Fashion Institute of Technology

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NOTICE TO ALL FIRMS

Date: January 24, 2025

To: All Prospective Bidders

From: Sam Li
Director of Procurement Services

Re: Addendum Number 3
IFB # C1667 – Dubinsky & Business and Liberal Arts Lobby Renovation

Summary

1) **The hold on this project has been released.**
2) **The bid due date for this project is now February 3, 2025, 12:00 PM. We must receive the bids on or before February 3, 2025, 12:00 PM**
3) Addendum #3 for bid C1667 responds to bidder questions, further delineates between Phase I & Phase II work, coordinates work amongst all design disciplines and provides clarity to scope lacking clear definition of work. All drawing modifications are clouded accordingly, and all modified specifications are highlighted in the table of contents. (See updated specifications and drawings)
4) All contractors must comply with New York State Labor Law Section 220-I and submit their NYS DOL Certificate of Contractor Registration with their bid.

Questions

Q1. Of those 30 or so site visit attendees, how many GC's are actually bidding the project?

A1. All qualified bidders are expected to bid on the project.

Q2. Who is responsible for furnishing and installing the signage/letters on the curtain wall?

A2. GC is responsible for furnishing and installing vinyl signage on curtain wall.

Q3. Which steel members are to receive the intumescent paint application?

A3. At concealed vestibule, Beams shall receive 2-hour fireproof spray & columns supporting one story shall receive 2 hours fireproof spray. Exposed columns at vestibules shall receive 2 hours fireproof intumescent paint. See structural drawings and specifications for more information.

Q4. Please confirm that the Level 02 ceiling, Lobby A101 (ht 22'-09") is a new gypsum bd ceiling. You responded in Addendum No. 1 that the decorative light fixture in that ceiling is to remain.

A4. Lobby ceiling shall be new. Existing fixture to remain shall be reinstalled by contractor.

Q5. Please provide imagery of the site that we're not shown to contractors during the walkthrough.

A5. *Click here to access Openspace* to see portions of the project captured with 360 cameras. The content of the scans are for general information only as they represents portions of the site and not the project in its entirety.

Q6. Please provide the name & contract information for the base building BMS vendor.

A6. **ADVANTEX Solutions** BMS Vendor
Giovanni Natale gnatale@advantexsolutions.com. (C) 917-682-2521 (O) 718-278-2290
See section 230900.1 & 230901 for more information.

Q7. Please provide the name & contact information for the client's recommended turnstile vendor, as mentioned at the walkthrough.

A7 **Linear Technologies** LV/Access Control/Video Surveillance
Edgar Fermin Senior Project Manager efermin@lineartech.com 1 212-376-7665

Q8. Please advise if these is an on-site location where all materials can be stored, including salvaging the existing light fixtures and storefront portion called for re-installation.

A8. Contractor may propose enlarging "AREA OF WORK TO BE PROTECTED FROM ADJANCENT SPACE" on sheet CP.201 for each Phase. Sufficient space must be provided from egress points to public access of way.

Q9. Please advise what portions of the job, if any, are to be completed on overtime, i.e. demolition, noisy work, deliveries, etc.

A9. See section 06 00 00 and Section 01 10 00 for work hours and noisy work, including, but not limited to core drilling and pencil rod installation for ceiling framing. Deliveries shall be coordinated with owner at start of the work day.

Q10. General note H/A-500 refers to plumbing drawings for the new floor drain centered below new walk-off grating mat. There is also a roof drain shown on A-501. No plumbing drawings were received. Please provide plumbing drawings.

A10. Plumbing scope to be clarified in Addendum #2 drawings.

Q11. Please advise if there is any sprinkler scope or an allowance that should be held. General notes on drawing A-312 mention sprinkler, however, no sprinkler drawings were provided.

A11. Sprinklers are limited to the work at A.300. See A.300 in Addendum #2 for existing sprinklers to be relocated to new ACT ceiling.

Q12. Please advise if there is any fire alarm scope. If so, please provide name & contact information for the base building fire alarm vendor.

A12. See sheets E.301.00 for special system plans for FA scope. See contact below.
High Rise Fire Protection Corp. Fire Alarm Vendor
Fatmir Isakoski Assoc. PM fisakoski@highrisefire.com (C) 1 917 685 3965 (O) 1-718-369-3434

Q13. G-100 is mentioned in the RFP but not found in the drawing package. Please provide.

A13. See G.000.00 for drawing list.

Q14. Please advise if temp security & the temp security stand, as mentioned on CP.201, is by others.

A14. Contractor shall hold an allowance of $500 per temporary security stand.

Q15. CP.201 mentions a temporary 2-hour ceiling. Please clarify the scope of work here.

A15. Partitions cannot go to the underside of the slab without demolition of the existing ceiling. 2-hr partition shall follow S2.6.40 (UL U419) as called out on CP.201. See revised detail #17 / A.801 for 2-hr ceiling (UL P561)

Q16. Please provide drawings that show locations of the temporary partitions.

A16. See CP.201

Q17. Please advise if X-ray of the slab prior to coring is required.

A17. Confirmed, see Existing Condition Note #8 S.101. Contractor shall locate rebar in exist. Construction prior to drilling of holes and shall take care not to damage exist. Bars. If damage to exist. Rebar occurs during construction, the contractor is responsible for repairing the damage. Repair procedures not detailed in the contract documents will require preparation by a qualified professional engineer registered in the state in which the project is located and must be approved by the engineer.

Q18. Please advise if repairing the light fixtures called to be removed & re-installed is required. If so, should all GC's include the same allowance for this?

A18. No allowance required. See revised A.300-A.312 drawings for revised sheet notes.

Q19. Drawings call for (1) 2x2 white metal access panel. Please advise if any additional access panels are required.

A19. See revised A.300-A.312 drawings for access panels.

Q20. Please confirm the exterior ceiling finish. Is that plaster?

A20. Confirmed, see detail #18 / A.801.

Q21. Please advise who is responsible for re-locating bike storage. If the GC is responsible, please provide product info, specifications and shop drawings.

A21. Contractor responsible for relocating existing bike storage. See A.101 for new location.

Q22. Please advise who is responsible for the new signage. If the GC is responsible, please provide more details and specifications.

A22. See response to Q2.

Q23. A-500 shows structural glass storefront to be buried in finishes. Please confirm this is the stone mentioned in general note G/A-500. Please also provide existing shop drawings for this existing storefront stone.

A23. Confirmed, finish of existing stone is Indiana Limestone.

Q24. Please advise if we are to include an allowance to re-install existing pavers or if we are to provide new.

A24. Existing concrete beyond new façade shall remain. Contractor is responsible to protect concrete to remain and patch areas for flush finish.

Q25. Please clarify locations for the angle iron detail 4/S101 at core holes. Is this to be included for only the floor drains? Or power/data stub ups as well?

A25. Reinforcing of the existing deck is not required for single holes less than 6” in diameter than do not cut more than one web of the existing deck.

Q26. Please advise if the GC is responsible for providing temporary heat.

A26. Yes, temporary heat is required per OSHA at the area of work and at the temporary entrance.

Q27. Please confirm working hours for the security conduit route shown on E100A/B.

A27. Routing shall be at normal working hours. Core drills shall be overtime.

Q28. Please clarify the following note shown on TE101B "Not sure of layout of this room and if it has a data rack in this tiny space. REH"

A28. Disregard comment.

Q29. Provide a detailed phasing and logistic plan for this project we will need to price.

A29. Refer to phasing diagram on G.000.00. Refer to schedule in 06 00 00 for additional information.

Q30. Who is building FA Vendor?

A30. See answer to Q12.

Q31. Who is building BMS vendor?

A31. See answer to Q6.

Q32. Please provide contact information of all required or preferred building vendors or build system vendors.

A32. See answers to Q6, Q7, and Q12.

Q33. Why is providing a list of qualifications with our bid grounds for possible disqualification? Qualifying or better put clarifying ones bid provides a way to communicate how we have formulated our proposal giving you a better understanding and re-assurance our interpretation of the bid documentation. Is qualifying/clarifying ones proposal 100% grounds for disqualification?

A33. Please provide only the items that are requested in the bid. If your firm happens to be the lowest bidder, we will review your bid for completeness and request clarification if needed.

Q34. What is the difference between **GWB-01**, **GWB-02**, and **GWB-03**, considering that **GWB-02** and **GWB-03** are not included in the finish schedule?

A34. See sheet A-801.00 for revised finish schedule.

Q35. In **A-300**, there is a discrepancy between **Sheet Note #2** and the label **ACT-2**. Sheet Note #2 specifies that **ACT-1** should be provided, while the plan labels it as **ACT-2**. Could you confirm that **ACT-2** should be used? Additionally, what are the specifications or **item number for the ACT-2** tile to match the existing tiles?

A35. ACT-01, 24”x24” acoustic ceiling tile remains. ACT-02 is replaced with SCS-01, 12”x12” spline ceiling system.

