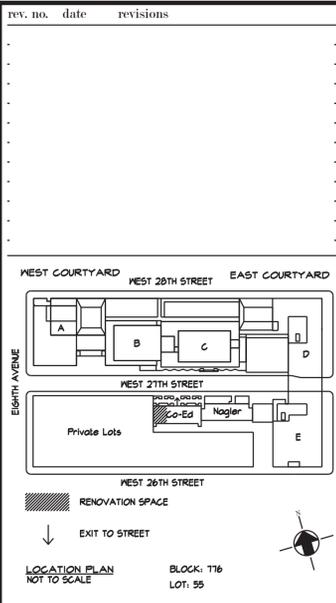
2 FAN COIL UNIT DETAIL
NOT TO SCALE



3 ROOF INSTALLATION OF UTILITY TYPE FANS
NOT TO SCALE



4 FIRE SMOKE DAMPER AND LOUVER INSTALLATION DETAIL
NOT TO SCALE



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DRAWING TITLE:
MECHANICAL DETAILS 3

DOB NOW JOB#	DATE: 2022.09.01
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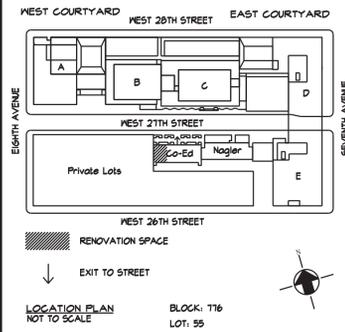
VARIABLE REFRIGERANT VOLUME - AIR-COOLED CONDENSING UNIT SCHEDULE																																	
TAG: ROOM	BASIS OF DESIGN (DAIKIN)	NOMINAL TONNAGE	DESCRIPTION	COOLING CAPACITY				HEATING CAPACITY				REFRIGERANT CHARGE		CONNECTION RATIO (%)	ELECTRICAL						DIMENSIONS		EFFICIENCY (NonDucted/Ducted or Specific Combo)						NOTES	Options and Accessories			
				BTU/h	AMBIENT DESIGN (°F DB)			BTU/h	AMBIENT DESIGN (°F DB / WB)			Factory Charge (lbs)	Add'l Refrigerant (lbs)		VOLTAGE-PHASE		MIN CIRCUIT AMPS (MCA)		MAX OVERCURRENT PROTECTION (MOP)		RUNNING CURRENT (PLA)		(WxHxD) (Inch)	WEIGHT (lbs)	EER	IEER	COP47	COP17			SCHED	SEER	HSPF
					mod #1	total	mod #1		total	mod #1	total				(WxHxD) (Inch)	WEIGHT (lbs)	EER	IEER	COP47	COP17	SCHED	SEER											
ACCU-1	REYQ9KATJB	8	Air cooled heat recovery (1)	93,366	95.0			85,458	12.0 / 10.8			25.8	19.8	85.0	208V - 230V 3ph	38.1	38.1	45	45	23.3	23.3	48.9 x 66.7 x 30.2	727.0	14.6 / 12.5	27.8 / 21.9	4.23 / 3.56	2.63 / 2.31	26.4 / 21.1	n/a / n/a	n/a / n/a			
ACCU-2	REYQ9KATJB	8	Air cooled heat recovery (1)	94,155	95.0			84,592	12.0 / 10.8			25.8	19.7	118.6	208V - 230V 3ph	38.1	38.1	45	45	23.3	23.3	48.9 x 66.7 x 30.2	727.0	14.6 / 12.5	27.8 / 21.9	4.23 / 3.56	2.63 / 2.31	26.4 / 21.1	n/a / n/a	n/a / n/a			

VARIABLE REFRIGERANT VOLUME - INDOOR UNIT SCHEDULE															DAIKIN AS STANDARD														
TAG	ROOM	BASIS OF DESIGN (DAIKIN)	NOMINAL TONNAGE	TYPE	CONNECTED TO:		SUPPLY FAN	COOLING CAPACITY				HEATING CAPACITY				ELECTRICAL				DIMENSIONS		WEIGHT	NOTES	Options and Accessories					
					CONDENSING UNIT	ZONE CHANGEOVER DEVICE		AIR FLOW RATE cfm	TOTAL BTU/h	SENSIBLE BTU/h		ENTERING AIR		TOTAL BTU/h	ENTERING AIR	POWER SUPPLY	Min Circuit Amps	Max Overcurrent Protection	WxHxD	Net									
										°F DB	°F WB	°F DB	°F WB								Voltage - Phase				MCA	MOP	Inch	Lbs	
AC-1-1	MEETING 1	FXZQ18TAVJU	1.5	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-2	Yes	511	18,086	12,679	80.0	67.0	20,132	70.0	208-230V 1ph	0.6	15.0	22.6 x 10.2 x 22.6	41.9		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-1-2	MEETING 2	FXZQ15TAVJU	1.3	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-2	Yes	405	15,015	10,672	80.0	67.0	17,061	70.0	208-230V 1ph	0.4	15.0	22.6 x 10.2 x 22.6	36.4		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-1-3	OFFICE 12	FXZQ09TAVJU	0.8	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-2	Yes	317	9,555	6,350	80.0	67.0	10,578	70.0	208-230V 1ph	0.3	15.0	22.6 x 10.2 x 22.6	35.3		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-1-4	OFFICE 13	FXZQ05TAVJU	0.5	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-2	Yes	300	5,802	4,651	80.0	67.0	6,483	70.0	208-230V 1ph	0.3	15.0	22.6 x 10.2 x 22.6	35.3		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-1-5	OPEN WORKSPACE	FXFQ24TVJU	2.0	Round Flow Sensing Cassette	ACCU-2	Yes	777	23,989	19,411	80.0	67.0	26,999	70.0	208-230V 1ph	0.7	15.0	33.1 x 9.7 x 33.1	50.7		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-1-6	WAITING AREA	FXZQ15TAVJU	1.3	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-2	Yes	405	15,015	10,672	80.0	67.0	17,061	70.0	208-230V 1ph	0.4	15.0	22.6 x 10.2 x 22.6	36.4		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-1-7	LOBBY	FXZQ15TAVJU	1.3	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-2	Yes	405	15,015	10,672	80.0	67.0	17,061	70.0	208-230V 1ph	0.4	15.0	22.6 x 10.2 x 22.6	36.4		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-1-8	COUNSEL 1	FXZQ05TAVJU	0.5	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-2	Yes	300	5,802	4,651	80.0	67.0	6,483	70.0	208-230V 1ph	0.3	15.0	22.6 x 10.2 x 22.6	35.3		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-1-9	COUNSEL 2	FXZQ05TAVJU	0.5	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-2	Yes	300	5,802	4,651	80.0	67.0	6,483	70.0	208-230V 1ph	0.3	15.0	22.6 x 10.2 x 22.6	35.3		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-C-1	CELLAR EAST	FXZQ05TAVJU	0.5	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-1	Yes	300	5,802	4,651	80.0	67.0	6,483	70.0	208-230V 1ph	0.3	15.0	22.6 x 10.2 x 22.6	35.3		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-C-10	OFFICE 10	FXZQ05TAVJU	0.5	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-1	Yes	300	5,802	4,651	80.0	67.0	6,483	70.0	208-230V 1ph	0.3	15.0	22.6 x 10.2 x 22.6	35.3		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-C-11	OFFICE 11	FXZQ05TAVJU	0.5	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-1	Yes	300	5,802	4,651	80.0	67.0	6,483	70.0	208-230V 1ph	0.3	15.0	22.6 x 10.2 x 22.6	35.3		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-C-12	CELLAR EAST	FXZQ05TAVJU	0.5	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-1	Yes	300	5,802	4,651	80.0	67.0	6,483	70.0	208-230V 1ph	0.3	15.0	22.6 x 10.2 x 22.6	35.3		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-C-13	CELLAR WEST S	FXZQ12TAVJU	1.0	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-1	Yes	353	11,944	7,696	80.0	67.0	13,649	70.0	208-230V 1ph	0.4	15.0	22.6 x 10.2 x 22.6	36.4		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-C-14	CELLAR WEST N	FXZQ12TAVJU	1.0	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-1	Yes	353	11,944	7,696	80.0	67.0	13,649	70.0	208-230V 1ph	0.4	15.0	22.6 x 10.2 x 22.6	36.4		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-C-2	OFFICE 5	FXZQ05TAVJU	0.5	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-1	Yes	300	5,802	4,651	80.0	67.0	6,483	70.0	208-230V 1ph	0.3	15.0	22.6 x 10.2 x 22.6	35.3		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-C-3	OFFICE 6	FXZQ05TAVJU	0.5	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-1	Yes	300	5,802	4,651	80.0	67.0	6,483	70.0	208-230V 1ph	0.3	15.0	22.6 x 10.2 x 22.6	35.3		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-C-4	OFFICE	FXZQ05TAVJU	0.5	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-1	Yes	300	5,802	4,651	80.0	67.0	6,483	70.0	208-230V 1ph	0.3	15.0	22.6 x 10.2 x 22.6	35.3		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-C-5	OFFICE 5	FXZQ05TAVJU	0.5	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-1	Yes	300	5,802	4,651	80.0	67.0	6,483	70.0	208-230V 1ph	0.3	15.0	22.6 x 10.2 x 22.6	35.3		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-C-6	OFFICE 6	FXZQ05TAVJU	0.5	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-1	Yes	300	5,802	4,651	80.0	67.0	6,483	70.0	208-230V 1ph	0.3	15.0	22.6 x 10.2 x 22.6	35.3		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-C-7	OFFICE 7	FXZQ05TAVJU	0.5	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-1	Yes	300	5,802	4,651	80.0	67.0	6,483	70.0	208-230V 1ph	0.3	15.0	22.6 x 10.2 x 22.6	35.3		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-C-8	OFFICE 8	FXZQ05TAVJU	0.5	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-1	Yes	300	5,802	4,651	80.0	67.0	6,483	70.0	208-230V 1ph	0.3	15.0	22.6 x 10.2 x 22.6	35.3		BYFQ60C3W1W (1), KRCS01-4B (1)									
AC-C-9	OFFICE 9	FXZQ05TAVJU	0.5	4-Way Discharge Ceiling Cassette (2' x 2')	ACCU-1	Yes	300	5,802	4,651	80.0	67.0	6,483	70.0	208-230V 1ph	0.3	15.0	22.6 x 10.2 x 22.6	35.3		BYFQ60C3W1W (1), KRCS01-4B (1)									

NOTES:

- 360 DEGREE AIRFLOW DISTRIBUTION AND ROOM SENSORS ENABLES OPTIMIZED OCCUPANT COMFORT AND EFFICIENCY
- OPTIONAL SELF-CLEANING FILTER PANEL TO FURTHER INCREASE EFFICIENCY AND REDUCE MAINTENANCE COSTS
- BUILT-IN CONDENSATE PUMP (FXDQ_M, FXFQ_P, FXFQ_T, FXM_Q_M, FXM_Q_P, FXU_Q_P, FXZQ_M)
- INDIVIDUALLY CONTROLLED SUPPLY AIR LOUVERS FOR COMFORTABLE AIR SUPPLY
- UNIT TO OPTIMIZE WITH UP TO 18 POSSIBLE AIRFLOW PATTERNS
- STANDARD LIMITED WARRANTY: 10-YEAR WARRANTY ON COMPRESSOR AND ALL PARTS

VARIABLE REFRIGERANT VOLUME - ZONE HEAT RECOVERY DEVICE SCHEDULE									
TAG: ROOM	BASIS OF DESIGN (DAIKIN)	CONDENSING UNIT SERVED	VOLTAGE-PHASE	MIN CIRCUIT AMPS (MCA)	MAX OVERCURRENT PROTECTION (MOP)	MAX CAPACITY (per Port)	DIMENSIONS (WxHxD inch)	WEIGHT (lbs)	Options and Accessories
BS 1 CELLAR	BSF6Q54TVJ	ACCU-1	208-230V 1ph	0.6	15.0	54,000	23.3 x 9.5 x 23.7	72.8	KHFP26A100C (1)
BS 2 CELLAR	BSF4Q54TVJ	ACCU-1	208-230V 1ph	0.4	15.0	54,000	13.7 x 9.5 x 23.7	48.5	
BS 3 CELLAR	BSF4Q54TVJ	ACCU-1	208-230V 1ph	0.4	15.0	54,000	13.7 x 9.5 x 23.7	48.5	
BS 1 1ST FLOOR	BSF4Q54TVJ	ACCU-2	208-230V 1ph	0.4	15.0	54,000	13.7 x 9.5 x 23.7	48.5	
BS 2 FIRST FLOOR	BSF6Q54TVJ	ACCU-2	208-230V 1ph	0.6	15.0	54,000	23.3 x 9.5 x 23.7	72.8	KHFP26A100C (1)



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DRAWING TITLE:
 MECHANICAL SCHEDULE 1

DOB NOW JOB#

SEAL & SIGNATURE: _____ DATE: 2022.09.01

PROJECT No: 12284.154

DRAWING BY: AB

CHK BY: DN

DWG No: _____

M-701.00

SCALE: T.S. 9 OF 19

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FAN COIL UNIT SCHEDULE																TITUS AS STANDARD					
GENERAL						COOLING							ELECTRICAL DATA				WEIGHT [LBS]	DIMENSIONS INCHES [WXHXD]	REMARKS		
TAG	MODEL	SERVICE	TYPE	AIR FLOW [CFM]	EXTERNAL STATIC PRESSURE [IN WC]	EAT DB [DEG F]	EAT WB [DEG F]	TOTAL CAPACITY [MBH]	SENSIBLE CAPACITY [MBH]	EWT [DEG F]	LWT [DEG F]	WATER FLOW [GPM]	WATER PD [FT WC]	COIL ROWSL	V/PH/HZ	FAN SPEED				FAN [WATTS]	FAN FLA [AMPS]
FCU-1-4	TVBA-10	VESTIBULE	FLOOR MOUNTED	805	0.05	75	64	23	18.5	45	55	4	10	FOUR	115/1/60	HIGH	132	1.5	200	76 X 28.75 X 10	SEE NOTES

NOTES:

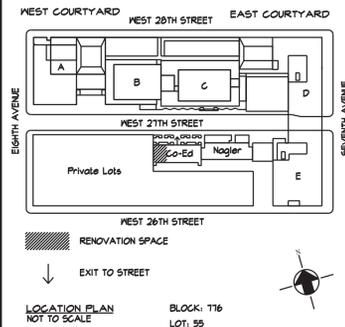
1. PROVIDE BOTTOM RETURN
2. PROVIDE TOP SUPPLY
3. PROVIDE STAINLESS STEEL AUXILIARY DRIP PAN WITH WATER LEAK SENSOR
4. PROVIDE 1" PLEATED MERV 8 FILTER
5. PROVIDE LEVELING LEGS
6. PROVIDE AUTOMATIC AIR VENT
7. PROVIDE THREE SPEED FAN SWITCH
8. PROVIDE DISCONNECT SWITCH

BASEBOARD HEATING SCHEDULE										STELPRO AS STANDARD				
GENERAL			SELECTION DATA				ELECTRICAL DATA			WEIGHT [LBS]	DIMENSIONS INCHES [L*X H X W]	APROX. ENCLOSURE LENGTH [INCHES]	NOTES	
TAG	SERVICE	LOCATION	MANUFACTURER	MODEL	TYPE	TYPE	THERMOSTAT	V/PH/HZ	ELECTRIC POWER [WATTS]					
BUH-1-1	MEETING ROOM 118	ROOM	STELPRO	ALUX1	BASEBOARD	RELAY 24 VOLTS	BUILT-IN	208/1/60	1,350	26.7	106.2 x 4.5 x 2	125	SEE NOTES	
BUH-1-2	MEETING ROOM 117	ROOM	STELPRO	ALUX1	BASEBOARD	RELAY 24 VOLTS	BUILT-IN	208/1/60	1,350	26.7	106.2 x 4.5 x 2	127	SEE NOTES	
BUH-1-3	125A	ROOM	STELPRO	ALUX1	BASEBOARD	RELAY 24 VOLTS	BUILT-IN	208/1/60	450	9.1	35.5 x 4.5 x 2	49	SEE NOTES	
BUH-1-4	OFFICE 124	ROOM	STELPRO	ALUX1	BASEBOARD	RELAY 24 VOLTS	BUILT-IN	208/1/60	750	16.8	59.1 x 4.5 x 2	72	SEE NOTES	
BUH-1-5	WAITING 111	ROOM	STELPRO	ALUX1	BASEBOARD	RELAY 24 VOLTS	BUILT-IN	208/1/60	1,350	26.7	106.2 x 4.5 x 2	124	SEE NOTES	
BUH-1-6	VESTIBULE 110	ROOM	STELPRO	ALUX1	BASEBOARD	RELAY 24 VOLTS	BUILT-IN	208/1/60	300	6.4	23.625 x 4.5 x 2	23	SEE NOTES	
BUH-1-7	VESTIBULE 110	ROOM	STELPRO	ALUX1	BASEBOARD	RELAY 24 VOLTS	BUILT-IN	208/1/60	300	6.4	23.625 x 4.5 x 2	23	SEE NOTES	
BUH-1-8	STUDENT CONSELING MEETING ROOM 112	ROOM	STELPRO	ALUX1	BASEBOARD	RELAY 24 VOLTS	BUILT-IN	208/1/60	1,050	23.1	82.6875 x 4.5 x 2	95	SEE NOTES	
BUH-1-9	STUDENT CONSELING MEETING ROOM 113	ROOM	STELPRO	ALUX1	BASEBOARD	RELAY 24 VOLTS	BUILT-IN	208/1/60	300	6.4	23.625 x 4.5 x 2	23	SEE NOTES	
BUH-1-10	STUDENT CONSELING MEETING ROOM 113	ROOM	STELPRO	ALUX1	BASEBOARD	RELAY 24 VOLTS	BUILT-IN	208/1/60	750	16.8	59.1 x 4.5 x 2	68	SEE NOTES	

NOTES:

1. PROVIDE BUILT-IN ELECTRONIC LOW VOLTAGE RELAY C/W TRANSFORMER 24 V [15 AMPS @ 208 VOLTS]
2. PROVIDE BUILT-IN TAMPER PROOF THERMOSTAT
3. PROVIDE STAINLESS STEEL ELEMENT WITH ALUMINUM FINIS
4. PROVIDE 3" HEIGHT PEDESTAL KIT (SINGLE)
5. PROVIDE ADDITIONAL JOINER STRIP (BLANK SECTION) FOR CONTINUOUS LOOK.
6. PROVIDE EPOXY-POLYESTER FINISH
7. PROVIDE STANDARD WHITE COLOR.

REV. NO. DATE REVISIONS



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DRAWING TITLE:
 MECHANICAL SCHEDULE 2

DOB NOW JOB#
 SEAL & SIGNATURE: DATE: 2022.09.01
 PROJECT No: 12224.154
 DRAWING BY: AB
 CHK BY: DN
 DWG No: M-702.00
 SCALE: N.T.S. 10 OF 19

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ISSUD FOR BID 09/01/2022

AIR CURTAIN HEATER SCHEDULE						FRICO AS STANDARD											
GENERAL			PERFORMANCE DATA			SELECTION DATA			CONTROL		ELECTRICAL DATA				WEIGHT [LBS]	DIMENSIONS INCHES [LXHXW]	REMARKS
TAG	SERVICE	LOCATION	MAX FLOW [CFM]	OUTPUT STEPS [MBH]	SOUND POWER [dB(A)]	MANUFACTURER	MODEL	TYPE	TYPE	COMMUNICATION	V/PH/Hz	FAN POWER [WATTS]	FLA	HEATER [AMPS]			
ACH-1	VESTIBULE	VESTIBULE CEILING	1,900	27/44	74	FRICO	AREC3220CE13-20 8VNA	2 HEAT STEPS/3 FAN STEPS	SIReAAY ADVANCED COMPETENT	MODBUS OR BACNET	208/3/60	254	39	36	130	83 X 10.2 X 21	SEE NOTES

NOTES:

- COORDINATE COLOR WITH ARCHITECT DRAWINGS

AIR OUTLET SCHEDULE				TITUS AS STANDARD								
MARK	SERVICE	MIN CFM	MAX CFM	INLET SIZE (IN. DIA)	TOTAL PRESSURE DROP (PI) AT MAX FLOW (IN. WC)	SOUND LEVEL (NC)	PANEL SIZE	DAMPER STYLE	BOREDR TYPE	MANUFACTURER	MODEL	NOTES
SD-1	SUPPLY	50	175	8 INCHES	0.049	<16	24X24	D-75 OBD	TYPE 3 LAY IN	TITUS	PAS	-
CR-1	EXHAUST	50	177	6 INCHES	0.023	<10	10X10	NONE	TYPE 1 SURFACE MOUNT	TITUS	PAR	-

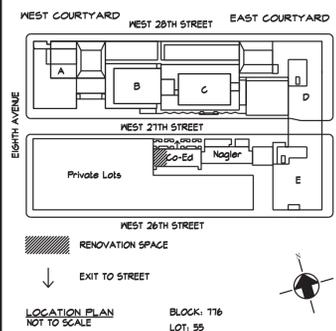
NOTES:

- ALL DIFFUSERS & DAMPERS TO BE PER SCHEDULE. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR COLOR FINISHING
- ALL DIFFUSERS TO BE STANDARD FACTORY POWDER COATED. PROVIDE CONCEALED FASTENERS FOR ALL AIR OUTLETS.
- COORDINATE WITH THE ARCHITECTURAL DRAWINGS.
- FOR EXHAUST AND RETURN THE STATIC PRESSURE IS NEGATIVE PRESSURE

EXHAUST FAN SCHEDULE				GREENHECK AS STANDARD														
GENERAL				FAN DATA						MOTOR DATA					WEIGHT [LBS]	VFD	INTERLOCKED WITH	REMARKS
TAG	SERVICE	LOCATION	MFG MODEL NO.	FAN TYPE	TOTAL AIR CFM	EXTERNAL STAT. PRESS. IN. WG.	FAN RPM	MAX RPM	STATIC EFFICIENCY [%]	MAX REQ'D BHP	MIN MOTOR HP	MOTOR SPEED RPM	VOLT/PH/Hz	FLA				
EF-8	TOILETS	ROOF	USF-18	UTILITY/BELT DRIVEN	3,000	1.5"	1,239	2,099	67	1.12	2	1725	208/3/60	7.5	299	YES	CONTROL FROM BMS	SEE NOTES
EF-9	KITCHEN	ROOF	USF-08	UTILITY/BELT DRIVEN	600	1.5"	2,498	4,050	39	0.4	3/4"	1725	208/3/60	3.5	170	YES	CONTROL FROM BMS	SEE NOTES

NOTES:

- NEMA PREMIUM EFFICIENCY MOTOR.
- DISCONNECT SWITCH NEMA 3R FACTORY MOUNTED AND WIRED.
- AIRFLOW STATION SURE-AIR PROBES AND ELECTRONICS IN NEMA 4 ENCLOSURE. PROBES SHALL BE FACTORY INSTALLED. COMMUNICATION PROTOCOL SHALL BE BACNET MSTP.
- VFD SHALL BE 3 HP YASKAWA BASE MODEL HV60U2011CFA WITH INPUT DISCONNECT SWITCH AND IN A NEMA 3R ENCLOSURE.
- FAN SHALL BE UL LISTED FOR UL6CUL - 705 "POWER VENTILATORS".
- PROVIDE FINIS COATING - PERMATECTOR, CONCRETE GRAY - RAL 7023, FAN AND ATTACHED ACCESSORIES.
- HOUSING SHALL BE PERMALOCK.
- PROVIDE POLISHED STEEL SHAFT.
- PROVIDE BOLTED ACCESS DOOR.
- PROVIDE 1" PIPE DRAIN CONNECTION WITH PLUG.
- INLET AND OUTLET CONNECTION SHALL BE SLIP FIT.
- PROVIDE FLEX CONNECTION AS PER SPECIFICATION.
- PROVIDE CLASS I DAMPER



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443 Park Avenue South New York, NY 10016
 212 889 4045 Fax 212 889 3672

PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
 230 WEST 21TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 MECHANICAL SCHEDULE 3

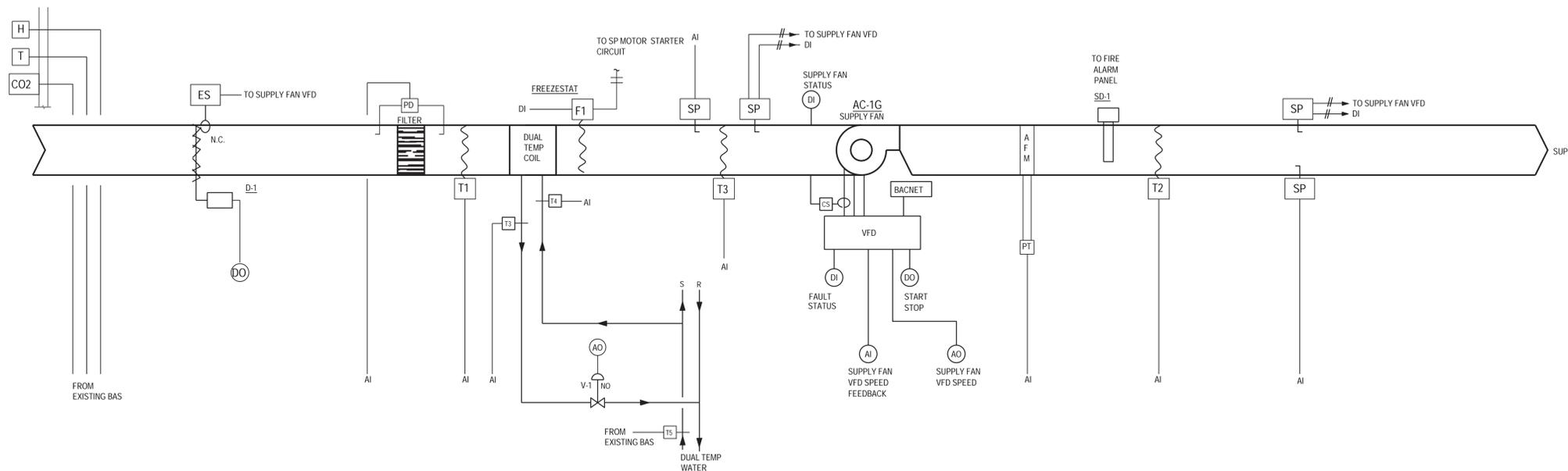
DOB NOW JOB#

SEAL & SIGNATURE:	DATE: 2022.09.01
	PROJECT No: 12284.154
	DRAWING BY: AB
	CHK BY: DN
	DWG No:
	M-703.00
SCALE: N.T.S.	11 OF 19

NEW YORK CITY BUILDING DEPARTMENT APPROVAL NOTE
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AC-1G UNIT CONTROL FLOW DIAGRAM

NTS

LEGEND

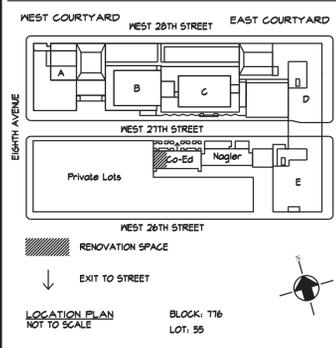
VFD	VARIABLE FREQUENCY DRIVE	C.S.	CURRENT SENSOR
SPS	STATIC PRESSURE SENSOR	M	MOTOR/ACTUATOR
PD	PRESSURE DIFFERENTIAL SENSOR (AIR)	PT	PRESSURE TRANSDUCER
S.D.	SMOKE DETECTOR	A F M	AIR FLOW MEASURING STATION
ES	END SWITCH	T#	TEMPERATURE SENSOR
M	CONTROL DAMPER	V#	CONTROL VALVE
---	ELECTRIC LINE	S/S	START/STOP
DI	DIGITAL INPUT	OBD	OPPOSED BLADE DAMPER
DO	DIGITAL OUTPUT	PBD	PARALLEL BLADE DAMPER
AI	ANALOG INPUT	SF	SUPPLY FAN
AO	ANALOG OUTPUT	ELECTR	ELECTRICAL
T	AVERAGING TEMPERATURE SENSOR		

NOTES FOR NEW WORK ON THIS CONTRACT

- ALL THE WORK INCLUDED IN THE REVISION CLOUD IS PART OF THE SCOPE OF WORK OF THIS CONTRACT. THE CONTRACTOR SHALL ENGAGE THE SERVICES OF THE FASHION INSTITUTE OF TECHNOLOGY (FIT) ON CALL BMS CONTRACTOR (SEE SPECIFICATION 230900 FOR CONTACT INFO) TO PERFORM THE FOLLOWING WORK:
1. UPDATE THE SEQUENCE OF OPERATION OF THE AC-1G. THE AC-1G SHALL BE IN SYSTEM MODE (WINTER/SUMMER) AS PER CAMPUS SETPOINTS. THE AC-1G SETPOINT OF THE UNIT SHALL BE SET AS PER FIT STANDARD SEQUENCE OF OPERATION. THE UNIT MODE SHALL BE COOLING/ECONOMIZER/HEATING. KEEP ALL THE OTHER SEQUENCE OF OPERATION OF AC-1G.
 2. IN SUMMER MODE THE SUPPLY AIR SETPOINT SHALL BE SET TO 72 DEG F (ADJUSTABLE).
 3. IN WINTER MODE THE SUPPLY AIR SETPOINT SHALL BE SET TO 68 DEG F (ADJUSTABLE).
 4. IMPLEMENT OPERATION SCHEDULE FOR THE AC-1G SIMILAR TO ALL AC UNITS AT FIT CAMPUS.
 5. PROVIDE AIR FLOW STATION TO BE INSTALLED ON THE FAN INLET MODEL ELECTRAFLOW.
 6. CORRECT ALL THE DEFICIENCIES OF THE UNIT (SENSOR READINGS, FAN COMMAND, FAN FEEDBACK, CO2, ENTHALPY, ETC).
 7. SUBMIT REPORT WITH ALL THE DEFICIENCIES CORRECTED.
 8. DEMONSTRATE TO THE ENGINEER ALL THE FUNCTIONS OF THE AC-2G ARE WORKING PROPERLY.

NEW YORK CITY BUILDING DEPARTMENT APPROVAL NOTE
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Cost Concepts
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MEP Consultant
MGENGINEERING
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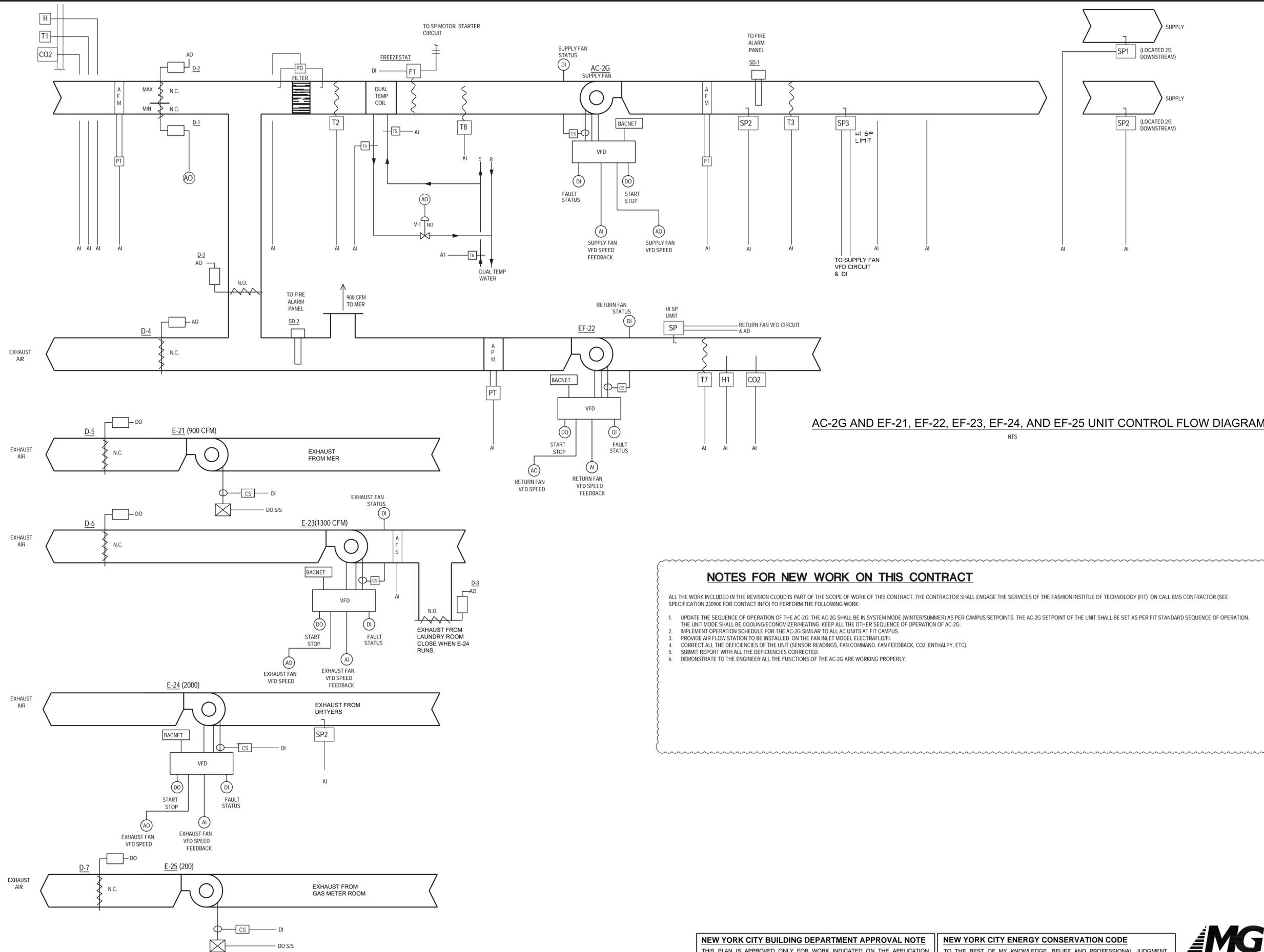
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 212 889 4045 Fax 212 889 3672

PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
 230 WEST 21TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 AC-1G
 MECHANICAL CONTROLS

DOB NOW JOB#	DATE: 2022.09.01
SEAL & SIGNATURE:	PROJECT No: 12284.154
	DRAWING BY: AB
	CHK BY: DN
	DWG No:
	M-801.00
	SCALE: N.T.S.
	12 OF 19



AC-2G AND EF-21, EF-22, EF-23, EF-24, AND EF-25 UNIT CONTROL FLOW DIAGRAM
NTS

NOTES FOR NEW WORK ON THIS CONTRACT

ALL THE WORK INCLUDED IN THE REVISION CLOUD IS PART OF THE SCOPE OF WORK OF THIS CONTRACT. THE CONTRACTOR SHALL ENGAGE THE SERVICES OF THE FASHION INSTITUTE OF TECHNOLOGY (FIT) ON CALL BMS CONTRACTOR (SEE SPECIFICATION 230900 FOR CONTACT INFO) TO PERFORM THE FOLLOWING WORK:

1. UPDATE THE SEQUENCE OF OPERATION OF THE AC-2G. THE AC-2G SHALL BE IN SYSTEM MODE (WINTER/SUMMER) AS PER CAMPUS SETPOINTS. THE AC-2G SETPOINT OF THE UNIT SHALL BE SET AS PER FIT STANDARD SEQUENCE OF OPERATION. THE UNIT MODE SHALL BE COOLING/ECONOMIZER/HEATING. KEEP ALL THE OTHER SEQUENCE OF OPERATION OF AC-2G.
2. IMPLEMENT OPERATION SCHEDULE FOR THE AC-2G SIMILAR TO ALL AC UNITS AT FIT CAMPUS.
3. PROVIDE AIR FLOW STATION TO BE INSTALLED ON THE FAN INLET MODEL ELECTRIFLOPI.
4. CORRECT ALL THE DEFICIENCIES OF THE UNIT (SENSOR READINGS, FAN COMMAND, FAN FEEDBACK, CO2, ENTHALPY, ETC).
5. SUBMIT REPORT WITH ALL THE DEFICIENCIES CORRECTED.
6. DEMONSTRATE TO THE ENGINEER ALL THE FUNCTIONS OF THE AC-2G ARE WORKING PROPERLY.

NEW YORK CITY BUILDING DEPARTMENT APPROVAL NOTE
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NEW YORK CITY ENERGY CONSERVATION CODE
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ISSUED FOR BID 09/01/2022

REV. NO.	DATE	REVISIONS

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MENGINEERING
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New York, NY 10001 / (212) 643-9898

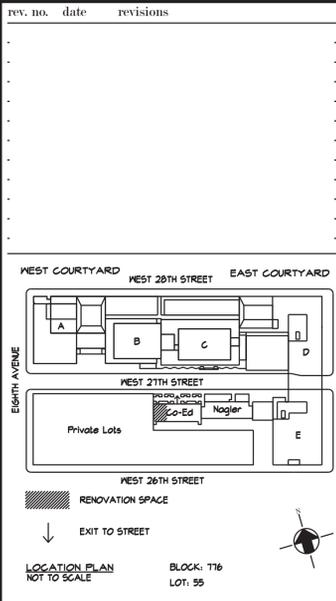
Fashion Institute of Technology
340 8TH AVENUE
NEW YORK, NY 10001

David Smotrich & Partners LLP
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443 Park Avenue South New York, NY 10016
212 889 4045 Fax 212 889 3672

PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 21TH ST
NEW YORK NY 10001

DRAWING TITLE:
AC-2G & EXHAUST FANS
MECHANICAL CONTROLS

DOB NOW JOB#
SEAL & SIGNATURE: DATE: 2022.09.01
PROJECT No: 12284.154
DRAWING BY: AB
CHK BY: DN
DWG No: M-802.00
SCALE: N.T.S. 13 OF 19



Structural Consultants
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MENGINEERING
 116 West 32nd Street
 New York, NY 10001 / (212) 643-9898

Fashion Institute of Technology
 340 8TH AVENUE
 NEW YORK, NY 10001

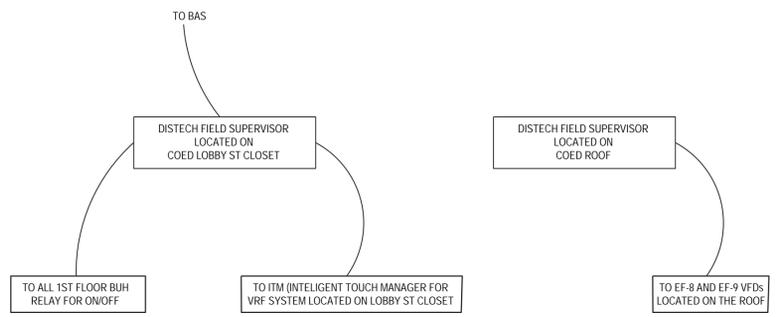
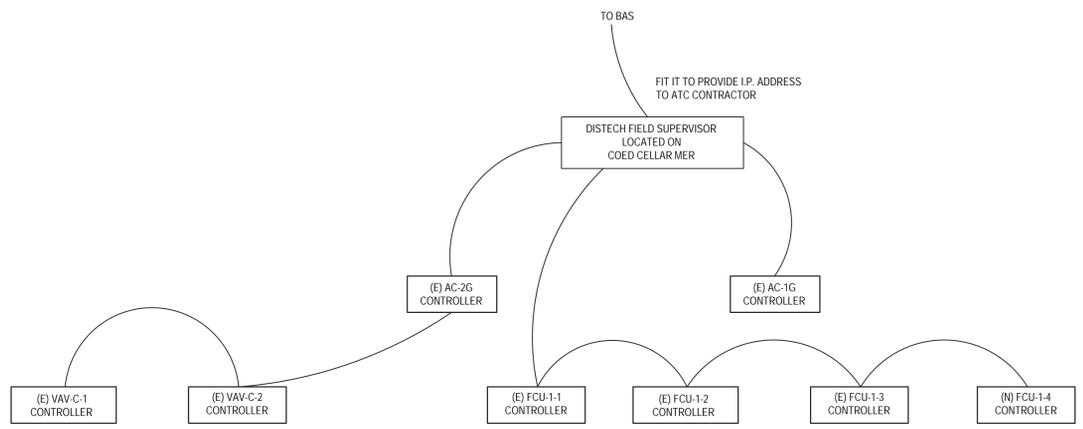
David Smotrich & Partners LLP
 Architects/Planners

443 Park Avenue South New York, NY 10016
 212 889 4045 Fax 212 889 3672

PROJECT:
**CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001**

DRAWING TITLE:
**BMS ARCHITECTURE AND UNIT CONTROLS
 MECHANICAL CONTROLS**

DOB NOW JOB#
 SEAL & SIGNATURE: _____ DATE: 2022.09.01
 PROJECT No: 12284.154
 DRAWING BY: AB
 CHK BY: DN
 DWG No:
M-803.00
 SCALE: N.T.S. 14 OF 19

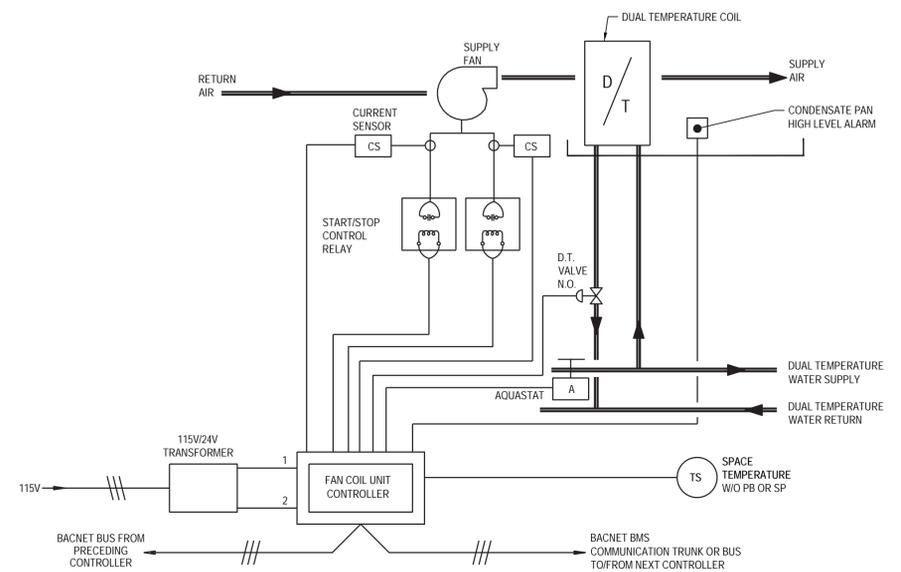


BAS ARCHITECTURE

NOTES FOR NEW WORK ON THIS CONTRACT

ALL THE WORK NOT SHOWN AS EXISTENT (E) IS PART OF THE SCOPE OF WORK OF THIS CONTRACT. THE CONTRACTOR SHALL ENGAGE THE SERVICES OF THE FASHION INSTITUTE OF TECHNOLOGY (FIT) ON CALL BMS CONTRACTOR (SEE SPECIFICATION 230900 FOR CONTACT INFO) TO PERFORM THE FOLLOWING WORK:

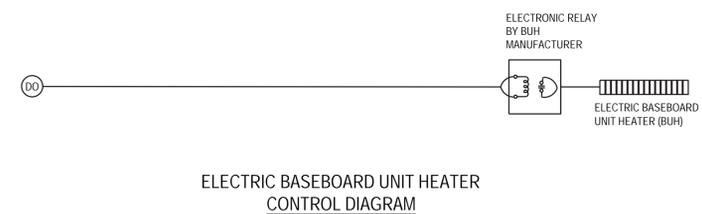
- THE BUH SHALL OPERATE AS FOLLOWS:
 - IN SUMMER MODE THE BUH SHALL BE DISABLED BY THE BMS.
 - IN WINTER MODE THE BUH SHALL BE ENABLED BY THE BMS.
- PROVIDE NEW DISTECH FCU CONTROLLER WITH WIRELESS CAPABILITIES FOR 4 FCU LOCATED ON THE EXITING LOBBY. PROVIDE WIRELESS ROOM TEMPERATURE SENSOR WITHOUT DISPLAY FOR FOUR FAN COIL UNITS. FCU-1.4 SHALL OPERATE WITH THE SAME SEQUENCE OF OPERATION AS FCU-1.1, FCU-1.2, FCU-1.3.
- DEMONSTRATE TO THE ENGINEER ALL THE FUNCTIONS OF THE FAN COILS AND BUH ARE WORKING PROPERLY.