Q36. Could you confirm the item number for **ACT-01**? I found **Armstrong #1912**, but it only has a **9/16” tegular** edge, and they do not offer a **9/16” groove** option

A36. Basis of design is Armstrong Ultima. 9/16” tegular edge is acceptable.

Q37. Please confirm if the **Exterior GWB Ceiling** shown on **A-302** is already existing.

A37. See sheet note #5 on AD.101.00 for area of ceiling to be removed. Exterior ceiling to be removed to existing joint. See detail #18 / A.801.00 for more information.

Q38. Could you confirm if the temporary walls S2.6.40 extend up to Level 03 at a 27.9 ft elevation, given that the Level 02 Floor Plan is not provided?

A38. No. Refer to CP.201.00 for tags. At Dining Room F101 (Building A), refer to detail 17 / A.801.00.

Q39. Are the areas with lighter shading, such as the GWB-01 ceiling in A311, the GWB-01 in Building A on A312, and the exterior gypsum ceiling, already existing?

A39. See Sheets A.300.00, A.301.00, A.302.00, A.311.00, Reflected Ceiling Plan Hatch Key

Q40. We need further clarification regarding the Liquidated Damages. We need to provide clearer information to our bonding company.

A40. There are no liquidated damages.

Q41. Please advise us if the Railroad Protective Liability Insurance is required for either solicitation.

A41. Railroad Protective Liability Insurance is not required for this solicitation.

Q42. Could you please confirm if there are any specific MWBE requirements or goals associated with this project?

A42. 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."

Q43. Please be advised that Division 27 and Division 28 of the specifications are not included addendum #1. Please provide missing divisions.

A43. Refer to Addendum #2 Project Manual for Divisions 27 and 28.

Q44. Please advise if welding needs to be done on OT?

A44. No.

Q45. Please note the specified Entry System – Thermaguard by Assa Abloy is not fire rated. It's rated only for thermal properties. Please confirm if 90 mins fire rating is required.

A45. 90 minutes is not required at exterior doors.

Q46. Please provide anticipated time frame from Plumbing and Sprinkler drawings?

A46. Plumbing drawings are included in addendum #2. Refer to A.300 for relocation of existing sprinkler heads with flex lines to new ACT ceiling at cellar. No sprinklers are required at the ground floor. The Contractor shall submit a shop drawing for coordination and approval.

Q47. Please provide updated A.800 sheet, as per below answer for Q9 from Addendum No. 1.

"A9. See revised door schedule on A.800.00 for door hardware. See Section 084126 " All Glass Entrances for Hardware Set 1.0. Note, the other hardware sets are outstanding and will be issued in a future addendum"

A47. Addendum #2 clarifies the hardware sets on A.800.00. See revised specification sections 080671 "door hardware schedule", 081113 "hollow metal doors and frames", 084126 "all glass entrances", and 087100 "door hardware" for additional information.

Q48. What are the M/WBE-SDVOB utilization goals for this project?

A48. See answer to Q42.

Q49. Please specify liquidated damages/day amount for schedule overrun.

A49. See answer to Q40.

Q50. As regards the lighting control scheme, Lutron issued the following:
Looks like they aren't touching the Grafik Eyes that are existing there.
The below narrative calls out Athena as the new Controls system. It's calling out Lobby spaces and Vestibules.
As per electricals Phase II scope is the below, but I don't see Lobby called out on any of those pages.
Page 22 EL111A.00 – Building A
Page 23 EL111B.00 – Building B
Page 24 EL112A.00 – Building A
Page 25 EL112B.00 – Building B

If you look at those electrical pages, they look very scarce. Some fixtures are stamped, but no zoning.
Note 1 says Central hub for each building - is that (1) Athena hub for Building A scope and (1) Athena hub for Building B?
Note 2 – ESNs normal and EM?
Note 4 – 5 button keypad per each floor?

Do they plan on adding to this scope later on? Just trying to understand the request for an Athena system for such small scope.

A50. A. Regarding scope associated with the existing Lutron Grafik Eyes, please reference sheet EL701.00, Lighting Controls Narrative, Phase II where it is stated the Lutron Grafik Eye controls serving the renovated spaces will be removed.
B. Referencing sheets EL111A.00, EL111B.00, EL112A.00 and EL112B.00 for phase II areas of lighting scope, it is confirmed room names are not provided. To clarify, all areas showing new scope on those sheets are considered lobby spaces. Vestibule spaces on first floor between the lobbies and the exterior are the vestibules referenced in the lighting control narrative (see phase 1 scope which details the work in these vestibules) ((1) vestibule per building for a total of (2) vestibules).
C. It is confirmed lighting control designations are not detailed on the sheets referenced in answer A50.B above. In lieu of identifying zones on plans, the lighting control narrative referenced in answer A50.A above states there is to be one control zone per luminaire type.
D. Confirmed one Athena hub per building for a total of (2).
E. The question is unclear regarding EM and normal ESN's. The control narrative references one normal multizone load controller in each building to dim lighting on normal power, and one multizone load controller on emergency power in each building to dim lighting on emergency power.
F. Note "4" states (1) switch per building, for a total of (2), each to be located in the electrical rooms on the first floor of each building.
G. It is confirmed the design intention is to install the Athena lighting control system in this scope and expand it to serve future areas of remodel within the buildings.

Q51. I don't see any drawings with sheetrock partitions. Do we have SR partitions on this project?

A51. SR partitions required for temporary egress. See A.801.00 for sheetrock partition types. See CP.201.00 for locations.

Q52. *As per the Specifications (see below), Siemens is required, however, as per Siemens Metro Area office, they are not at this site and won't be providing Controls proposal.*

Please advise who is the Building BMS base vendor or if there is a preferred vendor other than Siemens Industry (maybe someone is already authorized by them)?

DIRECT DIGITAL CONTROL SYSTEM FOR HVAC 230923 - 2

FIT-DUBINSKY & BUSINESS AND LIBERAL ARTS LOBBY RENOVATION 57-24140-02
FASHION INSTITUTE OF TECHNOLOGY DECEMBER 13, 2024
NEW YORK, NY ISSUED FOR BID - C1667

2.3 APPROVED MANUFACTURERS

A. Yale's West Campus has standardized around Siemens Controls. No other manufacturers will be accepted. The base bid shall be by contractors authorized by Siemens Controls.

B. Approved Control Manufacturers:

1. Siemens Industries, Inc.

a. Contact Michael Garala, Michael.garala@siemens.com, 860-306-8381

2.4 QUALITY ASSURANCE

A. The Building Automation System (BAS) system shall be designed, installed, commissioned, and serviced by manufacturer authorized and trained personnel. The Controls contractor shall be

A52. See answer to Q6 for BMS vendor.

Q53. Please confirm if WICKS is applicable on this project.

A53. WICKS Law does not apply to this project.

THIS ADDENDUM IS PART OF THE CONTRACT DOCUMENT AND SHALL BE INCLUDED WITH YOUR REQUEST FOR PROPOSAL SUBMITTAL. YOUR SIGNATURE BELOW WARRANTS THAT YOU UNDERSTAND THIS ADDENDUM AND THAT YOU HAVE MADE THE APPRORIATE ADJUSTMENTS IN YOUR PROPOSAL AND CALCULATIONS.

_____
Signature

_____
Print Name and Title of Authorized Representative

_____
Print Name of Company/Partnership/Individual

_____
Date

EXHIBIT C: SPECIFICATIONS

Addendum No. 3

DLRGROUP

ARCHITECTURE ENGINEERING PLANNING INTERIORS

FIT-DUBINSKY & BUSINESS AND LIBERAL ARTS LOBBY RENOVATION

FASHION INSTITUTE OF TECHNOLOGY

Project Manual

ISSUED FOR ADDENDUM #3 - C1667

DLR Group Project No. 57-24140-02

JANUARY 23, 2025

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 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.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Project Coordination
4. Phased Work
5. Work under Owner's separate contracts.
6. Access to site
7. Indoor air quality during construction
8. Coordination with occupants.
9. Work restrictions.
10. Specification and drawing conventions.
11. Correlation and intent of the contract documents
12. Miscellaneous provisions.

    a. Request for Interpretation
    b. Proposal Requests

1.3 PROJECT INFORMATION

A. Project Identification:

    a. Fashion Institute of Technology
    b. Dubinsky (Building A) Business and Liberal Arts (Building B)
    c. 340-358 8th Avenue
    d. New York, NY 10001

B. Owner

    a. Fashion Institute of Technology
    b. 227 West 27th Street
    c. New York, NY 10001
    d.
    e.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:

1. Provide labor, materials, tests, tools and equipment to renovate supporting spaces of the Morris W. and Fannie B. Haft Theater ("Haft Theater"). These spaces include the 2nd floor lobby, public restrooms, dressing rooms, and performance space. Additionally, the project includes infrastructure upgrades to theatrical, audio visual, and information technology systems.