DUAL TEMPERATURE FAN COIL UNIT CONTROL DIAGRAM

LEGEND

TS-1	ROOM TEMP SENSOR
VP	VELOCITY PRESSURE
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
AI	ANALOG INPUT
AO	ANALOG OUTPUT



ELECTRIC BASEBOARD UNIT HEATER CONTROL DIAGRAM

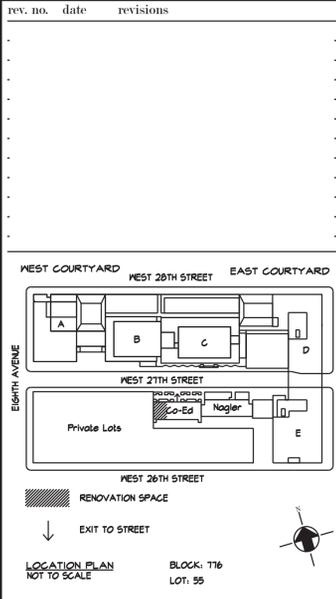
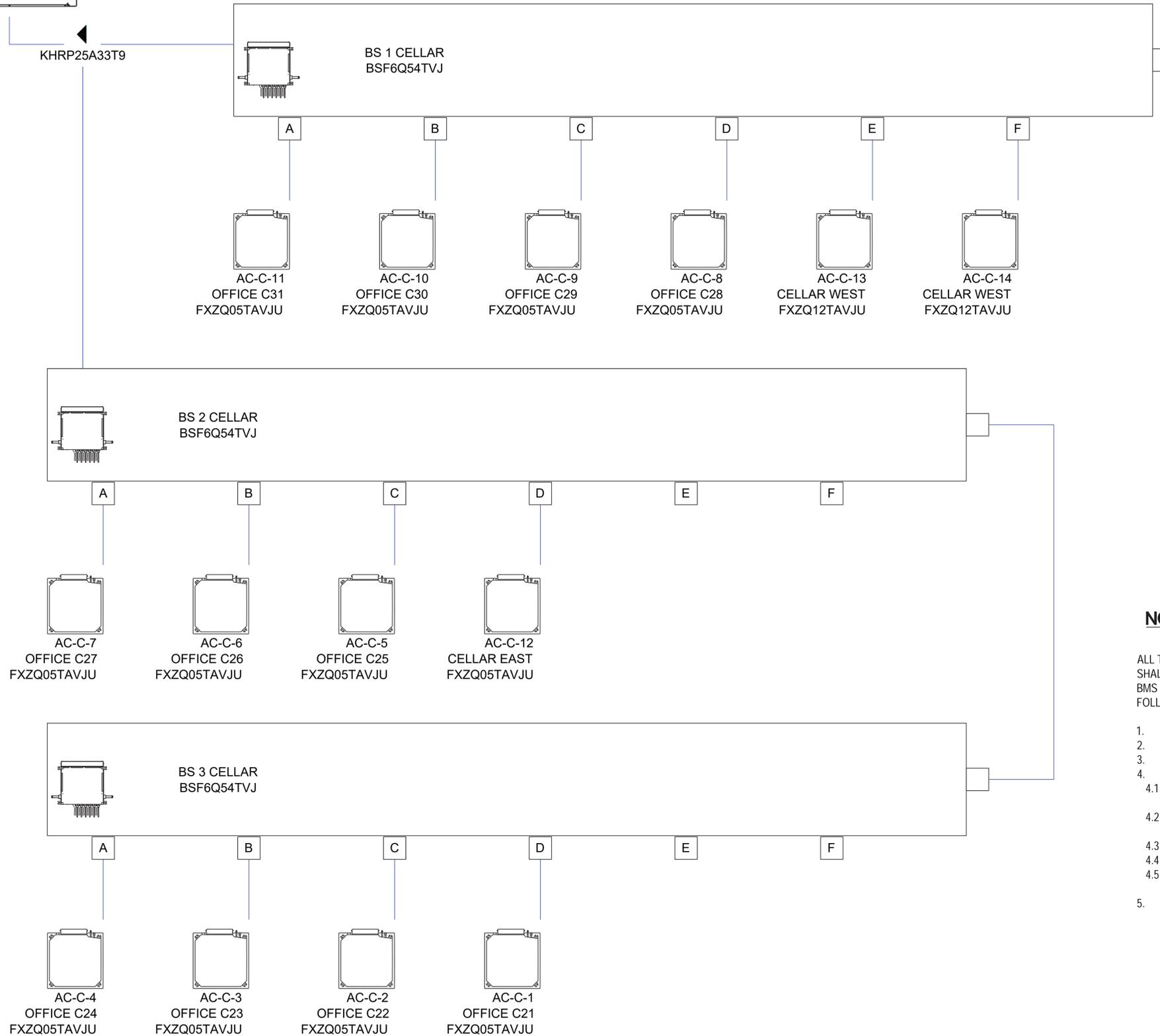
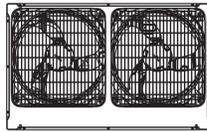
NEW YORK CITY BUILDING DEPARTMENT APPROVAL NOTE
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ACCU-1
REYQ96XATJA



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David Smotrich & Partners LLP
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443 Park Avenue South New York, NY 10016
212 889 4045 Fax 212 889 3672

PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 21TH ST
NEW YORK NY 10001

DRAWING TITLE:
ACCU-1
REFRIGERANT SYSTEM
PIPING SCHEMATIC AND CONTROLS

DOB NOW JOB#	DATE: 2022.09.01
SEAL & SIGNATURE:	PROJECT No: 12284.154
	DRAWING BY: AB
	CHK BY: DN
	DWG No:
	M-804.00
	SCALE: N.T.S.
	15 OF 19

NOTES FOR NEW WORK ON THIS CONTRACT

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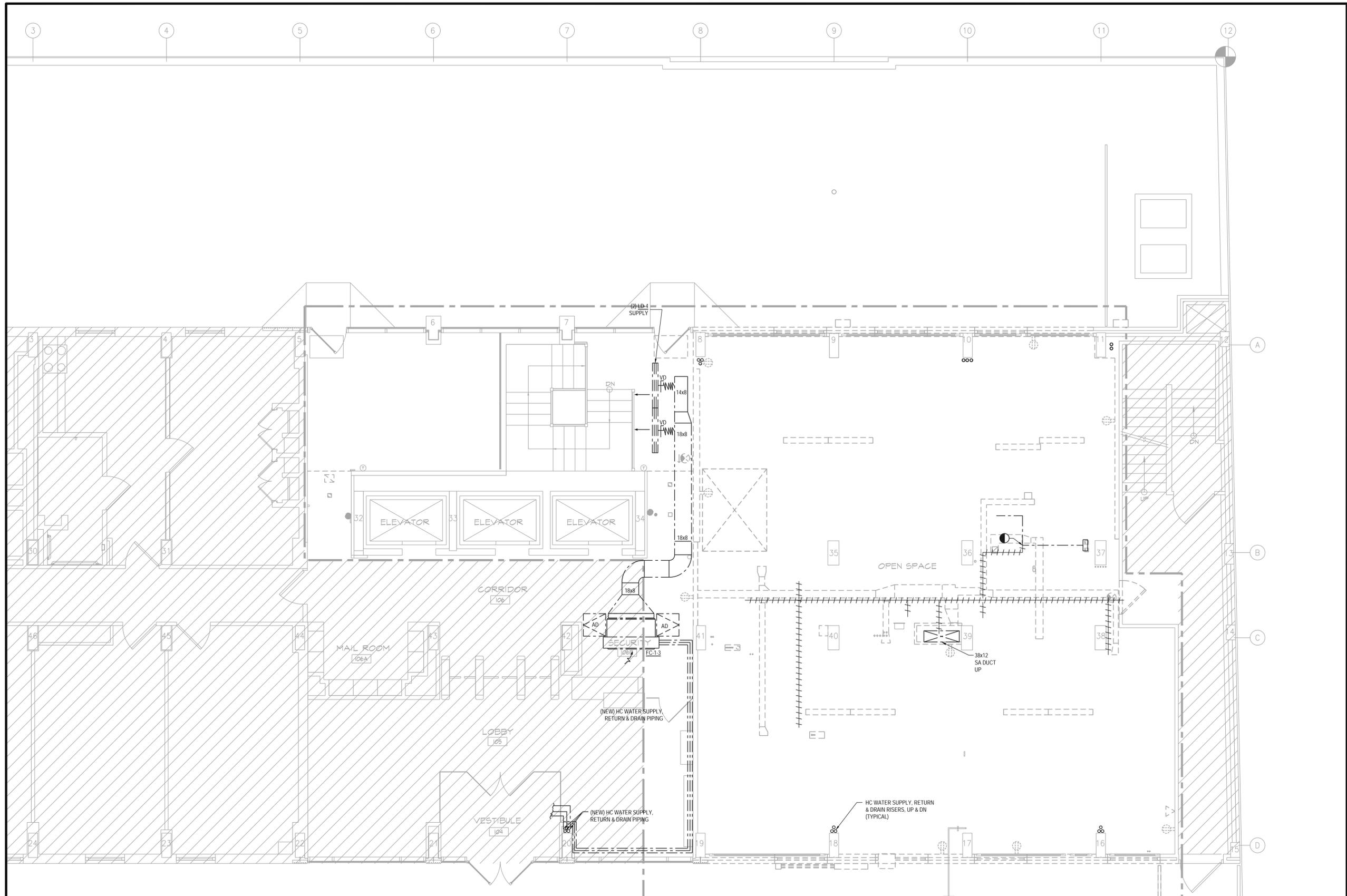
1. INSTALL ALL THE CONTROLS FOR THE VRF SYSTEM.
2. INTEGRATE THE ITM TO THE BMS.
3. PROVIDE ALL THE VRF VARIABLE TO THE BMS GRAPHIC INTERFACE.
4. THE SEQUENCE OF OPERATION OF THE VRF SHALL BE:
 - 4.1. IN THE WINTER THE SPACE TEMPERATURE SETPOINT SHALL BE 70 DEG F (ADJUSTABLE).
 - 4.2. IN THE SUMMER MODE, THE SPACE TEMPERATURE SETPOINT SHALL BE 74 DEG F (ADJUSTABLE).
 - 4.3. THE VRF SHALL OPERATE IN OCCUPIED MODE M-F FROM 8 AM TO 8 PM.
 - 4.4. THE VRF SHALL IN UNOCCUPIED MODE OTHERWISE.
 - 4.5. THE BMS SHALL FORCE OFF ALL THE INDOOR VRF UNIT WHEN IN UNOCCUPIED MODE.
5. DEMONSTRATE TO THE ENGINEER ALL THE FUNCTIONS OF THE VRF SYSTEM ARE WORKING PROPERLY.

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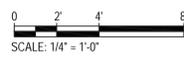
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① 1ST FLOOR DEMO PLAN
1/4" = 1'-0"



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REV. NO.	DATE	REVISIONS

WEST COURTYARD WEST 28TH STREET EAST COURTYARD

Private Lots
Nogler
WEST 27TH STREET
WEST 28TH STREET
WEST 29TH STREET
EIGHTH AVENUE SEVENTH AVENUE

RENOVATION SPACE
EXIT TO STREET

LOCATION PLAN NOT TO SCALE
BLOCK: 176
LOT: 55

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New York, NY 10001 / (212) 643-9898 #246943

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NEW YORK, NY 10001

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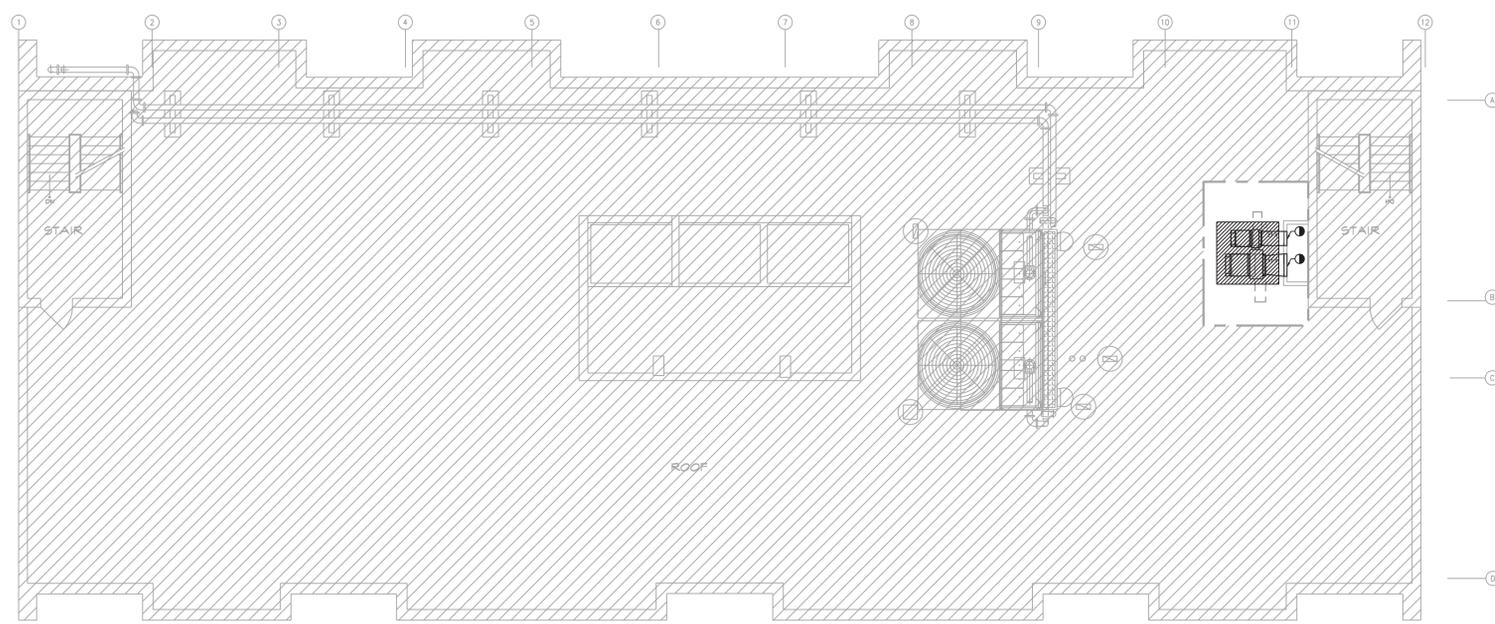
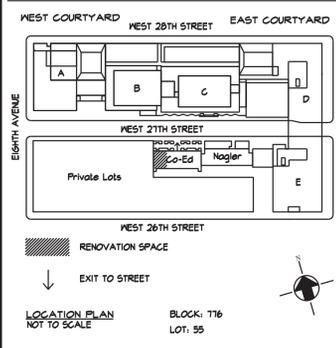
PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 27TH ST
NEW YORK NY 10001

DRAWING TITLE:
MECHANICAL 1ST FLOOR
DEMOLITION
PLAN

DOB NOW JOB#

SEAL & SIGNATURE: _____ DATE: 2022.09.01
PROJECT No: 12284.154
DRAWING BY: AB
CHK BY: DN
DWG No: M-902.00
SCALE: 1/4"=1' 18 OF 19

ISSUD FOR BID 09/01/2022



ROOF DEMO PLAN
1/4" = 1'-0"
SCALE: 1/4" = 1'-0"

Structural Consultants
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443 Park Avenue South New York, NY 10016
212 889 4045 Fax 212 889 3672

PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 21TH ST
NEW YORK NY 10001

DRAWING TITLE:
MECHANICAL ROOF
DEMOLITION
PLAN

DOB NCE JOB#

SEAL & SIGNATURE:	DATE: 2022.09.01
	PROJECT No: 12284.154
	DRAWING BY: AB
	CHK BY: DN
	DWG No: M-903.00
	SCALE: 1/8"=1'

NEW YORK CITY BUILDING DEPARTMENT APPROVAL NOTE
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LIGHTING FIXTURE SCHEDULE

TYPE	FIXTURE DESCRIPTION	MFR.	LAMP TYPE	CONTROL	MTG HEIGHT	VOLTAGE	WATTAGE	COMMENTS
A1	B3RDL-09X3-35KH-40-S-WH-WH-FT-UNV-D22	USA1	LED	DIM	COORD. W/ RCP	120V	9W	TRIMLESS SPACKLED-IN
A2a	OCR-CONCAVE-2X2-LED-8-35-024L-UNV-B02-C32-KO-V09	VISCOR	LED	DIM	COORD. W/ RCP	120V	20W	
A2b	OCR-CONVEX-2X2-LED-8-35-024L-UNV-B02-C32-KO-V09	VISCOR	LED	DIM	COORD. W/ RCP	120V	20W	
A3	KBM-F-H-22K-EPF-X-SP-X-EC LENGTH TO BE VERIFIED IN THE FIELD	OPTIC ARTS LUMINII	LED	DIM	COORD. W/ RCP	120V	3.7W/FT	LENGTH OF FIXTURES TO BE COORDINATED WITH RCP. THE ELECTRICAL CONTRACTOR SHALL PROVIDE LED STRIP REMOTE DRIVERS/ TRANSFORMERS AT ACCESSIBLE LOCATIONS TO BE COORDINATED WITH ARCHITECT. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL 24V WIRING FROM DRIVER/ TRANSFORMER TO LED STRIP FIXTURES FOR PROPER CONTROL. PROVIDE NEW WALL MTD. LIGHT SWITCH FOR PROPER CONTROL. COORDINATE WITH MANUFACTURER FOR ALL POWER SUPPLY REQUIREMENTS.
A4	PG4-X-35-MED-UNV-DB-W-T-4" RG-NA-X-TA LENGTH TO BE VERIFIED IN THE FIELD	CORONET	LED	DIM	COORD. W/ RCP	120V	8W/FT	LENGTH OF FIXTURES TO BE COORDINATED WITH RCP AND EXISTING CONDITIONS. FIXTURE TO BE WALL MOUNTED AND RECESSED 4". COORDINATE WITH NEW ARMSTRONG DROP CEILING
A5	MDG6-21H1-35KH-35-X-X-NCVS-UNV-D6E-X-X	USA1	LED	DIM	COORD. W/ RCP	120V	21W	COORDINATE FIXTURE WITH ARMSTRONG WOODWORKS GRILLE CEILING. COORDINATE FINAL LOCATIONS WITH CEILING GRILLE.
A6	RUSH DN-X-35-HIGH-UNV-DB-W-WM-SD NA-NA-NA LENGTH TO BE VERIFIED IN THE FIELD	CORONET	LED	DIM	COORD. W/ RCP	120V	7W/FT	LENGTH OF FIXTURES TO BE COORDINATED WITH RCP AND EXISTING CONDITIONS. FIXTURE TO BE WALL MOUNTED. COORDINATE WITH NEW ARMSTRONG DROP CEILING
A7	B3RDF-09X3-35KH-40-S-WH-WH-FT-UNV-D22	USA1	LED	DIM	COORD. W/ RCP	120V	9W	
A8	RUSH REC-X-35-HIGH-UNV-DB-W-PMWT-SU-NA-NA-NA LENGTH TO BE VERIFIED IN THE FIELD	CORONET	LED	DIM	COORD. W/ RCP	120V	7W/FT	LENGTH OF FIXTURES TO BE COORDINATED WITH RCP AND EXISTING CONDITIONS. FIXTURE TO BE WALL MOUNTED WITH MUD-IN INTO GWB CEILING.
A9	75S-4-L50-35-ACFNA-DIM-UNV	WILLIAMS	LED	DIM	COORD. W/ RCP	120V	7.4W/FT	
A10	LED VAPORPROOF 02-12W-LED-W-F-OG-01	CANLET	LED	DIM	COORD. W/ RCP	120V	12W	
A11	B3RDP-09X3-35KH-40-S-GW-FT-UNV-D22	USA1	LED	DIM	COORD. W/ RCP	120V	9W	USA1 TRIMLESS ACOUSTICAL LIGHTING PRODUCT MUST BE USED EXCLUSIVELY WITH PRE-CUT CEILING TILES BY ARMSTRONG CEILING SOLUTIONS. PRE-CUT CEILING TILES MUST BE PURCHASED FROM ARMSTRONG CEILING SOLUTIONS. ELECTRICAL CONTRACTOR AND GENERAL CONTRACTOR TO COORDINATE ORDER OF PRE-CUT TILES.

LIGHTING & BALLAST NOTES

- SEE LIGHTING FIXTURE SCHEDULES AND DETAILS ON DRAWINGS E-000 AND E-500 SERIES DRAWINGS.
- FOR EXACT LOCATION AND MOUNTING HEIGHTS OF ALL LIGHTING FIXTURES, SWITCHES AND JUNCTION BOXES SEE ARCHITECTURAL, FURNITURE AND LIGHTING DRAWINGS.
 - CIRCUITS ARE DESIGNATED BY THE NUMBER SHOWN ADJACENT TO EACH LIGHTING FIXTURE OR JUNCTION BOX. WIRING IS SHOWN ONLY UNDER SPECIAL CIRCUMSTANCES. PROVIDE ALL CONDUIT, WIRE AND BOXES AS WELL AS CEILING OUTLETS AND WHIPS REQUIRED TO ENERGIZE LIGHTING FIXTURES AS SHOWN.
 - LIGHTING FIXTURES DESIGNATED AS EMERGENCY, "NIGHT LIGHT" AND EXIT LIGHTS SHALL BE UN-SWITCHED, UNON.
 - FOR LIGHTING FIXTURE SPECIFICATIONS REFER TO ARCHITECTURAL & LIGHTING CONSULTANT LIGHTING FIXTURE SCHEDULES, CUT-SHEETS.
 - FOR ADDITIONAL LIGHTING REQUIREMENTS SEE ARCHITECTURAL LIGHTING, TECHNOLOGY LIGHTING CONTROLS, AND EQUIPMENT MANUFACTURERS DOCUMENTATION.
 - ELECTRONIC ENERGY SAVING BALLASTS SHALL BE USED AND SHALL MEET OR EXCEED BOTH THE MINIMUM BALLAST EFFICIENCY FACTOR (B.E.F.) AS SPECIFIED BY UTILITY COMPANY.
 - ALL BALLASTS SHALL BE RATED FOR AND SUPPLY A TOTAL HARMONIC DISTORTION (T.H.D.) OF 10% OR LESS.
 - ALL FLUORESCENT LIGHT FIXTURES SHALL HAVE ENERGY SAVING LAMPS AND SHALL BE EQUIPPED WITH ELECTRONIC ENERGY SAVING BALLASTS.
 - HYBRID & UNIVERSAL BALLASTS SHALL NOT BE USED AND WILL NOT BE ACCEPTED.
 - OCCUPANCY, VACANCY AND DAYLIGHT SENSOR LOCATIONS AND QUANTITIES SHOWN ON THE DRAWINGS ARE DIAGRAMMATIC. CONTRACTOR SHALL PROVIDE SENSORS AS REQUIRED TO MEET ALL CODE REQUIREMENTS AND AS PER THE SEQUENCE OF OPERATIONS IN THE CONTROLS NARRATIVE.

TELEPHONE, COMMUNICATION, SECURITY & OTHER LOW-VOLTAGE SYSTEM NOTES:

- PROVIDE TELEPHONE, COMMUNICATION, SECURITY AND OTHER LOW-VOLTAGE EQUIPMENT BACK-BOXES & EMPTY CONDUIT SYSTEMS FOR LOW-VOLTAGE WIRING AND CABLING. (UNON, WIRING & CABLING IS UNDER SEPARATE CONTRACT.) LOCATION AND SIZE OF CONDUIT SHALL BE AS SPECIFIED ON THE DRAWINGS OR AS REQUIRED. THE MANNER OF INSTALLING CONDUIT SHALL BE THE SAME AS SPECIFIED HEREIN FOR LIGHT AND POWER WIRING SYSTEM AND IN ACCORDANCE WITH THE REQUIREMENTS OF THE TELECOM COMPANY AND OTHER COMMUNICATION SYSTEMS VENDORS.
- THE TELEPHONE COMMUNICATION, SECURITY AND OTHER LOW-VOLTAGE SYSTEMS SHALL CONSIST OF EMPTY RACEWAYS, JUNCTION BOXES, PULL BOXES, ETC., LEFT IN READINESS FOR WIRING TO BE PROVIDED UNDER SEPARATE CONTRACT. UNON. PROVIDE DRAG LINE IN ALL EMPTY CONDUITS.
- ALL TELEPHONE/DATA/SECURITY/LOW VOLTAGE INSTALLATIONS SHALL BE COORDINATED WITH THE RESPECTIVE VENDORS.
- CONDUITS & BOXES SHALL BE AS SPECIFIED IN ELECTRICAL SPECIFICATIONS. RACEWAYS SHALL HAVE NO MORE THAN THE EQUIVALENT OF TWO 90 DEGREE BENDS WITHOUT INTERMEDIATE PULL BOXES OR ACCESS POINTS.
- REFER TO ARCHITECTURAL, TELECOM, INFORMATION TECHNOLOGY, SECURITY AND OTHER DRAWINGS FOR ADDITIONAL REQUIREMENTS.

POWER NOTES

- FOR EXACT LOCATION AND MOUNTING HEIGHT OF ALL POWER, TEL/DATA OUTLETS AND MECHANICAL EQUIPMENTS COORDINATE WITH ALL TRADES AND ARCHITECTURAL DRAWINGS.
- ALL BRANCH CIRCUIT WIRING SHALL BE RUN CONCEALED IN WALLS AND ABOVE HUNG CEILING, UNLESS OTHERWISE NOTED.
- NO. 12 AWG (THHN) SHALL BE THE MINIMUM SIZE AND SHALL BE USED FOR ALL 15A & 20A BRANCH CIRCUIT WIRING, UNLESS OTHERWISE NOTED. CONTRACTOR SHALL ADJUST SIZE FOR VOLTAGE DROP AND OTHER DE-RATING FACTORS AS PER CODE REQUIREMENTS.
- 3/4" CONDUIT SHALL BE THE MINIMUM TRADE SIZE OF CONDUIT.
- CIRCUITS ARE DESIGNATED BY THE NUMBER SHOWN ADJACENT TO EACH RECEPTACLE, ETC. WIRING IS SHOWN ONLY FOR UNDER SPECIAL CIRCUMSTANCES. PROVIDE CONDUITS, WIRES, ARMORED CABLES AND BOXES REQUIRED TO ENERGIZE THE EQUIPMENT AS SHOWN.
- ALL COMMUNICATIONS, SECURITY WORKS ARE A SEPARATE CONTRACT, UNON. EC TO PROVIDE ALL CONDUIT, RACEWAY, BACK-BOXES.
- FOR ADDITIONAL NOTES REFER TO ARCHITECTURAL DRAWINGS.
- CONDUIT RUNS THAT ARE SHOWN ARE DIAGRAMMATIC AND SHOW POTENTIAL ROUTING OF CONDUITS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE RUNS WITH ALL TRADES.

MECHANICAL/PLUMBING EQUIPMENT NOTES

- INTENT OF DRAWING IS TO SHOW LAYOUT OF MECHANICAL/PLUMBING EQUIPMENT AND RESPECTIVE ELECTRICAL CONNECTIONS WITH ASSOCIATED DEVICES. FOR EXACT LOCATIONS AND MOUNTING HEIGHTS OF ALL MECHANICAL/PLUMBING EQUIPMENT AND RESPECTIVE CONTROLS REFER TO MECHANICAL/PLUMBING DRAWINGS. USE THIS DRAWING FOR CIRCUITING PURPOSES ONLY.
- CONSTRUCTION MANAGER (CM) SHALL DETERMINE WHICH CONTRACTOR'S SCOPE IT IS TO PROVIDE DISCONNECT SWITCHES AND/OR CONTROL PANELS FOR MECHANICAL/PLUMBING EQUIPMENT. COORDINATE WITH CM PRIOR TO INCLUDING COSTS FOR SAME IN BID. DISCONNECT SWITCHES AND CONTROL PANELS SHALL BE INSTALLED/WIRED BY ELECTRICAL CONTRACTOR UNON. COORDINATE WITH MECHANICAL/PLUMBING CONTRACTORS FOR ADDITIONAL REQUIREMENTS.
- CONTRACTOR TO INSTALL & WIRE THERMOSTATS AND ASSOCIATED BACKBOXES FOR ALL EQUIPMENT INCLUDING INDIVIDUAL HEATPUMPS, THERMOSTATS PROVIDED BY MECHANICAL CONTRACTOR. REFER TO MECHANICAL SCHEDULES & SPECS FOR A LIST OF EQUIPMENT AND ASSOCIATED THERMOSTATS. COORDINATE LOCATION OF ALL THERMOSTATS WITH ARCHITECT.

VOLTAGE DROP REQUIREMENTS

NOTE: FEEDERS ARE SIZED TO MEET 3% MAXIMUM VOLTAGE DROP FROM THE SER TO THE LAST OCPD. CONTRACTOR MUST PROVIDE FEEDERS AS SIZED HERE AS A MINIMUM. IF CONTRACTOR FEEDER ROUTING INCREASES THEIR LENGTH, OR INCREASES VOLTAGE DROP FOR ANY OTHER REASON, CONTRACTOR SHALL INCREASE FEEDER SIZE AND/OR QUANTITY TO MEET 3% MAXIMUM FEEDER VOLTAGE DROP REQUIREMENTS. THE FEEDER VOLTAGE DROP IS THE SUM OF ALL FEEDER VOLTAGE DROPS FROM THE SERVICE POINT (SER) TO THE FINAL OVER-CURRENT PROTECTIVE DEVICE OF A CIRCUIT. MAXIMUM BRANCH CIRCUIT VOLTAGE DROP IS 2%. REFER TO ADDITIONAL BRANCH CIRCUIT VOLTAGE DROP REQUIREMENTS IF SHOWN IN DETAIL ON E-500 SERIES DRAWING. ANY CHANGE REQUESTS SHALL BE SUBMITTED TO ENGINEER FOR APPROVAL IN WRITING. CONTRACTOR SHALL MEASURE FEEDER LENGTHS AS FEEDERS ARE INSTALLED AND SUBMIT THIS DATA TO ENGINEER. INCLUDE TABLE OF FEEDER LENGTHS AND TABLE OF CALCULATED BRANCH CIRCUIT VOLTAGE DROPS (AS MAY BE REQUIRED PER E-500 SERIES DETAIL) IN CONTRACTOR'S AS-BUILT DRAWINGS.

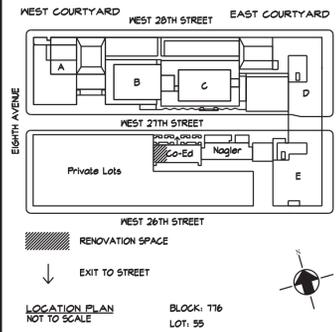
GENERAL NOTES

- ELECTRICAL CONTRACTOR IS RESPONSIBLE TO VISIT AND INSPECT SITE TO BECOME FAMILIAR WITH THE EXISTING CONDITIONS ASSOCIATED WITH, BUT NOT LIMITED TO THE FOLLOWING: CONTRACTOR'S INSPECTION SHALL BE CONDUCTED PRIOR TO FINAL BID, AND ANY ADDITIONAL WORK REQUIRED DUE TO FAILURE TO VISIT SITE OR INADEQUATE INSPECTION SHALL NOT BE CONSIDERED FOR COMPENSATION.
- ELECTRICAL CONTRACTOR SHALL VERIFY ELECTRICAL AND GROUNDING REQUIREMENTS OF ALL NEW AND EXISTING EQUIPMENT TO BE USED. ALL SPECIAL PURPOSE RECEPTACLES INDICATED ON PLAN SHALL BE VERIFIED WITH EQUIPMENT MANUFACTURER TO INSURE PROPER WIRING.
- CIRCUIT NUMBERS ARE FOR GUIDANCE ONLY. CONTRACTOR SHALL BE RESPONSIBLE TO BALANCE PHASES. REFER TO PANEL SCHEDULES FOR BRANCH CIRCUIT REQUIREMENTS.
- CIRCUIT WIRE SIZES OTHER THAN 2 #12-3/4" ARE INDICATED ON PLAN. REFER TO PANEL SCHEDULES FOR BRANCH CIRCUIT BREAKERS OTHER THAN 1 POLE, 20 AMP. ALL CIRCUITS AND FEEDERS SHALL HAVE A FULL SIZE INSULATED GREEN GROUND CONDUCTOR AND BE CONNECTED TO GROUND BUS IN RESPECTIVE PANEL. MINIMUM SIZE CONDUCTOR AND CONDUIT IS #12 THHN CU, 3/4" (EMT).
- THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING AND PROVIDING THE ACTUAL NUMBER OF CONDUCTORS REQUIRED FOR ALL BRANCH CIRCUIT WIRING TO SERVE THE INTENDED FUNCTION.
- ALL DEVICE PLATE FINISHES/COLORS SHALL BE AS INDICATED BY ARCHITECT. REFER TO ARCHITECT'S TELECOM AND ELECTRIC PLANS FOR ADDITIONAL ELECTRICAL INFORMATION.
- FOR EXACT LOCATION AND QUANTITY OF RECEPTACLES, TELEPHONE AND OTHER OUTLETS, REFER TO THE ARCHITECT'S DRAWINGS.
- MOUNT ALL WALL SWITCHES, DIMMERS, ETC., AT 40" A.F.F. TO CENTER LINE OF DEVICES, UNON. RECEPTACLES SHALL BE MOUNTED AT 15" A.F.F., UNON. REFER TO ARCHITECTURAL PLANS FOR EXACT LOCATION AND MOUNTING HEIGHT.
- THIS CONTRACTOR IS TO NOTIFY ENGINEER/ARCHITECT OF ANY CONTRADICTIONS FOUND ON THE DESIGN DOCUMENTS AND BASE THE BID ON THE MORE "STRINGENT & EXPENSIVE" CONDITIONS.
- ELECTRONIC AS-BUILT DRAWINGS, SHOWING CONDUIT RUNS AND CIRCUITING MUST BE GIVEN TO ARCHITECT, ENGINEER AND OWNER AT THE COMPLETION OF THE JOB.
- THE CONTRACTOR SHALL REMOVE AND/OR RELOCATE ALL EXISTING ELECTRICAL WORK WHICH INTERFERES WITH THE NEW ARCHITECTURAL AND ELECTRICAL LAYOUTS. ALL WORK WHICH IS NO LONGER REQUIRED TO FUNCTION SHALL BE DE-ENERGIZED AND DISCONNECTED AT THE SOURCE OF POWER SUPPLY.
- PANEL DIRECTORIES SHALL BE MODIFIED AND COMPLETELY FILLED IN AT COMPLETION OF JOB.
- ANY EXISTING WORK NOT STATED FOR REMOVAL AND DAMAGED AS A RESULT OF PERFORMING THE WORK OF THIS CONTRACT SHALL BE REPAIRED OR REPLACED AS REQUIRED. MATERIAL AND FINISH TO MATCH EXISTING TO THE SATISFACTION OF THE OWNER'S REPRESENTATIVE.
- CONNECT NEW WORK TO EXISTING WORK IN A NEAT AND ACCEPTABLE MANNER.
- DISPOSE OF REMOVED RACEWAYS, WIRE, PANELS, ETC., AS DIRECTED BY CM & OWNER.
- ALL ELECTRICAL WORK IN ADJOINING AREAS WHICH IS REQUIRED TO FUNCTION BUT IS AFFECTED BY THIS WORK SHALL BE RECONNECTED AND RESTORED TO ITS PRESENT FUNCTION AS PART OF THE ELECTRICAL SYSTEM OF THE BUILDING(S).
- ALL RACEWAYS WHICH BECOME EXPOSED BEYOND FINISHED SURFACES BECAUSE OF THE ALTERATION WORK SHALL BE REMOVED AND RE-ROUTED BEHIND THE FINISHED SURFACES.
- ANY FIRE SAFETY EQUIPMENT AND THIS ASSOCIATED CONDUIT AND WIRING SYSTEM SHALL NOT BE HARMED DURING DEMOLITION AND/OR CONSTRUCTION AND SHALL BE PROTECTED FROM ANY PHYSICAL DAMAGE.
- ALL NEW VOICE AND DATA WIRING IN CEILING PLENUM SHALL BE TEFLON-COATED OR RUN IN EMT CONDUIT. NEW WALL OUTLETS SHALL RECEIVE 3/4" EMPTY CONDUIT STUB-UP WITH DRAG WIRE AND JUNCTION BOX.
- EACH COMBINATION DATA/TELEPHONE AND DATA OUTLET SHALL UTILIZE 1" E.M.T. STUBBED UP TO HUNG CEILING FROM JUNCTION BOX.
- ALL NEW TELEPHONE, ELECTRIC AND DATA OUTLETS TO BE INSTALLED ON AN EXISTING WALL SHOULD BE FLUSH MOUNTED WITH THE FINISHED WALL SURFACE.
- CONTRACTOR SHALL COORDINATE ALL NEW TELEPHONE CONDUIT RUNS WITH TELECOM COMPANY REPRESENTATIVE BEFORE STARTING WORK.
- CONTRACTOR TO PROVIDE AN EMPTY CONDUIT SYSTEM AND OUTLET BOXES FOR INSTALLATION OF NEW SECURITY SYSTEM. VERIFY EXACT REQUIREMENTS WITH SECURITY VENDOR.
- ALL OPEN FLOOR OUTLETS, NOT USED, SHALL BE CAPPED.
- ALL HOLES IN SLABS OR WALLS SHALL BE FIRE STOPPED VIA LISTED FIRE-STOPPING ASSEMBLIES. SUBMIT TO ENGINEER FOR APPROVAL.
- PROVIDE A GROUND BUS IN NEW PANELS.
- CONTRACTOR TO DE-RATE CONDUCTORS IN ACCORDANCE WITH APPLICABLE ELECTRICAL CODES WHEN INSTALLING MORE THAN THREE (3) CIRCUITS IN A 3/4" HOMERUN AND OTHERWISE REQUIRED.
- REFER TO PROJECT 'BOOK' SPECIFICATIONS FOR ADDITIONAL, IMPORTANT REQUIREMENTS.

LIGHT FIXTURES AND CONTROLS

IN ADDITION TO THE WORK SHOWN IN THESE ELECTRICAL DRAWINGS, THE ELECTRICAL CONTRACTOR IS RESPONSIBLE TO PROVIDE, FURNISH AND INSTALL ALL WORK, LABOR, MATERIALS, FIXTURES, HARDWARE, CABLING AND OTHER COMPONENTS AS SHOWN ON THE ARCHITECTURAL LIGHTING DRAWINGS, INCLUDING ALL LIGHT FIXTURES. SEE ARCHITECTURAL LIGHTING DRAWINGS FOR THESE REQUIREMENTS AND WORK. ELECTRICAL CONTRACTOR IS ALSO RESPONSIBLE TO PROVIDE, FURNISH AND INSTALL ALL CONDUIT, RACEWAY, BACKBOXES AND ASSOCIATED LABOR, HARDWARE AND MATERIALS NECESSARY FOR THE INSTALLATION OF SAME, AND FOR THE INSTALLATION OF DIMMING & OTHER LIGHTING CONTROLS. REFER TO THE ELECTRICAL SPECIFICATIONS AND DRAWINGS OF OTHER TRADES FOR ADDITIONAL WORK, SUCH AS RELATED TO MECHANICAL, PLUMBING AND FIRE ALARM SYSTEMS, AND NOTES REGARDING SEPARATION OF TRADES.

REV. NO. DATE REVISIONS



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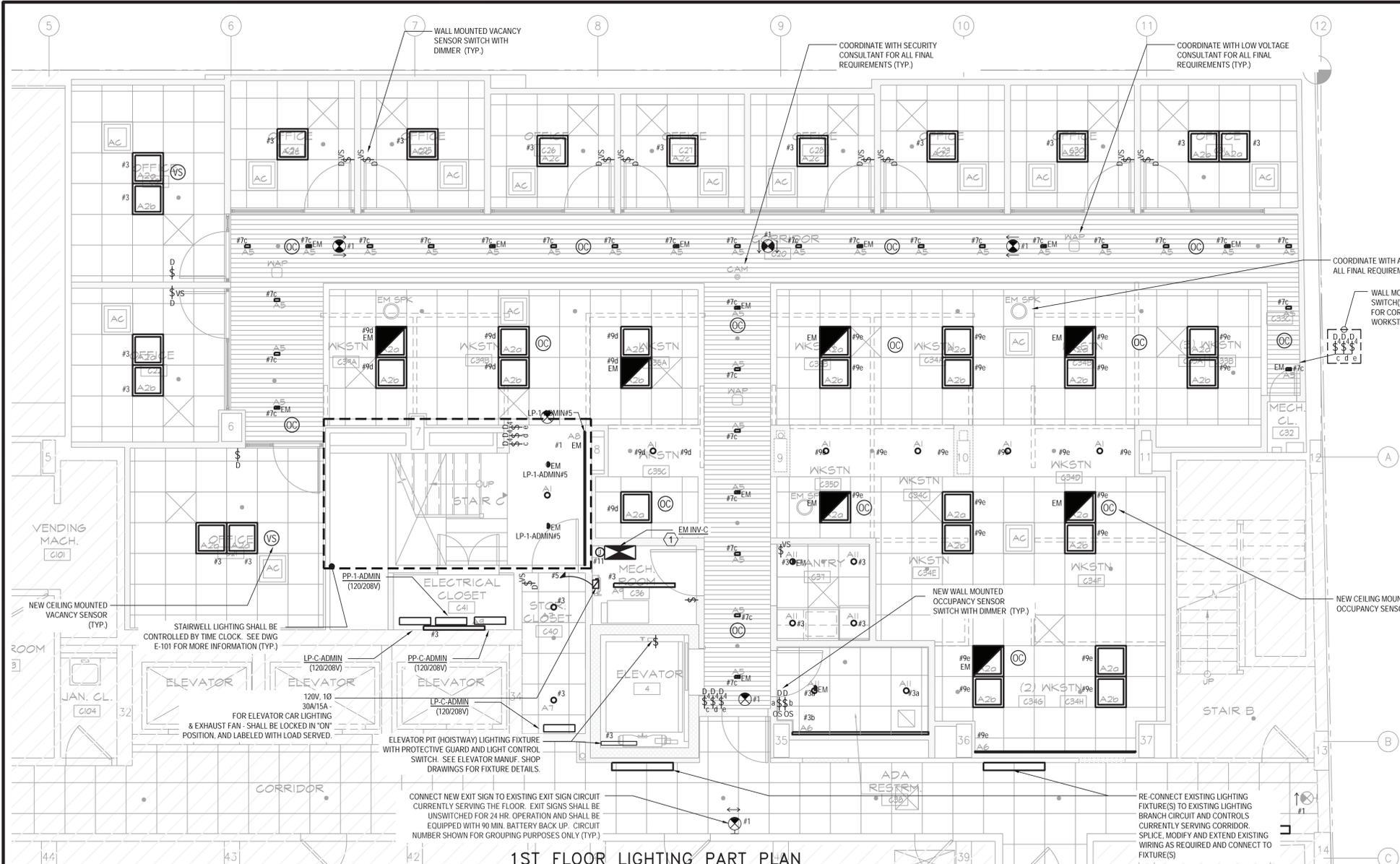
PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
NOTES AND
ENERGY FILING
INFORMATION

DOB NOE JOB#
 SEAL & SIGNATURE: DATE: 2022.09.01
 PROJECT No: 12284.154
 DRAWING BY: RMT
 CHK BY: KB
 DWG No:
E-002.00
 SCALE N.T.S. **02 OF 13**

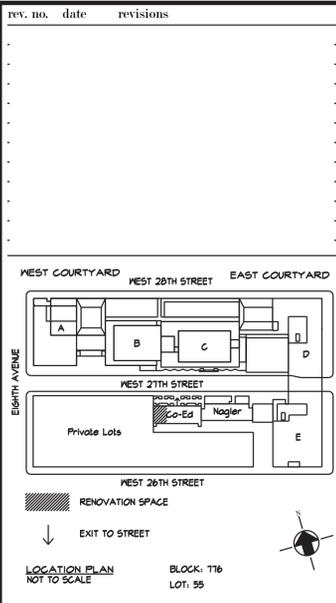
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 TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2020 NEW YORK CITY ENERGY CONSERVATION CODE.





1ST FLOOR LIGHTING PART PLAN
1/4" = 1'-0"

- LIGHTING NOTES:**
- SEE LIGHTING FIXTURE SCHEDULES AND DETAILS ON DRAWINGS E-001, E-002, EN-002 AND E-500 SERIES DRAWINGS.
 - FOR EXACT LOCATION AND MOUNTING HEIGHTS OF ALL LIGHTING FIXTURES, SWITCHES AND JUNCTION BOXES SEE ARCHITECTURAL, FURNITURE AND LIGHTING DRAWINGS.
 - FINAL CONNECTIONS TO ALL LIGHTING FIXTURES, LIGHTING TRANSFORMERS AND DRIVERS SHALL BE MADE WITH WIRING HAVING 90°C RATED INSULATION.
 - FOR LIGHTING FIXTURE SPECIFICATIONS REFER TO ARCHITECTURAL & LIGHTING CONSULTANT LIGHTING FIXTURE SCHEDULES, CUT-SHEETS.
 - FOR ADDITIONAL LIGHTING REQUIREMENTS SEE ARCHITECTURAL, LIGHTING, TECHNOLOGY, LIGHTING CONTROLS, AND EQUIPMENT MANUFACTURER'S DOCUMENTATION.
 - LIGHTING FIXTURES HAVE BEEN SPECIFIED BY THE ARCHITECT. LIGHTING FIXTURE CAN NOT BE SUBSTITUTED OR ALTERED WITHOUT COORDINATING WITH THE ARCHITECT.
 - ELECTRICAL CONTRACTOR TO RECONNECT/RE-CIRCUIT ANY BASE BUILDING LIGHTING DISCONNECTED DURING DEMOLITION OR IN AREAS OUTSIDE SCOPE OF WORK.
 - ELECTRICAL CONTRACTOR TO COORDINATE ALL LOW-VOLTAGE POWER SUPPLY AND SWITCHING REQUIREMENTS WITH ARCHITECT.
 - CONTRACTOR TO COORDINATE WITH LIGHTING MANUFACTURER FOR ALL REMOTE/LOCAL TRANSFORMER AND LOW VOLTAGE POWER SUPPLY REQUIREMENTS FOR ALL LED LAMP FIXTURES. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL 24V WIRING FROM DRIVER/ TRANSFORMER TO LED STRIP FIXTURES FOR PROPER CONTROL.
 - FOR CONTINUOUS RUNS LIGHTING FIXTURES, PROVIDE WITH SUPPORTS, JOINT, TAPABLE FLANGES AND END CONNECTOR ACCESSORIES. COORDINATE WITH LIGHTING MANUFACTURER AND ARCHITECT.
 - ALL LIGHTING FIXTURES INSTALLED OUTDOORS OR SUBJECT TO OUTDOOR EXPOSURE SHALL BE RATED FOR OUTDOOR USE (WEATHERPROOF TYPE).
 - MINIMUM FOOT-CANDLE ALONG EGRESS PATH SHALL BE 1.0 FOOT-CANDLE (FC). CONTRACTOR TO FIELD VERIFY DURING AND AFTER INSTALLATION AND PROVIDE ADDITIONAL EMERGENCY LIGHT FIXTURES AS REQUIRED TO MAINTAIN THESE REQUIREMENTS.
 - PROVIDE EMERGENCY LOAD SIDE TRANSFER ("SHUNT") RELAYS FOR ALL "EM" FIXTURES AS REQUIRED. PROVIDE A SEPARATE RELAY FOR RUNS THAT REQUIRE A SEPARATE CIRCUIT, SWITCH OR ZONE. COORDINATE LOCATIONS WITH ARCHITECT REFER TO DETAILS ON E-500 SERIES FOR ADDITIONAL INFORMATION.