B. Type of Contract:

1. Project will be constructed a single Prime Contract. Contracts for this Project include the following:

a. Prime Contract, including general trades, electrical, mechanical, plumbing, and specialties including audiovisual, information technology and theatrical systems.

C. Prime Contractor: Work in the Prime Contract includes, but is not limited to, the following:

1. General trades work.
2. Interior finish work.
3. Mechanical work.
4. Electrical work.
5. Fire Alarm work.
6. Theatrical Systems
7. Audiovisual systems
8. Information Technology systems.
9. Selective demolition and cutting and patching not identified as work under other contracts.

D. Temporary facilities and controls in the General Trades Contract include, but are not limited to, the following:

1. Temporary facilities and controls that are not otherwise specifically assigned to the Electrical Contract.
2. Unpiped temporary toilet fixtures (if Owner's facilities are not available for use), wash facilities, and drinking water facilities, including disposable supplies.
3. General waste disposal facilities.
4. Barricades, warning signs, and lights.
5. Security enclosure and lockup.
6. Environmental protection.
7. Restoration of Owner's existing facilities used as temporary facilities.
8. Staging and scaffolding as needed.
9. Temporary heating, cooling and ventilation, including temporary connections.
10. Indoor air quality measures as identified below.

1.5 PROJECT COORDINATION

A. Prime Contractor coordination activities of Project include, but are not limited to, the following:

1. Provide overall coordination of the Work, including that of owner direct purchase contracts.
2. Coordinate compliance with FIT's fire safety requirements during construction.
3. Coordinate shared access to workspaces.
4. Coordinate product selections for compatibility.
5. Provide overall coordination of temporary facilities and controls.
6. Coordinate, schedule, and approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.
7. Coordinate construction and operations of the Work with work performed by each Contract.
8. Coordinate sequencing and scheduling of the Work. Include the following:

    a. Initial Coordination Meeting: At earliest possible date, arrange and conduct a meeting with contractors for sequencing and coordinating the Work; negotiate reasonable adjustments to schedules.
    b. Prepare a combined contractors' construction schedule for entire Project. Base schedule on preliminary construction schedule. Secure time commitments for performing critical construction activities from contractors. Show activities of each contract on a separate sheet. Prepare a simplified summary sheet indicating combined construction activities of contracts.

        1) Submit schedules for approval.
        2) Distribute copies of approved schedules to contractors.

9. Provide photographic documentation.
10. Provide quality-assurance and quality-control services.
11. Coordinate sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections.
12. Provide information necessary to adjust, move, or relocate existing utility structures affected by construction.
13. Provide progress cleaning of common areas and coordinate progress cleaning of areas or pieces of equipment where more than one contractor has worked.
14. Coordinate cutting and patching.
15. Coordinate protection of the Work.
16. Coordinate firestopping.
17. Coordinate completion of interrelated punch list items.
18. Coordinate preparation of Project record documents if information from more than one contractor is to be integrated with information from other contractors to form one combined record.
19. Print and submit record documents if installations by more than one contractor are indicated on the same contract drawing or shop drawing.
20. Collect record Specification Sections from contractors, collate Sections into numeric order, and submit complete set.
21. Coordinate preparation of operation and maintenance manuals if information from more than one contractor is to be integrated with information from other contractors to form one combined record.

B. Each Contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of the Work. Each Contractor shall coordinate its operations with operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Unless otherwise indicated, the work described in this Section for each contract shall be complete systems and assemblies, including products, components, accessories, and installation required by the Contract Documents.
2. Blocking, backing panels, sleeves, and metal fabrication supports for the work of each contract shall be the work of each contract for its own work.
3. Furnishing of access panels for the work of each contract shall be the work of each contract for its own work. Installation of access panels shall be the work of each contract for its own work.
4. Painting for the work of each contract shall be the work of the General Construction Contract.
5. Cutting and Patching: Provided under each contract for its own work.
6. Through-penetration firestopping for the work of each contract shall be provided by each contract for its own work.

C. Temporary facilities and controls in the Prime Contractors Contract include, but are not limited to, the following:

1. Installation, operation, maintenance, and removal of each temporary facility necessary for its own normal construction activity, and costs and use charges associated with each facility, except as otherwise provided for in this Section.
2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
3. Temporary enclosures for its own construction activities.
4. Waste disposal facilities, including collection and legal disposal of its own hazardous, dangerous, unsanitary, or other harmful waste materials.
5. Progress cleaning of work areas affected by its operations on a daily basis.
6. Secure lockup of its own tools, materials, and equipment.
7. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
8. FIT’s fire safety requirements during construction.

1.6 PHASED CONSTRUCTION

A. Construct the Work in phases, with each phase substantially complete as indicated below. See diagram on drawings on G.000.00 for general information.

1. Phase I.A – Dubinsky Glazing & Turnstile – Building A

a. During this phase, one lobby shall remain undisrupted. Project will start with phase I.A at building A. At substantial completion, the turnstile and new glazing shall be fully operational and signed off by the special inspector and FDNY.
b.
c. Commencement of Construction:

1) Notice to Proceed: Work of this phase shall commence within 7 days of Monday, April 11th, 2025.
2) Start Date: Work of this phase shall commence by Monday, April 18th, 2025.

d. Substantial Completion:

1) Within 14 days after commencement of construction of this phase, or by August 22nd, 2025

e. Final Compleitiotn

1) Within 14 days after commencement of construction of this phase, or by September 5th, 2025
2)

2. Phase I.B – Business & Liberal Arts Glazing & Turnstile – Building B

a. Perform the remaining Work. The glazing and turnstiles from Phase I.A. shall be fully operational at the commencement of Phase I.B.
b.
c. Commencement of Construction:

1) Notice to Proceed: Work of this phase shall commence within 14 days of Substantial Completion of Phase I.A, or by September 5th, 2025.
2)

d. Substantial Completion:

1) Within 14 days after commencement of construction of this phase, or by November 28th, 2025

e. Final Compleitiotn

1) Within 14 days after commencement of construction of this phase, or by December 12th, 2025.
2)
3) Following this phase, the contractor shall fully vacate the site.

3. Phase II.A - Dubinsky ceiling beyond main area of work – Building A
4. Phase II.B – Business & Liberal Arts ceiling beyond the main area of work – Building B

a. Perform the remaining work at the ceiling and supporting spaces outside of the main area of work at Building A and Building B. The work for Phase II.A & Phase II.B may overlap.
b.
c. Due to the nature of the active lobby, the contractor must delineate areas of work to not prohibit the use of the lobby for the students and faculty. Contractor shall assume at minimum 3 separate areas of work.
d.

e. Commencement of Construction:

1) Notice to Proceed: Work of this phase shall commence within 14 days of Monday, May 26th, 2026.

2)

f. Substantial Completion:

1) Within 14 days after commencement of construction of this phase, or by August 1st, 2026

g. Final Compleitiotn

1) Within 14 days after commencement of construction of this phase, or by August 15th, 2026

B. Before commencing any work, the contractor is responsible for preparing a logistic plan to the owner to highlight sequencing within each phase.

C. Before commencing Work of each phase, Contractor shall submit an updated copy of Contractor's construction schedule, showing the sequence, commencement and completion dates for all phases of the Work.

1.7 WORK UNDER OWNER'S SEPARATE CONTRACTS

A. Work with Separate Contractors: Cooperate fully with Owner's separate contractors, so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under Owner's separate contracts.

B. Concurrent Work: Owner will award separate contract(s) for the following construction operations at Project site. Those operations may be partially conducted simultaneously with Work under this Contract.

1. If asbestos is observed:

a. JVN Restoration - Asbestos Remediation –

1) Charlie Tardy - charlie@jvnr.com

1.8 ACCESS TO SITE

A. Prime Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

1. Contractor shall have access directly to the project site for personal only.
2. Contractor will not be able to store material outside the area of work.
3. All material shall be delivered to loading docks and transported through freight entrances.

4. Contractor shall coordinate delivery of large exterior items including, but not limited to, metal, glazing, and structure with the owner for direct access to the area of work.

B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

D. Connections to Electrical Equipment and Systems: Contractor is not permitted 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 Owner’s Representative, detailing the proposed connection Work.
2. After procedures have been approved, notify the Owner’s Representative at least three working days prior to the connection Work so that arrangements can be made to have a FIT Facilities Management Department Representative witness the Work.

1.9 COORDINATION WITH OCCUPANTS

A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas where work is being performed. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.

1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.10 INDOOR AIR QUALITY DURING CONSTRUCTION

A. Dust, odor, and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust, odor, and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Other dust and odor-control measures.

B. Filter Replacement: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system.

C. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

1. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.

   a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.

2. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
3. Protect air-handling equipment.
4. Provide walk-off mats at each entrance through temporary partition if Owner will occupy all or part of premises during construction. Revise to suit Project. See the Evaluations.

1.11 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: As indicated in Owner's General Requirements.