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PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 27TH ST
NEW YORK NY 10001

DRAWING TITLE:
CELLAR
ELECTRICAL
LIGHTING PLAN

DOB NOW JOB#
SEAL & SIGNATURE: DATE: 2022.09.01
PROJECT No: 12284.154
DRAWING BY: RMT
CHK BY: KB
DWG No: E-100.00
SCALE: 1/4"=1' **03 OF 14**

LIGHTING CONTROL SUBMISSION NOTE:

- AS A PART OF THE WORK OF THIS CONTRACT, THE ELECTRICAL CONTRACTOR, IN CONSENT WITH THE SELECTED LIGHTING CONTROL VENDOR (LEVITON, OR APPROVED SIMILAR) SHALL PREPARE A DETAILED PLAN AND APPLICABLE DETAILS SHOWING ALL CONTROL DEVICES, SWITCHES, RELAY AND RELATED EQUIPMENT TO SATISFY THE LIGHTING CONTROL REQUIREMENTS OF THE PROJECT MATRIX SHOWN ON THE "COMCHECK" PLAN.
- THIS SHALL BE SUBMITTED AS A PROJECT SHOP DRAWING FOR REVIEW BY THIS ENGINEER.
- IN AREAS OF HUNG CEILINGS, THE LOW VOLTAGE CONTROL WIRING MAY BE RUN WITHOUT A RACEWAY, HOWEVER, PLENUM RATED CABLE IS REQUIRED FOR THIS APPLICATION.

DAYLIGHT HARVESTING NOTES(2020 NYECCC):

- PROVIDE ALL DAYLIGHT CONTROL FUNCTIONALITY AND INSTALLATION AS REQUIRED BY 2020 NYECCC.

ENERGY CODE NOTE:

- PROVIDE ALL LIGHTING CONTROL FUNCTIONALITY AND INSTALLATION AS REQUIRED BY 2020 NYECCC.

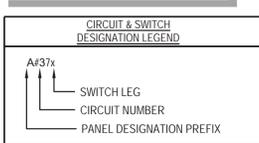
FOR LEGEND OF LIGHTING CONTROL DEVICES REFER TO LIGHTING CONTROL NARRATIVE ON DRAWING EN-002

- NOTES:**
- COORDINATE MEANS AND METHODS OF MOUNTING NEW ARCHITECTURAL LIGHTING FIXTURES WITH THE RECOMMENDED MANUFACTURER INSTALLATION INSTRUCTIONS. PROVIDE ALL SUPPORTS FOR CONDUITS, JUNCTION BOXES AND MOUNTING HARDWARE AS REQUIRED. COORDINATE EXACT LOCATION WITH ARCHITECT TO BE APPROVED BY LANDLORD PRIOR TO INSTALLATION. REFER TO ARCHITECTURAL DRAWINGS FOR ADDITIONAL INFORMATION.
 - EXACT ROUTING OF NEW CONDUITS IN CEILING OF FLOOR BELOW TO BE COORDINATED WITH BUILDING ENGINEERS.
 - ALL LIGHTING FIXTURES INSTALLED OUTDOORS OR SUBJECT TO OUTDOOR EXPOSURE SHALL BE RATED FOR OUTDOOR USE (WEATHERPROOF TYPE).
 - LOCATIONS AND SIZES OF ALL PENETRATIONS MUST BE APPROVED BY THE BUILDING AND STRUCTURAL ENGINEER PRIOR TO COMMENCEMENT OF WORK. COORDINATE ALL WORK WITH ARCHITECT AND BUILDING MANAGEMENT. INCLUDE ALL OVERTIME WORK IN BID PRICE.
 - ELECTRICAL CONTRACTOR TO CAREFULLY STUDY ALL NEW LIGHTING FIXTURES AND COORDINATE WITH LIGHTING MANUFACTURER/LIGHTING CONSULTANT/ARCHITECT FOR ANY TRANSFORMERS/DRIVERS (REMOTE/LOCAL) WITH ASSOCIATED CONTROL REQUIREMENTS AND INCLUDE IT IN BID CONTRACT.

NOTE:
LIGHTING FIXTURES HAVE BEEN SPECIFIED BY THE ARCHITECT. LIGHTING FIXTURE CAN NOT BE SUBSTITUTED OR ALTERED WITHOUT COORDINATING WITH THE ARCHITECT.

GENERAL NOTES:
ALL BRANCH CIRCUIT WIRING IN OPEN CEILING AREAS SHALL BE RUN IN EMT CONDUIT. CONDUITS SHALL BE RUN IN A NEAT MANNER, PARALLEL TO WALLS, BEAMS AND CABLE BASKET TRAY, TIGHT TO BEAMS AS MUCH AS POSSIBLE. COORDINATE ROUTING WITH DUCTWORK AND PIPING. THE ELECTRICAL CONTRACTOR SHALL SUBMIT A DIMENSIONED CONDUIT ROUTING LAYOUT AS A SHOP DRAWING TO ARCHITECT AND ENGINEER FOR APPROVAL PRIOR TO INSTALLING ANY CONDUIT. SHOP DRAWING TO INCLUDE ALL DUCTWORK, PIPING AND EXISTING CONDUITS. PAINTING OF OPEN CEILING CONDUITS SHALL BE COORDINATED WITH ARCHITECT AND GC.

CONNECT ALL 120V CIRCUITS TO PANEL "LP-C-ADMIN" U.O.N.



EMERGENCY FIXTURE INTENT LEGEND

"EM" DENOTES FIXTURE CONNECTED TO EMERGENCY INVERTER. FOR SWITCHED FIXTURES, PROVIDE EMERGENCY LIGHTING RELAY(S) - RELAYS SHALL BE COMPATIBLE WITH APPROVED LIGHTING CONTROL SYSTEM. COORDINATE WITH MANUFACTURER INSTALLATION INSTRUCTIONS.

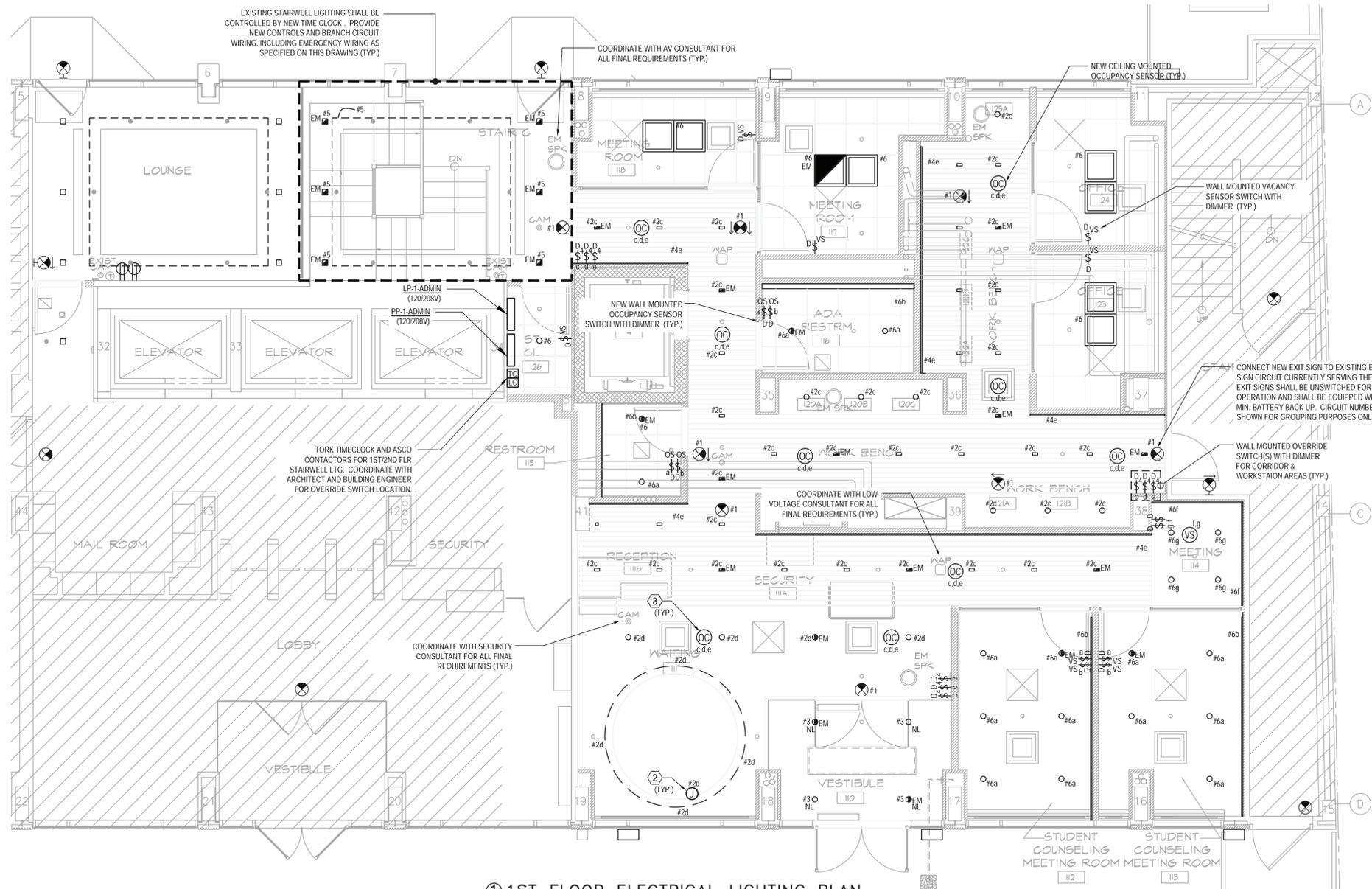
"NL" DENOTES NIGHT LIGHT - UNSWITCHED FOR 24 HR. OPERATION.

- LIGHTING KEY NOTES:**
- 24 25"W X 27.5"H X 10.5"D 1000 WATTS WALL MOUNTED INVERTER SYSTEM 120VOLT INPUT AND 120VOLT OUTPUT WITH 90 MIN. RUN TIME POWER FOR EMERGENCY WITH (4) NORMALLY ON OUTPUT CIRCUIT BREAKERS SIMILAR TO MYERS MODEL: EM-1-S-BA2008. SEE DETAIL ON E-500 SERIES. COORDINATE EXACT LOCATION WITH ARCHITECT AND BUILDING MANAGEMENT FOR MAINTENANCE IN FIELD. CONTRACTOR TO PROVIDE FACTORY START-UP OF LIGHTING INVERTER UNIT. INVERTER SHALL BE TESTED AND MAINTAINED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. CELLAR LIGHTING/INVERTER SHALL POWER BOTH CELLAR, AND 1ST FLOOR DESIGNATED EM FIXTURES.
 - THE ELECTRICAL CONTRACTOR SHALL PROVIDE LED STRIP REMOTE DRIVERS/ TRANSFORMERS AT ACCESSIBLE LOCATIONS TO BE COORDINATED WITH ARCHITECT. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL 24V WIRING FROM DRIVER/ TRANSFORMER TO LED STRIP FIXTURES FOR PROPER CONTROL. PROVIDE NEW WALL MTD. LIGHT SWITCH FOR PROPER CONTROL.
 - CEILING MOUNTED LIGHTING SENSOR AT 1ST FLOOR WAITING AREA SHALL BE PENDANT MOUNTED AT SAME ELEVATION AS LIGHT FIXTURES FOR THE AREA. PROVIDE ALL ASSOCIATED COMPONENTS REQUIRED FOR THE PENDANT MOUNTING THE SENSOR. COORDINATE LOCATION WITH ARCHITECT AND SENSOR MANUFACTURER FOR THE RECOMMENDED LOCATION PRIOR TO INSTALLATION.

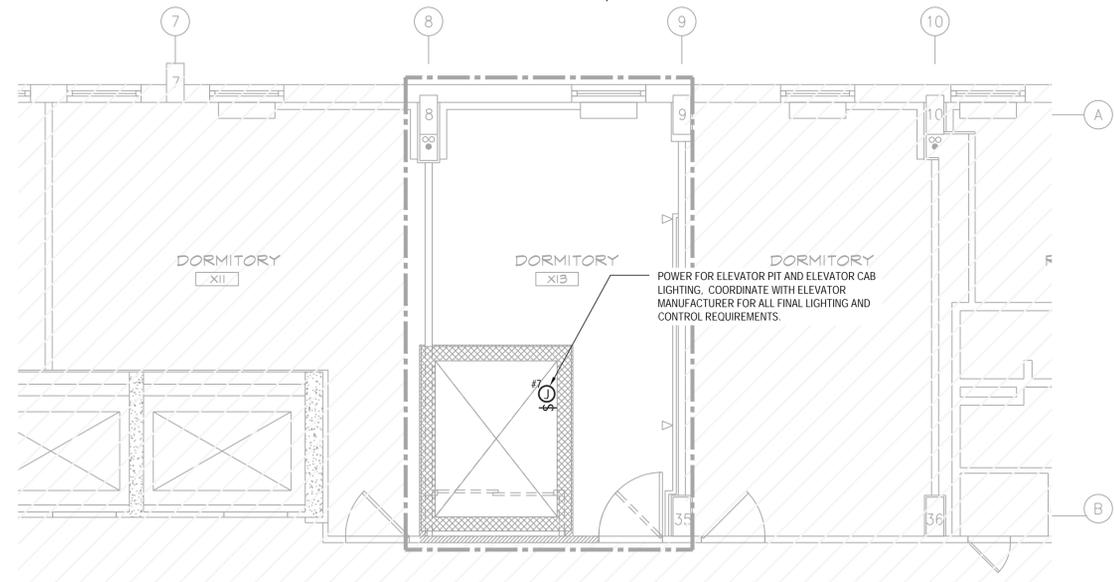
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TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2020 NEW YORK CITY ENERGY CONSERVATION CODE.



ISSUD FOR BID 09/01/2022



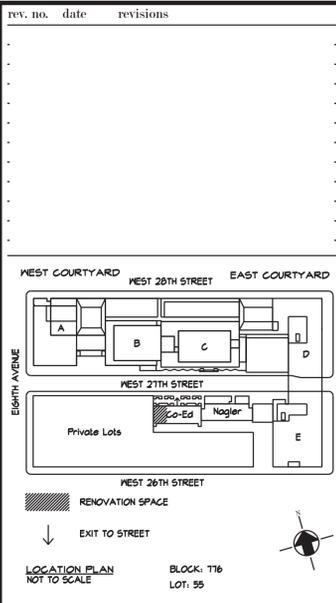
① 1ST FLOOR ELECTRICAL LIGHTING PLAN
1/4" = 1'-0"



② 2ND FLOOR ELECTRICAL LIGHTING PLAN
1/4" = 1'-0"

ISSUD FOR BID 09/01/2022

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PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 27TH ST
NEW YORK NY 10001

DRAWING TITLE:
1ST AND 2ND FLOORS
ELECTRICAL
LIGHTING PLAN

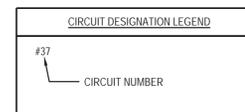
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SEAL & SIGNATURE:	DATE: 2022.09.01
	PROJECT No: 12284.154
	DRAWING BY: RMT
	CHK BY: KB
	DWG No:
	E-101.00
	SCALE: AS NOTED 04 OF 13



- POWER NOTES:**
- REFER TO SYMBOLS LIST ON DRAWING E-001. FOR BRANCH CIRCUIT DESIGNATIONS AND PANEL LOCATION(S), REFER TO THIS DRAWING.
 - REFER TO E-500 SERIES FOR ELECTRICAL DETAILS.
 - REFER TO E-701 FOR PANEL SCHEDULES.
 - REFER TO DRAWING E-901 AND ARCHITECTURAL DRAWINGS FOR POWER DEMOLITION SCOPE OF WORK AND MORE INFORMATION.
 - FOR EXACT LOCATION AND MOUNTING HEIGHT OF ALL POWER, TELECOM OUTLETS AND MECHANICAL EQUIPMENTS COORDINATE WITH ALL TRADES AND ARCHITECTURAL DRAWINGS.
 - ALL BRANCH CIRCUIT WIRING SHALL BE RUN CONCEALED IN WALLS AND ABOVE HUNG CEILING, UNLESS OTHERWISE NOTED.
 - No. 12 AWG (THHN) SHALL BE THE MINIMUM SIZE AND SHALL BE USED FOR ALL 15A & 20A BRANCH CIRCUIT WIRING, UNLESS OTHERWISE NOTED. CONTRACTOR SHALL ADJUST SIZE FOR VOLTAGE DROP AND OTHER DE-RATING FACTORS AS PER CODE REQUIREMENTS. USE NO. 10 AWG NEUTRAL WIRE FOR CONNECTION OF ALL SEPARATE CIRCUIT OUTLETS.
 - 3/4" CONDUIT SHALL BE THE MINIMUM TRADE SIZE OF CONDUIT.
 - CIRCUITS ARE DESIGNATED BY THE NUMBER SHOWN ADJACENT TO EACH RECEPTACLE, ETC. WIRING IS SHOWN ONLY FOR UNDER SPECIAL CIRCUMSTANCES. PROVIDE CONDUITS, WIRES, ARMORED CABLES AND BOXES REQUIRED TO ENERGIZE THE EQUIPMENT AS SHOWN. CIRCUIT NUMBERS ARE FOR CONTRACTORS REFERENCE ONLY AND MAY NOT NECESSARY TO REFLECT THE EXACT ARRANGEMENT IN EXISTING PANELS.
 - ALL COMMUNICATIONS, SECURITY WORKS ARE A SEPARATE CONTRACT, UON, EC TO PROVIDE ALL CONDUIT, RACEWAY, BACK-BOXES.
 - FOR ADDITIONAL NOTES REFER TO ARCHITECTURAL DRAWINGS.
 - CONDUIT RUNS THAT ARE SHOWN ARE DIAGRAMMATICAL AND SHOW POTENTIAL ROUTING OF CONDUITS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE RUNS WITH ALL TRADES.
 - ALL CIRCUITS TO COMPUTERS, LASER JET PRINTERS, COPIERS, FAX MACHINES AND ANY OTHER LOADS OF NON-LINEAR NATURE SHALL HAVE A SEPARATE GROUND AND SEPARATE NEUTRAL WIRES. STANDARD SHARED NEUTRAL HOMERUNS ARE NOT PERMITTED. ELECTRICAL CONTRACTOR TO COORDINATE WITH CLIENT AND ARCHITECT THE EXACT LOCATION OF ALL 208 VOLT COPIERS, SHREDDERS, ETC. ENGINEERS DRAWING INDICATE THE ADDITIONAL NEUTRAL IN THE EVENT EQUIPMENT LOCATIONS ON DOCUMENTS REQUIRE A 120 VOLT SOURCE. CONFIRM THE PRECEDING PRIOR TO RUNNING CIRCUITS.
 - EXACT LOCATION OF ALL FLOOR MOUNTED BOXES AND OUTLETS TO BE COORDINATED WITH ARCHITECT. COORDINATE WITH BASE BUILDING AND ARCHITECT FOR THE METHOD OF INSTALLATION AND EXACT CONDUITS' ROUTING. PRIOR TO THE COMMENCEMENT OF WORK, ALL TRENCHING, CORE-DRILLS AND OTHER PENETRATIONS EXISTING SLAB MUST BE APPROVED BY THE BUILDING AND STRUCTURAL ENGINEER. PERFORM AN X-RAY SCAN AT EACH LOCATION TO LOCATE REBAR SIZES AND LOCATIONS. ALL FIELD WORK OF CORE DRILLING OR TRENCHING FLOOR SLAB MUST BE DONE ON OVERTIME, WITH THE FLOOR BELOW BEING RESTORED TO IT'S ORIGINAL CONDITION.
 - ALL PENETRATIONS AND OPENINGS THROUGH SLAB OR FIRE RATED PARTITIONS MUST BE FIRE STOPPED USING APPROVED FIRESTOPPING MATERIALS FOR THE OCCUPANCY CLASSIFICATION IN EACH AREA.
 - CONTRACTOR SHALL MODIFY DISTRIBUTION BOARD TO PROVIDE REQUIRED DISTRIBUTION. REFER TO PARTIAL POWER SINGLE LINE DIAGRAM ON E-601.00.

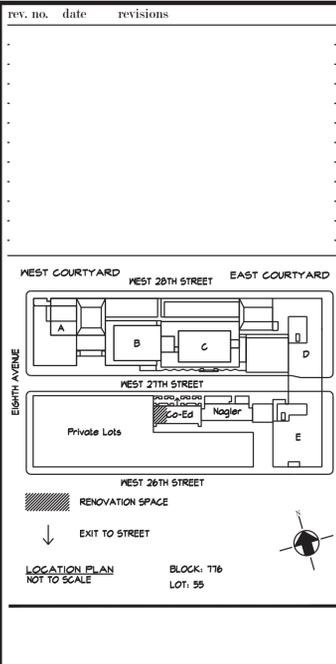
CONNECT ALL 120V CIRCUITS TO PANEL "LP-C-ADMIN" U.O.N.



AV, SECURITY, TELECOM NOTES:
CONTRACTOR MUST REVIEW AV, SECURITY, AND TELECOM DRAWINGS FOR ALL CONDUIT SIZES AND CONDUIT QUANTITY NEEDED FOR SAID SYSTEMS. GENERAL CONTRACTOR MUST FURNISH AND INSTALL ALL CONDUIT REQUIRED FOR SAID SYSTEMS AS INDICATED ON THE AV, SECURITY, AND TELECOM DRAWINGS.

NOTE:
REFER TO E-002.00 FOR POWER NOTES. ALL WORK SHOWN IS NEW UNLESS OTHERWISE NOTED.
ALL PENETRATIONS AND OPENINGS THROUGH SLAB OR FIRE RATED PARTITIONS MUST BE FIRE STOPPED USING APPROVED FIRESTOPPING MATERIALS FOR THE OCCUPANCY CLASSIFICATION IN EACH AREA

GENERAL NOTES:
ALL BRANCH CIRCUIT WIRING IN OPEN CEILING AREAS SHALL BE RUN IN EMT CONDUIT. CONDUITS SHALL BE RUN IN A NEAT MANNER, PARALLEL TO WALLS, BEAMS AND CABLE BASKET TRAY, TIGHT TO BEAMS AS MUCH AS POSSIBLE. COORDINATE ROUTING WITH DUCTWORK AND PIPING. THE ELECTRICAL CONTRACTOR SHALL SUBMIT A DIMENSIONED CONDUIT ROUTING LAYOUT AS A SHOP DRAWING TO ARCHITECT AND ENGINEER FOR APPROVAL PRIOR TO INSTALLING ANY CONDUIT. SHOP DRAWING TO INCLUDE ALL DUCTWORK, PIPING AND EXISTING CONDUITS. PAINTING OF OPEN CEILING CONDUITS SHALL BE COORDINATED WITH ARCHITECT AND GC.



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PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 21TH ST
NEW YORK NY 10001

DRAWING TITLE:
CELLAR
ELECTRICAL
POWER PLAN

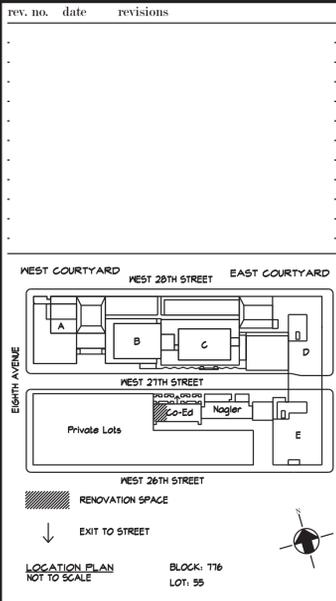
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SEAL & SIGNATURE: _____ DATE: 2022.09.01
PROJECT No: 12284.154
DRAWING BY: RMT
CHK BY: KB
DWG No: _____
E-200.00
SCALE: 1/4"=1' 05 OF 13

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CELLAR FLOOR POWER PART PLAN
1/4" = 1'-0"

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PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
1ST & 2ND FLOOR
ELECTRICAL
POWER PART PLANS

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SEAL & SIGNATURE: _____ DATE: 2022.09.01

PROJECT No: 12284.154

DRAWING BY: RMT

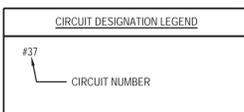
CHK BY: KB

DWG No: _____

E-201.00

SCALE: 1/4" = 1' 06 OF 13

CONNECT ALL 120V CIRCUITS TO PANEL "LP-1-ADMIN" U.O.N.

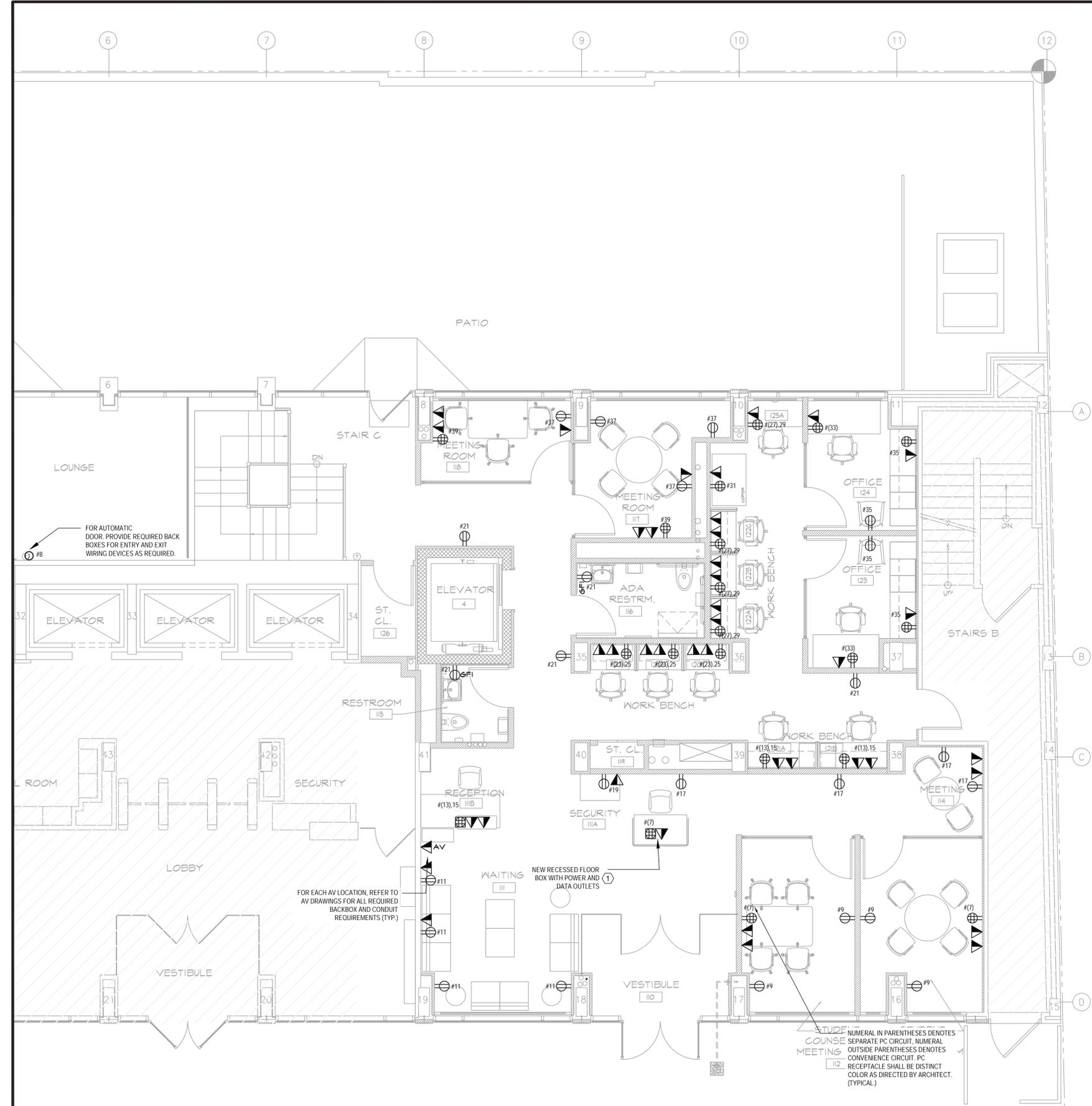


POWER NOTES:

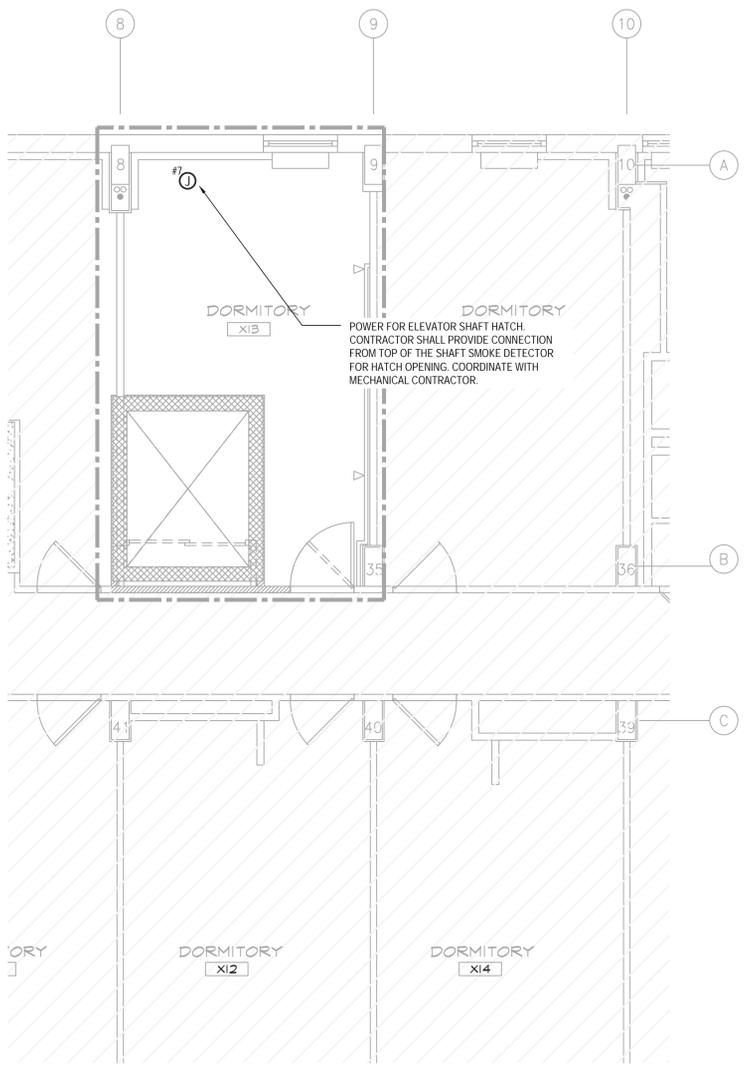
1. SEE POWER NOTES ON DRAWINGS E-002 AND E-200.

POWER KEY NOTES:

① RECESSED FLOOR MOUNTED FIRE RATED POKE-THRU FOR POWER & VOICE/DATA OUTLETS. SIMILAR TO WIREMOLD ARCA OR APPROVED EQUAL. (REQUIRED 4" FLOOR CORE) WITH ALUMINUM COVER PLATE. PROVIDE THE FOLLOWING:
 [1] 3/4" FOR POWER
 [1] 1-1/4" FOR VOICE/DATA
 RUN CONDUITS IN CEILING OF FLOOR BELOW AND TERMINATE IN NEW FLUSH FLOOR POKE-THRU DEVICE. SEE DETAIL ON E-500 SERIES (TYPICAL)



① 1ST FLOOR POWER PART PLAN
 1/4" = 1'-0"

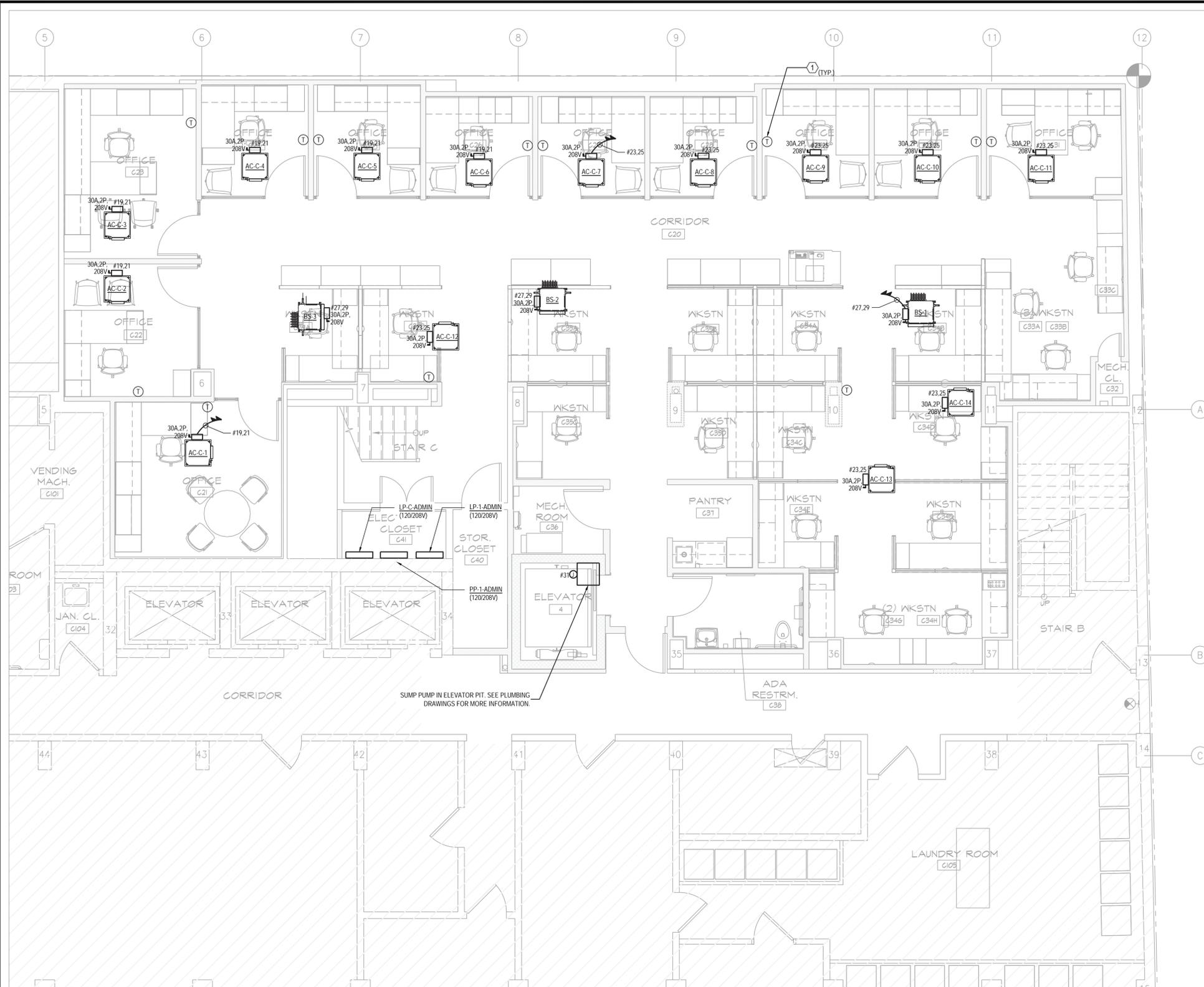


② 2ND FLOOR POWER PART PLAN
 1/4" = 1'-0"

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MECHANICAL POWER NOTES:

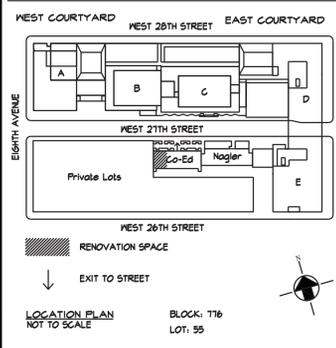
- REFER TO SYMBOLS AND GENERAL NOTES ON DRAWING E-001 FOR BRANCH CIRCUIT DESIGNATIONS AND PANEL LOCATIONS OR POWER RISER DIAGRAM SEE DRAWING E-000 FOR PANEL SCHEDULES. SEE DRAWING E-000 FOR DETAILS. SEE E-500 SERIES DRAWINGS REFER TO DRAWING E-201 AND THIS DRAWING.
- REFER TO E-500 SERIES FOR ELECTRICAL DETAILS.
- REFER TO E-301 FOR PANEL SCHEDULES.
- THE INTENTION OF THIS DRAWING IS TO SHOW THE LAYOUT OF MECHANICAL EQUIPMENT AND RESPECTIVE ELECTRICAL CONNECTIONS WITH ASSOCIATED SERVICES. FOR EXACT LOCATIONS AND MOUNTING HEIGHTS OF ALL MECHANICAL EQUIPMENT AND RESPECTIVE CONTROLS REFER TO MECHANICAL DRAWINGS. USE THIS DRAWING FOR CIRCUITING PURPOSES ONLY.
- PANEL VCP-CASSETTE UNITS AS HEAVY. CIRCUITS ARE DESIGNATED BY THE NUMBER SHOWN ADJACENT TO EACH MECHANICAL EQUIPMENT. WIRING IS SHOWN ONLY UNDER SPECIAL CIRCUMSTANCES. PROVIDE ALL CONDUITS, WIRES AND BOXES REQUIRED TO EMERGE THE EQUIPMENT AS SHOWN.
- CIRCUIT NUMBERS ARE FOR REFERENCE ONLY. CONTRACTOR SHALL PROVIDE PHASE BALANCING FOR TOTAL PANEL LOADS.
- ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR WIRING OF ALL CONTROL DEVICES AS PER POINT TO POINT WIRING DIAGRAMS OBTAINED FROM THE MECHANICAL CONTRACTOR. OBTAIN APPROXIMATE NUMBER OF CONTROL POINTS FROM THE MECHANICAL CONTRACTOR AND INCLUDE PRICE FOR SAME IN THE BID PRICE.
- ELECTRICAL CONTRACTOR SHALL SUBMIT FOR ENGINEER'S APPROVAL THE SHOP DRAWINGS, INDICATING ALL SOURCE OF OPERATION SCHEMATICS AS PER HVAC SPECIFICATIONS.
- PROVIDE MANUAL MOTOR STARTER SWITCH WITH INTEGRAL THERMAL OVERLOAD PROTECTION AT EACH FAN SQUARE FT CLASS 2516 TYPE FC-1 THERMAL OVERLOAD SWITCH MUST BE RATED TO ACCOMMODATE APPLICABLE MOTOR.
- PROVIDE BACK BOXES AND EMPTY CONDUIT STUBUPS WITH DRAGPIPE FOR THERMOSTATS ONLY. COORDINATE QUANTITIES WITH MECHANICAL DRAWINGS AND LOCATIONS WITH ARCHITECTURAL DRAWINGS.
- SUPPLEMENTAL AIR CONDITIONING EQUIPMENT AND EXHAUST FANS ARE INSTALLED ABOVE THE HANG CEILING BY OTHERS. PROVIDE DISCONNECT SWITCHES AND MAKE CONNECTIONS AS SHOWN.
- CONTRACTOR SHALL UTILIZE THE DISTRIBUTION BOARD PREVIOUSLY EMERGING REPLACED EXHAUST FANS. PROVIDE NEW BRANCH CIRCUIT WIRING AS INDICATED. REFER TO E-001 FOR ADDITIONAL INFORMATION.
- COORDINATE ALL WORK CONNECTIONS AND LOCATIONS OF ALL EQUIPMENTS AND DEVICES WITH PLUMBING AND HVAC CONTRACTOR PRIOR TO ANY INSTALLATION.
- UNLESS OTHERWISE NOTED, ALL NEW BRANCH CIRCUITS SHALL BE CONNECTED TO PANELS AS INDICATED.
- MECHANICAL CONTRACTOR SHALL PROVIDE ALL HVAC CONTROL WIRING ALONG WITH BACKBOXES AND STUBUPS FOR ALL THERMOSTATS.
- EXHAUST FANS, VAV BOXES, SUPPLEMENTAL AIR CONDITIONING EQUIPMENT ARE INSTALLED ABOVE THE HANG CEILING BY OTHERS. PROVIDE DISCONNECT SWITCHES AND MAKE CONNECTIONS AS SHOWN.
- UNLESS OTHERWISE NOTED, PROVIDE #10 (1) FWD. IN 3/4" FOR MECHANICAL EQUIPMENT POWER CONNECTION TO PANELS AS INDICATED.
- AREAS THAT ARE HATCHED ARE CONSIDERED NOT IN CONTRACT. SCOPE OF WORK IS AREA THAT IS NOT HATCHED.
- ALL MECHANICAL POWER LOADS SHALL BE CONNECTED TO HVAC CIRCUIT BREAKERS.
- FOR ALL EXISTING ACTIVE LOADS, TRACE OUT AND IDENTIFY LOADS, OCPD AND CABLE RATINGS. FOR THESE EXISTING LOADS CONTRACTOR SHALL MAINTAIN TO THE EXISTING ELECTRICAL CONNECTIONS. FOR EXISTING LOADS CONNECTED TO THEIR ELECTRICAL DISTRIBUTION, CONTRACTOR SHALL BE CONNECTED TO THE NEW ELECTRICAL DISTRIBUTION. CONTRACTOR SHALL COORDINATE WITH MECHANICAL PLUMBING/SPRINKLER CONTRACTORS. PROVIDE CONDUIT, CABLE AND COPES AS REQUIRED.
- PROVIDE ALL REQUIRED POWER REQUIREMENTS FOR HEAT TRACE ON ALL CHILLED WATER AND LOW PRESSURE CONDENSATE RE TURB PIPING. FURNISH AND INSTALL POWER CIRCUITRY & JUNCTION BOXES FOR HEAT TRACING SYSTEM PER PIPING AS REQUIRED. COORDINATE WITH MECHANICAL CONTRACTORS FOR QTY, SIZES, LOCATION AND EXACT REQUIREMENTS. PROVIDE ADDITIONAL POWER AS REQUIRED, BASED ON PER MANUFACTURER INSTRUCTIONS. PROTECT BY GFCI AS PER CODE REQUIREMENTS. REFER TO HEAT TRACE DETAIL ON E-500 SERIES DRAWING.

NOTE TO E-600 FOR GENERAL MECH. POWER NOTES.
 ALL PENETRATIONS AND OPENINGS THROUGH SLAB OR FIRE RATED PARTITIONS MUST BE FIRE STOPPED USING APPROVED FIRE STOPPING MATERIALS FOR THE OCCUPANCY CLASSIFICATION IN EACH AREA.

GENERAL NOTES:
 ALL BRANCH CIRCUIT WIRING IN OPEN CEILING AREAS SHALL BE RUN IN RIGID CONDUIT. CONDUITS SHALL BE RUN IN A NEAT MANNER, PARALLEL TO WALLS, BEAMS AND CABLE TRAYS. TEST TO BEAMS AS BACKUP POSSIBLE. COORDINATE RESULTING WITH ELECTRICAL AND PIPING. THE ELECTRICAL CONTRACTOR SHALL SUBMIT A DIMENSIONED CONDUIT ROUTING LAYOUT AS A SHOP DRAWING TO ARCHITECT AND ENGINEER FOR APPROVAL PRIOR TO INSTALLING ANY CONDUIT. SHOP DRAWINGS TO INCLUDE ALL ELECTRICAL PIPING AND EXISTING CONDUITS.

MECH. POWER KEY NOTES:
 PROVIDE BACK BOXES AND EMPTY CONDUIT STUBUPS WITH DRAGPIPE FOR THERMOSTATS ONLY. COORDINATE QUANTITIES WITH MECHANICAL DRAWINGS AND LOCATIONS WITH ARCHITECTURAL DRAWINGS.

REV. NO. DATE REVISIONS



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PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
ELECTRICAL
CELLAR
MECHANICAL POWER PLAN

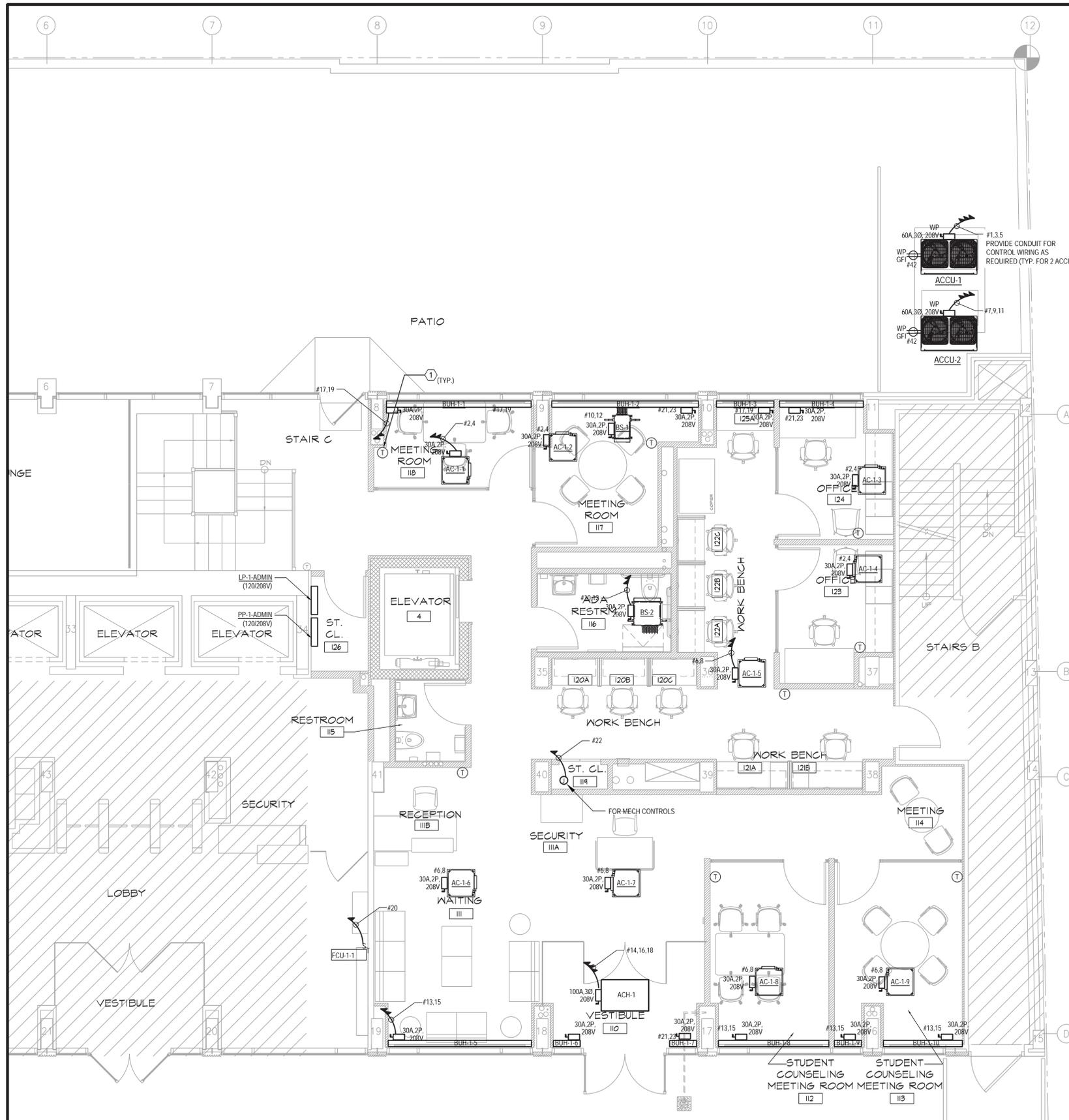
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 CHK BY: KB
 DWG No:
 E-300.00
 SCALE: 1/4"=1' **07 OF 13**

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PROGRESS 5/31/2022

DOB STAMPS



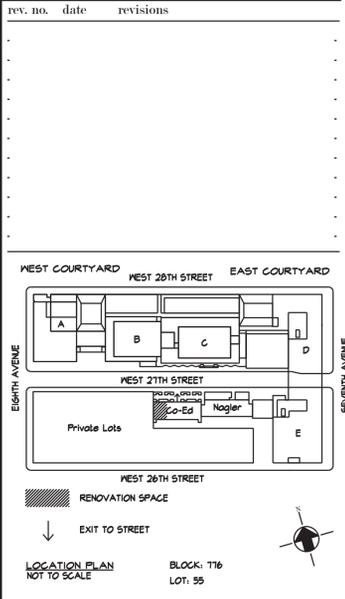
MECHANICAL POWER NOTES:

1. SEE MECHANICAL POWER NOTES ON DRAWINGS E-002 AND E-300. REFER TO DRAWING E-300 FOR KEY NOTES.

CONNECT ALL 120V CIRCUITS TO PANEL "PP-1-ADMIN" U.O.N.

CIRCUIT DESIGNATION LEGEND

#37
CIRCUIT NUMBER



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PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 27TH ST
NEW YORK NY 10001

DRAWING TITLE:
ELECTRICAL
1st FLOOR
MECHANICAL POWER PLAN

DOB NCE JOB#

SEAL & SIGNATURE: _____ DATE: 2022.09.01
 PROJECT No: 12284.154
 DRAWING BY: RMT
 CHK BY: KB
 DWG No: _____
E-301.00
 SCALE: 1/4"=1' **08 OF 13**

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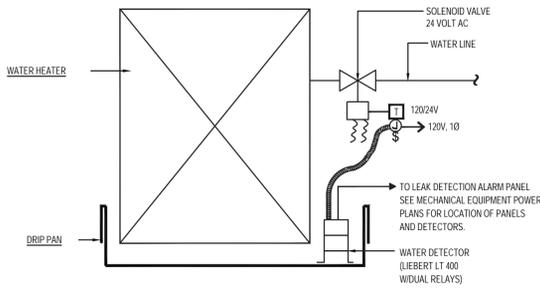


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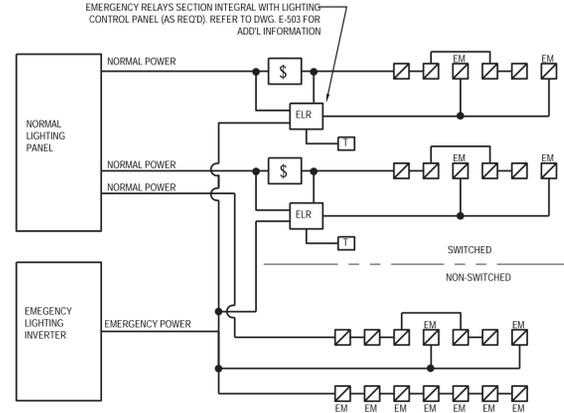
- NOTES:**
1. PROVIDE GENERIC ARC-FLASH LABELS AS SHOWN ON ALL ELECTRIC LOAD CENTERS, PANELBOARDS, SWITCHBOARDS, SWITCHGEAR, MOTOR CONTROLLERS, VFDs, ATS, ENCLOSED SWITCHES AND CIRCUIT BREAKERS, CONTROL PANELS, SPICE BOXES AND ALL OTHER ELECTRICAL SERVICE & DISTRIBUTION EQUIPMENT.
 2. LABELS TO COMPLY WITH NFPA 70E, NFPA 70E, 29 CFR 1910.144, 29 CFR 1910.145 (OSHA) AND ANSI Z355 (COLORS, SYMBOLS, ETC.)
 3. LABELS SHALL BE SELF-ADHESIVE, POLYESTER OR VINYL FILM LABELS, PREPRINTED, 6-MIL THICK, FLEXIBLE LABEL LAMINATED WITH A CLEAR, WEATHERPROOF, UV-RESISTANT, CHEMICAL RESISTANT COATING. MINIMUM LETTER HEIGHT SHALL BE 3/8 INCH.
 4. INSTALL IDENTIFICATION MATERIALS AND DEVICES AT LOCATIONS FOR MOST CONVENIENT VIEWING WITHOUT INTERFERENCE WITH OPERATION AND MAINTENANCE OF EQUIPMENT. APPLY TO EXTERIOR OF DOOR, COVER, OR OTHER ACCESS.

1 ARC FLASH LABEL
Not to Scale



- NOTES:**
1. WATER DETECTOR SHALL CLOSE SOLENOID VALVE AND ALARM AT LEAK DETECTION PANEL.
 2. SOLENOID VALVE AND WATER DETECTORS SHALL BE FURNISHED BY OTHERS. ELECTRICAL CONTRACTOR SHALL INSTALL AND WIRE AS REQUIRED. PROVIDE ALL RELAYS AS REQUIRED FOR PROPER CONNECTION AND OPERATION.

2 TYPICAL WATER HEATER LEAK DETECTION WIRING SCHEMATIC
Not to Scale

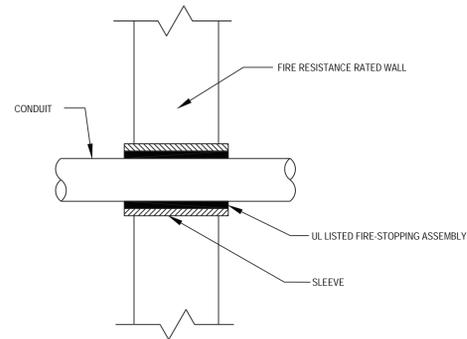


SYMBOL LIST

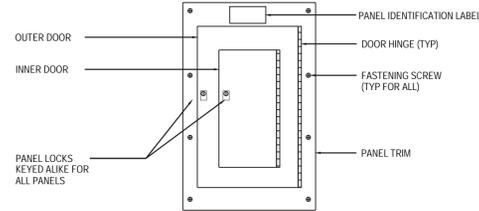
\$	SWITCHES INCLUDES WALL SWITCHES, OCCUPANCY/VACANCY SENSOR, TIME CLOCK, ETC.
ELR	EMERGENCY LIGHTING RELAY/WATTSTOPPER ELCU 200 OR EQUIVALENT.
EM	EMERGENCY LIGHTING RELAY/WATTSTOPPER ELCU 200 OR EQUIVALENT.
EM	REMOTE TEST BUTTON

- NOTES:**
1. THIS SCHEMATIC DIAGRAM IS FOR ILLUSTRATION ONLY. CONTRACTOR SHOULD OBTAIN POINT TO POINT WIRING DIAGRAM FROM MANUFACTURER FOR PROPER INSTALLATION.
 2. IN THE EVENT OF POWER FAILURE, RELAY SHALL TRANSFER POWER TO EMERGENCY CIRCUIT CONNECTED TO THE LUTRON ENERGY SAVER NODE MODULE, BY PASSING OCCUPANCY SENSOR CONNECTION FOR FULL LIGHT FIXTURE OUTPUT.
 3. FOR SWITCHED EMERGENCY LIGHTING FIXTURES DENOTED BY "EM", ELECTRICAL CONTRACTOR SHALL PROVIDE AN ADDITIONAL UNSWITCHED WIRE FROM SAME CIRCUIT SERVING FIXTURE AND CONNECT IT TO LINE SIDE OF EMERGENCY BALLAST.
 4. COMPONENTS SHOWN ARE FOR REFERENCE ONLY. ACTUAL COMPONENTS USED MAY VARY. CONNECT TO OSN DIGITAL LOOP CURRENTLY SERVING THE AREA VIA LUTRON OSN ENERGY SAVER NODE (ESN).

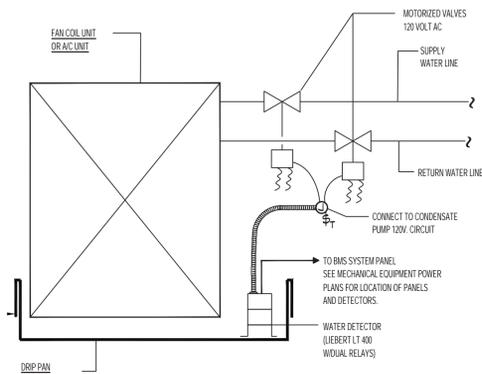
3 EMERGENCY LIGHTING FIXTURE SCHEMATIC WIRING DIAGRAM
Not to Scale



4 CONDUIT PENETRATION THRU FIRE RATED WALL
Not to Scale

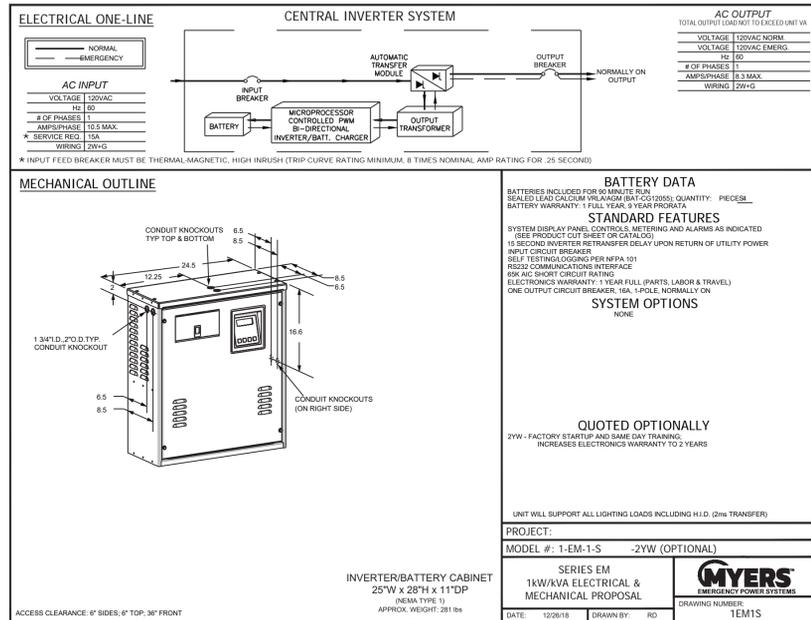


5 PANELBOARD WITH DOOR-IN-DOOR TRIM TYPE
Not to Scale

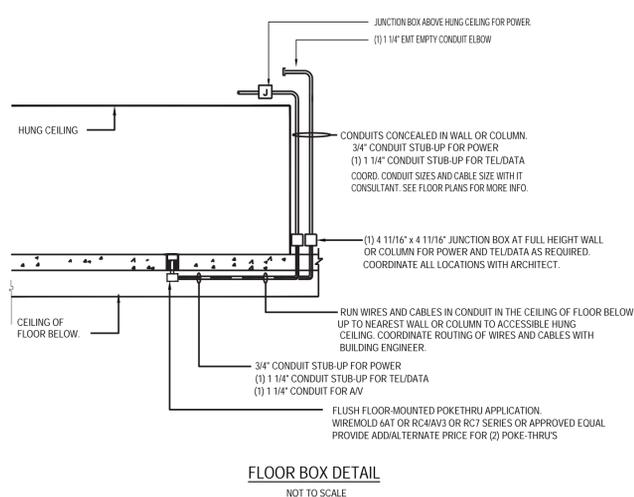


- NOTES:**
1. WATER DETECTOR SHALL CLOSE MOTORIZED VALVE AND ALARM AT BMS PANEL.
 2. MOTORIZED VALVE AND WATER DETECTORS SHALL BE FURNISHED BY OTHERS. ELECTRICAL CONTRACTOR SHALL INSTALL AND WIRE AS REQUIRED.

6 TYPICAL AC-UNIT LEAK DETECTION WIRING SCHEMATIC
Not to Scale

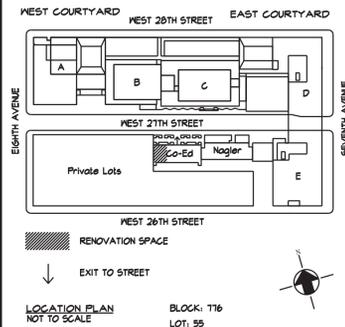


7 LIGHTING INVERTER DETAIL
Not to Scale



8 FLOOR BOX DETAIL
Not to Scale

NEW YORK CITY ENERGY CONSERVATION CODE
TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2020 NEW YORK CITY ENERGY CONSERVATION CODE.



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DRAWING TITLE:
ELECTRICAL
DETAILS

DOB NOE JOB#
SEAL & SIGNATURE: DATE: 2022.09.01
PROJECT No: 12284.154
DRAWING BY: RMT
CHK BY: KB
DWG No:
E-501.00
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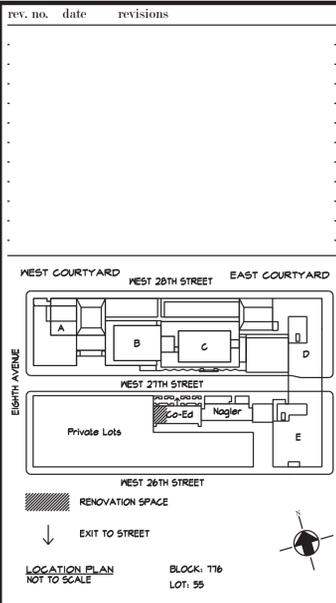
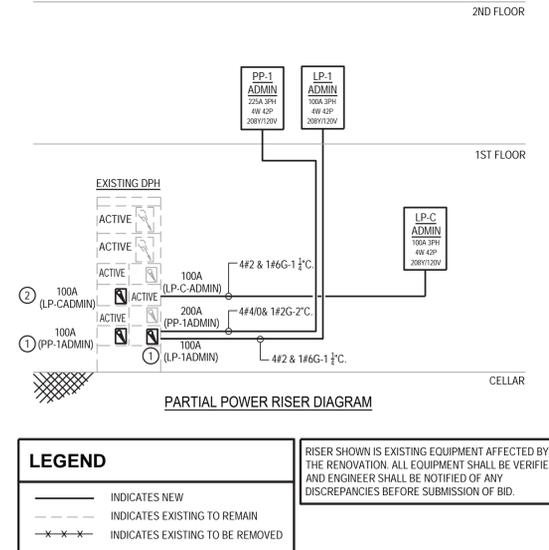
PANEL DESIGNATION:		LOCATION: CELLAR MACHINE ROOM					REMARKS:				
LP-C-ADMIN (NEW)		SERVICE: 208Y/120 V		3 PHASE, 4 WIRE			NEUTRAL BUS: 100%		EQUIPMENT GROUND BUS: YES ISOLATED GROUND BUS: NO		
		MAIN BUS RATING: 100 AMPS									
		MAIN CIRCUIT BREAKER: 100 AMPS									
		SCC RATING (SYM): 10 k A.I.C.									
		MOUNTING: SURFACE MOUNTED					GROUNDING:				
SERVICE TO:	TRIP	NO.	A	B	C	NO.	TRIP	SERVICE TO:			
CELLAR EXIT SIGNS	20A	1	740			2	20A	PC RECEPTACLE			
CELLAR LIGHTING	20A	3		1220		4	20A	RECEPTACLE			
ELEVATOR CAR LIGHTING	20A	5			1040	6	20A	PC RECEPTACLE			
CELLAR LIGHTING	20A	7	783			8	20A	RECEPTACLE			
CELLAR LIGHTING	20A	9		1176		10	20A	PC RECEPTACLE			
EM LIGHTING INVERTER	20A	11			1720	12	20A	RECEPTACLE			
ELEVATOR MOTOR (10HP) 4#8+1#10G - 3/4"C	3P/50A	13	3105			14	20A	PC RECEPTACLE			
		15		3285		16	20A	RECEPTACLE			
		17			3105	18	20A	PC RECEPTACLE			
AC-C-1, 2, 3, 4, 5, 6 2#10+1#10G - 3/4"C	2P/20A	19	1344			20	20A	RECEPTACLE			
		21		1164		22	20A	PC RECEPTACLE			
AC-C-7, 8, 9, 10, 11, 12, 13 2#10+1#10G - 3/4"C	2P/20A	23			1344	24	20A	RECEPTACLE			
		25	1344			26	20A	RECEPTACLE			
BS-1, 2, 3 2#10+1#10G - 3/4"C	2P/20A	27		1624		28	20A	PANTRY DEDICATED RECEPTACLE			
		29			1624	30	20A	PANTRY DEDICATED RECEPTACLE			
ELEVATOR PIT SUMP PUMP	20A	31	1164			32	20A	PC RECEPTACLE			
PC RECEPTACLE	20A	33		1260		34	20A	RECEPTACLE			
RECEPTACLE	20A	35			1620	36	20A	PC RECEPTACLE			
PC RECEPTACLE	20A	37	1740			38	20A	PANTRY DEDICATED RECEPTACLE			
RECEPTACLE	20A	39		1920		40	20A	PRINTER			
SPARE	20A	41			0	42	20A	SPARE			
TOTAL CONNECTED LOAD PER PHASE (KVA)			10.22	11.65	10.45						
TOTAL CONNECTED LOAD			32.32 KVA			89.7 A					
MINIMUM FEEDER SIZE PER ARTICLE 220			30.09 KVA			83.5 A					

PANEL DESIGNATION:		LOCATION: 1ST FLOOR STORAGE CLOSET					REMARKS:				
LP-1-ADMIN (NEW)		SERVICE: 208Y/120 V		3 PHASE, 4 WIRE			NEUTRAL BUS: 100%		EQUIPMENT GROUND BUS: YES ISOLATED GROUND BUS: NO		
		MAIN BUS RATING: 100 AMPS									
		MAIN CIRCUIT BREAKER: 100 AMPS									
		SCC RATING (SYM): 10 k A.I.C.									
		MOUNTING: SURFACE MOUNTED					GROUNDING:				
SERVICE TO:	TRIP	NO.	A	B	C	NO.	TRIP	SERVICE TO:			
1ST FLOOR EXIT SIGNS	20A	1	1700			2	20A	1ST FLOOR LIGHTING			
1ST FLOOR VESTIBULE LIGHTING (NL)	20A	3		1580		4	20A	1ST FLOOR LIGHTING			
1ST/2ND FLOOR STAIR LTG (TIMECLOCK)	20A	5			2500	6	20A	1ST FLOOR LIGHTING			
PC RECEPTACLE	20A	7	740			8	20A	AUTOMATIC DOOR			
RECEPTACLE	20A	9		720		10	20A	SPARE			
RECEPTACLE	20A	11			540	12	20A	SPARE			
PC RECEPTACLE	20A	13	540			14	20A	SPARE			
RECEPTACLE	20A	15		720		16	20A	SPARE			
RECEPTACLE	20A	17			720	18	20A	SPARE			
RECEPTACLE	20A	19	720			20	20A	SPARE			
RECEPTACLE	20A	21		720		22	20A	SPARE			
PC RECEPTACLE	20A	23			540	24	20A	SPARE			
RECEPTACLE	20A	25	720			26	20A	SPARE			
PC RECEPTACLE	20A	27		540		28	20A	SPARE			
RECEPTACLE	20A	29			720	30	20A	SPARE			
COPIER RECEPTACLE	20A	31	1500			32	20A	SPARE			
PC RECEPTACLE	20A	33		540		34	20A	SPARE			
RECEPTACLE	20A	35			1080	36	20A	SPARE			
RECEPTACLE	20A	37	720			38	20A	SPARE			
RECEPTACLE	20A	39		720		40	20A	SPARE			
SPARE	20A	41			0	42	20A	SPARE			
TOTAL CONNECTED LOAD PER PHASE (KVA)			6.64	5.54	6.10						
TOTAL CONNECTED LOAD			18.28 KVA			50.7 A					
MINIMUM FEEDER SIZE PER ARTICLE 220			18.38 KVA			51.0 A					

PANEL DESIGNATION:		LOCATION: 1ST FLOOR STORAGE CLOSET					REMARKS:				
PP-1-ADMIN (NEW)		SERVICE: 208Y/120 V		3 PHASE, 4 WIRE			NEUTRAL BUS: 100%		EQUIPMENT GROUND BUS: YES ISOLATED GROUND BUS: NO		
		MAIN BUS RATING: 225 AMPS									
		MAIN CIRCUIT BREAKER: X									
		SCC RATING (SYM): 10 k A.I.C.									
		MOUNTING: SURFACE MOUNTED					GROUNDING:				
SERVICE TO:	TRIP	NO.	A	B	C	NO.	TRIP	SERVICE TO:			
ACCU-1 3#8 +1#10G - 1"C	3P/50A	1	4988			2	2P/20A	AC-1-1,2,3,4 2#10+1#10G - 3/4"C			
		3		4988		4	2P/20A				
		5			5072	6	2P/20A	AC-1-5,6,7,8,9 2#10+1#10G - 3/4"C			
ACCU-2 3#8 +1#10G - 1"C	3P/50A	7	5072			8	2P/20A				
		9		4676		10	2P/20A	BS-1, 2			
BUH-1-(5,8,10) 2#10 &1#10-3/4"C	2P/20A	11			4676	12	2P/20A				
		13	7000			14	2P/20A				
BUH-1-(1,3,6) 2#10 &1#10-3/4"C	2P/20A	15			7000	16	3P/60				
		17			6500	18	20A	ACH-1 3#6 &1#8G-1"C			
BUH-1-(2,7,9) 2#10 &1#10-3/4"C	2P/20A	19	1300			20	20A	FCU-1-1			
		21		1200		22	20A	MECH CONTROL			
SPARE	20A	23			1200	24	20A	SPARE			
		25	0			26	20A	SPARE			
SPARE	20A	27		0		28	20A	SPARE			
SPARE	20A	29			0	30	20A	SPARE			
SPARE	20A	31	0			32	20A	SPARE			
SPARE	20A	33		0		34	20A	SPARE			
SPARE	20A	35			0	36	20A	SPARE			
SPARE	20A	37	0			38	20A	SPARE			
SPARE	20A	39		0		40	20A	SPARE			
SPARE	20A	41			0	42	20A	ACCU'S RECEPTACLE			
TOTAL CONNECTED LOAD PER PHASE (KVA)			18.36	17.86	17.45						
TOTAL CONNECTED LOAD			53.67 KVA			149.0 A					
MINIMUM FEEDER SIZE PER ARTICLE 220			32.90 KVA			91.3 A					

- ### PANELBOARD NOTES
- PROVIDE UPDATED TYPED WRITTEN DIRECTORIES FOR ALL EXIST. AND NEW PANEL BOARDS. CIRCUIT NUMBERS ARE FOR REFERENCE ONLY. FIELD CONDITIONS SHALL PREVAIL.
 - VERIFY CIRCUIT BREAKER SIZES SERVING EXISTING LOADS AND PROVIDE NEW CIRCUIT BREAKERS TO MATCH EXISTING FOR PROPER CONNECTION AND OPERATION. TRACE OUT ALL EXISTING LOADS TO CONFIRM EXISTING LOAD DESCRIPTIONS ABOVE.
 - ALL BRANCH CIRCUIT SHALL BE BALANCED WITH RESPECT TO PHASES AND BETWEEN PANELS IRRESPECTIVE OF CIRCUIT NUMBERS INDICATED ON DRAWINGS.
 - PROVIDE SCREW-FASTENED TYPE ENGRAVED LAMICOID NAMEPLATES FOR ALL PANEL BOARDS.
 - PROVIDE LOCKING TAB DEVICE FOR ALL EMERGENCY/NIGHT LIGHTS, EXIT LIGHTS AND CONTROL POWER CIRCUIT BREAKERS.
 - TURN OFF CIRCUIT BREAKERS THAT ARE NOT IN USE OR CONNECTED.
 - ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL ALL REQUIRED CIRCUIT BREAKERS AS INDICATED ON PANEL SCHEDULES. REPLACE ALL EXISTING 1-POLE 15A CIRCUIT BREAKERS WITH NEW 20A 1-POLE CIRCUIT BREAKERS. PROVIDE NEW CIRCUIT BREAKERS IN EXISTING SPACES AS TO SATISFY DESIGN INTENT.
 - HANDLE THE BARS SHALL BE PROVIDED FOR CIB'S SERVING MULTIBRANCH CIRCUITS SHARING A NEUTRAL WIRE AS PER NEC.
 - CIRCUIT NUMBERS ARE FOR REFERENCE ONLY AND INDICATE THE OUTLETS AND FIXTURES REQUIRED TO BE CONNECTED TO DESIGNATED CIRCUITS.
 - THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING AND PROVIDING THE ACTUAL NUMBER OF CONDUCTORS REQUIRED FOR ALL BRANCH CIRCUIT WIRING TO SERVE THE INTENDED FUNCTION.
 - MODIFY EXISTING BRANCH CIRCUITS AND PROVIDE NEW WIRING TO REFEED EXISTING LOADS AS REQUIRED FOR PROPER CONNECTION AND OPERATION.
 - ALL CIRCUIT BREAKERS SERVING VENDING MACHINES, HWAT HEATER CABLES AND WATER COOLERS SHALL BE G.F.I. TYPE.
 - ALL CIRCUIT BREAKERS SERVING MECHANICAL LOADS SHALL BE HACR TYPE.

- ### RISER NOTES
- COORDINATE ALL WORK AND SHUTDOWNS WITH BUILDING MANAGEMENT. CONTRACTOR IS TO NOTIFY BUILDING PRIOR TO PERFORMING ANY WORK AFFECTING OTHER SERVICES. SUCH WORK SHALL BE PERFORMED ON AN OVERTIME BASIS UNLESS OTHERWISE APPROVED BY THE BUILDING.
 - CONTRACTOR TO RE-BALANCE EXISTING PANEL PHASES BY RE-ARRANGING EXISTING CIRCUITS AS REQUIRED.
 - ALL METERING WORK TO BE COORDINATED WITH LANDLORD'S METERING VENDOR.
 - ELECTRIC PANELS COVER ARE NOT TO BE LEFT OFF AT ANY TIME UNLESS MEN ARE WORKING ON THEM. COVERS SHALL BE REPLACED EACH NIGHT BEFORE LEAVING JOB SITE.
 - EXISTING EQUIPMENT SHALL BE VERIFIED, AND ENGINEER SHALL BE NOTIFIED OF ANY DISCREPANCIES BEFORE SUBMISSION OF BID.
 - ELECTRICAL CONTRACTOR SHALL VISIT AND EXAMINE CAREFULLY THE EXISTING AREAS AFFECTED BY THIS WORK TO BECOME FAMILIAR WITH EXISTING CONDITIONS AND WITH DIFFICULTIES THAT WILL ATTEND THE EXECUTION OF THIS WORK. CONTRACTOR SHALL PERFORM THIS, PRIOR TO SUBMITTING HIS PROPOSAL. SUBMISSION OF PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE AND LATER CLAIMS WILL NOT BE RECOGNIZED FOR EXTRA LABOR, EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN AND SUCH AN EXAMINATION BEEN MADE.
 - PROPER CLEARANCE MUST BE MAINTAINED AROUND ELECTRICAL EQUIPMENT AS PER 2008 N.E.C. WITH 2011 NYC AMENDMENTS. FIELD VERIFY FOR EXACT MOUNTING SPACE AVAILABLE PRIOR TO INSTALLATION OF ELECTRICAL EQUIPMENT.
 - CONTRACTOR TO CIRCUIT TRACE ALL EXISTING CIRCUITS. IDENTIFY ALL CIRCUITS TO BE MODIFIED, EXTENDED OR REMOVED. ALL CIRCUITS THAT ARE NOT BEING UTILIZED SHALL BE LABELED SPARE FOR FUTURE USED.



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DRAWING TITLE:
ELECTRICAL
RISER DIAGRAM &
PANEL SCHEDULES

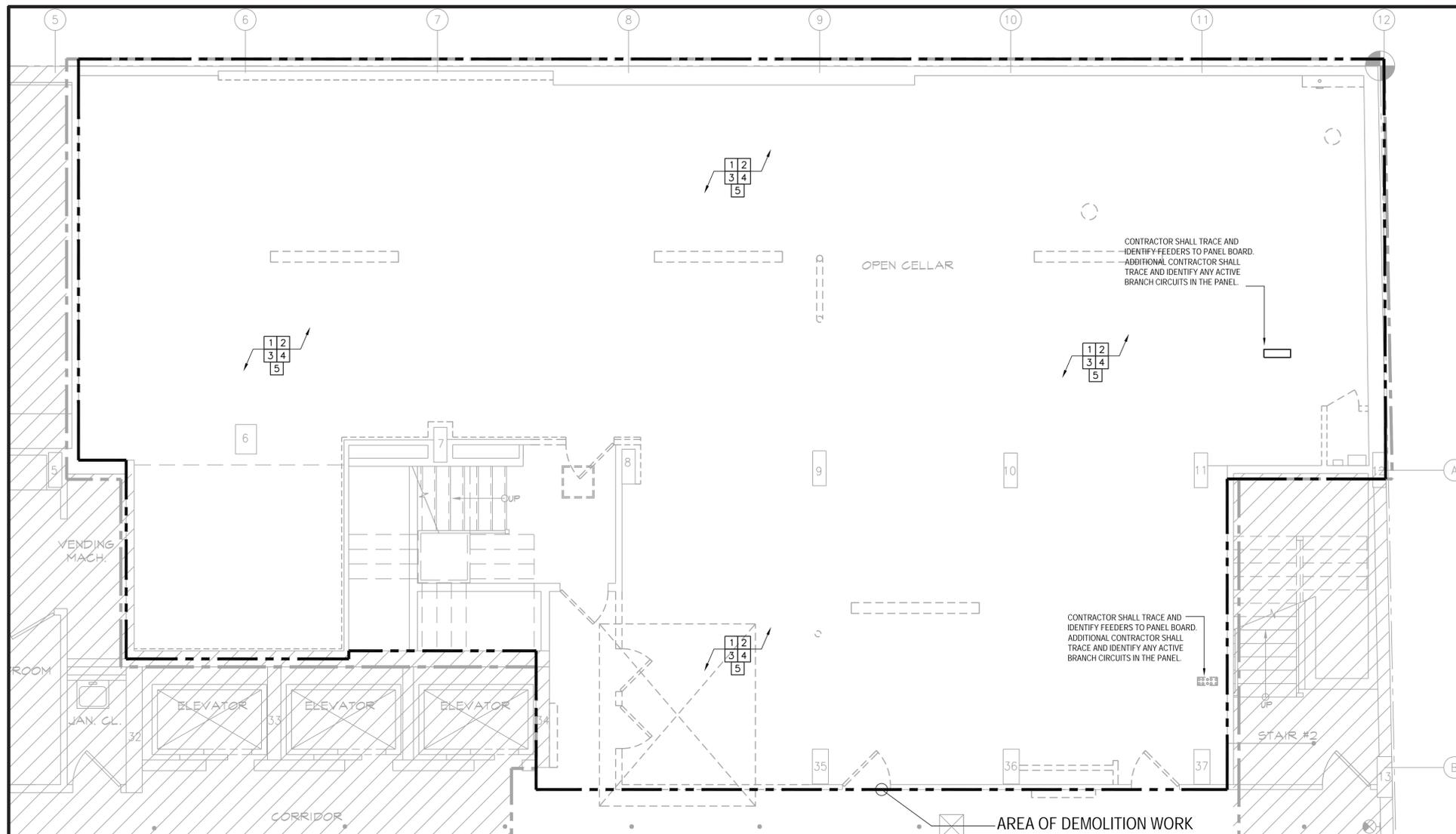
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ISSUD FOR BID 09/01/2022



1 CELLAR - DEMOLITION PLAN
SCALE: 1/4"=1'-0"

GENERAL DEMOLITION NOTES:

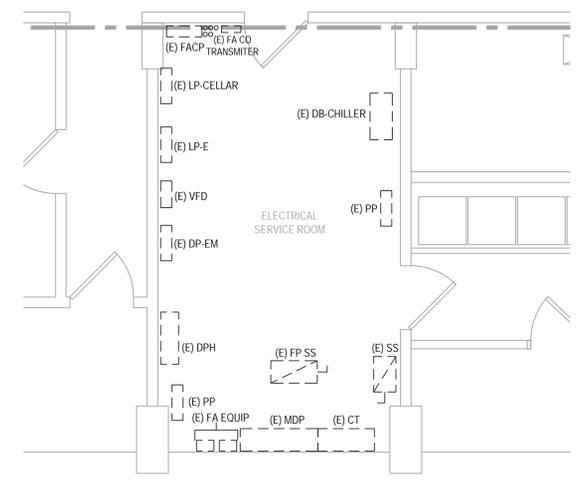
- THE CONTRACTOR SHALL INCLUDE ALL COSTS FOR REMOVALS AND RELOCATIONS IN THE CONTRACT. THESE COSTS SHALL INCLUDE WORK DESCRIBED IN THE SPECIFICATIONS AND SHOWN ON THE ELECTRICAL DRAWING WITH ALLOWANCES FOR NORMAL UNFORESEEN DIFFICULTIES WHEN CONCEALED WORK HAS BEEN OPENED. NO CLAIMS FOR ADDITIONAL WORK ASSOCIATED WITH DEMOLITION WILL BE ACCEPTED, EXCEPT IN SPECIFIC CASES CONSIDERED JUSTIFIABLE BY THE ENGINEER.
- THE CONTRACTOR SHALL REMOVE AND/OR RELOCATE ALL EXISTING ELECTRICAL WORK WHICH INTERFERES WITH THE NEW ELECTRICAL EQUIPMENT LAYOUT. ALL WORK WHICH IS NO LONGER REQUIRED TO FUNCTION SHALL BE DE-ENERGIZED AND DISCONNECTED AT THE SOURCE OF POWER SUPPLY PRIOR TO REMOVAL.
- IN AREAS DESIGNATED FOR DEMOLITION BY THE ARCHITECTURAL DRAWINGS, IT IS THE INTENT OF THIS CONTRACT THAT THE CONTRACTOR SHALL DISCONNECT AND REMOVE ALL EXISTING ELECTRICAL, TELECOMMUNICATION, SECURITY AND AUDIOVISUAL EQUIPMENT INCLUDING: POWER AND LIGHTING PANELBOARDS (WHERE INDICATED) AND ASSOCIATED FEEDERS, TRANSFORMERS, PULLBOXES, LIGHT FIXTURES, FLOOR RECEPTACLES, POWER AND TEL/DATA DOGHOUSE OUTLETS, WALL MOUNTED RECEPTACLES, TELEPHONE/DATA OUTLETS, CONTROL DEVICES AND LIGHT SWITCHES, POWER OUTLETS, BOXES, WIRING, RACEWAYS, CONDUITS AND CABLE TRAYS, AND ALL OTHER EQUIPMENT (UNLESS OTHERWISE NOTED) WHICH IS MOUNTED ON WALLS OR PARTITIONS THAT WILL BE TAKEN OUT. REMOVE BRANCH CIRCUITRY BACK TO NEAREST DEVICE SCHEDULED TO REMAIN AND SAFETY TERMINATE ALL CONNECTIONS. MAINTAIN CONTINUITY OF ALL EXISTING FEEDERS AND BRANCH CIRCUITRY TO EXISTING AREAS NOT BEING AFFECTED BY THIS DEMOLITION. ALL WORK TO BE DONE IN AN APPROVED MANNER.
- ALL ELECTRICAL WORK IN ADJOINING AREAS WHICH IS REQUIRED TO FUNCTION BUT IS AFFECTED BY DEMOLITION WORK SHALL BE RECONNECTED AND RESTORED TO ITS PRESENT FUNCTION AS PART OF THE ELECTRICAL SYSTEM OF THE BUILDING(S).
- ALL PRESENT ELECTRICAL MATERIAL AND EQUIPMENT WHICH ARE TO BE REMOVED UNDER THIS CONTRACT SHALL BE REMOVED BY THE ELECTRICAL CONTRACTOR AND SHALL BECOME THE PROPERTY OF BUILDING MANAGEMENT, U.O.N.
- ALL RACEWAYS WHICH BECOME EXPOSED BEYOND FINISHED SURFACES BECAUSE OF THE ALTERATION WORK SHALL BE REMOVED AND REROUTED BEHIND THE FINISHED SURFACES, U.O.N. ALL REROUTED FEEDER/BRANCH CIRCUITRY SHALL BE PROVIDED WITH NEW FEEDER/BRANCH CIRCUITRY EXTENSIONS, PULL BOXES, ETC. WHERE REQUIRED. NEW FEEDER EXTENSIONS SHALL MATCH EXISTING ONES IN ALL RESPECTS, CONDUCTOR CAPACITY, CONDUIT SIZE, ETC.
- PORTIONS OF FEEDER LINES THAT HAVE TO BE REMOVED OR ABANDONED AS A RESULT OF DEMOLITION WORK BUT ARE REQUIRED TO CONTINUE TO FUNCTION SHALL BE CUT AT CONVENIENT LOCATIONS, REROUTED AND RECONNECTED FOR CONTINUATION OF THEIR PRESENT FUNCTION. NEW FEEDER EXTENSIONS SHALL MATCH EXISTING ONES IN ALL RESPECTS, CONDUCTOR CAPACITY, CONDUITS SIZE, ETC.
- DISPOSE OF REMOVED RACEWAYS, WIRES, ETC., AS DIRECTED BY BUILDING MANAGEMENT.
- ALL UNUSED WIRES SHALL BE REMOVED WHERE DEMOLITION IS TO TAKE PLACE IN THE AREA OF THE BUILDING.
- REMOVE ALL ABANDONED ELECTRICAL EQUIPMENT, PANELS, CONDUITS, WIRING, JUNCTION AND PULL BOXES, SUPPORTS, ETC., UNLESS OTHERWISE NOTED.
- ALL HOLES IN SLABS OR WALLS SHALL BE SEALED WITH APPROVED FIRE RATED MATERIALS. FIRE STOPPED WITH UL LISTED FIRE STOPPING MATERIALS.
- DISCONNECT LOAD AND LINE END OF CONDUCTORS FEEDING EXISTING EQUIPMENT TO BE RELOCATED OR REMOVED.
- REMOVE CONDUCTORS FROM EXISTING RACEWAYS TO BE REWIRED.
- ALL PORTIONS OF FEEDERS THAT REQUIRE RELOCATION IN THE CORE AREA SHALL BE LOCATED PER BUILDING MANAGEMENT DIRECTIONS. NO RELOCATION SHALL BE DONE WITHOUT PRIOR APPROVAL FROM THE BUILDING MANAGEMENT.
- COORDINATE WITH MECHANICAL AND PLUMBING CONTRACTORS FOR THE SCOPE OF WORK. REFER TO CORRESPONDING HVAC AND PLUMBING DEMO DRAWINGS.
- THE DEMOLITION NOTES ARE DIAGRAMMATIC DESCRIPTION OF THE REMOVAL AND RELOCATION SCOPE OF WORK. THE CONTRACTOR, BY SITE INVESTIGATION, SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT SCOPE OF THE WORK INVOLVED, PRIOR TO SUBMITTING HIS BID. COORDINATE WITH ARCHITECT AND BUILDING MANAGEMENT BEFORE ANY WORK.
- CAP ABANDONED OUTLETS AND RACEWAYS. NO ABANDONED WIRING IS ALLOWED. ALL WIRING INCLUDING LOW TENSION WIRING SHALL BE REMOVED BACK TO SOURCE UNLESS OTHERWISE FIELD DIRECTED BY BUILDING MANAGEMENT.
- WHERE DEMOLITION IS TO TAKE PLACE IN THE AREA OF THE BUILDING, FIRE SAFETY EQUIPMENT SUCH AS ALARMS, SPEAKERS, SMOKE DETECTORS, FLOOR WARDEN STATIONS, ETC., BUILDING MANAGEMENT MUST BE NOTIFIED FIVE (5) WORKING DAYS PRIOR TO THE START OF DEMOLITION SO THE EQUIPMENT MAY BE PROTECTED OR REMOVED. PROTECTION OF DEVICES AND EQUIPMENT IS THE RESPONSIBILITY OF CONTRACTOR U.O.N.
- THIS FLOOR MUST REMAIN IN A STATE OF SAFETY CONDITIONS WITH REGARD TO FIRE SAFETY FOR PERSONNEL WORKING ON THE FLOOR. ALL FIRE STAIRS ALARMS, SPEAKERS, ETC. MUST REMAIN ACCESSIBLE AND OPERABLE AT ALL TIMES.
- ANY EXISTING WORK DAMAGED AS A RESULT OF PERFORMING THE WORK OF THIS CONTRACT SHALL BE REPAIRED OR REPLACED AS REQUIRED. MATERIAL AND FINISH TO MATCH EXISTING TO THE SATISFACTION OF THE OWNERS REPRESENTATIVE.
- ALL DEMOLISHING WORK, WHICH CREATES DISTURBING NOISE, SHALL BE PERFORMED AS PER OWNERS INSTRUCTIONS. THE REMOVAL OF DEBRIS AND EQUIPMENT MUST BE ARRANGED TO AVOID ANY INCONVENIENCE TO OWNER.
- AREAS THAT ARE HATCHED ARE CONSIDERED NOT IN CONTRACT. SCOPE OF WORK IS AREA THAT IS NOT HATCHED.
- UNLESS OTHERWISE NOTED, ALL EXISTING DEVICES AND RECEPTACLES SHALL BE DISCONNECTED AND REMOVED IN THEIR ENTIRETY INCLUDING ALL BRANCH WIRING AND CONDUIT. EXISTING FLOOR BOXES TO BE DISCONNECTED AND REMOVED IN THEIR ENTIRETY. FLOOR SHALL BE FILLED AND PATCHED AS REQUIRED.
- EXISTING FIRE ALARM DEVICES IN WALLS AND CEILING BEING REMOVED (LABELED 'E') SHALL BE REMOVED AND TEMPORARILY SUPPORTED. THESE DEVICES SHALL REMAIN ACTIVE. FINAL REMOVAL SHALL BE COORDINATED WITH THE BUILDING FIRE ALARM MAINTENANCE CONTRACTOR. PROVIDE A FIRE WATCH IF REQUIRED.
- PROVIDE TEMPORARY LIGHTING AND POWER FOR ALL TRADES DURING DEMOLITION AND CONSTRUCTION. WHEN USING TEMPORARY LIGHTING, THE CONTRACTOR SHALL CLEARLY LABEL PANELS AND BREAKERS USED FOR LIGHTING. LOCATION OF PANELS TO BE SHOWN ON FLOOR PLAN. POSTED AT ENTRANCE TO WORK AREA. PROPER TEMPORARY LIGHTING AND POWER MUST BE INSTALLED AND MAINTAINED IN ALL WORK AREAS. TEMPORARY LIGHT AND POWER STRINGERS SHALL UTILIZE C-TAP TERMINATIONS. LAMP HOLDERS SHALL HAVE LEFT HANDED SCREW SHELL LAMP HOLDERS AND NON-METALLIC LAMP GUARDS. CONNECTIONS TO EXISTING STAIRWELL AND EXIT LIGHT SYSTEMS ARE NOT PERMITTED.
- ELECTRIC PANELS' COVERS ARE NOT TO BE LEFT OFF AT ANY TIME, UNLESS MEN ARE WORKING ON SAME. COVERS SHALL BE REPLACED EACH NIGHT BEFORE LEAVING JOB SITE.
- BRANCH CIRCUITRY AND CONTROL WIRING FOR MECHANICAL EQUIPMENT AND DEVICES TO BE REMOVED SHALL BE DISCONNECTED AND REMOVED. COORDINATE WITH MECHANICAL CONTRACTOR THESE REMOVALS. RELOCATE ANY CONTROL DEVICES TO TEMPORARY LOCATIONS IF REQUIRED FOR EXISTING A/C UNITS TO BE REMOVED. DISCONNECT AND REMOVE STARTERS, DISCONNECT SWITCHES, JUNCTION BOXES, POWER AND CONTROL WIRING BACK TO SOURCE. CONTINUITY SHALL BE MAINTAINED ON ALL ELECTRICAL CIRCUITS FEEDING POWER TO A/C UNITS OR MECHANICAL EQUIPMENT NOT BEING REMOVED.
- THE CONTRACTOR SHALL MAINTAIN CONTINUITY OF SERVICE ON ALL CIRCUITS AFFECTED BY THIS DEMOLITION. WHENEVER IT IS REQUIRED THAT AN EXISTING CIRCUIT BE REVISED, DISCONNECTED OR REMOVED, IT SHALL BE UNDERSTOOD THAT THE CIRCUIT SHALL BE RECONNECTED AND SERVICE REESTABLISHED IN THE REMAINING PORTION OF THE CIRCUIT AFFECTED BY THIS ALTERATION.
- ALL POWER WIRING IN AREAS TO BE DEMOLISHED SHALL BE THOROUGHLY TRACED OUT TO DETERMINE THE DEVICES BEING FED FROM IT. ALL OBSOLETE WIRING AND CONDUIT SHALL BE REMOVED BACK TO THEIR RESPECTIVE PANELS UPON COMPLETION OF DEMOLITION. AN ACCURATE COUNT OF ALL SPARE CIRCUITS IN ALL PANELS SHALL BE MADE BY THE CONTRACTOR AND FURNISHED TO THE ARCHITECT AND ELECTRICAL ENGINEER. INFORMATION SHALL INCLUDE PANEL NAME, PANEL LOCATION, NUMBER OF SPARE CIRCUIT BREAKERS OF EACH SIZE AND TYPE, NUMBER OF EMPTY SPACES FOR FUTURE BREAKERS IN EACH PANEL.