1. Unless noted otherwise, Work is to be performed between the hours of 7:00 a.m. to 6:00 p.m., Monday through Friday, legal and union holidays excluded.
2. Major mobilization if required is to be performed at night, between the hours of 9:00 p.m. to 6:00 a.m., Monday through Friday.
3. All work conducted which causes significant noise that is considered a disturbance to the school shall be conducted, at contractor's expense, during the time period between 9:00 p.m. and 7:00 a.m. Work considered to be a disturbance or a disruption to the school includes but is not necessarily limited to installation of pencil rods at existing concrete substrate.
4. Hours for Utility Shutdowns: As approved in writing by Owner with not less than 72 hours' notice. Shutdowns shall be conducted, at contractor's expense, during the time period between 10:00 p.m. and 6:00 a.m.
5. Hours for Core Drilling: As approved in writing by Owner with not less than 72 hours notice. Core drilling shall be conducted, at Contractor's expense, during the time period between 10:00 p.m. and 6:00 a.m.
6. 24 Hour Access: The Owner will make the work site available as needed, including three shifts (24 hour access) as coordinated and approved in writing by Owner. All additional costs associated with work outside of normal business working hours shall be accounted for in the Contractor's bid.
7. Weekend Hours: As approved in writing by Owner.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, any level of odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than 72 hours in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.

E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

F. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

G. Employee Identification: Comply with the Facility's Visitor Identification Policy. A copy of the current policy will be distributed at the initial job meeting.

H.

1.12 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.13 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

A. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the work by the Contractor. The contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

B. In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by Addendum, the better quality or greater quantity of Work shall be provided in accordance with the Architect's interpretation.

C. If an item is shown on the Drawings but not specified, the Contractor shall provide the item of the same quality as similar items specified, as determined by the Architect. If an item is specified but not shown on the Drawings, it shall be located as directed by the Architect.

D. The Drawings are indications of the design intent as well as specific instructions. The "details" included on Drawings show the intent of all similar areas. If questions arise about the construction of an area not specifically detailed, consult with the Architect who will provide further "details" and instructions. Such further documentation, if consistent with the Contract Documents, shall not alter the Contract Sum.

E. If the Contractor, in the course of construction, finds any conflict, error, or discrepancy on or between the Drawings and Specifications or any of the related Contract Documents, such conflict, error, or discrepancy shall be immediately referred to the Architect, in writing. Architect shall issue an interpretation, in writing, to the Contractor within (10) days after receipt of the written request. No additional compensation will be paid to the Contractor as a result of an interpretation of the Contract Documents.

1.14 MISCELLANEOUS PROVISIONS

A. Electronic digital data files of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.

B. Request for Interpretation (RFI):

1. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form bound in the Project Manual.
2. Architect’s Action: Architect will review each RFI, determine action required, and respond. Allow five working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
3. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly.
4. On receipt of Architect’s action, update RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within five days if contractor disagrees with response.

C. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request or 10 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
e. Use form acceptable to Architect.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 011000

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 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.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1.
2. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use facsimile of form provided in Project Manual.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.

b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.7 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 012500

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

D. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

G. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.4 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

1.5 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for direction before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.6 ACTION SUBMITTALS

A. Shop Drawings: For integrated exterior mockups.

1. Include plans, sections, and elevations, indicating materials and size of mockup construction.
2. Indicate manufacturer and model number of individual components.
3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

B. Delegated-Design Services Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.7 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor's quality-control personnel.

C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.

5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

E. Reports: Prepare and submit certified written reports and documents as specified.

F. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.8 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, telephone number, and email address of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

1.9 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

G. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of

manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by Architect.
3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
4. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed to perform same tasks during the construction at Project.
5. Demonstrate the proposed range of aesthetic effects and workmanship.
6. Obtain Architect's approval of mockups before starting corresponding work, fabrication, or construction.

a. Allow seven days for initial review and each re-review of each mockup.

7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
8. Demolish and remove mockups when directed unless otherwise indicated.

1.10 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
2. Payment for these services will be made from testing and inspection allowances, as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Engage a qualified testing agency to perform quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform duties of Contractor.

E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections.

F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014339 - MOCKUPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Integrated exterior mockups.
2. Preconstruction laboratory mockups.
3. Room mockups.

B. Related Requirements:

1. Section 014000 "Quality Requirements" for quality assurance requirements for aesthetic and workmanship mockups specified in other Sections.

1.2 DEFINITIONS

A. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as part of permanent construction, consisting of multiple products, assemblies, and subassemblies.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1. Meet with Owner, Architect, inspecting agency representative, and installers of major systems whose Work is included in integrated exterior mockups.
2. Review locations and extent of mockups.
3. Review testing procedures to be performed on mockups.
4. Review and finalize schedule for mockups, and verify availability of materials, personnel, equipment, and facilities needed to complete mockups and maintain schedule for the Work.

1.4 ACTION SUBMITTALS

A. Shop Drawings: For integrated exterior mockups.

1. Include plans, elevations, sections, and mounting details.
2. Indicate manufacturer and model number of individual components, subassemblies, and assemblies.
3. Include site location drawing
4. Revise and resubmit Shop Drawings to reflect approved modifications in details and component interfaces resulting from changes made during testing procedures.

B. Delegated Design Submittal: For temporary structural supports for mockups not attached to building structure, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Preconstruction Test Reports: For integrated exterior mockups.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified in accordance with ASTM E699 for testing indicated and acceptable to Owner and Architect.

B. Build mockups to do the following:

1. Verify selections made under Sample submittals.
2. Demonstrate aesthetic effects.
3. Demonstrate the qualities of products and workmanship.
4. Demonstrate acceptable coordination between components and systems.
5. Perform preconstruction testing, such as window air- and water-leakage testing.

C. Fabrication: Before fabricating or installing portions of the Work requiring mockups, build mockups for each form of construction and finish required. Use materials and installation methods as required for the Work.

1. Build mockups of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by Architect
3. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed unless otherwise indicated.

D. Notifications:

1. Notify Architect seven days in advance of the dates and times when mockups will be constructed.
2. Notify Architect seven days in advance of the dates and times when mockups will be tested.
3. Allow seven days for initial review and each re-review of each mockup.

E. Approval: Obtain Architect's and Owner’s approval of mockups before starting fabrication or construction of corresponding Work.

1. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 COORDINATION

A. Coordinate schedule for construction of mockups, so construction, testing, and review of mockups do not impact Project schedule.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design support structure for free-standing mockups.

B. Structural Performance:

1. Wind Loads: As indicated on Drawings.

C. Mockup Testing Performance Requirements: Perform tests using design pressures and performance criteria indicated for assemblies and products that are specified in other Sections and incorporated into integrated exterior mockups.

2.2 INTEGRATED EXTERIOR MOCKUPS

A. Construct integrated exterior mockups according to approved mockup Shop Drawings. Construct mockups to demonstrate constructability, coordination of trades, and sequencing of Work; and to ensure materials, components, subassemblies, assemblies, and interfaces integrate into a system complying with indicated performance and aesthetic requirements.

B. Design and construct foundation and superstructure to support free-standing integrated exterior mockups.

C. Build integrated exterior mockups using installers and construction methods that will be used in completed construction.

D. Use specified products that have been approved by Architect. Coordinate installation of materials and products specified in individual Specification Sections that include Work included in integrated exterior mockups.

E. The Work of integrated exterior mockups includes, but is not limited to, the following:

F.

1. Cold-formed metal framing and sheathing.
2. Air and weather barriers.
3. Thermal insulation.
4. Through-wall flashing.
5. Joint sealants.
6. Metal wall panels.
7. Aluminum-framed entrances and storefront.
8. Structural Glazing

G. Photographic Documentation: Document construction of integrated exterior mockups with photographs. Provide photographs showing details of interface of different materials and assemblies.

1. Document testing procedures, including water leakage and other deficiencies. Photograph modifications to component interfaces intended to correct deficiencies.

H. Provide and document modifications to construction details and interfaces between components and systems required to properly sequence the Work, or to pass performance testing requirements. Obtain Architect’s approval for modifications.

I. Retain approved mockups constructed in place. Incorporate fully into the Work.

PART 3 - EXECUTION

3.1 TESTING OF INTEGRATED EXTERIOR MOCKUPS

A. Integrated Exterior Mockup Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

1. Testing and inspecting agency will interpret tests and state in each report whether tested Work complies with or deviates from requirements.

B. Integrated Exterior Mockup Testing Services: Perform the following tests in the following order:

1. Water-Spray Test: Before installation of interior finishes has begun, test areas designated by Architect in accordance with AAMA 501.2 for evidence of water penetration.

a. Perform a minimum of two tests in areas as directed by Architect.

2. Air Leakage: Test in accordance with ASTM E783 at 1.5 times the rate specified in "Mockup Testing Performance Requirements" Paragraph in "Performance Requirements" Article, but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.

a. Perform a minimum of two tests in areas as directed by Architect.