DEMOLITION KEY NOTES

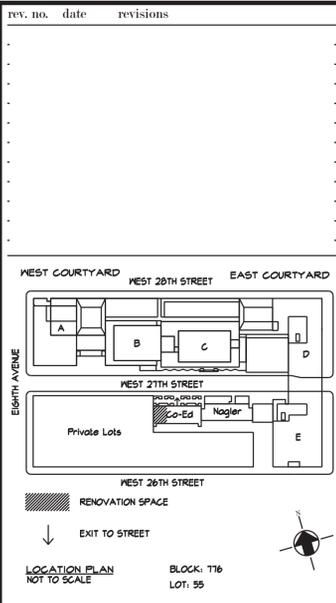
REFER TO THIS DWG. E-900 FOR GENERAL DEMOLITION NOTES. FOR ADDITIONAL DEMO NOTES SEE ARCHITECTURAL DRAWING.

AREAS THAT ARE HATCHED ARE CONSIDERED NOT IN CONTRACT. SCOPE OF WORK IS AREA THAT IS NOT HATCHED.

- UNLESS OTHERWISE NOTED, ALL EXISTING DEVICES AND RECEPTACLES SHALL BE DISCONNECTED AND REMOVED IN THEIR ENTIRETY INCLUDING ALL BRANCH WIRING AND CONDUIT. EXISTING FLOOR BOXES TO BE DISCONNECTED AND REMOVED IN THEIR ENTIRETY. FLOOR SHALL BE FILLED AND PATCHED AS REQUIRED.
- UNLESS OTHERWISE NOTED, ALL EXISTING LIGHT FIXTURES AND ASSOCIATED LIGHTING CONTROLS TO BE DISCONNECTED AND REMOVED IN THEIR ENTIRETY INCLUDING ALL BRANCH WIRING AND CONDUIT.
- DISCONNECT AND REMOVE EXISTING AC UNITS, EXHAUST FANS, WATER HEATERS, AND ALL OTHER ASSOCIATED MECHANICAL AND PLUMBING EQUIPMENT, U.O.N. DISCONNECT AND REMOVE ASSOCIATED POWER AND CONTROL CIRCUITRY. REMOVE WIRING BACK TO SOURCE PANELS AND INDICATE AS SPARE. REFER TO MECHANICAL AND PLUMBING DRAWINGS FOR EXACT SCOPE OF WORK.
- ALL BRANCH CIRCUITS TO BE TRACED OUT TO VERIFY CIRCUITS ARE NOT SERVING EQUIPMENT TO REMAIN. IDENTIFY ALL PANEL FEEDERS AND ASSOCIATED BRANCH CIRCUITS WHICH WILL NEED TO REMAIN. THE EXISTING BRANCH CIRCUITS IDENTIFIED SHALL BE TERMINATED IN A JUNCTION BOX AND LABELED WITH PANEL NAME AND CKT NUMBER FOR RE-USE/EXTENSION DURING CONSTRUCTION PHASE.
- EXISTING FIRE ALARM DEVICES IN WALLS BEING REMOVED SHALL BE REMOVED FROM THE WALLS AND TEMPORARILY SUPPORTED. THESE DEVICES SHALL REMAIN ACTIVE. FINAL REMOVAL SHALL BE COORDINATED WITH THE BLDG FIRE ALARM CONTRACTOR (TYPICAL).
- STAIRWELL LIGHTING LOCATED ON THE 1ST FLOOR IS EXISTING TO REMAIN. ALL ASSOCIATED BRANCH CIRCUIT WIRING, CONDUIT, AND CONTROLS SHALL BE REMOVED BACK TO SOURCE. REFER TO DRAWING E-101 FOR NEW BRANCH CIRCUIT WIRING AND CONTROLS DETAILS (TYPICAL).



2 CELLAR - ELECTRICAL SERVICE ROOM PART. PLAN
SCALE: 1/4"=1'-0"



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PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 27TH ST
NEW YORK NY 10001

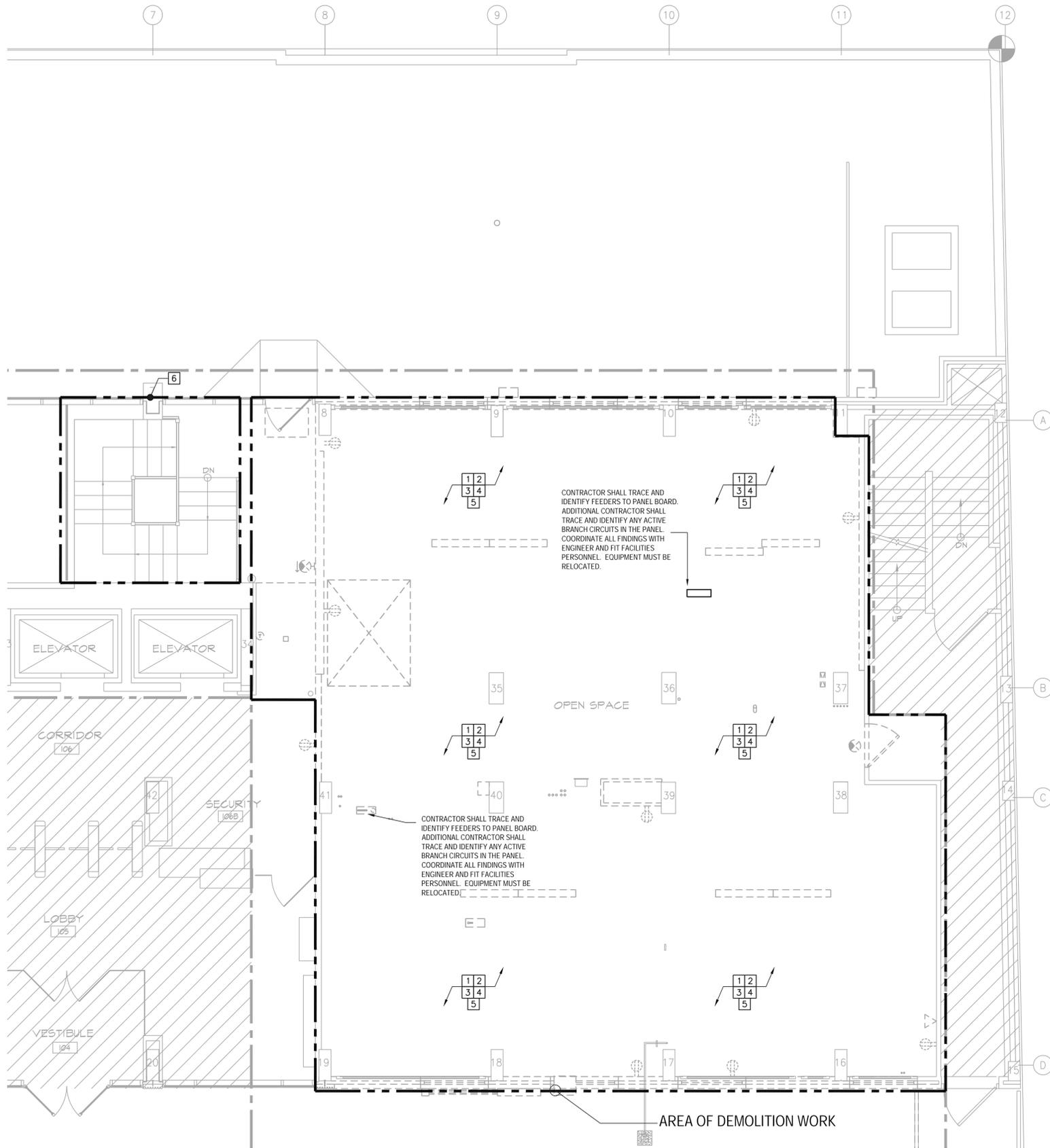
DRAWING TITLE:
CELLAR
ELECTRICAL
DEMOLITION PLAN

DOB NOE JOB#
SEAL & SIGNATURE: DATE: 2022.09.01
PROJECT No: 12284.154
DRAWING BY: RMT
CHK BY: KB
DWG No:
E-900.00
SCALE: 1/4"=1' **12 OF 13**

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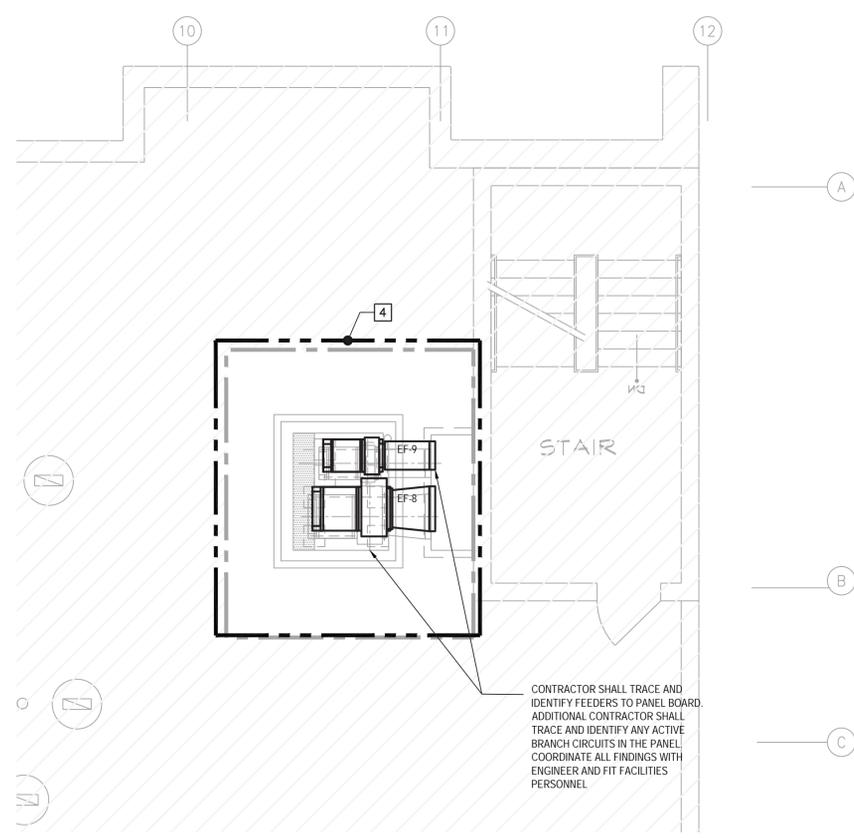
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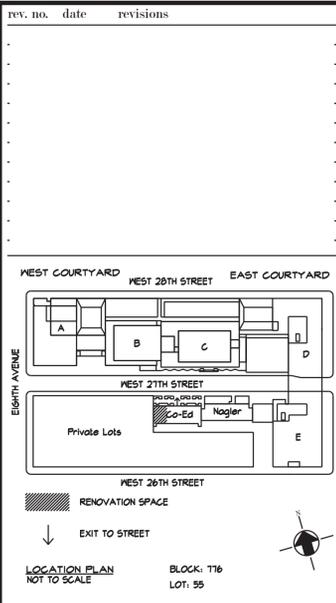
1 1ST FLOOR DEMOLITION PART PLAN
SCALE: 1/4"=1'-0"

GENERAL DEMOLITION NOTES

1. REFER TO DRAWING E-900 FOR GENERAL DEMOLITION NOTES AND DEMOLITION KEY NOTES. FOR ADDITIONAL DEMO NOTES SEE ARCHITECTURAL DRAWING.



2 ROOF -DEMOLITION PART. PLAN
SCALE: 1/4"=1'-0"



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DRAWING TITLE:
 1ST FLOOR & ROOF
 ELECTRICAL
 DEMOLITION PART PLANS

DOB NCE JOB#

SEAL & SIGNATURE: _____ DATE: 2022.09.01
 PROJECT No: 12284.154
 DRAWING BY: RMT
 CHK BY: KB
 DWG No: E-901.00
 SCALE: 1/4"=1' 13 OF 13

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FIRE ALARM DRAWING LIST	
FA-100.00	CELLAR FIRE ALARM PLAN
FA-101.00	1ST AND 2ND FLOORS FIRE ALARM PLAN
FA-601.00	FIRE ALARM NOTES, SYMBOLS LIST, AND RISER DIAGRAM
FA-602.00	FIRE ALARM SPECIFICATIONS

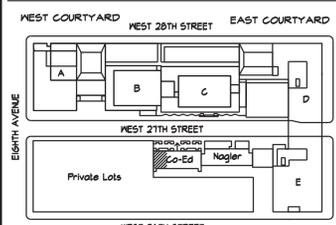
- FIRE ALARM NOTES:**
- FOR FIRE ALARM NOTES, SYMBOL LIST AND RISER DIAGRAM, SEE DWG FA-601.00 AND FA-602.00.
 - ALL DEVICES SHALL BE RECESSED IN WALL, UNLESS OTHERWISE NOTED.
 - ALL NEW DEVICES SHALL BE WHITE WITH RED LETTERS, COORDINATE COLOR WITH ARCHITECT.
 - FUR OUT COLUMNS AS REQUIRED.
 - COORDINATE EXACT LOCATION OF NOTIFICATION DEVICES WITH OTHER TRADES PRIOR TO INSTALLATION.
 - AREAS THAT ARE HATCHED ARE CONSIDERED NOT IN CONTRACT. SCOPE OF WORK IS AREA THAT IS NOT HATCHED.
 - EXISTING FIRE ALARM DEVICES IN WALLS BEING REMOVED SHALL BE REMOVED FROM THE WALLS AND TEMPORARILY SUPPORTED. THESE DEVICES SHALL REMAIN ACTIVE. FINAL REMOVAL SHALL BE COORDINATED WITH THE BLDG FIRE ALARM CONTRACTOR (TYPICAL).

ALL DEVICES SHOWN ARE NEW, U.O.N.

MAINTAIN CONTINUITY OF EXISTING FIRE ALARM CIRCUITS WHEN FIRE ALARM DEVICES ARE REMOVED FROM THAT CIRCUIT.

GENERAL NOTES:
 ALL FIRE ALARM CABLING IN OPEN CEILING AREAS TO BE RUN IN EMT CONDUIT. ALL JUNCTION BOXES AND PULLBOXES TO BE PAINTED RED. THE ELECTRICAL CONTRACTOR SHALL REPLACE ALL EXISTING FIRE ALARM CABLE AS REQUIRED. FIRE ALARM CONDUITS SHALL BE INCLUDED IN THE CONDUIT ROUTING SHOP DRAWING. OBTAIN APPROVED CONDUIT SHOP DRAWING BEFORE PERFORMING ANY FIRE ALARM WORK.

rev. no. date revisions



WEST COURTYARD WEST 28TH STREET EAST COURTYARD
 EIGHTH AVENUE SEVENTH AVENUE
 WEST 27TH STREET
 Private Lots
 WEST 26TH STREET
 RENOVATION SPACE
 EXIT TO STREET
 LOCATION PLAN NOT TO SCALE
 BLOCK: 176
 LOT: 55

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PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
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DRAWING TITLE:
CELLAR LEVEL
FIRE ALARM PART PLAN

DOB NOW JOB#
 SEAL & SIGNATURE: DATE: 2022.09.01
 PROJECT No: 12224.154
 DRAWING BY: RMT
 CHK BY: KB
 DWG No: FA-100.00
 SCALE: 1/4"=1' 1 OF 4

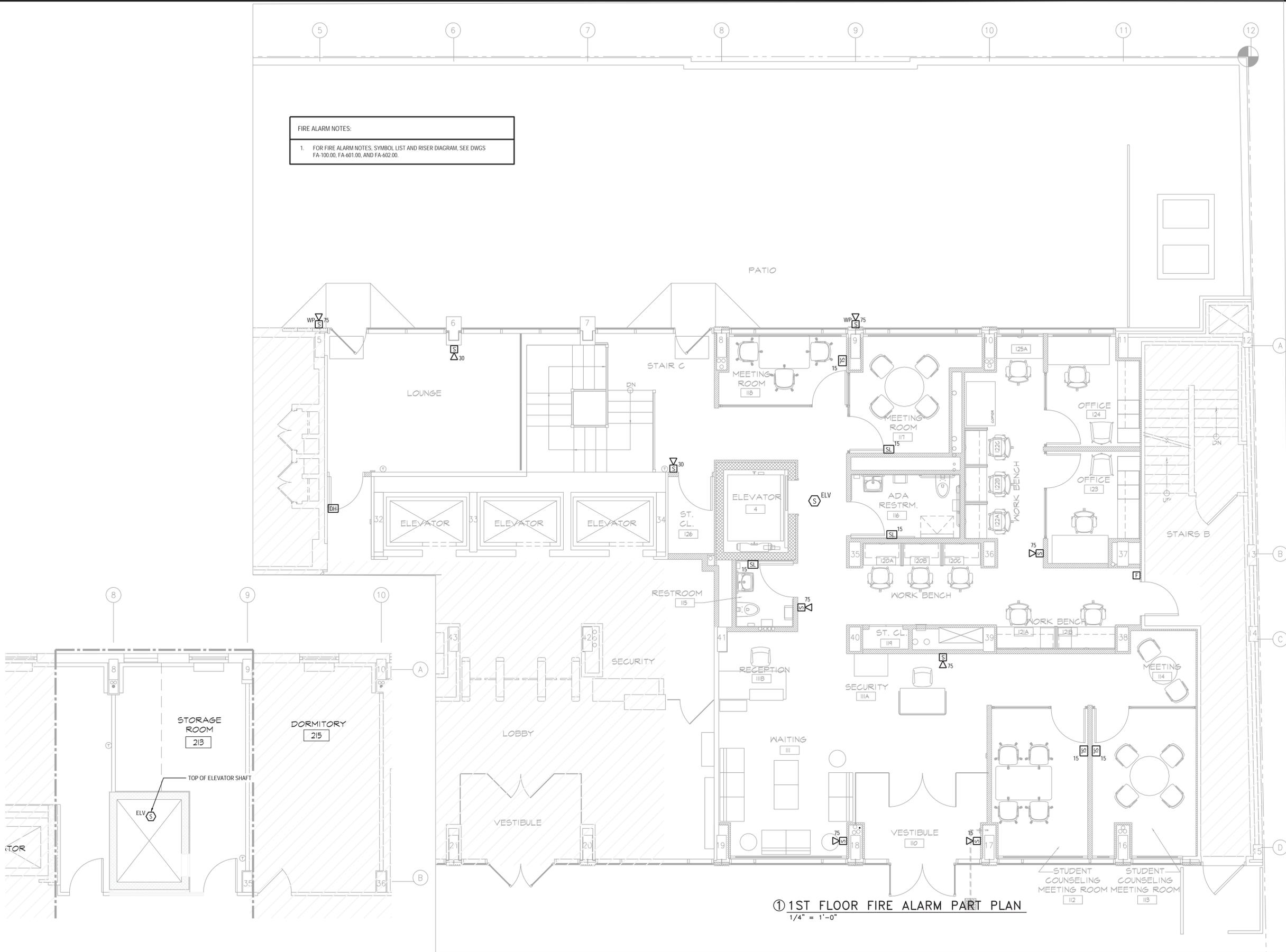
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FIRE ALARM NOTES:
 1. FOR FIRE ALARM NOTES, SYMBOL LIST AND RISER DIAGRAM, SEE DWGS FA-100.00, FA-601.00, AND FA-602.00.



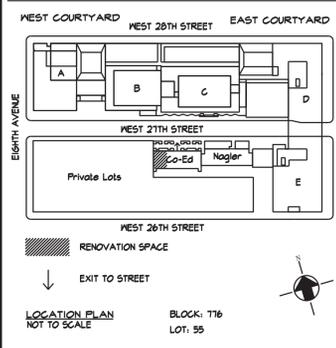
① 1ST FLOOR FIRE ALARM PART PLAN
 1/4" = 1'-0"

② 2ND FLOOR FIRE ALARM PART PLAN
 1/4" = 1'-0"

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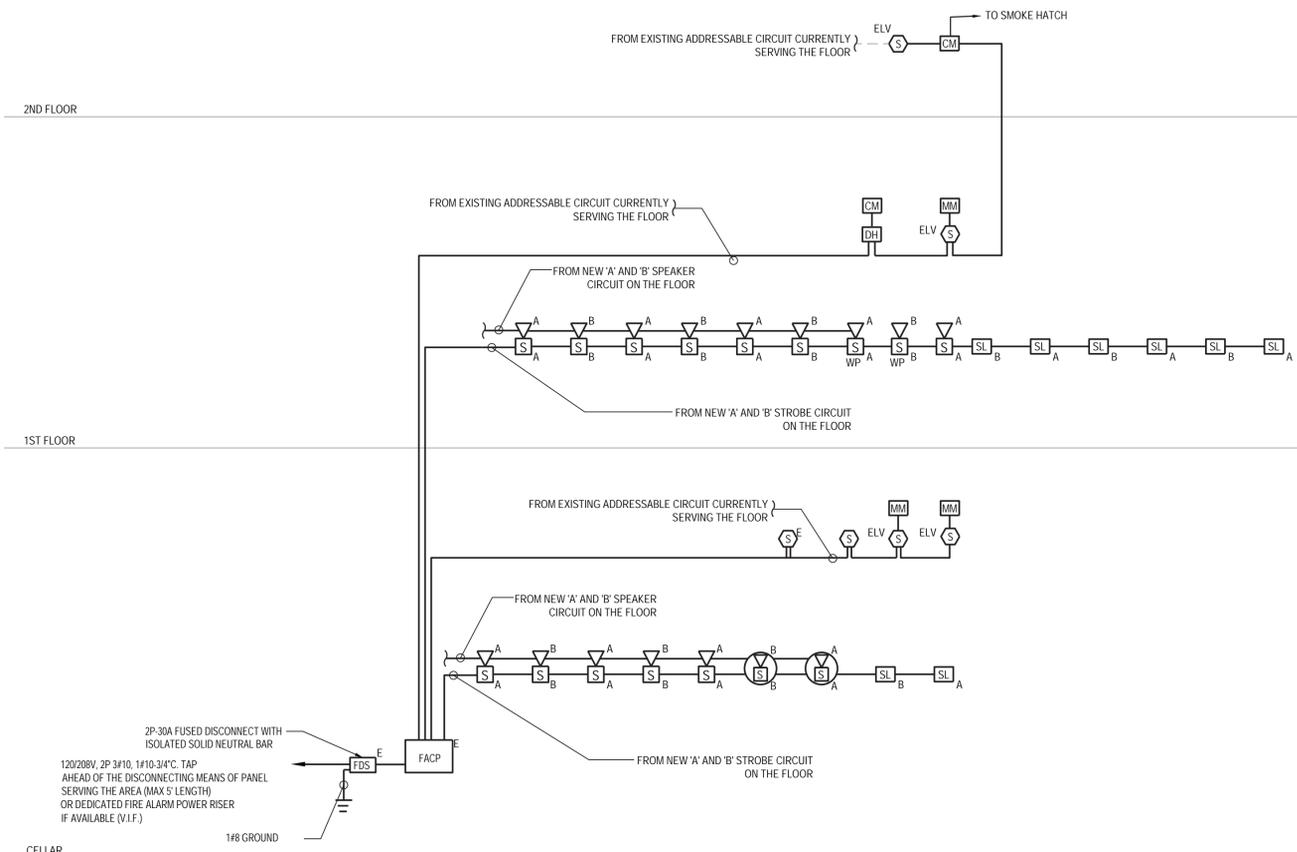
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PROJECT:
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 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 1ST AND 2ND FLOORS
 FIRE ALARM PART PLANS

DOB NOE JOB#
 SEAL & SIGNATURE: DATE: 2022.09.01
 PROJECT No: 12224.154
 DRAWING BY: RMT
 CHK BY: KB
 DWG No: FA-101.00
 SCALE: AS NOTED 2 OF 4



CELLAR

RISER NOTES:

1. ALL FIRE ALARM CABLING SHALL BE SUPPORTED FROM BUILDING STRUCTURE AND NOT DEPEND ON CEILING MEDIA, PIPES, DUCTS, CONDUITS OR EQUIPMENT FOR SUPPORT. CABLING SHALL BE SECURED IN PLACE AT INTERVALS NOT EXCEEDING 5 FEET ON CENTERS AND WITHIN 12" EVERY ASSOCIATED CABINET BOX OR FITTING.
2. MODIFY STROBE POWER SUPPLY AS REQUIRED BY FIRE ALARM VENDOR. SUPPLY ALL MODULES, HARDWARE AND SOFTWARE AS NECESSARY.
3. STROBES SHALL BE SYNCHRONIZED WHEN FLASHING SO THAT NO TWO OR MORE STROBES IN ANY FIELD OF VIEW SHALL FLASH AT DIFFERENT TIMES OR RATES.
4. INSTALL NEW STROBE BOOSTER PANEL IN THE CELLAR TO ACHIEVE SYNCHRONIZATION. ALL NEW STROBES ON THE CELLAR AND 1ST FLOORS TO BE CONNECTED FROM THE NEW BOOSTER PANEL. PROVIDE LINE VOLTAGE POWER FOR NEW BOOSTER PANEL FROM DEDICATED FIRE ALARM LINE VOLTAGE POWER RISER VIA 2P-30A DISCONNECT SWITCH.

MAINTAIN CONTINUITY OF EXISTING FA CIRCUITS WHEN FA DEVICES ARE REMOVED.

ALL DEVICES SHOWN ARE NEW, U.O.N.

SYMBOL LEGEND	
	STROBE POWER SUPPLY
	FIRE ALARM FUSED DISCONNECT SWITCH, LOCKABLE IN THE 'ON' POSITION, (3P-40A SERVICE: 2P-30A AT DGP) WITH NEUTRAL AND GROUND
	WALL MOUNTED, COMBINATION SPEAKER/STROBE APPLIANCE XX - DENOTES CANDELA RATINGS (TYP.) WP - WEATHERPROOF (TYP.)
	CEILING MOUNTED, COMBINATION SPEAKER/STROBE APPLIANCE XX - DENOTES CANDELA RATINGS (TYP.)
	WALL MOUNTED, STROBE ONLY APPLIANCE XX - DENOTES CANDELA RATINGS (TYP.)
	MANUAL PULL STATION, MOUNTED NOT LESS THAN 42" AND NOT MORE THAN 48" ABOVE FINISH FLOOR.
	AREA SMOKE DETECTOR EL - DENOTES ELEVATOR RELATED DEVICE
	RELAY DR - DENOTES DOOR RELEASE
	CONTROL MODULE
	MONITORING MODULE
	DOOR HOLDER
E	EXISTING TO REMAIN
ER	EXISTING REMOVED
ERL	EXISTING RELOCATED
ERP	EXISTING IN RELOCATED POSITION
ERPL	EXISTING REPLACED WITH NEW

- NOTES**
1. ALL WORK IS TO COMPLY WITH THE IBC AND NFPA 13 AS AMENDED BY THE NEW YORK CITY COUNCIL AND THE DEPARTMENT OF BUILDINGS OF THE CITY OF NEW YORK.
 2. ALL WORK IS TO COMPLY WITH THE LOCAL AUTHORITY HAVING JURISDICTION IF NOT SPECIFICALLY MENTIONED/COVERED BY THE ABOVE.
 3. ALL PHASES OF WORK SHALL BE COORDINATED WITH THE PROPERTY MANAGEMENT OFFICE AND THE BUILDING ENGINEER.
 4. LOCATIONS FOR THE HANGING OF EQUIPMENT SHALL BE PULL-TESTED PRIOR TO THE INSTALLATION OF EQUIPMENT.
 5. OCCUPIED SPACE NEEDS TO BE PROTECTED WHILE WORK IS IN PROGRESS.

DWG No.	DRAWING TITLE
FA-100.00	FIRE ALARM CELLAR PART PLAN
FA-101.00	FIRE ALARM 1ST FLOOR & SECOND FLOOR PART PLANS
FA-601.00	FIRE ALARM RISER DIAGRAM, MATRIX, & RISER NOTES
FA-602.00	FIRE ALARM SPECIFICATIONS AND GENERAL NOTES

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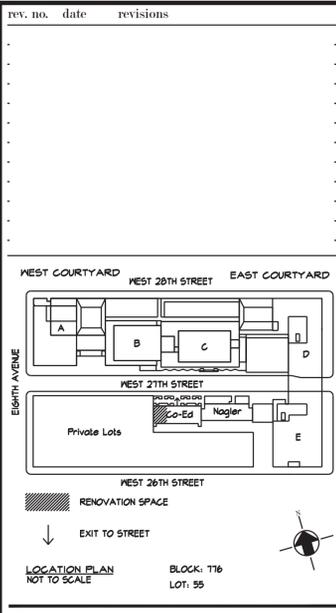
DESIGN NOTES:

1. AUDIBLE DEVICES SHALL PROVIDE ALARM SIGNALS THAT ARE EQUAL TO 15 DECIBELS ABOVE AMBIENT SOUND PRESSURE LEVEL FOR THE OCCUPANCY. BUSINESS OCCUPANCY HAS AMBIENT SOUND PRESSURE LEVEL 55 DECIBELS PER NFPA 72. THEREFORE, AUDIBLE DEVICES SHALL BE 70 DECIBELS OR MORE SOUND PRESSURE LEVEL. MECHANICAL SPACES SHALL PROVIDE MINIMUM SOUND PRESSURE LEVEL OF 90 DECIBELS.
2. ADDRESSABLE DEVICES SHALL BE WIRED CLASS B CIRCUIT & LEVEL 1, SURVIVABILITY. AUDIBLE AND VISUAL DEVICES SHALL BE WIRED CLASS B CIRCUIT & LEVEL 1, SURVIVABILITY.

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SEQUENCE OF OPERATION

SYSTEM INPUTS	SYSTEM OUTPUTS																		
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1. MANUAL PULL STATION	●	●					●	●	●		●								
2. AREA SMOKE DETECTOR	●	●					●	●	●		●								
3. ELEVATOR LOBBY SMOKE DETECTOR	●	●					●	●	●		●								
4. IN-DUCT SMOKE DETECTOR	●	●					●	●	●		●								
5. HEAT DETECTOR	●	●					●	●	●		●								
6. WATERFLOW SWITCH	●	●					●	●	●		●								
7. TAMPER SWITCH				●	●														
8. FIRE ALARM AC POWER FAILURE						●	●	●							●				
9. FIRE ALARM LOW BATTERY						●	●	●							●				
10. OPEN CIRCUIT						●	●	●							●				
11. GROUND FAULT						●	●	●							●				
12. NOTIFICATION APPLIANCE CIRCUIT FAULT						●	●	●							●				



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PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 21TH ST
NEW YORK NY 10001

DRAWING TITLE:
FIRE ALARM
RISER, MATRIX, SYMBOL LIST
& RISER NOTES

DOB NOE JOB#
SEAL & SIGNATURE: _____ DATE: 2022.09.01
PROJECT No: 12284.154
DRAWING BY: RMT
CHK BY: KB
DWG No: FA-601.00
SCALE: N.T.S. **3 OF 4**



FIRE ALARM SPECIFICATIONS

I. NEW FIRE ALARM SYSTEM WORK

A. NEW FIRE ALARM STROBE LIGHT SUB-PANEL

1. PROVIDE NEW STROBE LIGHT CONTROL PANEL IN ACCORDANCE WITH THE FOLLOWING:

a. PANEL SHALL BE APPROVED BY THE BUREAU OF ELECTRICAL CONTROL OR APPROVED BY THE BOARD OF STANDARDS AND APPEALS/MEA.

b. PANEL SHALL CAUSE FIRE ALARM SIGNAL RECEIVED FROM BUILDING FIRE ALARM SYSTEM TO ACTIVATE STROBES.

c. PANEL SHALL BE EQUIPPED WITH A BATTERY AND CHARGER CAPABLE OF PROVIDING AT LEAST FIFTEEN (15) MINUTES OF FULL SYSTEM ALARM OPERATION FOLLOWING TWENTY-FOUR (24) HOURS OF SUPERVISORY OPERATION.

d. WHEN IT IS NOT PHYSICALLY POSSIBLE FOR THE STROBE LIGHT CONTROL PANEL TO BE RESET FROM THE BUILDING FIRE COMMAND STATION, A TIMER TO SHUT OFF THE STROBES AND RESET THE PANEL FIVE (5) MINUTES AFTER THEY ARE ACTIVATED SHALL BE PROVIDED IN THE PANEL.

e. PANEL SHALL INCORPORATE THE ELECTRICAL SUPERVISION OF THE FOLLOWING:

(1) ALARM CIRCUITRY FOR THE STROBES.

(2) INITIATING CIRCUITRY FROM THE BUILDING FIRE ALARM SYSTEM.

(3) THE 120 VOLT POWER SOURCE AND BATTERY.

f. PANEL SHALL HAVE A TROUBLE CONTACT FOR REPORTING TO THE BUILDING FIRE ALARM AND SIGNAL SYSTEM.

g. THE PANEL SHALL BE CAPABLE OF DISCONNECTING ANY FLASHING OR IN-MOTION LIGHTING THAT MAY MAKE STROBES INEFFECTIVE.

h. PANEL SHALL HAVE AN INDEPENDENT 120V POWER SUPPLY DERIVED FROM A NORMAL OR EMERGENCY SOURCE SUPPLYING THE FLOOR, VIA A SEPARATELY INSTALLED FIRE ALARM FUSED DISCONNECT LOCKABLE IN THE "ON" POSITION CONNECTED TO THE ELECTRICAL SUPPLY IN ACCORDANCE WITH THE REQUIREMENT OF THE ELECTRICAL CODE OF THE STATE OF NEW YORK.

i. PROVIDE SMOKE DETECTOR ABOVE NEW STROBE PANEL IF THERE IS NO EXISTING SMOKE DETECTOR AT LOCATION OF NEW STROBE PANEL.

II. NEW FIRE ALARM SYSTEM WORK

A. STROBE LIGHT: PROVIDE 24VDC. STROBE LIGHTS (CANDELA TO BE SET AS INDICATED ON THE PLANS) TO BE FLUSH WALL MOUNTED AS INDICATED ON THE DRAWINGS. PROVIDE DEVICE WITH WHITE LENS AND THE WORD "FIRE" ENGRAVED IN RED. MOUNT DEVICES PER NFPA 72 OF 2010, THE ENTIRE LENS SHALL NOT BE LESS THAN 80° AND NOT GREATER THAN 96° A.F.F.. NEW WALL MOUNTED FIRE ALARM STROBES SHALL MATCH EXISTING BUILDING FIRE ALARM STROBES AND BE WIRED TO THE EXISTING BUILDING FIRE ALARM SYSTEM ANNUNCIATION CIRCUITS IN TYPICAL "A-B" LOOPS.

B. FIRE ALARM SPEAKERS: NEW WALL MOUNTED FIRE ALARM SPEAKERS SHALL MATCH EXISTING BUILDING FIRE ALARM SPEAKERS AND BE WIRED TO THE EXISTING BUILDING FIRE ALARM SYSTEM ANNUNCIATION CIRCUITS IN TYPICAL "A-B" LOOPS.

C. COMBINATION SPEAKER/STROBE LIGHTS: PROVIDE WALL MOUNTED COMBINATION SPEAKER/STROBE LIGHTS IN LOCATION INDICATED ON THE DRAWINGS. PROVIDE DEVICE WITH WHITE LENS AND THE WORD "FIRE" ENGRAVED IN RED. MOUNT DEVICES PER NFPA 72 OF 2010, THE ENTIRE LENS SHALL NOT BE LESS THAN 80° AND NOT GREATER THAN 96° ABOVE FINISH FLOOR. SPEAKERS SHALL BE WIRED FROM THE EXISTING BUILDING FIRE ALARM SYSTEM ANNUNCIATION CIRCUITS IN TYPICAL "A-B" LOOPS.

D. FAN SHUT DOWN: PROVIDE REQUIRED RELAYS FOR FAN SHUTDOWN IN ACCORDANCE WITH 2014 NYC MECHANICAL CODE SECTION 606.4, AND AS INDICATED ON DRAWINGS. FANS THAT WERE SHUTDOWN DURING SMOKE/FIRE CONDITION MUST NOT AUTOMATICALLY RE-START OR BE RE-ENERGIZED UPON RESET OF FIRE ALARM CONTROL PANEL. A MANUAL MEANS OF RESTARTING THE FANS OR FAN SYSTEM SHALL FUNCTION INDEPENDENTLY FROM THE MANUAL RESETTING OF EITHER THE AUTOMATIC FIRE DETECTING DEVICE OR FIRE ALARM SYSTEM. ALL DUCT DETECTORS SHALL BE PROVIDED WITH A REMOTE ALARM LED.

E. CONTRACTORS SHALL BE HELD RESPONSIBLE FOR CONTRACTING THE BUILDING FIRE ALARM SYSTEM VENDOR FOR ALL INTERCONNECTIONS OF NEW FIRE ALARM EQUIPMENT TO THE EXISTING BUILDING'S FIRE ALARM SYSTEM FOR REQUIRED MODULES, RELAYS, ADDITIONAL BATTERIES, ETC. NO EXTRAS WILL BE ALLOWED FOR FAILURE TO COORDINATE THE EXTENT OF FIRE ALARM WORK WITH THE BUILDING VENDOR.

F. ALL NEW EQUIPMENT SHALL BE BUILDING STANDARD DEVICES AND BE IN COMPLIANCE WITH ALL LOCAL CODES.

III. EXISTING AND/OR NEW FIRE ALARM SYSTEM WORK

A. WHERE NEW HUNG CEILING INTERFERES WITH EXISTING FIRE ALARM EQUIPMENT OR IS LOCATED ON EXISTING CEILINGS/WALLS TO BE DEMOLISHED, IT SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR TO NOTIFY BUILDING OWNER BEFORE REMOVING SUCH DEVICES AND PROVIDE SUITABLE TEMPORARY SUPPORT AND MAINTAIN CONTINUITY OF SERVICE TO SUCH EQUIPMENT.

B. THE BUILDING MUST BE NOTIFIED WHEN ANY ALARM DEVICE ON A FLOOR IS DISARMED TEMPORARILY FOR CONSTRUCTION OR WHEN DEVICES ARE TEMPORARILY PROTECTED FROM DUST DURING DEMOLITION.

C. ELECTRIC WIRING FOR CLASS "E" SYSTEMS FOR RELOCATION OF SMOKE DETECTORS, SPRINKLER FLOW SWITCHES TAMPER SWITCHES, ETC. SHALL BE APPROVED BY THE FIRE DEPARTMENT. CONTRACTOR MUST FILE FORM A-433 APPLICATION FOR ELECTRICAL INSPECTION WITH THE FIRE DEPARTMENT. A WRITE-OFF MUST BE GIVEN TO THE BUILDING MANAGER AT THE COMPLETION OF THE JOB. NO ADDITIONAL DETECTOR, SWITCHES, ETC. MAY BE INSTALLED. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR ALL FEES, INCLUDING NEW YORK FIRE DEPARTMENT INSPECTION.

FIRE ALARM NOTES:

1. PRIOR TO BID, CONTRACTOR SHALL CONTACT THE BUILDING FIRE ALARM MAINTENANCE CONTRACTOR, ROBERT E. GILMORE @ QSCS OF NEW YORK, INC., (212)-244-1771, TO OBTAIN PRICING FOR THE EQUIPMENT AND SERVICES LISTED BELOW WHICH MUST BE PROVIDED BY THAT CONTRACTOR.

2. ALL EQUIPMENT FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR AND SHALL BE PURCHASED FROM THE BUILDING FIRE ALARM MAINTENANCE CONTRACTOR TO TO ASSURE COMPATIBILITY WITH EXISTING FIRE ALARM SYSTEM.

3. REPROGRAMMING OF FIRE COMMAND STATION AND FINAL CONNECTIONS AT THE FIRE COMMAND STATION OR DATA GATHERING PANEL ARE BY BUILDING'S FIRE ALARM MAINTENANCE CONTRACTOR. INCLUDE PRICE FOR SAME IN BID PRICE.

4. INSTALL FIRE ALARM EQUIPMENT, FIRE ALARM SPEAKERS AND STROBE LIGHTS (CANDELA TO BE SET AS INDICATED ON THE PLAN) UNITS AT LOCATION INDICATED ON THE PLAN.

5. CONNECT WIRES TO "2 WATT" TAP ON SPEAKER TRANSFORMER OR AS RECOMMENDED BY THE BUILDING'S FIRE ALARM MAINTENANCE CONTRACTOR. OPERATING VOLTAGE OF SPEAKER UNITS SHALL BE COMPATIBLE WITH EXISTING FIRE ALARM SYSTEM.

6. FIRE ALARM RECESSED CEILING MOUNTED SPEAKERS AND WALL MOUNTED (PER NFPA 72 OF 2010, THE ENTIRE LENS SHALL NOT BE LESS THAN 80° AND NOT GREATER THAN 96° A.F.F.) STROBE LIGHT UNITS OR COMBINATION SPEAKER/STROBE UNITS SHALL BE BASE BUILDING TYPE.

7. ALL CABLING SHALL BE TEFLON INSULATED RATED AT 150°C AND JACKETED, "NYC CERTIFIED", FIRE PROTECTION SERVICE APPROVED, (1) PAIR #14 AWG FOR STROBES AND "POINTS" WIRING AND #16 AWG FOR SPEAKERS. PROVIDE SHIELD WIRING WHERE REQUIRED.

8. EXISTING BUILDING SYSTEM DEVICES SHOWN ARE TO REMAIN INTACT UNLESS OTHERWISE NOTED.

9. OBTAIN PERMISSION FROM BUILDING MANAGER PRIOR TO RUNNING WIRE FROM NEW FIRE ALARM DEVICES TO EXISTING FIRE COMMAND STATION OR DATA GATHERING PANELS.

10. ALL ROUTING OF CABLES TO FIRE COMMAND STATION SHALL BE DIRECTED AND APPROVED BY BUILDING MANAGER.

11. THE FIRE ALARM RISER DIAGRAM SHOWN IS AN INDICATION OF THE WORK REQUIRED AND SHALL BE USED AS GUIDE FOR DEVELOPING A COMPLETE SCOPE AND IS NOT A POINT-TO-POINT WIRING DIAGRAM. THE CONTRACTOR SHALL OBTAIN A POINT-TO-POINT WIRING DIAGRAM FROM THE BUILDING FIRE ALARM MAINTENANCE CONTRACTOR AND PERFORM ALL WORK IN ACCORDANCE WITH THAT DIAGRAM.

12. THE OPERATION OF THE FIRE ALARM INSTALLATION DOES NOT CONSTITUTE AN ACCEPTANCE OF THE WORK BY THE OWNER. FINAL ACCEPTANCE IS TO BE MADE AFTER THE CONTRACTOR HAS DEMONSTRATED THAT THE WORK FULFILLS THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS AND HAS FURNISHED ALL REQUIRED CERTIFICATES OF APPROVAL FROM THE STATE AUTHORITIES, MUNICIPAL AUTHORITIES AND UNDERWRITERS.

13. INCLUDE ALL FEES FOR FILING APPROVALS, AND FDNY INSPECTION AND RE-INSPECTION OF THE FIRE ALARM INSTALLATION.

14. INSULATION OF FIRE ALARM CABLES SHALL BE MINIMUM 150° RATED AND SHALL BE UL APPROVED FOR USE IN N.Y.C..

15. ALL EXISTING FIRE ALARM DEVICES, WHETHER SHOWN ON PLANS OR NOT, SHALL REMAIN ACTIVE DURING DEMOLITION AND CONSTRUCTION.

16. AREA AND ELEVATOR LOBBY SMOKE DETECTOR SHALL BE MOUNTED AT THE HIGHEST POINT ON THE CEILING.

17. INSTALL SMOKE DETECTORS AT LEAST 3 FEET FROM ANY AIR DIFFUSER.

18. THE INSTALLATION SHALL COMPLY WITH 2014 NYC CONSTRUCTION CODES AND NFPA 72 OF 2010. ALL ELECTRICAL WORK SHALL COMPLY WITH 2011 NYC ELECTRICAL CODE ARTICLE 760.

19. ALL EQUIPMENT/DEVICES USED SHALL BE APPROVED MANUFACTURERS THAT ARE LISTED FOR THEIR USE.

20. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL REQUIRED "SPECIAL INSPECTIONS" AND SHALL SUBMIT THE NAME AND QUALIFICATIONS OF THE INSPECTOR TO THE ENGINEER FOR REVIEW.

21. CONTRACTOR SHALL PROVIDE "AS-BUILT" DRAWINGS TO THE ENGINEER AT LEAST TWO WEEKS PRIOR TO FDNY INSPECTION. THESE DRAWINGS SHOULD BE BUBBLED TO INDICATE ALL CHANGES AND VARIATIONS FROM THE APPROVED DRAWINGS. THE ENGINEER SHALL PROVIDE THE REQUIRED AS-BUILT DRAWING FOR THE FDNY INSPECTION. THE FUNCTIONALITY STATEMENT SHALL BE SIGNED BY THE INSTALLING CONTRACTOR PRIOR TO THE ENGINEER SIGNING AND SEALING THE OVERALL DRAWING.

22. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL UNUSED OR ABANDONED FIRE ALARM CABLE, CONDUIT AND DEVICES. REPROGRAM THE SYSTEM FOR DEVICES REMOVED FROM SERVICE.

23. FIRE ALARM PLANS SHALL BE APPROVED BY THE FIRE DEPARTMENT PLAN EXAMINER PRIOR TO ANY INSTALLATION WORK.

24. PRIOR TO FDNY INSPECTION THE ENTIRE INSTALLATION SHALL BE COMPLETELY TESTED BY THE FIRE ALARM VENDOR AND INSTALLING ELECTRICIAN.

25. ALL LINE VOLTAGE ELECTRICAL WORK ASSOCIATED WITH FIRE ALARM SYSTEM (IF APPLICABLE) SHALL BE FILED FOR BY A LICENSED MASTER ELECTRICIAN WITH THE BUREAU OF ELECTRICAL CONTROL (FORM 16A).

26. EXACT LOCATION OF ALL DEVICES TO BE COORDINATED WITH THE ARCHITECT PRIOR TO INSTALLATION OF ANY ROUGH IN, CONDUIT, WIRING OR DEVICES.

27. 24V POWER ON ALL FIRE ALARM DEVICES (RELAYS, SOUNDER BASES, ETC.) SHALL BE SUPERVISED BY THE FIRE ALARM SYSTEM.

28. PROVIDE REMOTE LED'S FOR FSD'S LOCATED ABOVE HUNG CEILINGS. LED TO BE VISIBLE FROM TENANT SPACE TO INDICATE LOCATION/OPERATION.

29. PROVIDE REMOTE LED'S FOR AREA SMOKE DETECTORS LOCATED IN CONCEALED SPACES. LED TO BE VISIBLE FROM TENANT SPACE TO INDICATE LOCATION/OPERATION.

30. IN OCCUPIED SPACES THAT HAVE NO OR OPEN CEILINGS, FIRE ALARM WIRING SHALL BE IN CONDUIT. COORDINATE WITH ARCHITECT.

31. ALL FIRE ALARM CABLES INSTALLED BELOW HUNG CEILING SHALL BE PROVIDED IN METAL RACEWAY.

32. ALL FIRE ALARM CABLES INSTALLED IN MECHANICAL SPACES, ELEVATOR MACHINE ROOMS AND LOADING DOCKS SHALL BE PROVIDED IN METAL RACEWAY PER NYC ELECTRICAL CODE ARTICLE 760.

33. WHEN RELOCATING FIRE ALARM DEVICE(S) IF EXISTING WIRING DOES NOT REACH NEW LOCATION, PROVIDE NEW WIRING AS REQUIRED. ALL WIRING MUST BE PROPERLY SUPPORTED PER CODE.

34. MAINTAIN CONTINUITY OF CIRCUITS WHEN FIRE ALARM DEVICES ARE REMOVED FROM EXISTING CIRCUITS SERVING OTHER DEVICES. TRACE OUT CIRCUITRY TO DETERMINE ACTIVE CIRCUITS TO REMAIN. PROVIDE TERMINAL BOXES WITH ACCESS AS REQUIRED.

35. CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE INSTALLATION IN COMPLIANCE WITH BUILDING REGULATIONS AND STANDARDS.

EXISTING FIRE ALARM DEVICES NOTES:

THE FOLLOWING SHALL APPLY FOR ALL DEVICES IDENTIFIED AS EXISTING TO REMAIN.

1. EXISTING WIRING SHALL BE PROTECTED DURING DEMOLITION AND CONSTRUCTION SO THAT IT CAN BE REUSED AND RECONNECTED TO MAKE EXISTING DEVICES FULLY OPERATIONAL. EXISTING WIRING THAT HAS BEEN DAMAGED DURING DEMOLITION OR CONSTRUCTION SHALL BE REPLACED AT NO ADDITIONAL COST TO THE OWNER.

2. EXISTING MANUAL PULL STATIONS AND FIRE WARDEN STATIONS AFFECTED BY THE SCOPE OF WORK AND INDICATED TO BE LOWERED/RELOCATED OR REPLACED SHALL BE LOWERED SO THAT THE HIGHEST OPERABLE PART IS NOT MORE THAN 48" AND SHALL NOT BE LESS THAN 42" ABOVE FINISH FLOOR. EXISTING WIRING MAY BE REUSED ONLY IF IT CAN BE EXTENDED TO THE NEW MOUNTING POSITION WITHOUT SPLICES. IF EXISTING WIRING IS TOO SHORT, FURNISH AND INSTALL NEW WIRING BACK TO THE FIRE ALARM COMMAND STATION, "DGP" OR TERMINAL CABINET.

3. THE ABOVE DESCRIBED WORK SHALL BE INCLUDED IN THE CONTRACT PRICE.

4. EXISTING BASE BUILDING FIRE ALARM EQUIPMENT AND DEVICES MUST REMAIN IN SERVICE AT ALL TIMES DURING DEMOLITION AND CONSTRUCTION.

FIRE ALARM SYSTEM DIVISION OF WORK IS AS FOLLOWS:

1) FIRE ALARM VENDOR WILL PROVIDE THE FOLLOWING INSTALLATION PACKAGE UNDER THIS CONTRACT:

A) FURNISH A COMPLETE SUBMITTAL PACKAGE INCLUDING CATALOGUE CUT SHEETS, RISER DIAGRAM WITH SEQUENCE OF OPERATIONS, POINT-TO-POINT WIRING DIAGRAM AND TYPICAL HOOK-UP DIAGRAMS.

B) FURNISH ALL DRAWINGS, MATERIAL AND PROGRAM CHANGES.

C) FILE DRAWINGS WITH NYDOB & NYFD.

D) COORDINATE INSPECTIONS WITH NYFD.

E) PROVIDE BUILDING OWNER WITH A LETTER ATTESTING THAT SAID SYSTEM(S) ARE FULLY OPERATIONAL PRIOR TO TENANT MOVE IN.

2) ELECTRICAL CONTRACTOR SHALL:

A) PURCHASE EQUIPMENT, DRAWINGS AND FILING FROM BUILDING FIRE ALARM VENDOR.

B) INSTALL EQUIPMENT AND WIRE RUNS TO DESIGNATED POINTS PER VENDOR DRAWINGS.

C) FILE THE A-433 FORM FOR HIS WORK WITH THE NYFD.

D) PROVIDE A LETTER OF REQUEST FOR NYFD INSPECTION AND COORDINATE SAME WITH VENDOR.

E) CONTRACTOR SHALL BE AVAILABLE ON THE DATE OF ANY NYFD INSPECTION OR TEST OF SUCH SYSTEMS.

3) TENANTS WILL NOT BE PERMITTED TO MOVE IN OR OCCUPY ANY AREAS UNTIL TENANT CLASS "E" SYSTEMS ARE COMPLETE AND BUILDING FIRE ALARM VENDOR CONFIRMS, IN WRITING, THAT THE SYSTEM(S) ARE OPERATIONAL.

4) THE SYSTEM MUST BE KEPT OPERABLE IN THE AREAS OF EXISTING TENANTS WHEN AN ALTERATION IS PERFORMED ON A MULTI-OCCUPIED FLOOR. THIS MAY REQUIRE A TEMPORARY HOOK-UP DURING CONSTRUCTION.

5) WHEN A FLOOR IS COMPLETELY DEMOLISHED, THE ESD (ELEVATOR LOBBY SMOKE DETECTORS), PULL STATIONS AND WARDEN STATIONS MUST REMAIN OPERATIONAL TEMPORARILY UNTIL SUCH TIME WHEN THESE DEVICES ARE PERMANENTLY INSTALLED.

THERE IS NO CARBON MONOXIDE PRODUCING EQUIPMENT ON THIS FLOOR OR THE FLOOR BELOW THERE IS NO FLOOR ABOVE

NEW YORK CITY BUILDING DEPARTMENT APPROVAL NOTE

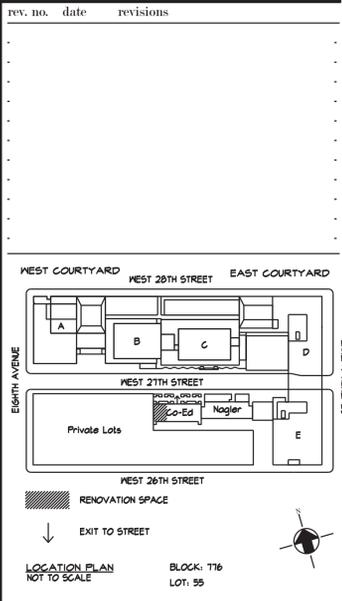
THIS PLAN IS APPROVED ONLY FOR WORK INDICATED ON THE APPLICATION SPECIFICATION SHEET. ALL OTHER MATTERS SHOWN ARE NOT TO BE RELIED UPON OR TO BE CONSIDERED AS EITHER BEING APPROVED OR IN ACCORDANCE WITH APPLICABLE CODES.

NEW YORK CITY ENERGY CONSERVATION CODE

EXEMPTION WHEN COMPLIANCE WITH FIRE PROTECTION, DETECTION, ALARM AND/OR SUPPRESSION REQUIREMENTS OF TITLE 28 AND/OR THE 2014 NEW YORK CITY CONSTRUCTION CODES CONFLICTS WITH 2020 NYECC COMPLIANCE, THE TITLE 28 AND/OR 2014 CONSTRUCTION CODES SAFETY PROVISIONS WILL TAKE PRECEDENCE OVER CONFLICTING PROVISIONS IN 2020 NYECC.



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PROJECT:

CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 27TH ST
NEW YORK NY 10001

DRAWING TITLE:

FIRE ALARM
SPECIFICATIONS

DOB NOE JOB#

SEAL & SIGNATURE:

DATE: 2022.09.01

PROJECT No: 12284.154

DRAWING BY: RMT

CHK BY: KB

DWG No:

FA-602.00

SCALE N.T.S. 4 OF 4

ISSUD FOR BID 09/01/2022

PLUMBING SYMBOLS	
	DOMESTIC COLD WATER PIPING
	DOMESTIC HOT WATER PIPING (120°)
	DOMESTIC HOT WATER RETURN PIPING (120°)
	VENT PIPING
	SOIL, WASTE OR SANITARY PIPING
	SUMP PUMP DISCHARGE PIPING
	BURIED PIPING
	LEADER PIPING OR STORM (ST)
	CLEAN OUT/PLUGGED OUTLET
	CAPPED OUTLET
	CLEAN-OUT DECK PLATE (FLOOR PLAN)
	P-TRAP (FLOOR PLAN)
	ELBOW TURNED UP
	ELBOW TURNED DOWN
	BOTTOM PIPE CONNECTION
	TOP PIPE CONNECTION
	SLOPE CHANGE IN PIPE ELEVATION (ROLL DOWN)
	GLOBE VALVE
	CHECK VALVE
	BALL VALVE
	DIRECTION OF PUMPED FLOW
	ARROW INDICATES DIRECTION OF FLOW
	PIPE SLEEVE
	UNION
	CAPPED PIPE WITH SHUT-OFF VALVE
	TRAP (RISER DIAGRAM)
	WATER FILTER
	VACUUM BREAKER ASSEMBLY
	FLOOR/AREA/ROOF OR PLENUM DRAIN (PLAN VIEW)
	FLOOR, AREA ROOF DRAIN (RISER DIAGRAM)
	PLUMBING (CW, HW, S, V) RISER
	RISER SERVICE
	RISER NUMBER
	CONNECT NEW WORK TO EXISTING
	DISCONNECT EXISTING WORK & CAP

PLUMBING ABBREVIATIONS			
AD	ACCESS DOOR	GPM	GALLONS PER MINUTE
AFF	ABOVE FINISHED FLOOR	HVAC	HEATING, VENTILATION, & AIR CONDITIONING
AP	ACCESS PANEL	HW	HOT WATER
BLDG	BUILDING	HWC	HOT WATER CIRCULATION
BOP	BOTTOM OF PIPE	IE	INVERT ELEVATION
CLG	CEILING	JC	JANITOR'S CLOSET
CM	COFFEE MAKER	L	LEADER
CO	CLEAN OUT	LAV	LAVATORY
CODP	CLEANOUT DECK PLATE	MAX	MAXIMUM
CONN	CONNECTION	MECH	MECHANICAL
CONT	CONTINUATION	MER	MECHANICAL EQUIPMENT ROOM
CORR	CORRIDOR	MFR	MANUFACTURER
COWP	CLEANOUT WALL PLATE	MIN	MINIMUM
CV	CHECK VALVE	MISC	MISCELLANEOUS
CW	COLD WATER	MTD	MOUNTED
DET	DETAIL	NIC	NOT IN CONTRACT
DF	DRINKING FOUNTAIN	NTS	NOT TO SCALE
DIA	DIAMETER	PD	PLAZA DRAIN
DIM	DIMENSION	PLBG	PLUMBING
DN	DOWN	PO	PLUGGED OUTLET
DR	DRAIN	RCV	RISER CONTROL VALVE
DWG	DRAWING	RM	ROOM
EA	EACH	RPM	REVOLUTIONS PER MINUTE
EL	ELEVATION	S	SANITARY/SOIL
ELEC	ELECTRICAL	SHT	SHEET
ELEV	ELEVATOR	SK	SINK
EMR	ELEVATOR MACHINE ROOM	SLV	SLEEVE
ENG	ENGINEER	SQ	SQUARE
EOS	END/EDGE OF SLAB	SQ.FT.	SQUARE FOOT (#)
EQUIP	EQUIPMENT	STD	STANDARD
EX	EXISTING	STOR	STORAGE
EXT	EXTERIOR	TEMP	TEMPORARY
FD	FLOOR DRAIN	THRU	THROUGH
FDN	FOUNDATION	TP	TRAP PRIMER
FF	FINISH FLOOR	TYP.	TYPICAL
FL	FLOOR	V	VENT
FT	FEET	VB	VACUUM BREAKER
FTG	FITTING	VERT	VERTICAL
FXT	FIXTURE	W	WASTE
GC/CM	GENERAL CONTRACTOR/CONST. MANAGER	W/	WITH
GAL	GALLONS	WC	WATER CLOSET
GALV	GALVANIZED	WF	WATER FILTER

2014 NYC PLUMBING NOTES

- THE PLUMBING SYSTEMS (SANITARY, WASTE, STORM, VENT, GAS, WATER DISTRIBUTION) AND ALL ASSOCIATED EQUIPMENT WILL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE FULL REQUIREMENTS OF THE 2014 BUILDING CODE OF THE CITY OF NEW YORK AS CITED IN CHAPTER 29, THE 2014 NEW YORK CITY PLUMBING CODE AND THE 2014 FUEL GAS CODE.
- THE SANITARY SYSTEM SHALL BE PROVIDED IN FULL ACCORDANCE WITH THE GENERAL PROVISIONS OF CHAPTER 7.
- THE MATERIALS USED IN THE PLUMBING SYSTEM SHALL BE PROVIDED IN FULL ACCORDANCE WITH CHAPTER 3.
- EQUIPMENT HOOK-UP AND THE JOINING OF PIPING SHALL BE IN FULL COMPLIANCE WITH CHAPTER 4.
- THE INSTALLATION OF FIXTURES SHALL BE IN FULL ACCORDANCE WITH SECTION PC CHAPTER 4.
- TRAPS FOR FIXTURES AND DRAIN LINES SHALL BE PROVIDED AND CLEANOUTS INSTALLED IN FULL COMPLIANCE WITH CHAPTER 10 AND CLEANOUTS INSTALLED IN FULL COMPLIANCE WITH CHAPTER 7.
- VERTICAL AND HORIZONTAL PIPING SHALL BE HUNG AND SUPPORTED AS DIRECTED IN SPECIFICATIONS AND WITH THE FULL COMPLIANCE WITH SECTION CHAPTER 3.
- WHERE THE WORK MAKES TEMPORARY SHUT DOWN OF SERVICES UNAVOIDABLE, THEY SHALL BE MADE AT NIGHT OR AT SUCH TIMES THAT WILL CAUSE THE LEAST INTERFERENCE WITH THE ESTABLISHED OPERATING ROUTINE OF THE BUILDING.
- THE SANITARY DRAINAGE SYSTEM SHALL BE SIZED AND INSTALLED IN FULL COMPLIANCE WITH SECTIONS CHAPTER 7.
- THE VENT PIPING FOR THE SANITARY DRAINAGE SYSTEM SHALL BE INSTALLED IN FULL COMPLIANCE WITH CHAPTER 9.
- THE STORM DRAINAGE SYSTEM AND PIPING SHALL BE INSTALLED IN FULL COMPLIANCE WITH CHAPTER 11.
- RODENT PROOFING SHALL BE IN ACCORDANCE WITH SECTION PC 304.
- TEMPORARY TOILET FACILITIES SHALL BE PROVIDED FOR WORKMAN AS PER SECTION PC 311.
- ALL TRENCHING SHALL BE DONE IN ACCORDANCE WITH SECTION PC 306.

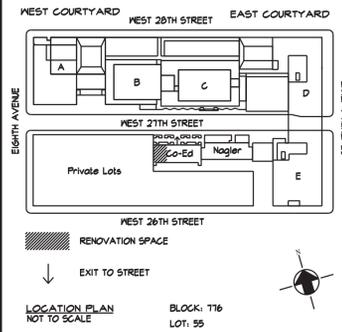
PLUMBING DEMOLITION NOTES

- THE CONTRACTOR SHALL INCLUDE IN HIS PRICE ALL COSTS ASSOCIATED WITH REMOVALS AND RELOCATIONS OF PLUMBING WORK AS DESCRIBED ON THE DRAWINGS AND IN THE SPECIFICATIONS WITH ALLOWANCES FOR EXPECTED OR UNFORESEEN DIFFICULTIES WHEN CONCEALED WORK HAS BEEN EXPOSED. NO CLAIMS FOR ADDITIONAL WORK ASSOCIATED WITH DEMOLITION WILL BE ACCEPTED, EXCEPT IN CERTAIN CASES CONSIDERED JUSTIFIABLE BY THE ARCHITECT.
- THE CONTRACTOR SHALL REMOVE AND/OR RELOCATE ALL EXISTING PLUMBING WORK WHICH INTERFERES WITH THE NEW ARCHITECTURAL LAYOUTS. ALL SYSTEMS WHICH ARE NO LONGER REQUIRED TO FUNCTION SHALL BE REMOVED BACK TO ACTIVE LINES AND SHALL BE CAPPED/PLUGGED OR VALVED OFF AS NEEDED.
- THE CONTRACTOR SHALL PERFORM DEMOLITION AND REMOVAL WORK WITH MINIMUM INTERFERENCE TO FUNCTIONING PLUMBING SYSTEMS. ALL AFFECTED SYSTEMS SHALL BE RECONNECTED AND RESTORED.
- DEMOLITION AND REMOVAL WORK SHALL BE PERFORMED IN A NEAT AND WORKMANLIKE MANNER. THE CONTRACTOR SHALL PATCH, REPAIR, OR OTHERWISE RESTORE ANY DAMAGED INTERIOR OR EXTERIOR BUILDING SURFACE TO ITS ORIGINAL CONDITION.
- THE CONTRACTOR SHALL REMOVE ALL PIPING SUPPORTS, ETC. FROM PARTITIONS THAT ARE TO BE REMOVED. WHERE THE REMOVAL OF THESE ITEMS DISRUPTS EXISTING PIPING THAT IS TO REMAIN, THE CONTRACTOR SHALL INSTALL AND PROVIDE BYPASS CONNECTIONS AS NECESSARY.
- ALL PIPING WHICH BECOMES EXPOSED DURING THE ALTERATION WORK SHALL BE REMOVED AND REROUTED CONCEALED BEHIND FINISHED SURFACES.
- PORTIONS OF MAINS TO BE REMOVED OR ABANDONED AS A RESULT OF DEMOLITION WORK, BUT ARE REQUIRED TO REMAIN ACTIVE, SHALL BE CUT AT CONVENIENT LOCATIONS, REROUTED AND RECONNECTED.
- THE CONTRACTOR SHALL NOTIFY THE OWNER AT THE APPROPRIATE TIME OF THE PROJECTED DEMOLITION AND PHASING SCHEDULE SO THAT REMOVAL OR RELOCATION OF AFFECTED UTILITIES MAY BE CARRIED OUT IN COORDINATION WITH THE PROJECT REQUIREMENTS.
- ALL EXISTING MATERIAL AND EQUIPMENT IN USABLE CONDITION, WHICH IS TO BE REMOVED UNDER THIS CONTRACT SHALL REMAIN THE PROPERTY OF THE OWNER OR SHALL BE DISPOSED OF BY THE PLUMBING CONTRACTOR, AS DIRECTED BY THE OWNER.
- ARRANGE TO WORK CONTINUOUSLY, INCLUDING OVERTIME, IF REQUIRED, TO ASSURE THAT SYSTEMS WILL BE SHUT DOWN ONLY DURING TIME REQUIRED TO MAKE THE NECESSARY CONNECTIONS TO THE EXISTING SYSTEMS.
- ALL PIPING TO BE REMOVED SHALL BE PROPERLY PLUGGED OR CAPPED SO THAT UPON COMPLETION OF ALL NEW WORK, ALL ABANDONED PIPING SHALL BE REMOVED FROM FINISHED AREAS.
- NO DEAD ENDS SHALL BE LEFT ON ANY PIPING UPON COMPLETION OF THE PROJECT.
- EXISTING EXPOSED PIPING NOT SPECIFICALLY NOTED OR SHOWN ON DRAWINGS TO BE ABANDONED SHALL BE COMPLETELY REMOVED.

GENERAL PLUMBING NOTES:

- EACH BIDDER SHALL VISIT THE SITE AND BECOME INFORMED AS TO THE CONDITION OF THE PREMISES AND THE EXTENT AND CHARACTER OF WORK REQUIRED. NO ADDITIONAL COMPENSATION WILL BE APPROVED DUE TO THE FIELD CONDITIONS.
- ALL EXISTING SYSTEMS SHALL BE LEFT IN PERFECT WORKING ORDER UPON COMPLETION OF ALL NEW WORK.
- EXACT SIZES AND LOCATIONS OF ALL EXISTING PIPING SHALL BE VERIFIED ON THE SITE.
- NO EXISTING OR REMOVED PIPING SHALL BE REUSED UNLESS OTHERWISE INDICATED.
- THIS CONTRACTOR SHALL NOT INTERRUPT ANY OF THE SERVICES OF THE EXISTING BUILDING NOR INTERFERE WITH THE SERVICES IN ANY WAY WITHOUT THE EXPRESSED PERMISSION OF THE OWNER. SUCH INTERRUPTIONS AND INTERFERENCES SHALL BE MADE AS BRIEF AS POSSIBLE.
- UNDER NO CIRCUMSTANCES WILL THIS CONTRACTOR OR HIS WORKMEN BE PERMITTED TO USE ANY PART OF THE BUILDING AS A SHOP, EXCEPT PART DESIGNATED BY THE OWNER FOR SUCH PURPOSES.
- UNNECESSARY NOISE SHALL BE AVOIDED AT ALL TIMES AND NECESSARY NOISE SHALL BE REDUCED TO A MINIMUM.
- WHERE THE WORK MAKES TEMPORARY SHUT DOWN OF SERVICES UNAVOIDABLE, THEY SHALL BE MADE AT NIGHT OR AT SUCH TIMES THAT WILL CAUSE THE LEAST INTERFERENCE WITH THE ESTABLISHED OPERATING ROUTINE OF THE BUILDING.
- THIS CONTRACTOR SHALL ARRANGE ALL WORK CONTINUOUSLY, INCLUDING OVERTIME AS REQUIRED, TO ASSURE THAT SERVICES WILL BE SHUT DOWN AND CUT-IN ONLY DURING THE TIME ACTUALLY REQUIRED TO MAKE THE NECESSARY CONNECTION TO EXISTING WORK.
- THIS CONTRACTOR SHALL GIVE AMPLE WRITTEN NOTICE IN ADVANCE TO THE OWNER OF ANY REQUIRED SHUT DOWNS.
- ANY AND ALL REQUIRED DEMOLITION WORK TO BE PERFORMED ABOVE EXISTING SUSPENDED CEILINGS AND FURRED OUT WALLS SHALL BE DONE AT THE TIME WHEN THE EXISTING CEILINGS AND FURRED OUT WALLS ARE REMOVED BY THE GENERAL CONTRACTOR.
- TO ENSURE CONTINUOUS OPERATION, MAKE ALL NECESSARY TEMPORARY CONNECTIONS BETWEEN NEW AND EXISTING WORK. ALL COST RESULTING FROM TEMPORARY SHUTDOWNS SHALL BE BORNE BY THIS CONTRACTOR.
- ALL VENT, HOT WATER CIRCULATION, HOT AND COLD WATER PIPING ARE AT CEILING OR IN HUNG CEILING; EXCEPT IN PIPE CHASES OR OTHERWISE NOTED.
- CONTRACTOR SHALL CHECK AND VERIFY THE EXACT LOCATION OF ALL PIPE PENETRATIONS, PIPE ELEVATIONS, DRAINS, ETC.
- ACCESS DOORS SHALL BE PROVIDED FOR ALL CLEANOUTS, VALVES, FLUSH VALVES, AND ANY OTHER EQUIPMENT AND ACCESSORIES THAT MAY REQUIRE ACCESS FOR MAINTENANCE OR OPERATION WHICH ARE LOCATED BEHIND WALLS AND PARTITIONS OR CONCEALED IN HUNG CEILINGS. COORDINATE INSTALLATION WITH GENERAL CONTRACTOR.
- THIS CONTRACTOR SHALL OBTAIN A COPY OF THE BUILDING RULES AND REGULATIONS AND PROVIDE ALL WORK AS REQUIRED TO CONFORM TO ALL REQUIREMENTS.
- THIS CONTRACTOR SHALL PROVIDE ALL WORK AT THE CEILING OF THE FLOOR BELOW AS INDICATED ON THE DRAWINGS. COORDINATE EXACT ROUTING OF PIPING IN THE FIELD WITH EXISTING CONDITIONS AND WORK OF OTHER TRADES. ALL WORK SHALL BE SCHEDULED AND COORDINATED TO ACCOMMODATE TENANT AND BUILDING ENGINEER.
- THIS CONTRACTOR SHALL PROVIDE CUTTING AND PATCHING OF ALL WORK AS REQUIRED INCLUDING WORK OUTSIDE OF THE GENERAL PROJECT LIMIT LINES (I.E. CEILING OF THE FLOOR BELOW).
- THIS CONTRACTOR SHALL PROVIDE CAPPED/VALVED OUTLETS FOR FUTURE CONNECTIONS WHENEVER CONNECTING INTO AN EXISTING CAPPED/VALVED OUTLET. SIZE OF NEW CAPPED/VALVED OUTLET SHALL MATCH EXISTING.

rev. no. date revisions



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 212 889 4045 Fax 212 889 3672

PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
PLUMBING SYMBOLS LIST,
ABBREVIATIONS, NOTES, AND
DRAWINGS LIST

DOB NOW JOB#
 SEAL & SIGNATURE: DATE: 2022.09.01
 PROJECT No: 12224.154
 DRAWING BY: CN/TC
 CHK BY: CN
 DWG No:
P-001.00
 SCALE NTS 1 OF 7

PLUMBING FIXTURE SPECIFICATION SCHEDULE

FIXTURE DESIGNATION	MODEL No.	MANUFACTURER (OR EQUAL)	DESCRIPTION
P-1 WATER CLOSET	CT708EVG	TOTO	WALL MOUNTED FLUSHMETER VALVE TOILET, SIPHON JET, VITREOUS CHINA WITH CEFIONTECT CERAMIC GLAZE, ELONGATED BOWL WITH 1/2" BACK SPUD, LOW CONSUMPTION 1.28GPF, ADA COMPLIANT
	TE12LARVSS	TOTO	1.28GPF, SELF-POWERED HYDROELECTRIC FLUSH VALVE, STAINLESS STEEL COVER PLATE AND SOLID BRONZE VALVE BODY, SELF-CLEANING PISTON WITH 360° FILTER SCREEN, MANUAL FLUSH OVERRIDE, CONCEALED FLUSH VALVE WITH ANGLE STOP AND 1-1/2" VACUUM BRAKER, ADA COMPLIANT
	SC534	TOTO	TOILET SEAT, OPEN FRONT LESS COVER.
P-2 LAVATORY	SOHO K-2084	KOHLER	WALL-MOUNT BATHROOM SINK, VITREOUS CHINA, 20"x18", ONE HOLE, CONCEALED ARM CARRIER INSTALLATION, ADA COMPLIANT
	TEL115-D110EM	TOTO	SENSOR OPERATED, SELF-GENERATING HYDROPOWERED ECOPOWER SYSTEM, 0.5 GPM, LEAD FREE, ADA COMPLIANT, PROVIDED WITH THERMOSTATIC MIXING VALVE TLM10
		ZURN	LAVATORY CARRIER
P-3 SINK	STRIVE K-5287	KOHLER	UNDER-MOUNT SINGLE-BOWL KITCHEN SINK WITH RACK, 18" MINIMUM BASE CABINET WIDTH, 9" DEPTH, 16 GAUGE STAINLESS STEEL, ADA COMPLIANT, TO BE PROVIDED WITH SINK DRAIN AND STRAINER.
	CRUE K-22972	KOHLER	LEAD FREE, PULL-DOWN SINGLE-HANDLE KITCHEN SINK FAUCET, 1.5GPM, TEMPERATURE MEMORY AND CERAMIC DISC VALVES.

NYC DOB SPECIAL INSPECTION NOTES

- AN INDEPENDENT SPECIAL INSPECTOR SHALL BE RETAINED TO PERFORM SPECIAL INSPECTIONS AS WELL AS FILE FORM TR-1 FOR PLUMBING SYSTEM DESIGN AS DOCUMENTED ON THESE PLANS IN ACCORDANCE WITH THE NYC BUILDING CODE.
- SPECIAL INSPECTION REQUIRED FOR FIRE-RESISTANT PENETRATIONS AND JOINTS PER 2014 NYCBC 1704.27.
- SPECIAL INSPECTION REQUIRED FOR POST-INSTALLED ANCHORS PER 2014 NYCBC 1704.32.
- ENERGY CODE COMPLIANCE INSPECTION REQUIRED PER 2014 NYCBC 110.3.5.
- FINAL INSPECTION REQUIRED PER 2014 NYCBC 28-116.2.4.2, BC110.5, DIRECTIVE 14 OF 1975, & 1RCNY 101-10.

NYC FLOOD HAZARD AREA NOTES

- PROPERTY IS NOT IN SPECIAL FLOOD HAZARD AREA

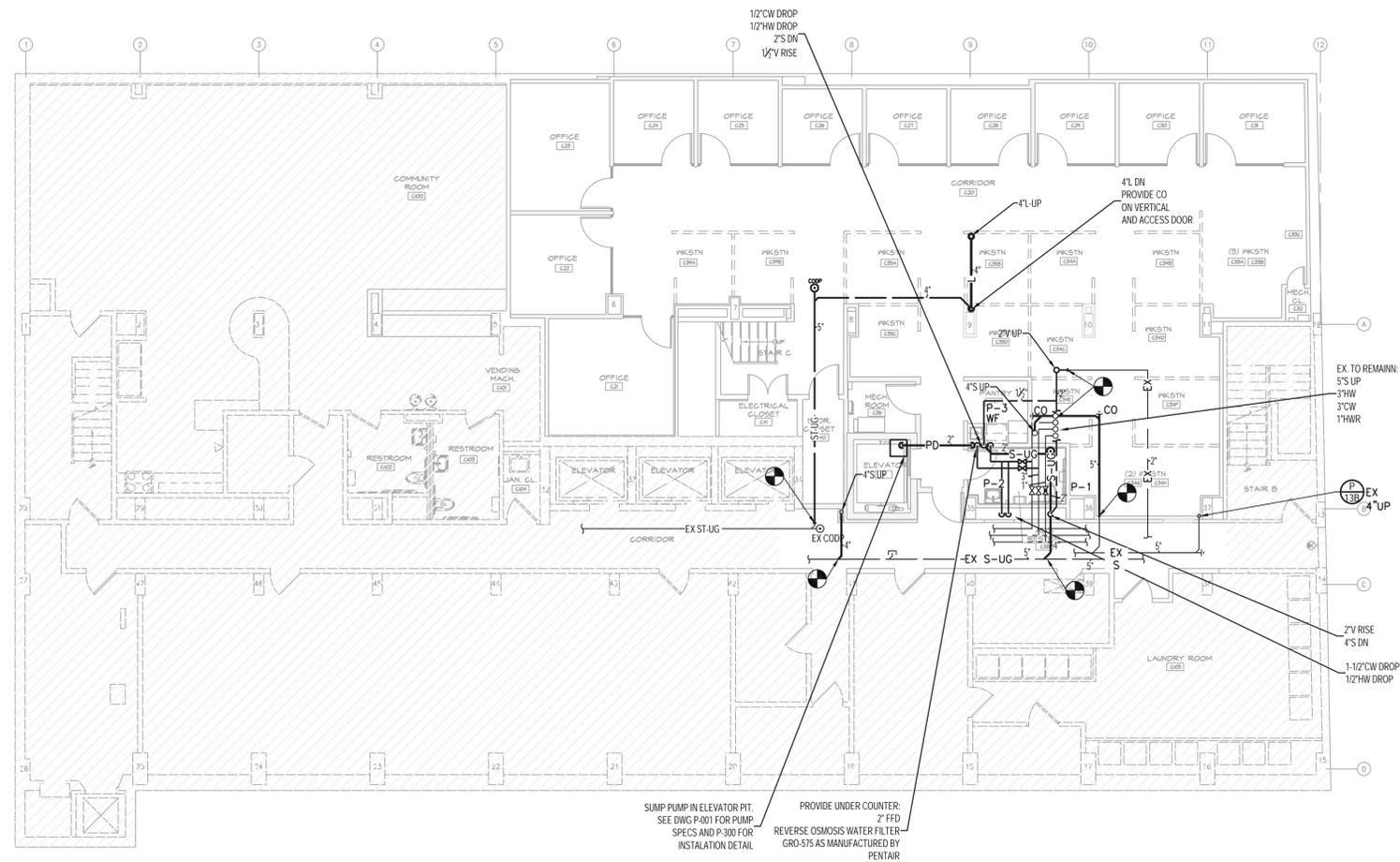
PLUMBING DRAWING LIST

P-001.00	PLUMBING NOTES, SYMBOLS, ABBREVIATIONS & DRAWING LIST
P-100.00	CELLAR FLOOR PLUMBING PLAN
P-101.00	1ST FLOOR PLUMBING PLAN
P-501.00	PLUMBING DETAIL
P-601.00	PLUMBING RISER DIAGRAM
P-900.00	CELLAR FLOOR PLUMBING DEMOLITION PLAN
P-901.00	1ST FLOOR PLUMBING DEMOLITION PLAN

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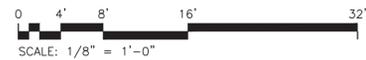
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SUMP PUMP IN ELEVATOR PIT. SEE DWG P-001 FOR PUMP SPECIFICATIONS AND P-300 FOR INSTALLATION DETAIL.

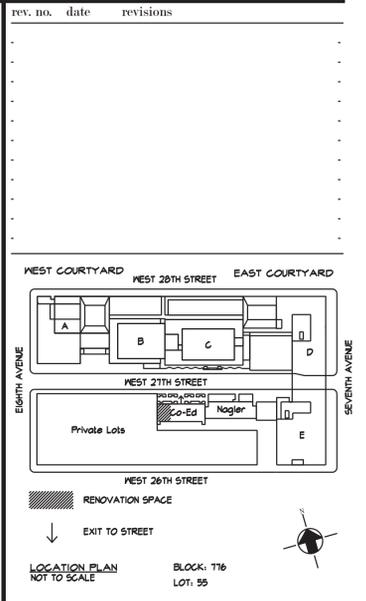
PROVIDE UNDER COUNTER: 2" FFD REVERSE OSMOSIS WATER FILTER. GRO-SIS AS MANUFACTURED BY PENTAIR.