3. Water Penetration: Test in accordance with ASTM E1105 at a minimum static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Mockup Testing Performance Requirements" Paragraph in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft., and verify no evidence of water penetration.

C. Manufacturer's Field Service: Owner will engage a factory-authorized service representative to test and inspect components, assemblies, and installations, including connections, and also to observe testing for the following systems and assemblies.

1. Structural Glazing in Section 084426
2. Metal Composite Material Wall Panels in Section 074213.23

D. Integrated exterior mockup will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION 014339

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 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.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for requests for substitutions.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved by Architect through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications. Submit a comparable product request, if applicable.

1.4 ACTION SUBMITTALS

A. Comparable Product Request Submittal: Submit request for consideration of each comparable product. Identify basis-of-design product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

    a. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:

a. Name of product and manufacturer.
b. Model and serial number.
c. Capacity.
d. Speed.
e. Ratings.

3. See individual identification sections in Divisions 21, 23, and 26 for additional identification requirements.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

   a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

a. Sole product may be indicated by the phrase: "Subject to compliance with requirements, provide the following: …"

2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

   a. Sole manufacturer/source may be indicated by the phrase: "Subject to compliance with requirements, provide products by the following: …"

3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

   a. Limited list of products may be indicated by the phrase: "Subject to compliance with requirements, provide one of the following: …"

4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, which complies with requirements.

   a. Non-limited list of products is indicated by the phrase: "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following: …"

5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

   a. Limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, provide products by one of the following: …"

6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, which complies with requirements.

   a. Non-limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following: …"

7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
2. Evidence that proposed product provides specified warranty.
3. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
4. Samples, if requested.

B. Submittal Requirements: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:

1. Field engineering.
2. Installation of the work.
3. Cutting and patching.
4. Coordination of Owner's portion of the Work.
5. Progress cleaning.
6. Protection of installed construction.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 024119 "Selective Demolition" for demolition and removal of selected portions of the building.

1.2 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.3 INFORMATIONAL SUBMITTALS

A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be

relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.4 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:

   a. Primary operational systems and equipment.
   b. Fire separation assemblies.
   c. Air or smoke barriers.
   d. Fire-suppression systems.
   e. Plumbing piping systems.
   f. Mechanical systems piping and ducts.
   g. Control systems.
   h. Communication systems.
   i. Fire-detection and -alarm systems.
   j. Conveying systems.
   k. Electrical wiring systems.
   l. Operating systems of special construction.
   m.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

   a. Water, moisture, or vapor barriers.
   b. Membranes and flashings.
   c. Exterior curtain-wall construction.
   d. Sprayed fire-resistive material.
   e. Equipment supports.

f. Piping, ductwork, vessels, and equipment.
g. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

B. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings. If discrepancies are discovered, notify Architect promptly.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Repair or remove and replace damaged, defective, or nonconforming Work.

3.5 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
5. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

   a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
   b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

   a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. The Work of this Section Includes:

1. Demolition and removal of selected portions of interior of building.
2. Removal and salvage of existing items for delivery to Owner and removal of existing items for reinstallation.

B. Related Requirements:

1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 017300 "Execution" for cutting and patching procedures.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner as indicated.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage; prepare for reuse; and reinstall where indicated.

D. Existing to Remain (ETR): Existing items of construction that are not to be removed.

1.3 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.4 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

1.5 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.

2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.
6. Review and finalize protection requirements.
7. Review procedures for noise control and dust control.
8. Review storage, protection, and accounting for items to be removed for salvage or reinstallation.

1.6 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property , for dust control , for noise control. Indicate proposed locations and construction of barriers.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Temporary interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

1.7 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials:

1. It is not expected that hazardous materials will be encountered in the Work.

a. Hazardous materials will be removed by Owner before start of the Work.
b. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

D. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.

1. Inventory and record the condition of items to be removed for salvage or reinstallation. Photograph or video conditions that might be misconstrued as damage caused by removal.
2. Photograph or video existing conditions of adjoining construction including finish surfaces, that might be misconstrued as damage caused by selective demolition operations or removal of items for salvage or reinstallation.

3.2 PREPARATION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.

2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 011000 “Summary”

B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.3 UTILITY SERVICES AND BUILDING SYSTEMS

A. Existing Services/Systems to Remain: Maintain utilities and building systems and equipment to remain and protect against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utilities and building systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated utilities when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. If disconnection of utilities and building systems will affect adjacent occupied parts of the building, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to those parts of the building.
4. Demolish and remove existing building systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment and components.

5. Abandon existing building systems, equipment, and components indicated on Drawings to be abandoned in place.

    a. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    b. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

6. Remove and reinstall/salvage existing building systems, equipment, and components indicated on drawings to be removed and reinstalled or removed and salvaged:

    a. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment and components; when appropriate, reinstall, reconnect, and make equipment operational.
    b. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and components and deliver to Owner.

3.4 SALVAGE/REINSTALL

A. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
3. Store items in a secure area until delivery to Owner.
4. Protect items from damage during transport and storage.

B. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

3.5 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
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. Use hand tools 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 fire watch during and for at least two hours after flame-cutting operations.

6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed trafficways if required by authorities having jurisdiction.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete:

1. Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inchat junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
2. Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

B. Marble Flooring: Carefully remove vestibule to not disrupt the existing marble flooring. Maintain access to flooring to provide new marble slab flooring to match existing at transition.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

3.8 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 042200 CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Masonry units.

B. Reinforcement, anchorage, and accessories.

C. Precast concrete wall cap.

1.2 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

A. Section 084426 – Structural Glass Façade: Placement of fabricated metal items into masonry.

1.3 REFERENCES

A. California Building Code (CBC) 2022 edition, as adopted by Authority Having Jurisdiction (AHJ).

B. ACI 315 - Details and Detailing of Concrete Reinforcement.

C. ASTM A615- Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.

D. ASTM A706 - Low Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

E. ASTM C90 - Loadbearing Concrete Masonry Units.

F. ASTM C1314 - Compressive Strength of Masonry Prisms.

G. ASTM C90 - Hollow Load Bearing Concrete Masonry Units.

H. ASTM C 55 - Standard Specification for Concrete Brick.

1.4 QUALIFICATIONS

A. Installer: Company specializing in performing the work of this Section with minimum 5 years documented experience.

1.5 SUBMITTALS

A. Samples:

1. Submit one full size samples of each block type and color indicating surface texture and color.

2. Certification: Submit certification from block manufacturer confirming compliance with criteria established by referenced standard and this section.

B. Materials List: Submit proposed materials list for all products used.

C. Shop Drawings

1. Submit steel reinforcement shop drawings in accordance with ACI 315. Include placing drawings and bending charts. Show length and locations of splices, size and length of reinforcing steel, bar position dimensions and spacings.

D. Grouting Procedures: Prior to beginning high lift grouting, provide submittal defining proposed grouting procedures. Incorporate DSA IR 21-2, as well as qualification statement of installing contractor demonstrating experience with high lift grouting techniques on Title 24 projects.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 011000 “Summary”.

1.7 GUARANTEE

A. Provide the Owner with a guarantee, in Architect approved form, against the following specific defects or failures for a period of three (3) years after Notice of Substantial Completion:

1. Expansion/contraction cracks.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Characteristics of specific products, where named in this Section, are indicated to establish required level of quality, appearance, and performance. Architect will consider requests for substitutions, under the provisions of Section 01 25 00.

2.2 CONCRETE MASONRY UNITS: PRECISION

A. Type:

1. Block: Hollow Load Bearing Block Units per ASTM C90 and Section 2103A.1, Chapter 21A, Part 2, Title 24, CCR.

a. Minimum compressive strength of 3,750 psi as a component of design f'm assembly value of 2,500 psi.

B. Size and style

1. Block: Nominal 8 x 8 x 16 and 8 x 12 x 16, hollow load bearing units, one open end at vertical reinforcing, bond beam units at horizontal reinforcing. Provide additional sizes as required and as shown on drawings.

C. Finish: Manufacturer's Precision Block finish.

D. Color:

1. Concealed applications: Provide natural gray color.

2.

E. Fire Rating: Where masonry units are components in fire rated assemblies, provide written certification of compliance with *Title 24*, UL material listing requirements or other approved material certification methods.

2.3 ACCESSORIES, REINFORCEMENT AND ANCHORAGE

A. Precast concrete wall cap

1. Provide precast concrete wall cap, configured as shown on drawings, Type II cement, minimum 3,000 psi concrete mix design.

2. Provide embed as shown on drawing, coordinated with wall reinforcing layout.
3. Provide natural gray concrete, light sandblast finish.
4. Where required, provide cast corner units. Do not cast as mitered or butt joint corner units.

B. Reinforcing Steel: ASTM A 615 or ASTM A 706, in accordance with 2022 CBC, Title 24, CCR

C. Where required or shown on structural drawings, provide prefabricated horizontal joint reinforcement complying with 2022 CBC, Title 24, CCR, hot dipped galvanized.

D. Mortar and Grout

2.4 SOURCE QUALITY CONTROL AND TESTING

A. Masonry Units: 2022 CBC, Part 2, Title 24, CCR.

2.5 OTHER MATERIALS

A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection

1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.

2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
3. Verify that built-in items are in proper location, and ready for roughing into masonry work.
4. In the event of discrepancy, immediately notify the Architect.
5. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

B. PREPARATION

1. Direct and coordinate placement of metal anchors supplied to other Sections.

2. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.
3. Provide templates for setting anchor bolts, maintaining clearances and embedment in compliance with 2022 CBC, Title 24, Part 2, CCR.
4. Provide all necessary reinforcement of embeds to prevent blowouts and displacement during grouting.

C. COURSING

1. Establish lines, levels, and coursing indicated. Protect from displacement.

2. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
3. Lay masonry units in running bond as indicated on drawings. Course one unit and one mortar joint to equal 8 inches.
4. Joint Tooling:

   a. Tool wall joints - Flush

   b. Tool joints tight and flush at locations where waterproofing or tile finish occurs.
   c. Where furring or framing assemblies are installed over masonry, tool joints tight and flush.

5. Surface preparation for waterproofing membranes: Provide smooth mortar parge coat at all block surfaces receiving below grade waterproofing systems, free of ridges, gaps, holes or other surface imperfections.

D. REINFORCEMENT AND ANCHORAGES - REINFORCED UNIT MASONRY

1. Install reinforcement at spacing indicated and to allow a minimum grout coverage of 1/2 inch or 1 bar diameter, whichever is greater.

2. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
3. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters.
4. Splice reinforcing bars in accordance with 2022 CBC Part 2, Title 24, and as shown on structural drawings.
5. Embed anchors for attachment of metal fabrications.
6. When conflicts in rebar layout are identified in the structural drawings, contractor to assume most conservative layouts unless otherwise specified by the engineer of record.

E. Placing and Bonding

1. Lay masonry in accordance with 2022 CBC Part 2, Title 24, CCR.

2. Perform jobsite cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
3. Lay masonry units with full face shell bedding on bed joints and full head joints.
4. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
5. Lay masonry units with core cells grout space vertically aligned, clear of mortar, and unobstructed with a minimum cell dimension of 3 inches.
6. Interlock intersections and external corners.
7. Where expansion or control joints are shown on structural drawings, provide Type 1 sealant and backer rod as specified in Section 07 92 00 at both sides of joint.
8. Remove excess mortar as Work progresses. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
9. Grout may be placed after mortar has been set and cured. Cure time shall be adequate to prevent blow-outs in high lift grouting operations.

F. Grouting

1. Wet masonry unit surfaces in contact with grout just prior to grout placement.

2. Provide coarse grout.
3. Grout masonry using specified grouting techniques.

   a. Maintain weep joints free of grout.

4. When grouting is stopped for more than one hour, terminate grout a mimimum of 1 1/2 inch below top of upper masonry unit to form a positive key for subsequent grout placement and as required by the California Building Code 21204A.5.
5. "Bucketing" of grout following grout consolidation is not acceptable.
6. Lack of consolidation

a. When lack of consolidation is identified, contractor to remove and replace all material in the offending lift at the contractor's expense.

b. Any delays associated with additional testing as a result of lack of consolidation will be at the contractors expense.

c. Fees for any additional testing required that identify lack of consolidation will be reimbursed by the contractor. Such testing methods will be identified solely by the Structural Engineer of Record in coordination with the Division of the State Architect, Architect of Record, and the Inspector of Record, and may include scanning, sounding, coring, and face shell removal.

d. Any additional design services required to address any failures in masonry or grouting will be reimbursed by the Contractor to the District.

G. BUILT - IN WORK

1. As work progresses, build in anchor bolts, plates, and other items furnished by other Sections.

2. Build in items plumb and level.
3. Do not build in pipes or ducts unless specifically detailed by the Structural Engineer.
4. Do not build in organic materials subject to deterioration.

H. TOLERANCES

1. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

2. Maximum Variation From Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.
3. Maximum Variation From Plumb: 1/4 inch per story non-cumulative.
4. Maximum Variation From Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.
5. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

I. CUTTING AND FITTING

1. Cut and fit for chases, pipes, conduit, sleeves, grounds, and other penetrations. Coordinate with other Sections of work to provide correct size, shape, and location.

2. Obtain Architect approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

J. CLEANING

1. Clean work under provisions of Section 01 73 00.

2. Remove excess mortar and mortar smears.
3. Replace defective mortar. Match adjacent work.
4. Use non-metallic tools in cleaning operations.
5. Do not use acid or acid base cleaning agents.

K. PROTECTION OF FINISHED WORK

1. Protect finish installation under provisions of Section 01 73 00

2. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.
3. Protection of groundface units:

   a. Without damaging completed work, provide protective covers at groundface block external corners to prevent damaged by construction activities.

   b. Without damaging completed work, provide protective covers to prevent dirt staining on surfaces.

L. PROTECTION OF ADJACENT MARBLE FLOORING

1. When Masons are working adjacent to a protected floor, Contractor to provide additional floor protection from debris, tools, masonry, or other objects falling from scaffolding.

M. FIELD QUALITY ASSURANCE

1. Masonry Inspection: Provide inspection per 2022 CBC, Part 2, Title 24, CCR.
2. Masonry Testing: Provide testing per 2022 CBC, Part 2, Title 24, CCR.
3. Masonry Prism Testing: For each different masonry compressive strength. Provide testing per Section 2105A.2.2.2, Chapter 21A, Part 2, Title 24, CCR. Prepare prisms as follows:

   a. A set of five masonry prisms shall be built and tested in accordance with ASTM C 1314 prior to the start of construction. Materials used for the construction of the prisms shall be taken from those specified to be used in the project. Prisms shall be constructed under the observation of the special inspector or an approved agency and tested by an approved agency.
   b. A set of three prisms shall be built and tested during construction in accordance with ASTM C1314 for each 5,000 square feet of wall area, but not less than one set of three masonry prisms for the project.

4. Masonry Core Tests: Provide masonry core tests for each different masonry compressive strength in accordance with 2022 CBC, Part 2, Title 24, CCR. Whenever possible, coring sample diameters to be 6" unless otherwise instructed by the Architect, Structural Engineer, or Testing Agent.

END OF SECTION 042200

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural-steel materials.

1.2 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data:

1. Structural-steel materials.
2. High-strength, bolt-nut-washer assemblies.
3. Anchor rods.
4. Threaded rods.
5. Shop primer.
6. Galvanized-steel primer.
7. Etching cleaner.
8. Shrinkage-resistant grout.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. Identify members not to be shop primed.

C. Delegated Design Submittal: For structural-steel connections indicated on Drawings to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, fabricator, shop-painting applicators, professional engineer, and testing agency.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural-steel materials, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength, bolt-nut-washer assemblies.

F. Survey of existing conditions.

G. Source quality-control reports.

H. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).

B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

C. Shop-Painting Applicator Qualifications: Qualified in accordance with AISC's Sophisticated Paint Endorsement P1 or to SSPC-QP 3.

D. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125/F3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with applicable provisions of the following specifications and documents:

1. ANSI/AISC 303.
2. ANSI/AISC 360.
3. RCSC's "Specification for Structural Joints Using High-Strength Bolts."

B. Connection Design Information:

1. Design connections and final configuration of member reinforcement at connections in accordance with ANSI/AISC 303 by fabricator's qualified professional engineer.

a. Use Load and Resistance Factor Design; data are given at factored-load level.

C. Moment Connections: Type FR, full restrained.

2.2 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A992/A992M.

B. Channels, Angles: ASTM A36/A36M.

C. Plate and Bar: ASTM A36/A36M.

D. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade B structural tubing.

E. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS AND CONNECTORS

A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325 (Grade A325M), Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH (ASTM A563M, Class 10S), heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1 (Type 8.8-1), compressible-washer type with plain finish.

2.4 PRIMER

A. Steel Primer:

1. Comply with Section “078123 "Intumescent Fireproofing”.
2. Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.5 SHRINKAGE-RESISTANT GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 2.

F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.7 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened or Slip critical.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.8 SHOP PRIMING

A. Shop prime steel surfaces, except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Surfaces enclosed in interior construction.

B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:

1. SSPC-SP 2.
2. SSPC-SP 3.

C. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.

B. Maintain erection tolerances of structural steel within ANSI/AISC 303.

C. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

D. Splice members only where indicated.

E. Do not use thermal cutting during erection.

F. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.

1. Joint Type: Snug tightened or Slip critical.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

3.5 REPAIR

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780/A780M.

B. Touchup Painting:

1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

2. Cleaning and touchup painting are specified in Section 078123 "Intumescent Fireproofing”.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

1. Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.

    a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

        1) Liquid Penetrant Inspection: ASTM E165/E165M.
        2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
        3) Ultrasonic Inspection: ASTM E164.
        4) Radiographic Inspection: ASTM E94/E94M.