ISSUED FOR BID 09/01/2022

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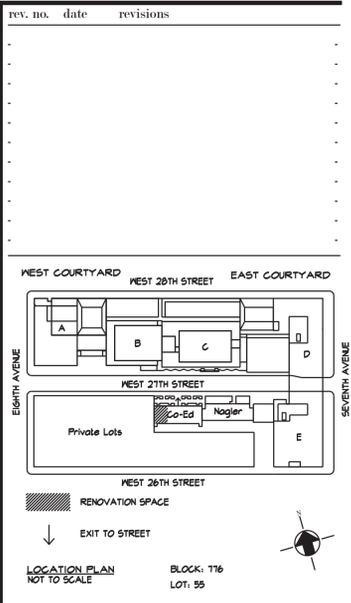
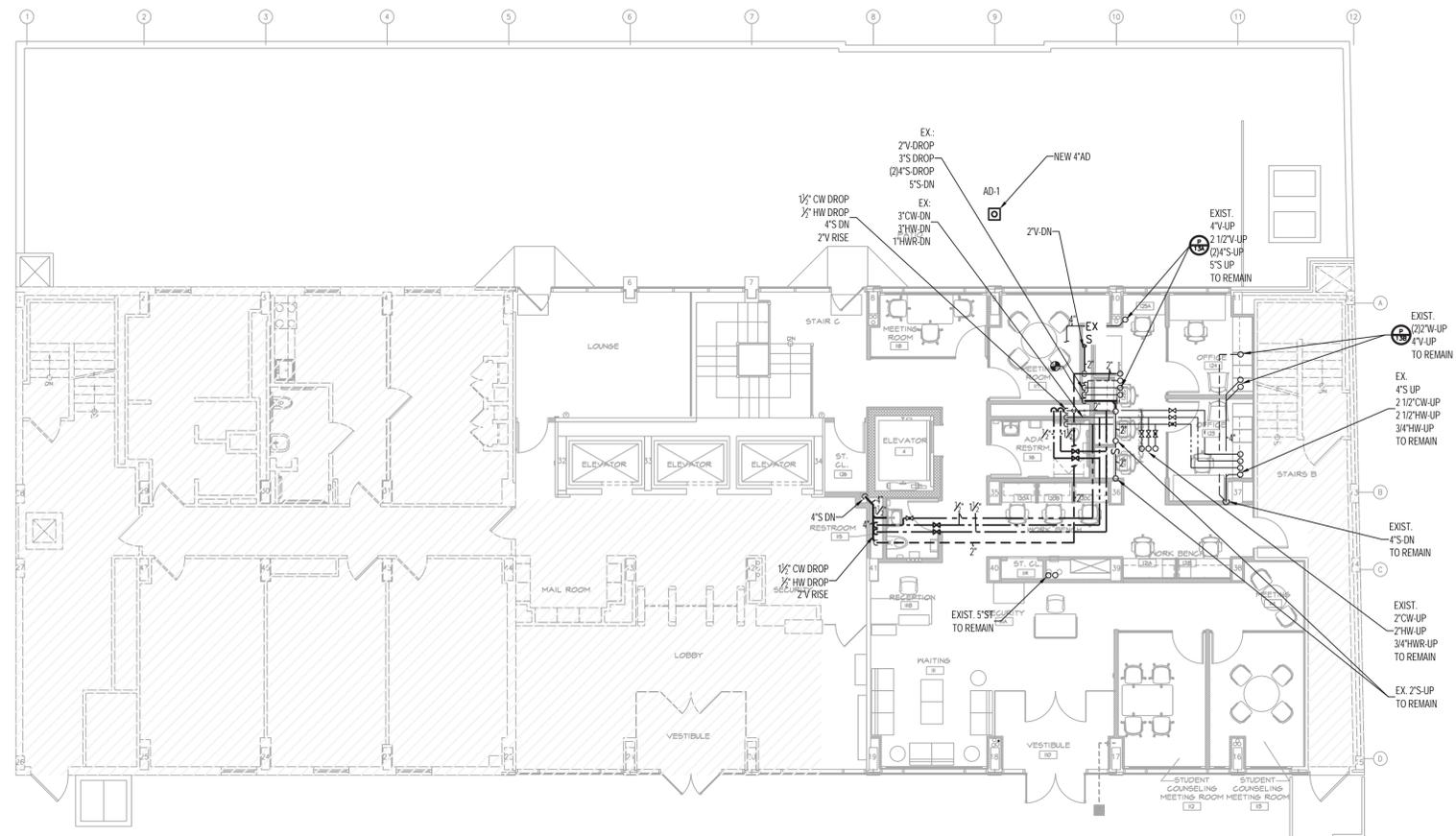
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 443 Park Avenue South New York, NY 10016
 212 889 4045 Fax 212 889 3672

PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 21TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 CELLAR LEVEL
 PLUMBING
 PLAN

DOB NOW JOB#	
SEAL & SIGNATURE:	DATE: 2022.09.01
	PROJECT No: 12284.154
	DRAWING BY: CN/TC
	CHK BY: CN
	DWG No:
	P-100.00
	SCALE: 1/8"=1'
	2 OF 7



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PROJECT:
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 NEW YORK NY 10001

DRAWING TITLE:
 1ST FLOOR
 PLUMBING
 PLAN

DOB NOE JOB#	
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	PROJECT No: 12284.154
	DRAWING BY: CN/TC
	CHK BY: CN
	DWG No:
	P-101.00
	SCALE: 1/8"=1'
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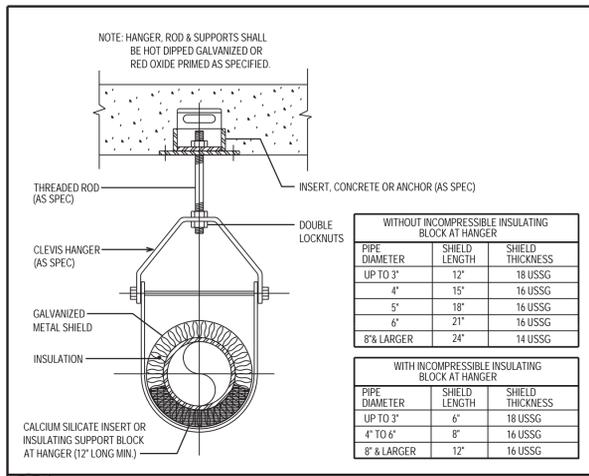


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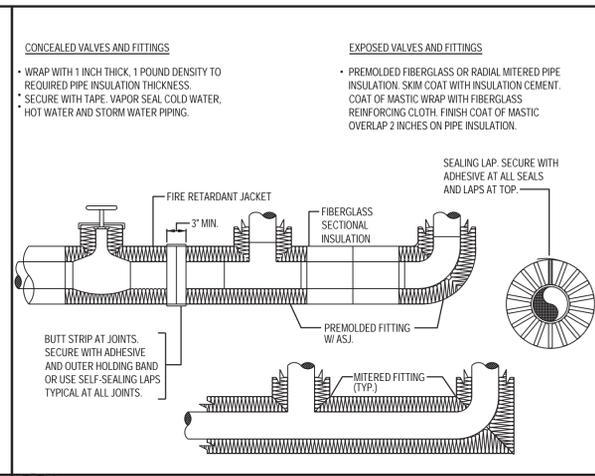




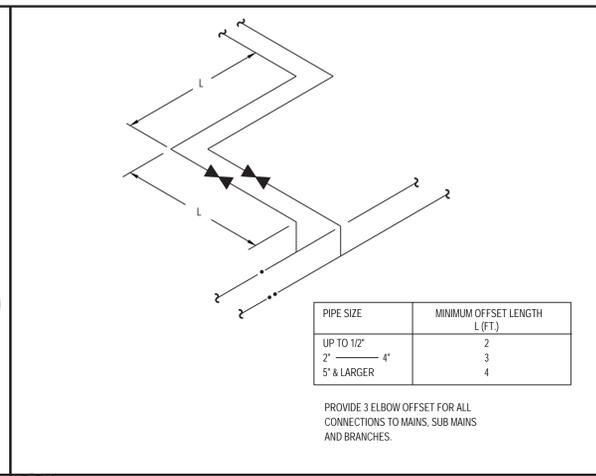
WITHOUT INCOMPRESSIBLE INSULATING BLOCK AT HANGER		
PIPE DIAMETER	SHIELD LENGTH	SHIELD THICKNESS
UP TO 3"	12"	18 USGG
4"	15"	18 USGG
5"	18"	18 USGG
6"	21"	18 USGG
8" & LARGER	24"	14 USGG

WITH INCOMPRESSIBLE INSULATING BLOCK AT HANGER		
PIPE DIAMETER	SHIELD LENGTH	SHIELD THICKNESS
UP TO 3"	6"	18 USGG
4" TO 6"	8"	16 USGG
8" & LARGER	12"	16 USGG

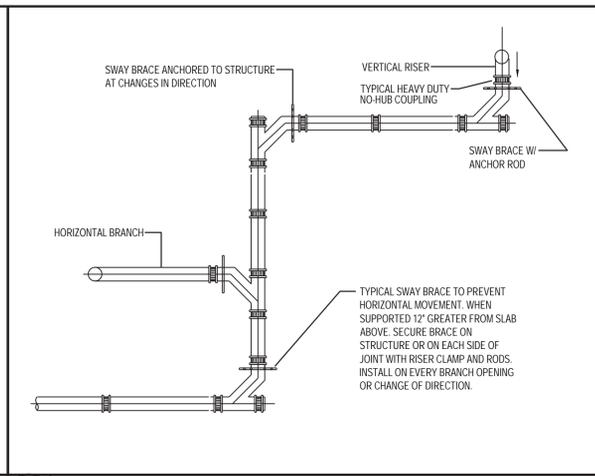
1 Insulated Pipe Support
Not to Scale



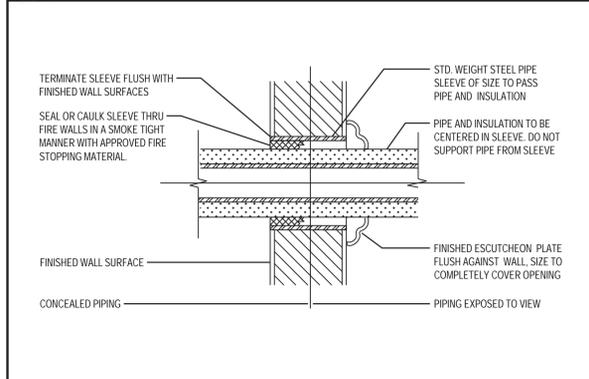
2 Insulation of Piping, Valves and Fittings
Not to Scale



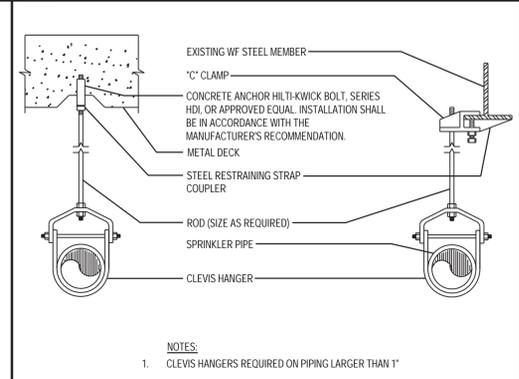
3 Typical Branch Take-off
Not to Scale



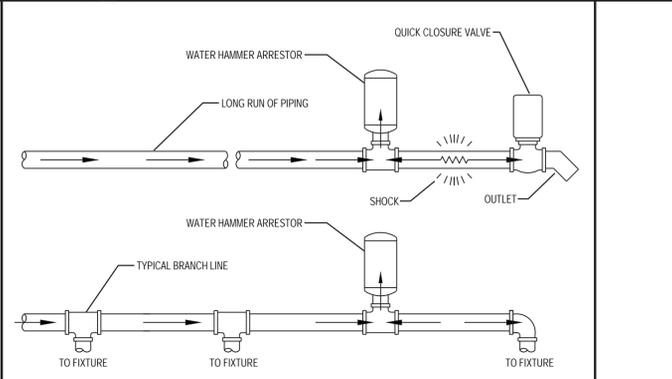
4 Sway Bracing for Horizontal Drainage Piping
Not to Scale



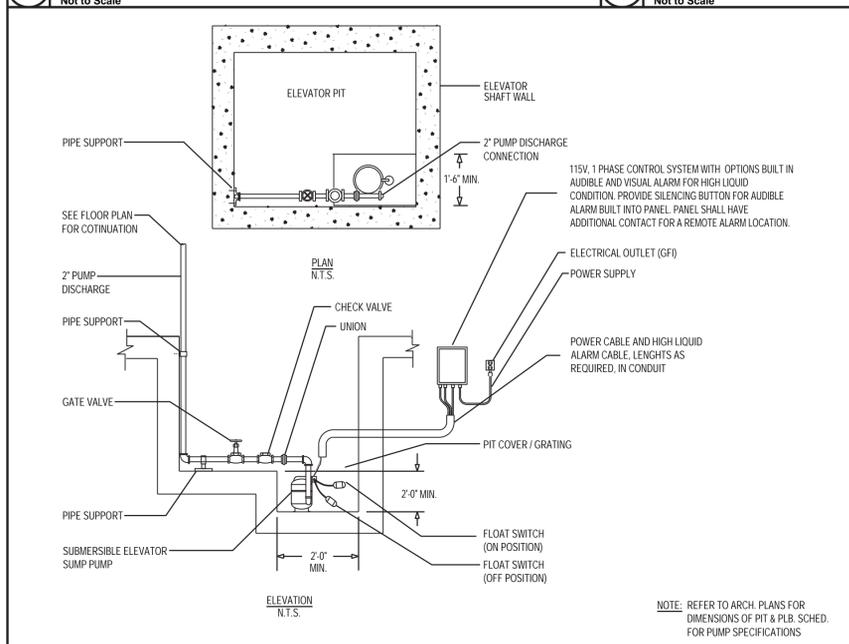
5 Pipe Sleeves Thru Walls
Not to Scale



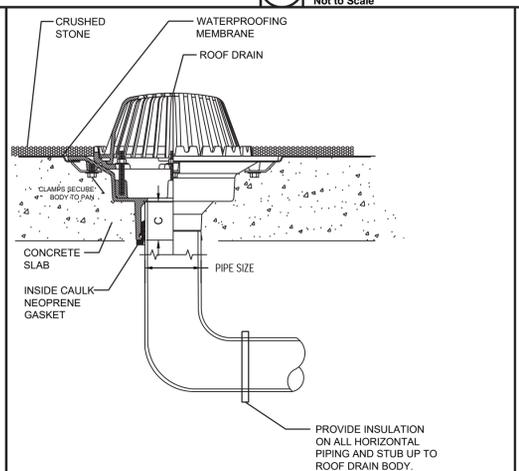
7 Typical Hanger Detail
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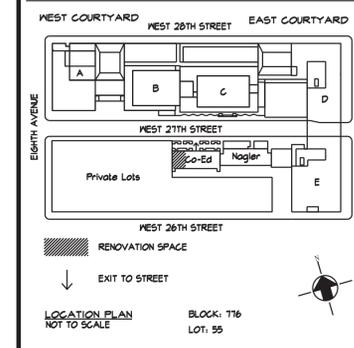
8 Water Hammer Arrestor
Not to Scale



9 Elevator Sump Pump
Not to Scale



10 Roof Drain
Not to Scale



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PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 21TH ST
NEW YORK NY 10001

DRAWING TITLE:
PLUMBING DETAILS

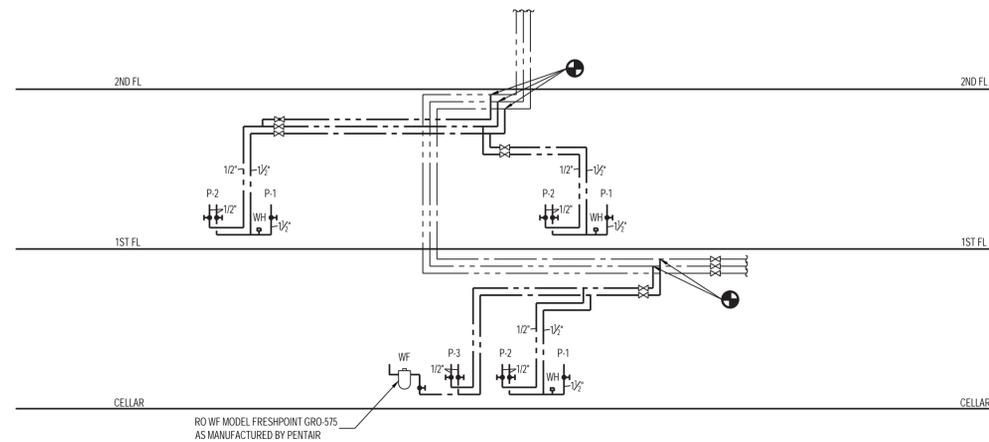
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	P-501.00
SCALE: NTS	4 OF 7

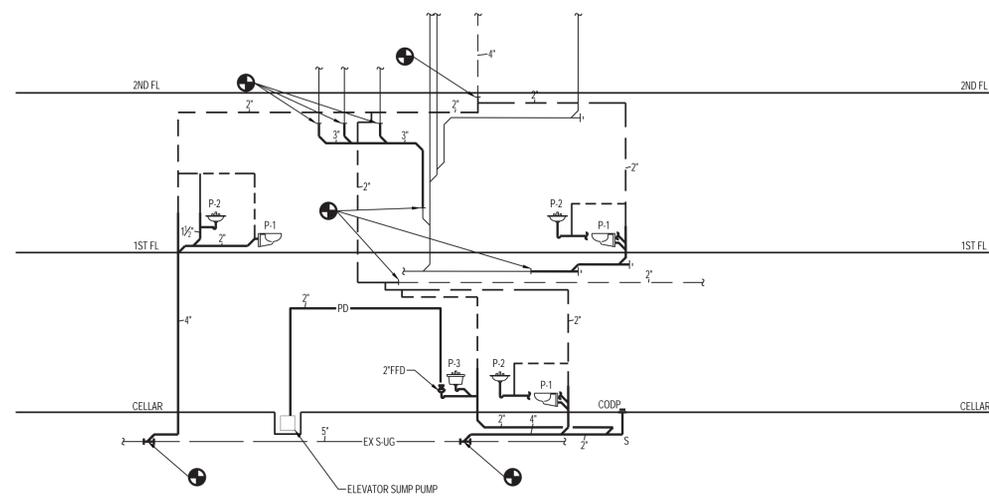
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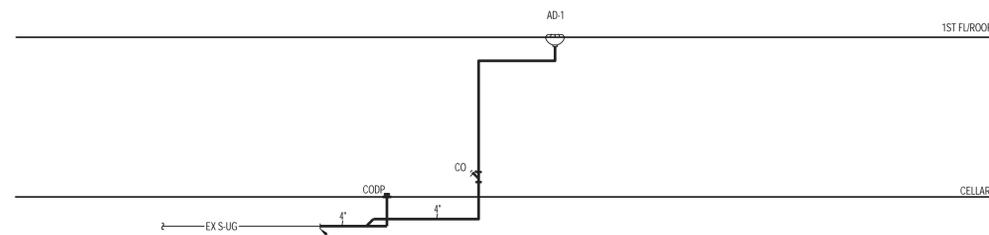




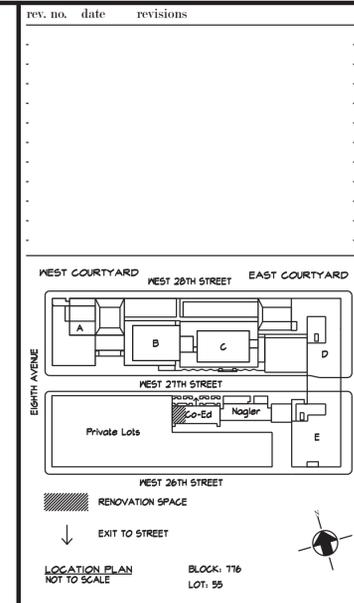
DOMESTIC WATER RISER DIAGRAM
NTS



SANITARY RISER DIAGRAM
NTS



STORM RISER DIAGRAM
NTS



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PROJECT:
**CO-ED DORMITORY
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230 WEST 21TH ST
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DRAWING TITLE:
PLUMBING RISERS DIAGRAM

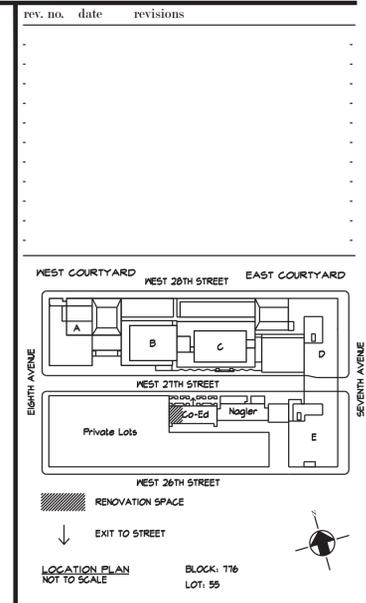
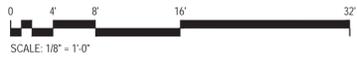
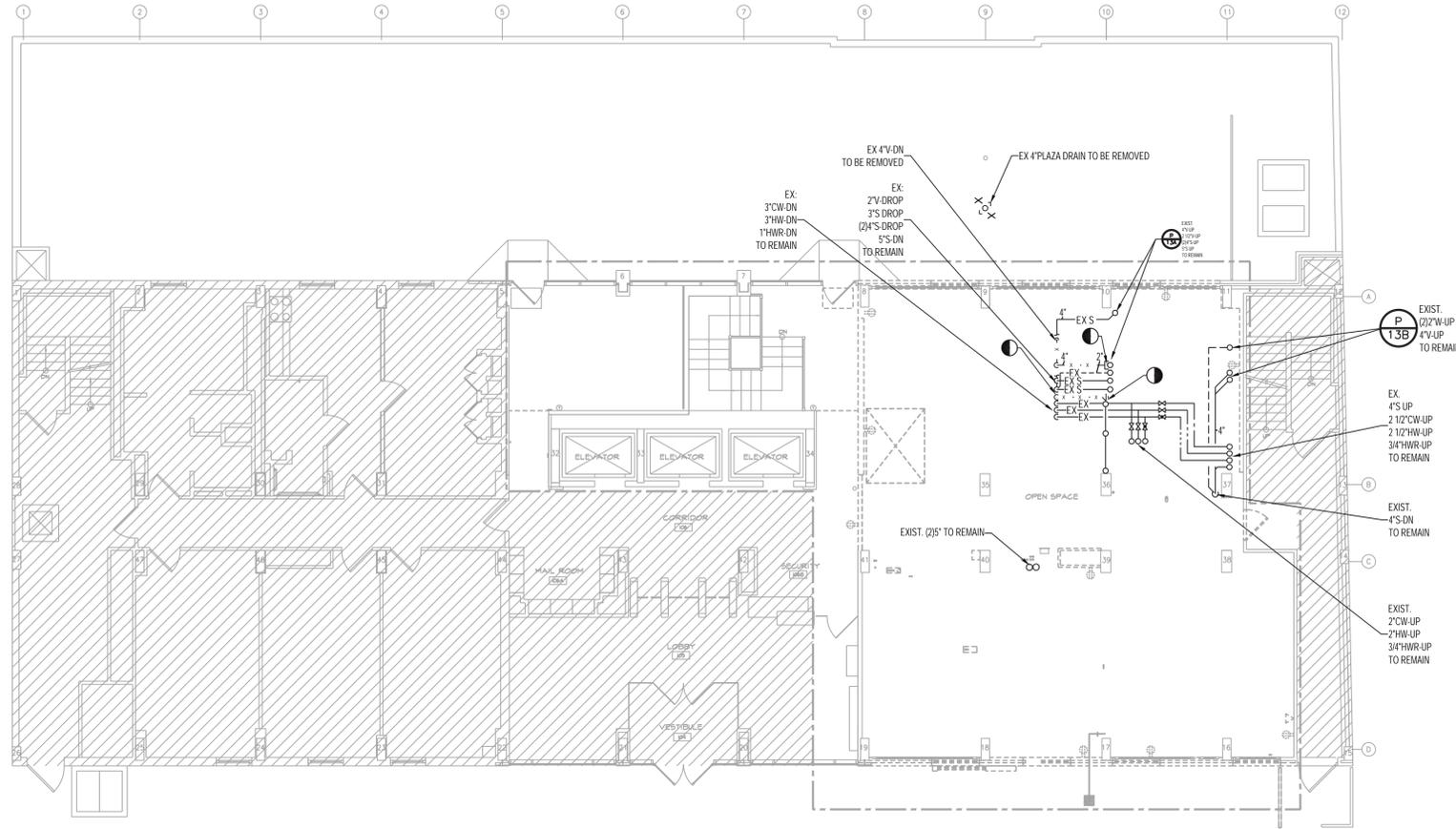
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SEAL & SIGNATURE:	DATE: 2022.09.01
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	DRAWING BY: CN/TC
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	P-601.00
SCALE: NTS	5 OF 7

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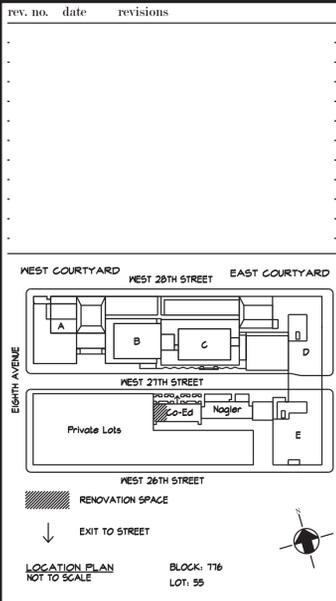
DRAWING TITLE:
 1ST FLOOR
 PLUMBING
 DEMOLITION PLAN

DOB NCE JOB#	
SEAL & SIGNATURE:	DATE: 2022.09.01
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	P-901.00
	SCALE: 1/8"=1'
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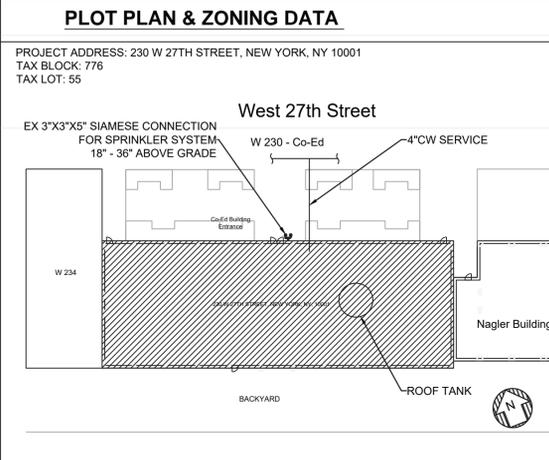
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FIRE PROTECTION SYMBOLS	
	SPRINKLER MAIN PIPING
	SPRINKLER BRANCH PIPING
	SPRINKLER PIPING UNDER OBSTRUCTION
	SPRINKLER DRAIN PIPING
	EXISTING PIPING (REFER TO LETTER DESIGNATION ABOVE)
	EXISTING PIPING TO BE REMOVED
	UPRIGHT/ PENDANT SPRINKLER HEAD
	CONCEALED SPRINKLER HEAD
	SIDEWALL SPRINKLER HEAD
	CAPPED OUTLET
	FIRE DEPT. CONNECTION (WALL MOUNTED)
	FIRE HOSE RACK
	FIRE HOSE CABINET
	FLOOR CONTROL VALVE ASSEMBLY (FCVA)
	3-WAY/ 4-WAY ROOF MANIFOLD
	FIRE HOSE VALVE
	FIRE PUMP (AUTOMATIC FIRE PUMP)
	JOCKEY PUMP
	RISER SERVICE
	RISER NUMBER
	CONNECT NEW WORK TO EXISTING
	DISCONNECT EXISTING WORK & CAP

FIRE PROTECTION ABBREVIATIONS			
ABD	AUTOMATIC BALL DRIP	HZ	HIGH ZONE
AFF	ABOVE FINISHED FLOOR	ID	INSIDE DIAMETER
AFP	AUTOMATIC FIRE PUMP	IE	INVERT ELEVATION
ARCH	ARCHITECTURAL	IN	INCH
BFP	BACKFLOW PREVENTER	JP	JOCKEY PUMP
BLDG	BUILDING	LP	LOW POINT
BOP	BOTTOM OF PIPE	LZ	LOW ZONE
CFM	CUBIC FEET PER MINUTE	MAX	MAXIMUM
CLG	CEILING	MECH	MECHANICAL
COL	COLUMN	MER	MECHANICAL EQUIPMENT ROOM
CONN	CONNECTION	MFR	MANUFACTURER
CONST	CONSTRUCTION	MIN	MINIMUM
CONT	CONTINUATION	MISC	MISCELLANEOUS
CV	CHECK VALVE	MTD	MOUNTED
DCDA	DOUBLE CHECK DETECTOR ASSEMBLY	NIC	NOT IN CONTRACT
DIM	DIMENSION	No.	NUMBER
DN	DOWN (THRU FLOOR SLAB)	NTS	NOT TO SCALE
DPV	DRY PIPE VALVE	PO	PLUGGED OUTLET
DR	DRAIN	PSIG	POUNDS PER SQUARE INCH (GAUGE)
DWG	DRAWING	RCV	RISER CONTROL VALVE
EA	EACH	REV	REVISED / REVISION
EL	ELEVATION	RPM	REVOLUTIONS PER MINUTE
ELEC	ELECTRICAL	RPZ	REDUCED PRESSURE ZONE BACKFLOW PREVENTER
ELEV	ELEVATOR	RV	RELIEF VALVE
EMR	ELEVATOR MACHINE ROOM	SCHED	SCHEDULE
ENCL	ENCLOSURE	SECT	SECTION
EQUIP	EQUIPMENT	SLV	SLEEVE
EX	EXISTING	SP	SPRINKLER
FCVA	FLOOR CONTROL VALVE ASSEMBLY	SS	STAINLESS STEEL
FD	FLOOR DRAIN	SSFP	SPECIAL SERVICE FIRE PUMP
FDC	FIRE DEPARTMENT CONNECTION	SQ.FT.	SQUARE FOOT (+/-)
FE	FIRE EXTINGUISHER	STD	STANDARD
FHC	FIRE HOSE CABINET	TCSF	TEMPORARY CORE SPRINKLER PROTECTION
FHR	FIRE HOSE RACK	TEMP	TEMPORARY
FHV	FIRE HOSE VALVE	THRU	THROUGH
FHVC	FIRE HOSE VALVE CABINET	TOP	TOP OF PIPE
FF	FINISH(ED) FLOOR	TOS	TOP OF SLAB
FL	FLOOR	TYP	TYPICAL
FSP	FIRE STANDPIPE	UP	UP (THRU FLOOR SLAB)
FT	FEET	VERT	VERTICAL
GC	GENERAL CONTRACTOR	VIF	VERIFY IN FIELD
GAL	GALLONS	VLV	VALVE
GPM	GALLONS PER MINUTE	VO	VALVED OUTLET
HP	HORSEPOWER/HIGH POINT	W/	WITH
HR	HOUR	WFS	WATER FLOW SWITCH

FIRE PROTECTION DRAWING LIST	
SP-001.00	SPRINKLER SYMBOLS, ABBREVIATIONS, PLOT PLAN, AND DRAWINGS LIST
SP-002.00	SPRINKLER NOTES
SP-100.00	CELLAR FLOOR SPRINKLER PLAN
SP-101.00	1ST FLOOR SPRINKLER PLAN
SP-501.00	SPRINKLER DETAILS
SP-601.00	SPRINKLER RISER DIAGRAM
SP-900.00	CELLAR FLOOR SPRINKLER DEMOLITION PLAN
SP-901.00	1ST FLOOR SPRINKLER DEMOLITION PLAN



SPRINKLER HEAD SCHEDULE											
SYMBOL	MANUFACTURER MODEL No	SIZE	TYPE	SIN	RESPONSE	K-FACTOR	TEMP. RATING	COVERAGE	APPROVED FINISHES	APPROVED ESCUTCHEONS	LOCATION
	RELIABLE GS-56	1/2"	CONCEALED	RA3415	QUICK	5.6	165 F	STANDARD	WHITE COVER PLATE	-	AREAS WITH SUSPENDED CEILING LIGHT & ORDINARY HAZARD OCCUPANCY
	RELIABLE, F1FR56	1/2"	HORIZONTAL SIDEWALL	RA1435	QUICK	5.6	155 F	STANDARD	CHROME	F1	-

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PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 SPRINKLER SYMBOLS LIST,
 ABBREVIATIONS, PLOT PLAN, AND
 DRAWINGS LIST

DOB NOW JOB#
 SEAL & SIGNATURE: _____ DATE: 2022.09.01
 PROJECT No: 12284.154
 DRAWING BY: CN/TC
 CHK BY: CN
 DWG No: SP-001.00
 SCALE: NTS 1 OF 8

FIRE PROTECTION GENERAL NOTES

- ALL SPRINKLER LOCATIONS SHOWN ON SPRINKLER DRAWING ARE DIAGRAMMATIC. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT SPRINKLER LOCATION AND ALIGNMENT.
- SPRINKLER CONTRACTOR IS RESPONSIBLE FOR PROVIDING COMPLETE SHOP DRAWINGS INCLUDING HEAD LOCATIONS, PIPE SIZING AND HYDRAULIC CALCULATIONS.
- THE SPRINKLER CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS, INSPECTIONS & SIGN-OFF REQUIRED BY THE BUILDING DEPT. OFFICIALS.
- SPRINKLER HEADS IN GYPSUM BOARD CEILING AREAS TO BE ALIGNED WITH OR CENTERED BETWEEN ADJACENT LIGHT FIXTURES.
- PROVIDE 'SWING ARM' CONNECTION TO ALL SPRINKLER HEADS TO ASSURE PRIOR ALIGNMENT.
- REFER TO ARCHITECTURAL AND STRUCTURAL DRAWING FOR EXACT SIZE & LOCATION OF SLAB PENETRATIONS. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS WITH ALL PENETRATIONS FOR APPROVAL TO STRUCTURAL & MEP ENGINEER PRIOR INSTALLATION OF SPRINKLER WORK.
- PROVIDE SPRINKLER COVERAGE UNDER OBSTRUCTIONS 48" IN WIDTH OR GREATER.
- ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.
- EXISTING PIPING WHERE SHOWN FOR VARIOUS SYSTEMS IS DIAGRAMMATIC ONLY.
- BECOME THOROUGHLY FAMILIAR WITH ACTUAL EXISTING CONDITIONS AT THE BUILDING OF THE PRESENT INSTALLATIONS, INCLUDING LOCATIONS, SIZES, AND ELEVATIONS OF PIPING, TO WHICH CONNECTIONS MUST BE MADE OR WHICH MUST BE CHANGED OR ALTERED. THE INTENT OF THE WORK IS SHOWN ON THE DRAWINGS AND DESCRIBED HEREINAFTER, AND NO CONSIDERATION WILL BE GRANTED BY REASON OF LACK OF FAMILIARITY ON THE PART OF THE CONTRACTOR WITH ACTUAL PHYSICAL CONDITIONS AT THE SITE.
- INSTALL ALL WORK IN FULL ACCORDANCE WITH THE REQUIREMENTS OF ALL LOCAL AND GOVERNMENTAL DEPARTMENTS HAVING JURISDICTION OVER THESE MATTERS, AS WELL AS WITH ANY REQUIREMENTS OF THE NFPA, UL, AND OTHER APPLICABLE CODES. SECURE AND PAY FOR NECESSARY APPROVALS, PERMITS, INSPECTIONS, ETC., AND DELIVER THE OFFICIAL RECORDS OF THE GRANTING OF PERMITS TO THE ARCHITECT WITHOUT ADDITIONAL COST TO THE OWNER.
- PREPARE AND SUBMIT FOR APPROVAL MANUFACTURER'S SHOP DRAWINGS AND DATA FOR EQUIPMENT, AND DETAILED DRAWINGS OF ALL SPRINKLER PIPING WORK.
- KEEP AN ACCURATE RECORD ON ALL DEVIATIONS BETWEEN WORK SHOWN ON DRAWINGS AND THAT WHICH IS ACTUALLY PERFORMED.
- ALL FIRESTOPPING MUST BE APPROVED PRODUCTS THAT ARE UL RATED.
- ALL SPRINKLER HEADS TO BE INSTALLED SHALL BE NEW.

SPRINKLER SIGNAGE NOTE

CONTRACTOR SHALL PROVIDE PERMANENTLY MARKED RIGID SIGN LOCATED AT EACH FLOOR CONTROL VALVE ASSEMBLY IDENTIFYING THE HYDRAULICALLY CALCULATED SPRINKLER SYSTEM. THE SIGN SHALL INCLUDE THE FOLLOWING INFORMATION.

- LOCATION OF DESIGNATED AREA OR AREAS.
- DISCHARGE DENSITIES OVER THE DESIGN AREA OR AREAS
- REQUIRED FLOW AND RESIDUAL PRESSURE AT THE BASE OF THE RISER
- OCCUPANCY CLASSIFICATION
- HOSE STREAM ALLOWANCE INCLUDED IN ADDITION TO THE SPRINKLER DEMAND
- THE NAME OF THE CONTRACTOR.

SPRINKLER AND STANDPIPE PAINTING

IN ACCORDANCE WITH 2014 NYCBC CHAPTER 9 SECTION 903.6. ALL STANDPIPE AND SPRINKLER PIPING INCLUDING MAINS, LOOP MAINS AND VALVE HANDLES MUST BE PAINTED, AS OUTLINED IN THE LAW. THIS LAW IS RETROACTIVE AND IS REQUIRED FOR ALL PROJECTS. SPRINKLER BRANCH LINES FROM MAIN TEES ARE EXCLUDED FROM THIS REQUIREMENT. SAMPLES OF THE THREE PRIMARY COLORS USED, RED, GREEN AND YELLOW SHALL BE SUBMITTED FOR APPROVAL BY ENGINEER. PAINTING OF ALL PIPING SHALL REQUIRE A SPECIAL INSPECTION AND CERTIFICATION. NO PIPING SHALL BE ENCLOSED PRIOR TO PAINT INSPECTION BY SPECIAL INSPECTOR.

2014 NEW YORK CITY SPRINKLER NOTES

- SPRINKLER SYSTEM CONFORMS TO NEW YORK CITY BUILDING CODE, CHAPTER 9, SECTION BC 903 AND APPENDIX Q, SECTIONS BC Q101 & BC Q102.
- THE INSTALLATION, COMPONENTS, SIZING, SPACING, CLEARANCES, POSITION & TYPE OF SYSTEMS CONFORMS TO BC 903.3 & BC Q102, CHAPTER 6.
- ONLY APPROVED DEVICES SHALL BE USED AS PER BC Q102, SECTION 6.1.1
- SPRINKLERS SHALL BE PROTECTED AGAINST FREEZING & INJURY AS PER BC Q102, CHAPTER 8.
- INSPECTIONS & TESTS OF SPRINKLER SYSTEMS SHALL BE CONDUCTED AS PER BC 901.5 & BC Q102, CHAPTER 26.
- THE OCCUPANCY OF THE AREAS TO BE SPRINKLERED SHALL BE IN ACCORDANCE WITH BC 903 & BC Q102, CHAPTER 5.
- WATER SUPPLY TEST PIPES & GAUGES SHALL BE PROVIDED AS PER BC Q102, CHAPTER 5.
- SPACING, LOCATION & POSITION OF SPRINKLERS SHALL BE IN ACCORDANCE WITH BC Q102, CHAPTER 8.
- THERE IS NO HIGH PILED STORAGE AS DEFINED IN BC Q102, CHAPTER 12.
- ALL PIPES PASSING THROUGH WALLS SHALL BE IN ACCORDANCE WITH BC 713.
- DISTANCE OF SPRINKLERS FROM HEAT SOURCE SHALL BE AS PER TABLE 8.3.2.5(A) OF BC Q102.
- ALL VALVES SHALL BE IDENTIFIED AS PER CHAPTER 6.7.4 OF BC Q102.
- DRAINAGE SHALL CONFORM TO CHAPTER 8.16.2 OF BC Q102.
- FITTINGS SHALL BE PROVIDED AS PER CHAPTER 6.4 OF BC Q102.
- VALVES SHALL BE PROVIDED AS PER CHAPTER 6.7 OF BC Q102.
- PIPE HANGERS SHALL BE PROVIDED AS PER CHAPTER 9 OF BC Q102.
- PROVISIONS SHALL BE MADE TO FACILITATE FLUSHING SYSTEM PIPING AS PER CHAPTER 8.16.3 OF BC Q102.
- SPRINKLERS SHALL BE AN APPROVED TYPE AS PER CHAPTER 6.2 OF BC Q102.
- TEMPERATURE RATING OF SPRINKLERS SHALL COMPLY WITH CHAPTER 6.2.5 OF BC Q102.
- MINIMUM CLEARANCE OF 18" BELOW SPRINKLER DEFLECTORS SHALL BE MAINTAINED AS PER CHAPTER 6.5.3 OF BC Q102.
- CONCEALED PIPING SHALL BE INSPECTED PRIOR TO BEING COVERED PER BC 901.5 AND NEW YORK CITY FIRE CODE, FC 106.
- SPRINKLER SYSTEM ALARMS SHALL BE PROVIDED AS PER CHAPTER 6.9 OF BC Q102.
- SPARE SPRINKLER HEADS AND WRENCH TO BE KEPT ON PREMISES AS PER CHAPTER 6.2.9 OF BC Q102.
- ENGINEER SHALL BE RESPONSIBLE FOR THE DESIGN TO COMPLY WITH THE REQUIREMENTS OF BC 903 & BC Q102.
- ALL SPRINKLER BRANCH PIPING SHALL BE A MINIMUM OF 1 INCH AS PER CHAPTER 8 OF BC Q102.
- SPRINKLER HEADS ARE APPROVED UNDER BSA & MEA NUMBERS AS SHOWN ON SPRINKLER SCHEDULE.
- WATER SUPPLIES TO SPRINKLER SYSTEM SHALL BE IN ACCORDANCE WITH BC Q102, CHAPTER 23.
- SPRINKLER SYSTEM SPECIAL INSPECTIONS SHALL BE PERFORMED IN ACCORDANCE WITH SECTION BC 1704.23 OF THE NEW YORK CITY BUILDING CODE.
- QUICK RESPONSE SPRINKLER HEADS SHALL NOT BE PERMITTED FOR USE IN EXTRA HAZARD OCCUPANCIES PER NFPA 13-2007 ITEM 8.4.1.2 & 11.2.3.2.2.2.
- SPRINKLER HEADS IN LIGHT HAZARD OCCUPANCIES SHALL BE IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS AS APPLICABLE:
 - HEADS SHALL BE QUICK RESPONSE TYPE PER NFPA 13-2007 ITEM 3.8.2.9
 - HEADS FOR MODIFICATION OR ADDITION TO AN EXISTING SYSTEM EQUIPPED WITH STANDARD RESPONSE SPRINKLER HEADS SHALL MEET NFPA 13-2007 ITEM 8.3.3.1
- QUICK RESPONSE SPRINKLER HEADS & STANDARD RESPONSE SPRINKLER HEADS SHALL NOT BE INTERMIXED WITHIN A COMPARTMENT PER NFPA 13-2007 ITEM 8.3.3.2.
- WHEN EXISTING LIGHT HAZARD SYSTEMS ARE CONVERTED TO USE QUICK RESPONSE HEADS, ALL SPRINKLERS IN A COMPARTMENT SPACE SHALL BE QUICK RESPONSE PER NFPA 13-2007 ITEM 8.3.3.4.
- OCCUPANCY OF SPACE IS: LIGHT HAZARD PER BC 903.2 & CHAPTER 5 OF BC Q102.
- SPRINKLER SYSTEM IS HYDRAULICALLY DESIGNED IN ACCORDANCE WITH CHAPTER 11 OF BC Q102. SPRINKLER SYSTEM IS DESIGNED TO 0.10 GPM/SQ.FT. OVER 1500 SQ. FT.

NYC PROFESSIONAL'S STATEMENT

- PER 1RCNY: 5000-01(E)(2)(III) STANDPIPE AND SPRINKLER WORK IS EXEMPT FROM THE ENERGY CODE.
- I HEREBY CERTIFY THAT THE SYSTEM'S NEWLY CALCULATED HYDRAULIC DEMAND AS PER 2014 NYC BUILDING CODE DUE TO WORK FILED UNDER THIS APPLICATION IS EQUAL TO OR LESS THAN THE HYDRAULIC DEMAND OF THE EXISTING SYSTEM PRIOR TO CURRENT OR PROPOSED MODIFICATION.

SPRINKLER DESIGN CRITERIA

EACH SPRINKLER SYSTEM SHALL BE HYDRAULICALLY CALCULATED IN ACCORDANCE WITH NFPA-13-2007 TO MEET FOLLOWING CRITERIA:

SPRINKLER SYSTEM

- LIGHT HAZARD OCCUPANCY: DENSITY .10 GPM PER SQ. FT. OVER MOST HYDRAULICALLY REMOTE 1500 SQ. FT., MAXIMUM COVERAGE PER SPRINKLER HEAD 225 SQ. FT.**
- ORDINARY HAZARD GROUP 1 OCCUPANCY - STORAGE ROOMS, PARKING (W/O STACKERS) MECHANICAL ROOMS, DENSITY 0.15 GPM PER SQ. FT. MAXIMUM COVERAGE PER SPRINKLER HEAD 130 SQ. FT.**
- EXACT LOCATION OF SPRINKLER HEADS IN FINISHED AREAS WITH SUSPENDED CEILINGS SHALL BE AS INDICATED ON ARCHITECTURAL REFLECTED CEILING PLANS.
- MINIMUM PRESSURE AT EACH SPRINKLER HEAD SHALL BE 7 PSI & 15 GPM.
- WHENEVER ROLL GROOVED CONNECTIONS ARE USED, ALLOWANCE FOR ADDITIONAL PRESSURE LOSS AT GROOVES SHALL BE MADE AS FOLLOWS:
 - FOR EACH COUPLING ON STRAIGHT RUN INCLUDING STRAIGHT FLOW THROUGH TEE OR CROSS; ADD 1 EQUIVALENT FOOT OF PIPE.
 - FOR EACH COUPLING AT ELBOW, TEE OR CROSS WHERE DIRECTION OF FLOW CHANGES; ADD 2 EQUIVALENT FEET OF PIPE.
- EQUIVALENT FITTING LENGTHS USED IN HYDRAULIC CALCULATIONS SHALL BE IN ACCORDANCE WITH NFPA 13-2007.
 - WHEREVER FITTINGS ARE USED IN CONJUNCTION WITH LIGHTWALL PIPE, EQUIVALENT FITTING LENGTHS INDICATED IN NFPA 13 SHALL BE INCREASED BY 30%.
- DISCHARGE FROM EACH SPRINKLER HEAD SHALL NOT BE LESS THAN REQUIRED FOR AREA COVERED BY THIS HEAD. AREA COVERAGE PER HEAD SHALL BE DETERMINED IN ACCORDANCE WITH NFPA 13-2007.
- THE RESULT OF HYDRAULIC CALCULATIONS SHALL INDICATE A MINIMUM 5% SAFETY MARGIN FOR PRESSURE.

NYC DOB SPECIAL INSPECTION NOTES

- AN INDEPENDENT SPECIAL INSPECTOR SHALL BE RETAINED TO PERFORM SPECIAL INSPECTIONS AS WELL AS FILE FORM TR-1 FOR FIRE PROTECTION SYSTEMS DESIGN AS DOCUMENTED ON THESE PLANS IN ACCORDANCE WITH THE NYC BUILDING CODE.
- SPECIAL INSPECTION REQUIRED FOR SPRINKLER SYSTEMS PER 2014 NYCBC 1704.23.
- SPECIAL INSPECTION REQUIRED FOR FIRE-RESISTANT PENETRATIONS AND JOINTS PER 2014 NYCBC 1704.27.
- SPECIAL INSPECTION REQUIRED FOR POST-INSTALLED ANCHORS PER 2014 NYCBC 1704.32.
- FINAL INSPECTION REQUIRED PER 2014 NYCBC 28-116.2.4.2, BC110.5, DIRECTIVE 14 OF 1975, & 1RCNY 101-10.
- OWNER SHALL NOTIFY FDNY OF SPRINKLER SYSTEM DISCONNECTION BY SUBMITTING A LETTER OF NOTIFICATION.

SPRINKLER DEMOLITION NOTES

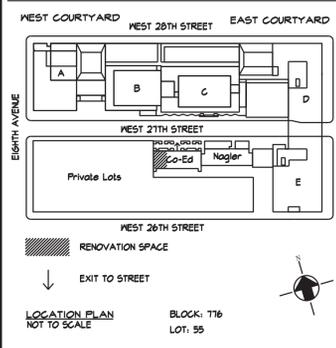
- DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT.
- VERIFY ALL GOVERNING DIMENSIONS, PIPE SIZES AND LOCATION OF THE PIPING AND EQUIPMENT TO BE REMOVED.
- NOTIFY BUILDING MANAGER AT LEAST 48 HOURS BEFORE DEMOLITION WORK OR BEFORE SHUT DOWN OF EXISTING SERVICES. RISER SHUT DOWNS SHALL BE PERFORMED AT TENANT'S COST, AT DESIGNATED TIMES UNDER BUILDING MANAGER'S SUPERVISION AND ONLY WITH HIS APPROVAL.
- ALL EQUIPMENT, PIPING, ETC. TO BE REMOVED, SHALL BE DISPOSED OF, RELOCATED, TURNED OVER OR SALVAGED AS DIRECTED BY THE BUILDING OWNER.
- UPON COMPLETION OF ALL NEW WORK NO ABANDONED PIPING SHALL REMAIN. EXISTING BRANCH PIPING SERVING REMOVED SPRINKLER SHALL BE COMPLETELY REMOVED TO MAIN BRANCH AND CAPPED AT TEE WITH NEW FITTINGS.
- THE EXISTING SYSTEMS SHALL BE LEFT IN PERFECT WORKING ORDER UPON COMPLETION OF ALL NEW WORK.
- LOCATIONS AND SIZES OF EXISTING PIPING ARE APPROXIMATE. FIELD VERIFY EXACT SIZES AND LOCATIONS OF ALL EXISTING PIPING AT THE SITE.
- NO REMOVED EXISTING PIPING FITTINGS, VALVES, FIXTURES, ETC. SHALL BE REUSED UNLESS OTHERWISE APPROVED BY THE ENGINEER.
- THE CONTRACTOR SHALL NOT INTERRUPT ANY OF THE SERVICES OF THE EXISTING BUILDING NOR INTERFERE WITH THE SERVICES IN ANY WAY WITHOUT THE EXPRESS PERMISSION IN WRITING BY THE BUILDING MANAGER. SUCH INTERRUPTIONS AND INTERFERENCES SHALL BE MADE AS BRIEF AS POSSIBLE AND ONLY AT THE TIME STATED BY THE BUILDING MANAGER.
- CONTRACTOR & THEIR SUBCONTRACTOR'S SHALL BE RESPONSIBLE FOR LOCATING ALL EXISTING SPRINKLERS AND RELATED PIPING AND REMOVING SPRINKLERS AND RELATED PIPING AS REQUIRED TO MEET NEW PROPOSED SPRINKLER HEAD LAYOUT.
- AS PART OF THIS CONTRACT, THE CONTRACTOR SHALL INCLUDE A FIREWATCH FOR THE DURATION OF THE SPRINKLER SHUT-DOWN. WHERE APPROVED BY BUILDING MANAGEMENT, A TEMPORARY SPRINKLER LOOP MAY BE PROVIDED IN LIEU OF THE REQUIRED FIRE WATCH. THERE SHALL BE NO APPROVED CHANGE ORDERS FOR THIS SCOPE.
- CONTRACTOR SHALL EXERCISE EXTREME CARE IN PROTECTING AREAS ADJACENT TO CONSTRUCTION AREAS, SHALL FULLY PROTECT THEM FROM ANY DAMAGE RESULTING FROM CONTRACTOR'S WORKMEN, SUBCONTRACTORS OR AGENTS, SHALL BE RESPONSIBLE FOR REPAINTING, CLEANING OR REPLACING ANY SUCH DAMAGE.
- THE CONTRACTOR SHALL VISIT THE JOB SITE AND THOROUGHLY FAMILIARIZE HIMSELF WITH ALL EXISTING CONDITIONS AND FIRE PROTECTION SYSTEMS PRIOR TO THE BEGINNING OF DEMOLITION WORK.
- SPRINKLER COVERAGE OF THE EXISTING SPRINKLER SYSTEM OUTSIDE THE AREA OF WORK SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION.
- PROVIDE TEMPORARY SPRINKLER LOOP WHEN THE NEW CONSTRUCTION BEGINS TO PROTECT ALL MEANS OF EGRESS. IN ACCORDANCE W/ BUILDING BULLETIN 2017-009
- IN THE EVENT OF ANY DISCREPANCY BETWEEN THE DEMOLITION PLAN AND THE CONSTRUCTION PLANS, CONSTRUCTION PLANS AND INTENT SHALL GOVERN.

NYC FLOOD HAZARD AREA NOTES

- PROPERTY IS NOT IN SPECIAL FLOOD HAZARD AREA PER EFFECTIVE 2007 FIRM.

NYC DOB FILING NOTE

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PROJECT:
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230 WEST 27TH ST
NEW YORK NY 10001

DRAWING TITLE:
SPRINKLER NOTES

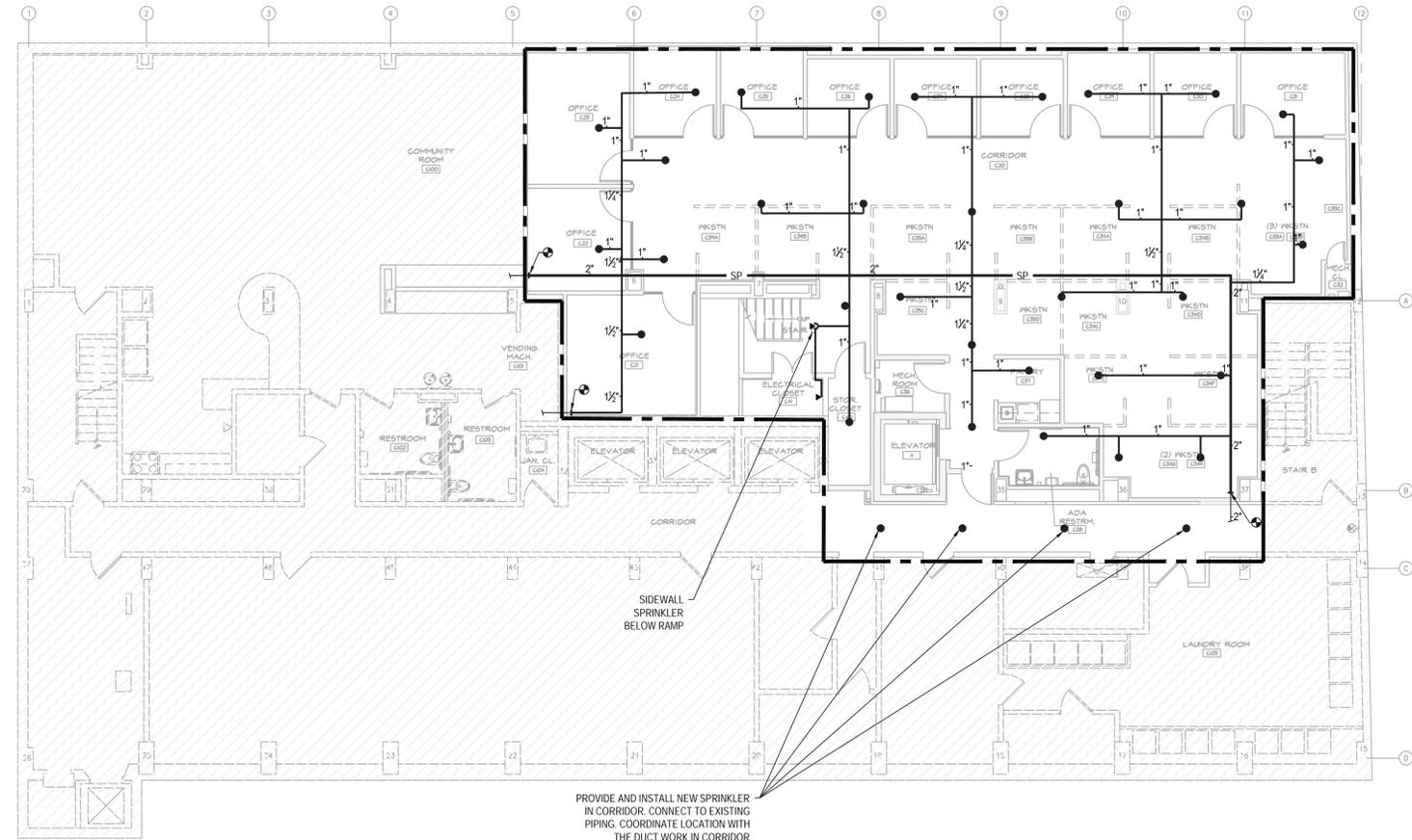
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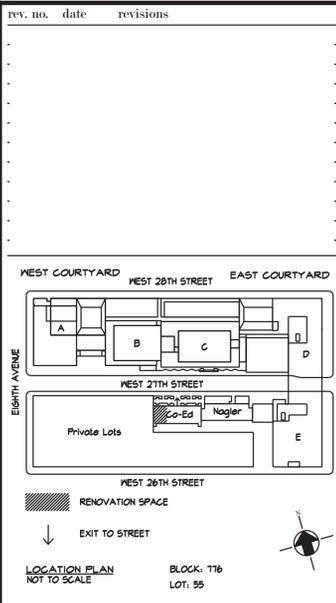
PROVIDE AND INSTALL NEW SPRINKLER IN CORRIDOR. CONNECT TO EXISTING PIPING. COORDINATE LOCATION WITH THE DUCT WORK IN CORRIDOR



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 EXEMPTION WHEN COMPLIANCE WITH FIRE PROTECTION, DETECTION, ALARM AND/OR SUPPRESSION REQUIREMENTS OF TITLE 28 AND/OR THE 2014 NEW YORK CITY CONSTRUCTION CODES CONFLICTS WITH 2020 NYCCEC COMPLIANCE, THE TITLE 28 AND/OR 2014 CONSTRUCTION CODES SAFETY PROVISIONS WILL TAKE PRECEDENCE OVER CONFLICTING PROVISIONS IN 2020 NYCCEC.



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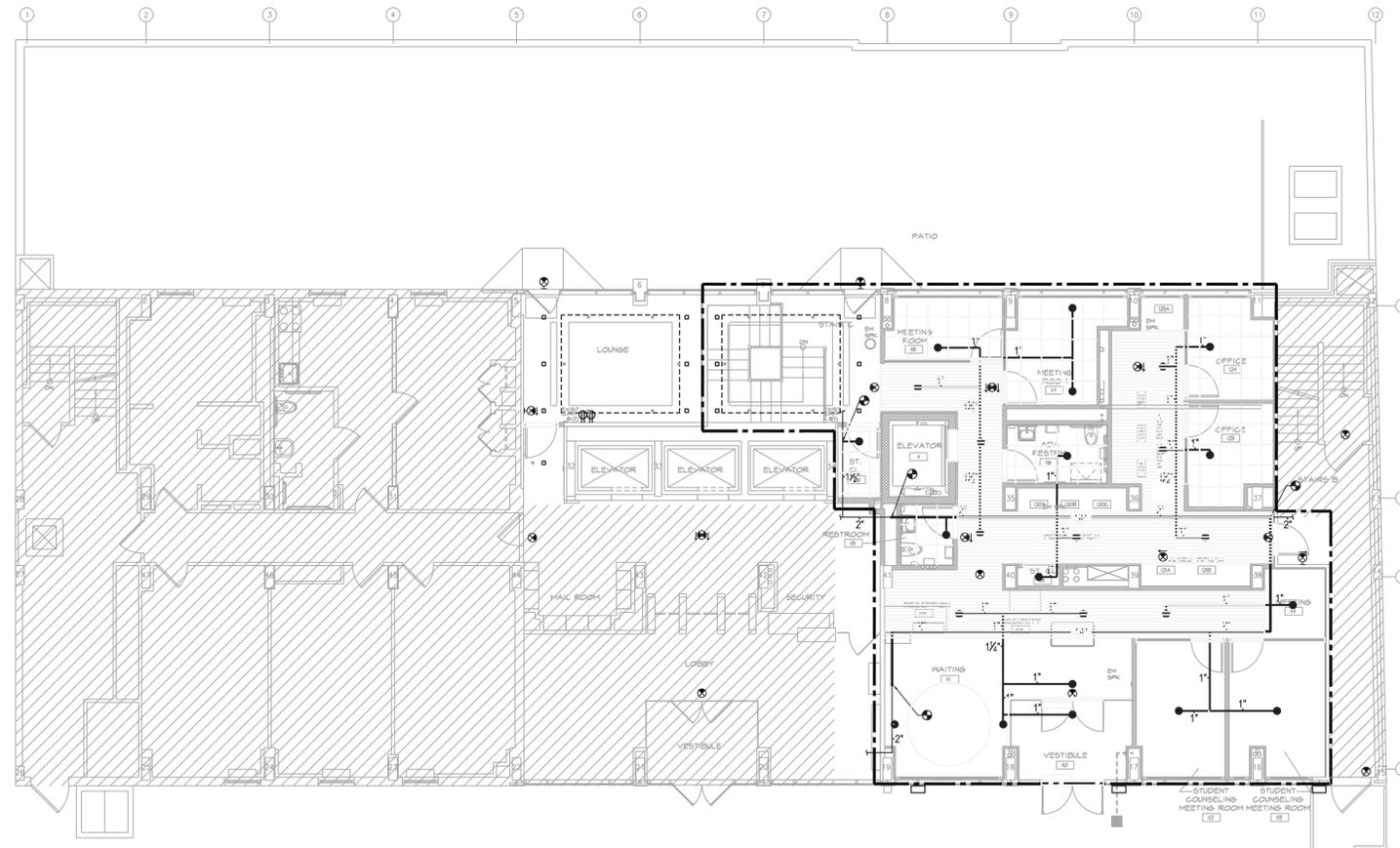
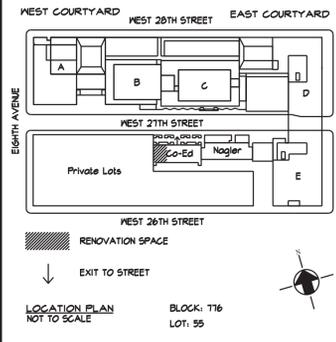
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PROJECT:
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DRAWING TITLE:
 CELLAR LEVEL
 SPRINKLER
 PLAN

DOB NOW JOB#

SEAL & SIGNATURE:	DATE: 2022.09.01
	PROJECT No: 12224.154
	DRAWING BY: CN/TC
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	3 OF 8



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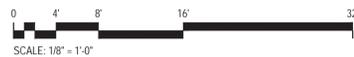
PROJECT:
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DRAWING TITLE:
 1ST FLOOR
 SPRINKLER
 PLAN

DOB NOE JOB#
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DATE: 2022.09.01
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 SP-101.00

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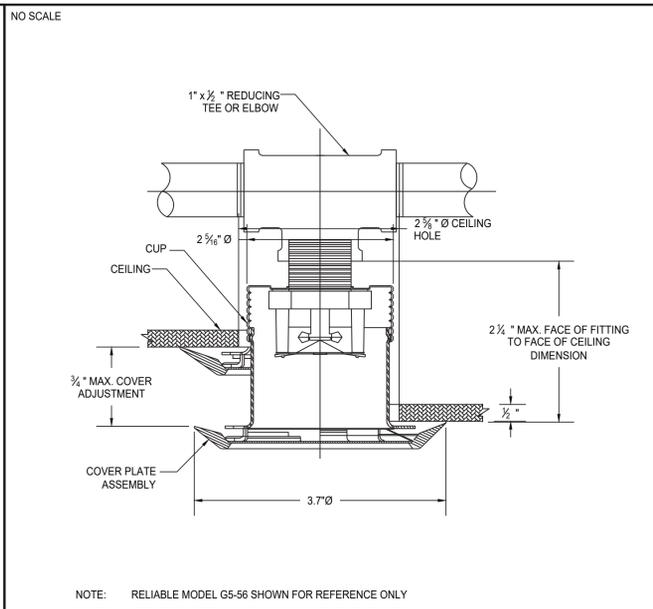
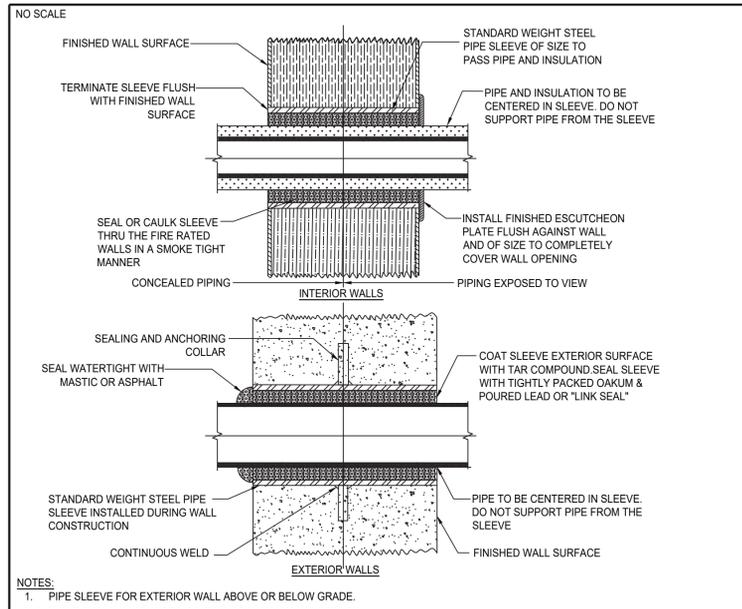


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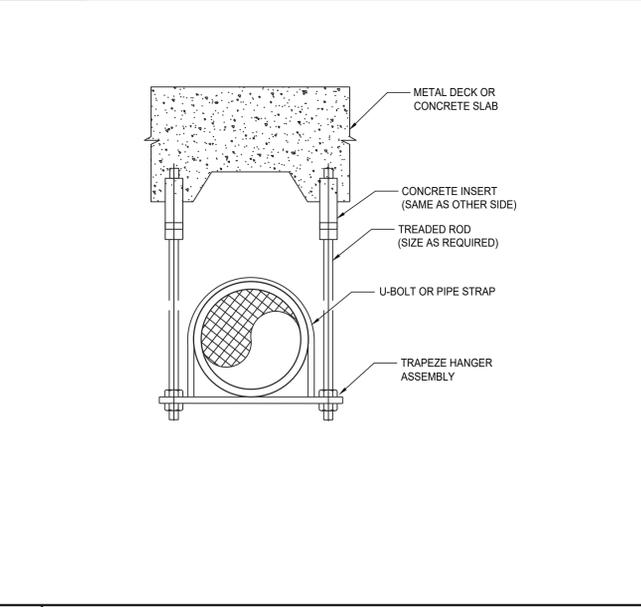
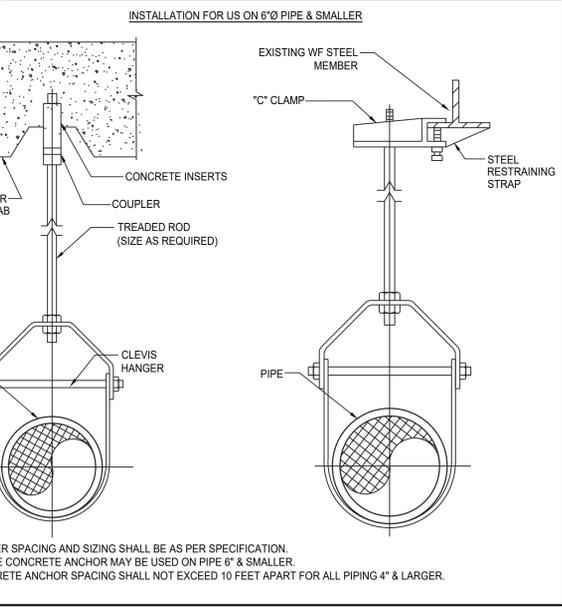
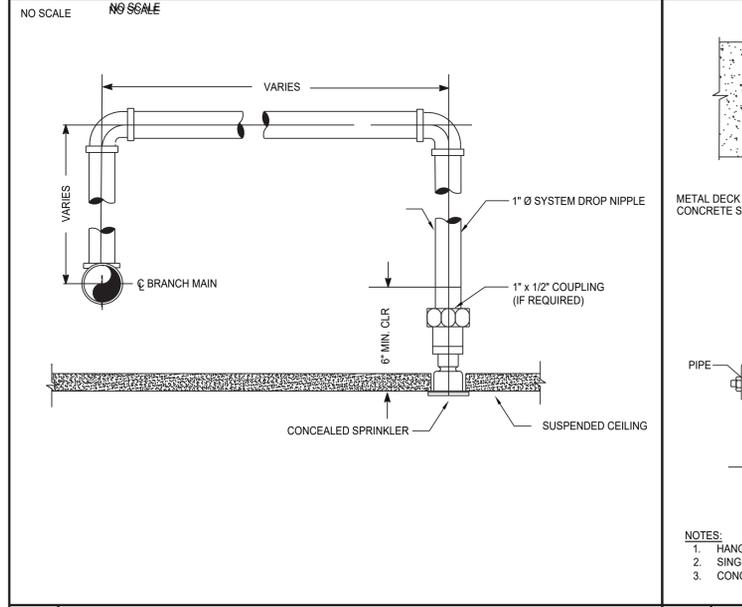


ISSUD FOR BID 09/01/2022



1 TYPICAL PIPE SLEEVES THROUGH WALL

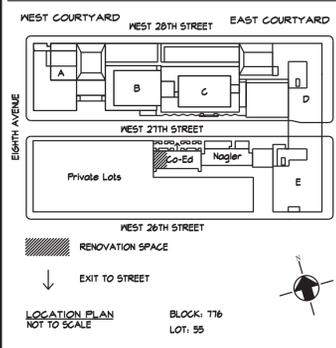
2 CONCEALED SPRINKLER HEAD



3 CONCEALED SPRINKLER ARM OVER DETAIL

4 PIPE HANGER DETAILS

5 PIPE HANGER DETAILS



Structural Consultants
Allan Margolin & Associates
420 Lexington Avenue, Suite 2738
New York, NY 10170 / (212) 867 6720

Elevator Consultants
VDA
120 Eagle Rock Avenue, Suite 301
East Hanover, NJ 07936 / (973) 994-9220

Cost Consultants
Cost Concepts
104 Bedell Place
Melville, NY 11747 / (631) 423-7963

Environmental Consultants
EPM, Inc.
983 Marcus Ave. Suite 109
Lake Success, NY 11042 / (516) 328-1194

MEP Consultant
MENGINEERING
116 West 32nd Street
New York, NY 10001 / (212) 643-9898

Fashion Institute of Technology
340 8TH AVENUE
NEW YORK, NY 10001

David Smotrich & Partners LLP
Architects/Planners
443 Park Avenue South New York, NY 10016
212 889 4045 Fax 212 889 3672

PROJECT:
CO-ED DORMITORY
ADMISSIONS OFFICE RELOCATION
230 WEST 21TH ST
NEW YORK NY 10001

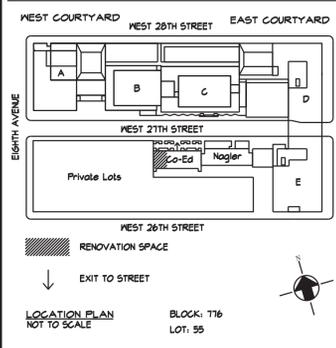
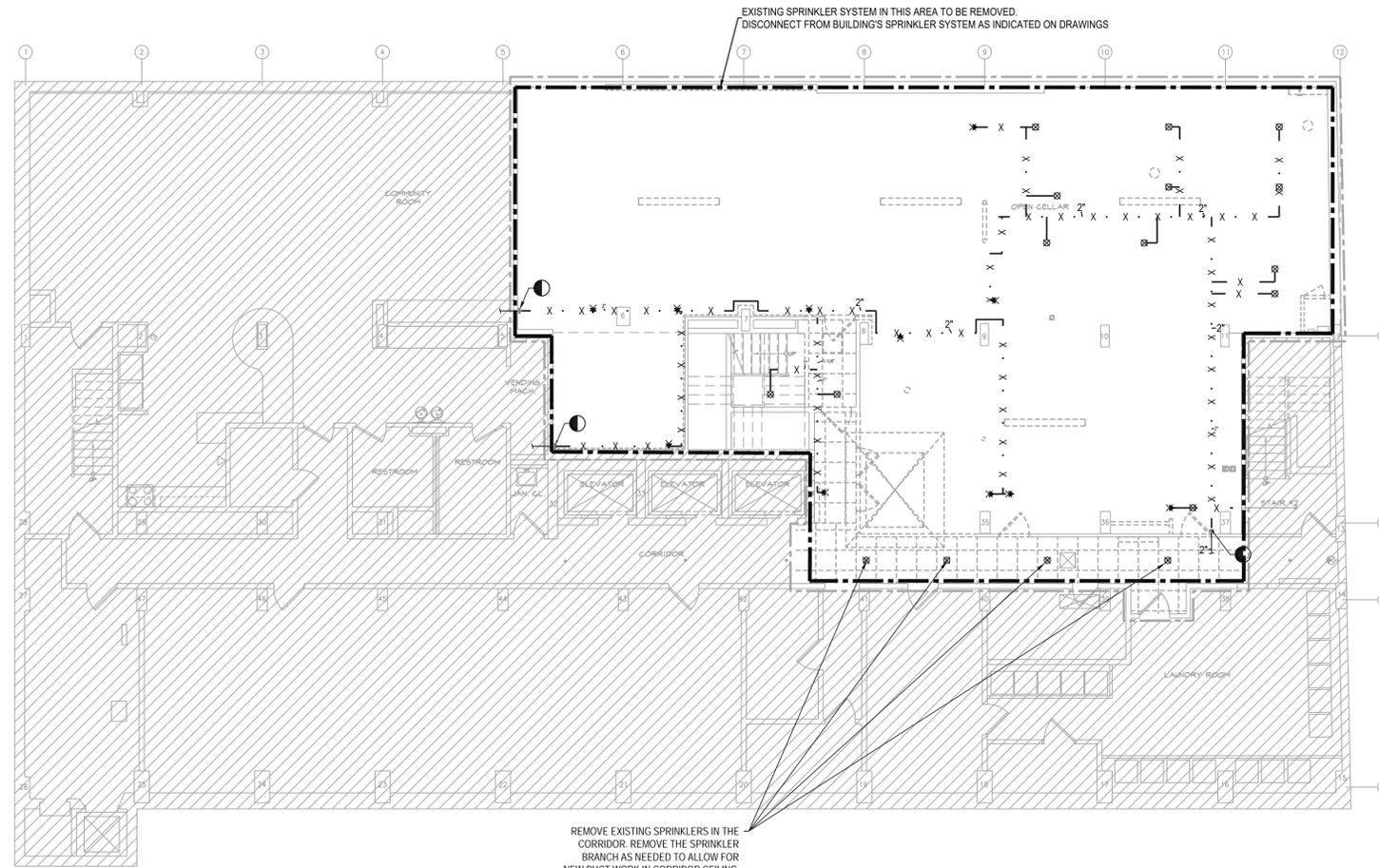
DRAWING TITLE:
SPRINKLER DETAILS

DOB NOW JOB#
SEAL & SIGNATURE: DATE: 2022.09.01
PROJECT No: 12284.154
DRAWING BY: CN/TC
CHK BY: CN
DWG No: SP-501.00
SCALE: NTS 5 OF 8

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TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE 2020 NEW YORK CITY ENERGY CONSERVATION CODE.





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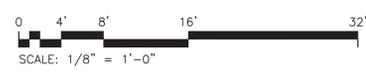
David Smotrich & Partners LLP
 Architects/Planners
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 212 889 4045 Fax 212 889 3672

PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 CELLAR
 FIRE PROTECTION
 DEMOLITION PLAN

DOB NCE JOB#

SEAL & SIGNATURE:	DATE: 2022.09.01
	PROJECT No: 12224.154
	DRAWING BY: CN/TC
	CHK BY: CN
	DWG No: SP-900.00
	SCALE: 1/8"=1' 7 OF 8

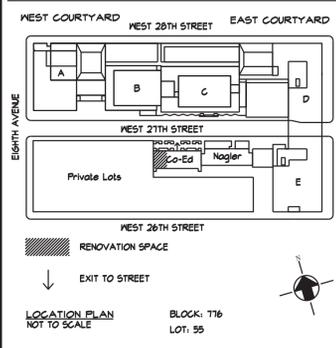
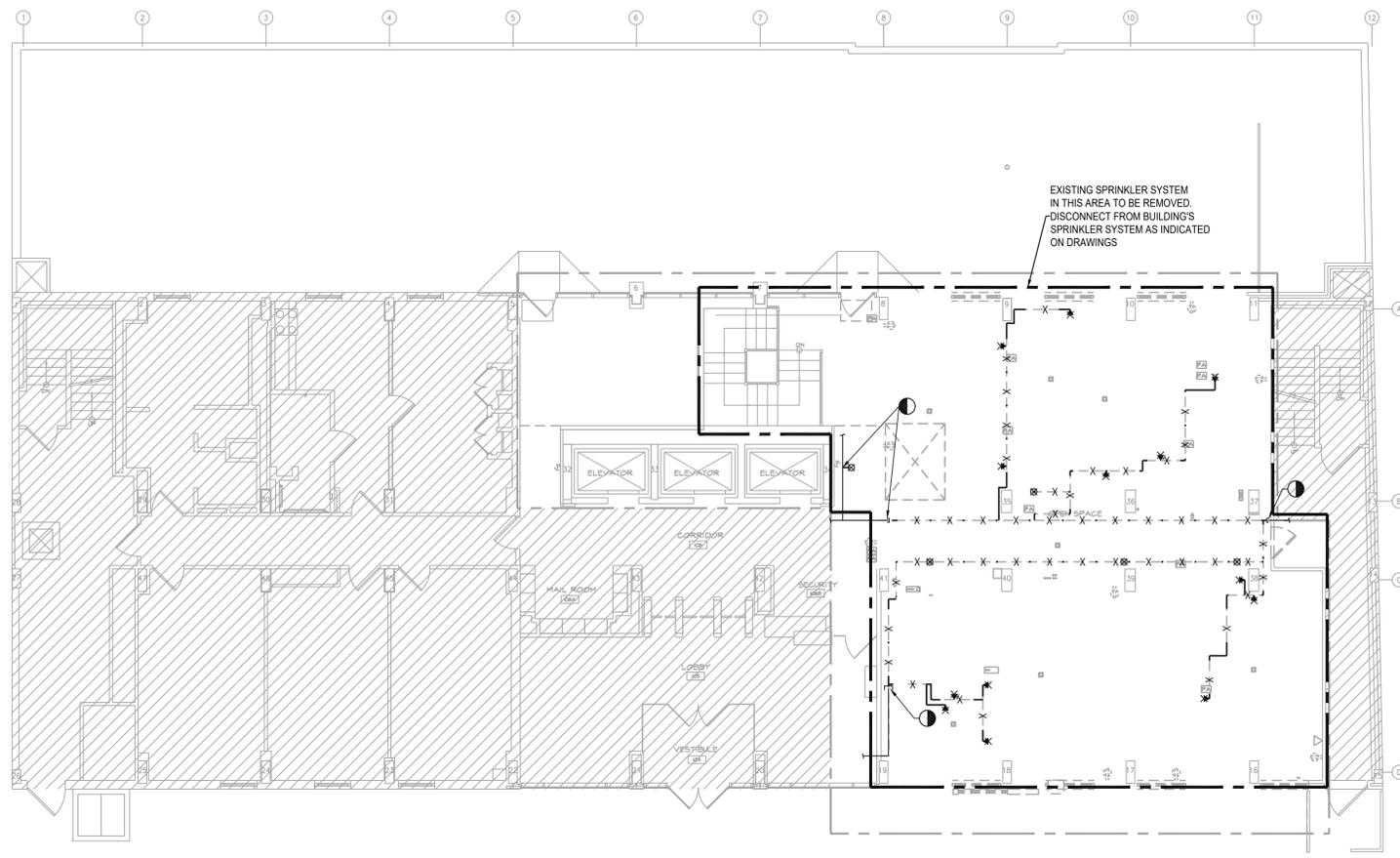


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Fashion Institute of Technology
 340 8TH AVENUE
 NEW YORK, NY 10001

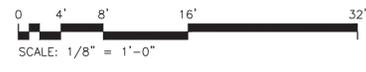
David Smotrich & Partners LLP
 Architects/Planners
 443 Park Avenue South New York, NY 10016
 212 889 4045 Fax 212 889 3672

PROJECT:
 CO-ED DORMITORY
 ADMISSIONS OFFICE RELOCATION
 230 WEST 27TH ST
 NEW YORK NY 10001

DRAWING TITLE:
 1ST FLOOR
 SPRINKLER
 DEMOLITION PLAN

DOB NCE JOB#

SEAL & SIGNATURE:	DATE: 2022.09.01
	PROJECT No: 12284.154
	DRAWING BY: CN/TC
	CHK BY: CN
	DWG No: SP-901.00
	SCALE: 1/8"=1'



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EXHIBIT E: EXECUTIVE ORDER 202.16



Interim Guidance on Executive Order 202.16 Requiring Face Coverings for Public and Private Employees Interacting with the Public During the COVID-19 Outbreak

April 14, 2020

Background:

In December 2019, a new respiratory disease called the novel coronavirus (COVID-19) was detected. COVID-19 is caused by a virus (SARS-CoV-2) that is part of a large family of viruses called coronaviruses. Recently, community-wide transmission of COVID-19 has occurred in the United States, including New York where the number of both confirmed and suspected cases is increasing. To reduce the community-wide transmission of COVID-19, Governor Andrew M. Cuomo has taken aggressive action through [Executive Order 202](#), as amended, to combat the spread of this infectious disease, reducing the density of people in areas of common congregation by closing the in-person operations of non-essential businesses and prohibiting all non-essential gatherings of individuals of any size for any reason.

Executive Order:

[Executive Order 202.16](#), issued on April 12, 2020, provides the following directive:

For all essential businesses or entities, any employees who are present in the workplace shall be provided and shall wear face coverings when in direct contact with customers or members of the public. Businesses must provide, at their expense, such face coverings for their employees. This provision may be enforced by local governments or local law enforcement as if it were an order pursuant to section 12 or 12-b of the Public Health Law. This requirement shall be effective Wednesday, April 15 at 8 p.m.

Guidance:

Essential businesses, as well as state and local government agencies and authorities, must procure, fashion, or otherwise obtain face coverings and provide such coverings to employees who directly interact with the public during the course of their work at no-cost to the employee.

- Businesses are deemed essential by the Empire State Development Corporation (ESD), pursuant to the authority provided in Executive Order 202.6. Please visit the [ESD website](#) for specific information on essential businesses. For the purpose of this guidance, essential businesses shall also provide face coverings to contractors, including independent contractors.
- Face coverings include, but are not limited to, cloth (e.g. homemade sewn, quick cut, bandana), surgical masks, N-95 respirators, and face shields. Please visit the Centers for Disease Control and Prevention's "Coronavirus Disease 2019 (COVID-19)" [website](#) for [information](#) on cloth face covers and other types of personal protective equipment (PPE), as well as instructions on use and cleaning.

- Direct interaction with the public shall be determined by the employer, but, at a minimum, shall include any employee who is routinely within close contact (i.e. six feet or less) with members of the public, including but not limited to customers or clients.
- Employees are allowed to use their own face coverings, but shall not be mandated to do so by their employer. *Further, this guidance shall not prevent employees from wearing more protective coverings (e.g. surgical masks, N-95 respirators, or face shields) if the individual is already in possession of such PPE, or if the employer otherwise requires employees to wear more protective PPE due to the nature of their work (e.g. healthcare).*
- Employees are required to wear face coverings when in direct contact with members of the public, except where doing so would inhibit or otherwise impair the employee's health. *Employers are prohibited from requesting or requiring medical or other documentation from an employee who declines to wear a face covering due to a medical or other health condition that prevents such usage.*
- Employees who are unable to wear face coverings and are susceptible to COVID-19 based on the "Matilda's Law" criteria (i.e. individuals who are 70 years of age or older, individuals with compromised immune systems, and individuals with underlying illnesses) should consult with their employer to consider [reasonable accommodations](#), including but not limited to different PPE, alternate work location, or alternate work assignment with fewer interactions with the public. Employers should work with their employees to see if they can be accommodated to ensure the employee can continue to deliver essential services in the safest manner possible.
- If an employer is unable to procure, fashion, or otherwise obtain face coverings for their employees, they may consult with their local office of emergency management to determine if extra supplies exist within the municipality for this purpose and, if so, they may submit a request for face coverings. Please note that quantities are extremely limited and are prioritized for health care workers and first responders. *Not being able to source face coverings does not relieve an employer's obligation to provide such face coverings to their employees.*
- Nothing in this guidance shall supercede the respiratory protection equipment requirements set forth by the United States Department of Labor's Occupational Safety and Health Administration (OSHA).

Additional Information:

New York State Coronavirus (COVID-19) Website

<https://coronavirus.health.ny.gov/>

United States Centers for Disease Control and Prevention Coronavirus (COVID-19) Website

<https://www.cdc.gov/coronavirus/2019-ncov/index.html>

Name of Contractor: _____

Signature: _____

Date: _____

**EXHIBIT F: COVID-19 CONTRACTOR
GUIDANCE FOR JOBSITES**

COVID-19 CONTRACTOR GUIDANCE FOR JOBSITES

In response to the public health emergency for the COVID-19, Governor Andrew Cuomo has declared a State disaster emergency and temporarily suspended or modified laws that would prevent, hinder, or delay action necessary to cope with the disaster or emergency. The Governor has also issued directives to allow for the expansion of certain services including those relating to emergency procurement, and to facilitate the continued work of essential businesses subject to compliance with mandatory directives for safety best practices and social distancing. The purpose of this guidance is to set forth the recommended best practices and social distancing requirements for contractors performing work at State University of New York construction sites in the context of the COVID-19 health crisis.

Contractor Responsibilities

Under your contract with the Campus,

- Contractors and their subcontractors are required at all times to guard the safety and health of all persons on and in the vicinity of the work site
- Contractors and their subcontractors are required to comply with all applicable rules, regulations, codes, and bulletins of the New York State Department of Labor and the standards imposed under the Federal Occupational Safety and Health Act of 1970, as amended (“OSHA”)
- Contractors and their subcontractors are also required to comply with all contract safety requirements
- Contractors and their subcontractors must comply with all City or State of New York safety requirements for projects within the City or State of New York constructed in accordance with the applicable building code, and contractors are required to provide written safety plans for the site showing how all safety requirements of applicable law will be implemented for the duration of the contract.

Contractors and their subcontractors must also adhere to the following practices to help prevent exposure and spread of COVID-19. The following recommendations are based on what is currently known about COVID-19. Contractors and their subcontractors are advised to stay current and immediately implement the most up-to-date practices to protect the safety and health of your employees, clients, and the general public.

General Responsibilities:

- Contractors and their subcontractors should educate their employees on the symptoms of COVID-19, which include cough, fever, trouble breathing, and pneumonia. Contractors and their subcontractors must instruct any employee who feels they may have any of the

above symptoms to refrain from reporting to the jobsite and immediately contact their health care provider and the local health department in the county in which they reside. Contact information for local health departments can be found at www.health.ny.gov.

- If the employee begins to exhibit these symptoms while in the workplace, steps should be taken to remove the individual from the workplace. Using safe social distancing practices, provide the employee with a surgical mask and instruct them to put it on, self-transport themselves home, and to contact their health care provider and inform the local health department. The Contractor must notify the contracting agency/authority.
- Personnel should be advised to self-quarantine in accordance with the requirements of the New York State and local health department. Contracting agencies/authorities reserve the right to require any employee of the Contractor, and their subcontractors exhibiting symptoms, to be removed from the jobsite
- If an employee is confirmed to have COVID-19 infection, contractors and their subcontractors should inform fellow employees, who have been in contact with this employee, of their possible exposure to COVID-19 in the workplace while maintaining confidentiality as required by applicable New York State and federal law. The fellow employees should then self-monitor for symptoms (i.e., cough, fever, trouble breathing, and pneumonia) and self-quarantine in accordance with the requirements of the New York State and local health department
- If an employee tests positive for COVID-19, Contractors and their subcontractors should direct the employee to self-quarantine and remain quarantined for 14 days, following the guidance of New York State and local health department
 - Contractors and their subcontractors may permit such employee to return to the jobsite when this employee produces a negative COVID-19 test or receives medical clearance to return to work
- If an employee tests negative for COVID-19, contractors and their subcontractors may direct the employee to return to work after recovery from their illness. Any direct contacts on pre-cautionary quarantine may return to the jobsite and resume their work activities.

Social Distancing:

- Do not host large group meetings or congregate in large groups. When meetings are necessary, maintain a distance of 6-feet between people.
- Perform any tool box or other training maintaining the distance of 6-feet between people.
- Perform meetings online or via conference call whenever possible
- Only essential personnel should be permitted on the jobsite
- Discourage handshaking and other contact greetings

General Jobsite Practices

- Procedures and supplies should be in place to encourage proper hand and respiratory hygiene.
 - Hand hygiene:

Signage with handwashing procedures should be posted in prominent locations promoting hand hygiene

 - Regular handwashing with soap and water for at least 20 seconds should be done:
 - Before and after eating
 - After sneezing, coughing, or nose blowing
 - After using the restroom
 - Before handling food
 - After touching or cleaning surfaces that may be contaminated
 - After using shared equipment and supplies; and also
 - Whenever a contractor or subcontractor believes it is necessary
 - If soap and water are not available, use an alcohol-based hand sanitizer that contains at least 60% alcohol
 - Respiratory Hygiene:
 - Covering coughs and sneezes with tissues or the corner of elbow
 - Disposing of soiled tissues immediately after use
 - Where possible, have disposable masks available to cover an employee's mouth and nose if they develop symptoms on the job to protect others from exposure.
- Practice routine environmental cleaning and disinfecting of all frequently touched surfaces on the jobsite. This includes work stations, project trailers and offices, portable toilets, countertops, handles, doorknobs, gang boxes, tools and equipment. See OSHA Guidance on Preparing Workplaces for COVID-19. www.osha.gov/Publications/OSHA3990.pdf
- Appropriate cleaning agents and directions should be utilized to perform all cleaning. Ensure all workers are trained on the hazards of cleaning chemicals used in the workplace and comply with all OSHA requirements regarding same in accordance with the Hazard Communication (Global Harmonization) Standard. Information about <https://coronavirus.health.ny.gov/home>
- Do not use a common water bottle
- If using a common water cooler clean dispenser knob after use
- Do not share tools
- Utilize personal protection equipment (PPE) for the job being performed
- Sanitize reusable PPE per manufacturer's recommendation prior to each use
- Do not share PPE
- Ensure used PPE and other trash is disposed of properly

- Utilize disposable gloves where appropriate and instruct workers to wash hands after removing gloves
- Disinfect reusable supplies and equipment
- Don't stack trades, if possible
- Stagger work schedules to minimize the number of people on a job site at any one time.
- Keep one contractor or subcontractor in an area at a time. Indicate an area is occupied with workers with a sign or flag indicating which contractor or subcontractor is in the area at that time. Remove the sign or flag after completion of work in that area to let others know they may then enter into that area to perform their work. The next contractor or subcontractor will then post their sign or flag to notify others that the area is occupied.
- Minimize the number of workers in an area as much as possible by using indicators of an occupied area (signs or flags) scheduling work activities to stagger those required to be in any one time to a minimal number of workers.
- Minimize entryways into a work area so that employees will be able to observe flagging practices described above. Do not reduce the number of emergency exits.
- Avoid cleaning techniques, such as pressurized air or water sprays that may result in generation of bioaerosols

The Campus may request an updated written safety plan for the site to address practices to help prevent exposure and spread of COVID-19 at the jobsite pursuant to New York State, OSHA recommendations and Centers for Disease Control requirements, which include:

- Assessment of potential worker exposure hazards, taking into account the specific recommendations and controls for the four levels of worker exposure risk identified in OSHA's Guidance on Preparing Workplaces for COVID-19 (i.e., very high, high, medium, and lower)
- Evaluation of exposure to risk;
- Selecting, implementing, and ensuring the use of controls (i.e., social distancing appropriate personal protective equipment, hygiene, and cleaning supplies);
- Minimizing the number of workers in an area as much as possible by using indicators of an occupied area (signs or flags) and scheduling work activities to stagger those required to be in any one area to a minimal number of workers.
- Minimize entryways into a work area so that employees will be able to observe flagging practices described above. Do not reduce number of emergency exits; and
- Additional criteria consistent with health and safety practices at the work site.

Project Closure:

- Where work is suspended on a project, contractors are directed to follow any additional project shut-down protocols as provided by the campus.

For additional resources:

OSHA COVID-19 Resources

OSHA Guidance on Preparing Workplaces for COVID-19

DOL COVID-19 Resources

Interim Guidance for Business and Employers

Centers for Disease Control -- <https://www.cdc.gov/coronavirus/2019-ncov/index.html>

Name of Contractor: _____

Signature: _____

Date: _____

**EXHIBIT G: INTERIM GUIDANCE LETTER TO
CONTRACTORS**

(date)

Project No.
Contract No.
Project Title
Campus

(Contractor address)

Subject: REQUIRED NYS DOH GUIDANCE – COVID-19

Attachment:

1. Interim Guidance for Construction Activities During the COVID-19 Public Health Emergency
2. NYS DOH Safety Plan Template

Dear Contractor,

Please be advised the NYS Department of Health (NYS DOH) issued an “Interim Guidance for Construction Activities During the COVID-19 Public Health Emergency” (Guidance) on May 13th, 2020, which sets forth the minimum requirements applying to all construction entities to help protect against the spread of COVID-19. The Guidance requires all such entities to acknowledge and affirm compliance with the Guidance (Business Affirmation). It also mandates employers to continuously check for updates to the Guidance and take such actions to comply with the updated Guidance. The Guidance supersedes any best practices document previously provided by the State University of New York (“University”).

Once your company has reviewed the Guidance, the Business Affirmation can be submitted online at the following website: <https://forward.ny.gov/>. Under Phase 1 Construction click “Read and Affirm Detailed Guidelines”. The attached documents are both available online at the website provided.

Also attached is a NYS DOH Safety Plan Template. Each construction entity employer is required to develop, implement and post a COVID-19 safety plan pursuant to the Guidance. Additionally, the Guidance requires the designation of a safety monitor to implement COVID-19 safety obligations for your company.

The University requires an authorized representative of your company sign and return a copy of this document to the undersigned affirming compliance with the Guidance requirements.

Regards,

Insert Name
Insert Title

Cc: Insert appropriate campus representatives (Business Officer, Project Manager, Other)
Cc: Insert

Contractor Name
Contractor Address

The undersigned authorized representative of _____ hereby affirms that it has submitted the necessary Business Affirmation to NYS; has updated its safety plan to meet the COVID-19 minimum requirements of the Guidance; will check on a regular basis for updates to the Guidance; and will provide the University with the name of its COVID-19 safety monitor and other information requested by the University.

Signature: _____

Print Name and Title: _____

Date: _____

EXHIBIT H. FIT NO DAMAGES FOR DELAY
CLAUSE

To:

From: Fashion Institute of Technology

Project Name:

Project/Contract Number:

Date:

Subject: No Damages for Delay Acknowledgment

In the event the Contractor's performance under this agreement is delayed or interfered with arising out of or connected to the COVID19 pandemic, including but not limited to worker availability, government-mandated suspension of work or any other emergency action associated with protecting the health and safety of the workforce, which leads to a site closure, delay or suspension of the work, Contractor or any subcontractors hereby acknowledge their only remedy under this agreement is to request an extension of time for the performance of the unfinished work as herein provided; under no circumstances will Contractor or any subcontractors or vendors be entitled to any increase in the subcontract price or additional compensation for any alleged costs, expenses or damages as a consequence of such delays or interference, including but not limited to: i) General Condition Costs (e.g.: site clean-up, home and field office expenses, telecommunications equipment or use , and/or supervisory costs including but not limited to Project Manager, Project Engineer, Superintendent and Foremen, etc.), ii) escalation (increases in material costs, transportation charges or any alleged wage or salary increases) or iii) any alleged inefficiencies or loss of productivity. NOTE: The above examples are not intended to be an exhaustive list of all the alleged costs, expenses or damages excluded by this clause. It is offered only as an example of some costs within each category.

Owner shall review the Contractor's request for delay and, if acceptable, shall extend the time of performance by Change Order for such reasonable time as the Fashion Institute of Technology, in its sole discretion, may determine.

By signing below, Contractor acknowledges receipt and acceptance of the terms and conditions herein.

Fashion Institute of Technology

By: _____

Title: _____

By: _____

Title: _____