END OF SECTION 051200

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood products.
2. Fire-retardant-treated lumber.
3. Miscellaneous lumber.
4. Plywood backing panels.

1.2 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
2. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency in accordance with ASTM D5664.
3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS

A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:

1. Dimension Lumber: 15 percent for 2-inch nominal thickness or less; 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.2 FIRE-RETARDANT-TREATED LUMBER

A. General: Where fire-retardant-treated materials are indicated, materials are to comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Treatment is not to promote corrosion of metal fasteners.
2. Interior Type A: Treated materials are to have a moisture content of 28 percent or less when tested in accordance with ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.

C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent. Kiln-dry plywood after treatment to maximum moisture content of 15 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency and other information required by authorities having jurisdiction.

E. Application: Treat all rough carpentry unless otherwise indicated.

2.3 MISCELLANEOUS LUMBER

A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.

B. Dimension Lumber Items: Standard, Stud, or No. 3 grade lumber of any species.

C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

2.4 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, fire-retardant treated, in thickness indicated or, if not indicated, not less than ¾ inch nominal thickness.

2.5 FASTENERS

A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.

B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193, or ICC-ES AC308 as appropriate for the substrate.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate blocking and similar supports to comply with requirements for attaching other construction.

B. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.

C. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

D. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

E. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.10.1, "Fastening Schedule," in ICC's International Building Code (IBC).

F. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 INSTALLATION OF WOOD BLOCKING

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach wood blocking to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

END OF SECTION 061000

SECTION 064116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

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:

B.

1. Custom fabricated reception desk units.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products high-pressure decorative laminate adhesive for bonding plastic laminate and cabinet hardware and accessories.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.

2. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural plastic-laminate cabinets.
3. Apply WI Certified Compliance Program label to Shop Drawings.

C. Samples for Initial Selection:

1. Plastic laminates.

2. PVC edge material.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For the following:

1. Composite wood and agrifiber products.

2. High-pressure decorative laminate.
3. Adhesives.

C. Woodwork Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: 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. Shop is a licensee of WI's Certified Compliance Program.

B. Installer Qualifications: Licensee of WI's Certified Compliance Program.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Provide full size base cabinet, upper cabinet and each counter type, in specified finish with hardware installed.

2. Build mockups of typical plastic-laminate cabinets as shown on Drawings.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.

C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

1.9 REGULATORY REQUIREMENTS

A. Operable parts for all accessible casework shall comply with CBC Section 11B-309.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL CABINET FABRICATORS

A. Basis of Design: PL-01,

B. Characteristics of specific products, where named in this section, are indicated to establish required level of quality, appearance and performance.

2.2 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide labels and certificates from WI certification program indicating that woodwork, including installation, complies with requirements of grades specified.

B. Grade: Custom.

C. Certified Wood: Plastic-laminate cabinets shall be made from wood products certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and FSC STD-40-004, "FSC Standard for Chain of Custody Certification."

D. Type of Construction: Frameless.

E. Casework Cores: Provide SierraPine Arreis or equal, phone (503) 773-2522, Medium Density Fiberboard (MDF), Type MD, Per ANSI A 208.2, latest edition and NEMA LD3-85.

1. Provide Scientific Certification System certification that product is manufactured from 100 percent recovered and recycled wood fiber content and contains no added formaldehyde.

F. Cabinet Door Cores: Provide SierraPine Arreis or equal, phone (503) 773-2522, Medium Density Fiberboard (MDF), Type MD, Per ANSI A 208.2, latest edition and NEMA LD3-85.

1. Provide Scientific Certification System certification that product is manufactured from 75 percent recovered and recycled wood fiber content and contains no added formaldehyde.

G. Shelving: Provide SierraPine Arries or equal, phone (503) 773-2522, Medium Density Fiberboard (MDF), Type MD, Per ANSI A 208.2, latest edition and NEMA LD3-85.

1. Provide Scientific Certification System certification that product is manufactured from 75 percent recovered and recycled wood fiber content and contains no added formaldehyde.

H. Provide Scientific Certification System certification that product is manufactured from 75 percent recovered and recycled wood fiber content and contains no added formaldehyde.

I. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.

J. Reveal Dimension: 1/2 inch (13 mm).

K. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Formica Corporation.
b. Lamin-Art, Inc.
c. Panolam Industries International, Inc.
d. Wilsonart International; Div. of Premark International, Inc.

L. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade VGS.
4. Edges: PVC edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish.
5. Pattern Direction: Horizontally for drawer fronts, doors, and fixed panels.

M. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: Panolam Thermofused melamine WI listed.

a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish.
b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide Panolam Thermofused melamine WI listed.

2. Drawer Sides and Backs: Provide SierraPine Arreis or equal, Medium denisty Fiberboard (MDF), Type MD, per ANSI A 208.2, latest edition and NEMA LD3-85.

3. Drawer Bottoms: Provide SierraPine Arries or equal, Medium denisty Fiberboard (MDF), Type MD, per ANSI A 208.2, latest edition and NEMA LD3-85.

N. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

O. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.

P. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Architect from full color and finish line for specified products.

a. PL-01 shall match color of SSM-01. Samples shall be review simultaneously.

Q. Surface Finish Criteria

1. Exposed portions: Finish exposed portions with high pressure laminate as specified. For purposes of this specification, definition of exposed portions requiring high pressure laminate includes:

a. Interior surfaces of knee space or recesses provided for moveable equipment.
b. All cabinet doors and surfaces.
c.

2.3 CABINET HARDWARE AND ACCESSORIES

A. Provide in accordance with Resource Guide Appendix to Wl Manual of Millwork except as noted below.

B. Hinges: Unless noted otherwise, provide RPC or equal, 850 or 370 series, Heavy duty wrap around, Hospital Tips, 2-3/4 inch height minimum, width configuration as required for application, color as selected by Architect from complete line, including powder coating.

C. Drawer and Door Pulls: Trimco or equal, loop handle, 4 inch center to center, No. 562-4 inches x US 26D.

D. Adjustable Shelf Standards and Supports: Provide KV 346, ENG11-WH or equal metal shelf support clips, with Phillips PHWS at each clip.

1. Drawer Guides: Unless noted otherwise, provide Accuride Model 3832 at drawers less than 24 inches wide, Model 4034 at drawers 24 inches and wider and file locations.

2. File Drawers: Provide Pendaflex G-6110-04(WH) file railing system at all drawers marked "file".

E. Door and Drawer Locks:

1. Manufacturer: Olympus, www. olvmpus-lock, com, as represented by Coffman Associates, phone (626) 810-7337.

2. Type: Provide specified design, with front loaded removable cylinder permitting rekeying without total lock disassembly.

   a. Drawer Lock Series: 800SC, pin tumbler design, suitable for Owners standard keyway, with bar strike. Comply with ANSI A156.11 Grade 1 cycle testing criteria.
   b. Door Lock Series: 700SC, pin tumbler design, suitable for Owners standard keyway, with bar strike. Comply with ANSI A156.11 Grade 1 cycle testing criteria.

3. Magnetic catches: Provide magnetic catches at all cabinet doors, with maximum 5 pounds holding power.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesives: Do not use adhesives that contain urea formaldehyde.

D. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.5 FABRICATION

A. Construct casework to WI Premium grade, modified as specified in this section.

1. Provide white anchor screw cover caps.

2. Fabricate all drawers full depth of cabinet.
3. Provide cabinet locks at the following locations:

   a. At all teacher workrooms, office areas, administrative areas, health areas, and 25% of all other areas per Owner direction

B. Provide Wl listed backer sheet.

C. Fabricate cabinets to dimensions, profiles, and details indicated.

D. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

E. Plough drawer bottoms into sides, fronts, or sub fronts, and backs. Surface attachment of bottoms is not acceptable.

F. Install paper management grommet and wire grommet at each countertop, located as directed by Architect.

G. Install door and drawer handle horizontally, spaced as shown on drawings. Do not center drawer handles in drawer face. Space same distance from top edge of drawer as at doors.

H. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

C. Verify adequacy of backing support framing.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.

C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.

1. Use filler matching finish of items being installed.

F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
2. Set and secure casework in accordance with Wl Manual of Millwork and T - 24 CCR Provide Wl Certified Compliance Certificate for Installation.
3. Install separate anchor strips behind cabinet back. Cabinet back shall not be used for anchorage.

   a. Provide one anchor strip top and bottom for wall hung cabinets and base cabinets less than four feet high. Provide three strips for base cabinets over four feet high.
   b. Provide design and detailing for seismic attachment/bracing of all free standing library shelving units, including specifying and coordinating all required embedded shields necessary to comply with DSA requirements.

4. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Adjust doors with mechanical and magnetic catches to limit opening force to maximum 5 pounds force.

C. Clean, lubricate, and adjust hardware.

D. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Polyisocyanurate foam-plastic board insulation.
2. Mineral-wool blanket insulation.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Installer's Certification: Listing type, manufacturer, and R-value of insulation installed in each element of the building thermal envelope.

1. For blown-in or sprayed fiberglass and cellulosic-fiber loose-fill insulation, indicate initial installed thickness, settled thickness, settled R-value, installed density, coverage area, and number of bags installed.
2. Sign, date, and post the certification in a conspicuous location on Project site.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Research Reports: For foam-plastic insulation, from ICC-ES.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indexes less than Class A, 25 and 450 when tested in accordance with ASTM E84.

B. Fire-Resistance Ratings: Comply with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from listings of another qualified testing agency.

C. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

D. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

E. Thermal-Resistance Value (R-Value): R-value as indicated on Drawings in accordance with ASTM C518.

2.2 POLYISOCYANURATE FOAM-PLASTIC BOARD INSULATION

A. Polyisocyanurate Board Insulation, Glass-Fiber-Mat Faced As specified on A.501.00: ASTM C1289, glass-fiber-mat faced, Type II, Class 2.

2.3 MINERAL-WOOL BLANKET INSULATION

A. Mineral-Wool Blanket Insulation, Unfaced As specified on A.501.00: ASTM C665, Type I (blankets without membrane facing); consisting of fibers; complying with ASTM E136 for combustion characteristics.

2.4 ACCESSORIES

A. Insulation for Miscellaneous Voids:

1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.
2. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.
3. Polyurethane Pour-In-Place Insulation: Closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84, specifically formulated for pour-in-place applications.

a.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or those that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products, applications and applicable codes.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Install insulation with manufacturer's R-value label exposed after insulation is installed.

D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF SLAB INSULATION

A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive in accordance with manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units in accordance with manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

3.4 INSTALLATION OF FOUNDATION WALL INSULATION

A. Butt panels together for tight fit.

B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:

1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive in accordance with anchor manufacturer's written instructions.
2. Space anchors in accordance with insulation manufacturer's written instructions for insulation type, thickness, and application.
3. Apply insulation standoffs to each spindle to create cavity width indicated on Drawings between concrete substrate and insulation.
4. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation.
5. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing in accordance with manufacturer's written instructions.

3.5 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members in accordance with the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3 inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. For metal-framed wall cavities where cavity heights exceed 96 inches support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
5. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install unfaced blanket insulation over ceiling area in thickness indicated. Where partitions occur, extend insulation up either side of partition.

3.6 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 074213.23 - METAL COMPOSITE WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal composite material (MCM) panels.
2. Metal composite material (MCM) system.

B. Related Requirements:

1. Section 014339 "Mockups" for integrated exterior mockup requirements.

1.2 DEFINITIONS

A. DBVC: Drained and back-ventilated cavity rainscreen system designed to drain and dry water entering cavity through drainage channels, weeps, and air ventilation.

B. MCM: Metal composite material; cladding material formed by joining two thin metal skins to polyethylene or fire-retardant core and bonded under precise temperature, pressure, and tension.

C. PER: Pressure-equalized rainscreen system designed for no water intrusion, with equal pressure within air cavity and outside cladding barrier.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project Site

1. Meet with Owner, Architect, Owner's insurer if applicable, MCM system Installer, MCM system manufacturer's representative, and installers whose work interfaces with or affects MCM panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to MCM system installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect MCM system.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for system assembly during and after installation.

8. Review procedures for repair of panels damaged after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel, system, and accessory.

1. Metal composite material (MCM) panels.
2. Metal composite material (MCM) system.

B. Shop Drawings:

1. Include fabrication and installation layouts of MCM system; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, accessories, and special details.
2. Accessories: Include details of flashing, trim, and anchorage, at a scale of not less than 1-1/2 inches per 12 inches (1:10).
3. Provide signed and sealed drawings, by a qualified design professional in Project jurisdiction, of MCM system showing compliance with performance requirements and design criteria identified for this Project.

C. Samples for Initial Selection: For each type of MCM panel indicated, with factory-applied color finishes.

1. Size: 6” x 6”
2. Include Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of MCM panel and system required, with factory-applied color finishes.

1. MCM Panel: One Sample, 6 by 6 inches
2. MCM System: 12 inches long by actual panel width, fabricated into panel systems indicated. Include fasteners, closures, and other MCM panel accessories

E. Delegated Design Submittals: For MCM system, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports:

1. Product Test Reports: For each MCM panel and system, for tests performed by qualified testing agency

a. MCM Panel Manufacturer's Material Test Reports: Certified test reports showing compliance with specific performance or third-party listing documenting compliance in accordance with the IBC.
b. Fabricator's MCM System Test Reports: Certified test reports showing system compliance with specific performance or third-party listing documenting compliance in accordance with the IBC.

1) Dry or Wet Seal System: Tested to AAMA 501.1.
2) DBVC System: Tested to AAMA 509.
3) PER System: Tested to AAMA 508.

2. Research Reports: For MCM systems, from an agency acceptable to authorities having jurisdiction
3. Preconstruction Test Reports: For MCM system.

B. Field Quality-Control Submittals:

1. Field quality-control reports.

C. Qualification Statements: For fabricator and installer

D. Delegated design engineer qualifications.

E. Sample warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For MCM panels.

B. Warranty Documentation:

1. Manufacturers' special warranties.
2. Installer's special warranties.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5 years' experience

B. Fabricator Qualifications: Approved by MCM panel manufacturer

C. Installer Qualifications: Fabricator of MCM system

D. Delegated Design Engineer Qualifications: A professional engineer who is legally qualified to practice in New York, where Project is located and who is experienced in providing engineering services of the type indicated.

E. Testing Agency Qualifications: An agency acceptable to authorities having jurisdiction.

1.8 MOCKUPS

A. Build mockups for preconstruction testing

1. Build mockup including corner, soffits, supports, attachments, and accessories. Panel sample need not be provided in the specified color.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, MCM panels, and other manufactured items so as not to be damaged or deformed. Package MCM panels for protection during transportation and handling.

B. Unload, store, and erect MCM panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack MCM panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store MCM panels to ensure dryness, with positive slope for drainage of water. Do not store MCM panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on MCM panels during installation.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of MCM panels to be performed in accordance with manufacturers' written instructions and warranty requirements.

1.11 COORDINATION

A. Coordinate MCM panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.12 WARRANTY

A. Panel Integrity Warranty: Manufacturer agrees to repair or replace components of MCM panels that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: 10 years from date of Substantial Completion.

B. Panel Finish Warranty: Manufacturer agrees to repair finish or replace MCM panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 10 years from date of Substantial Completion.

C. MCM System Warranty: System manufacturer's standard form in which manufacturer agrees to repair or replace components of MCM systems that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design MCM system.

B. Structural Performance: MCM systems to withstand the effects of the following loads, based on testing in accordance with ASTM E330/E330M:

1. Wind Loads: As indicated on the structural drawings.
2. Other Design Loads: As indicated on the structural drawings.

C. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft.when tested in accordance with ASTM E283/E283M at the following test-pressure difference:

1. Test-Pressure Difference: 1.57 lbf/sq. ft.

D. Water Penetration under Static Pressure: No water penetration when tested in accordance with ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: [2.86 lbf/sq. ft.

E. Water Penetration under Dynamic Pressure: No water penetration when tested in accordance with AAMA 501.1 at the following test pressure:

1. Test Pressure: 12 psf

F. Pressure Cycling: Provide PER system with a pass rating in accordance with AAMA 508.

1. Lag between the cavity and the cyclic wind pressure to not exceed 0.08 seconds.
2. Maximum differential between the cavity and the cyclic wind pressure to not exceed 50 percent of the maximum test pressure.

G. Provide DBVC system with V-axis classification number greater than or equal to W-axis classification number in accordance with AAMA 509.

H. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces

I. Fire-Resistance Ratings: Comply with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from listings of another qualified testing agency.

J. Fire Propagation Characteristics: MCM system passes NFPA 285 testing.

2.2 METAL COMPOSITE MATERIAL (MCM) WALL PANELS

A. Metal Composite Material (MCM) Wall Panels: Provide MCM panels fabricated from two metal facings bonded to a solid, extruded thermoplastic core.

1. Core: Dark Bronze Metal
2. Panel Thickness: 0.157 inch ((1/8”)
3. Bond Strength: 22.5 in-lb/in. when tested for bond integrity in accordance with ASTM D1781.
4. Fire Performance: Flame-spread index less than [**25**] [**75**] and smoke-developed index less than 450, in accordance with ASTM E84 or UL 723.

B. MCM Panel Materials:

1. Aluminum-Faced Panels as shown on A.501 and A.502.00

a. ASTM B209/B209M alloy as standard with manufacturer, temper as required to suit finish and forming operations with 0.020-inch- thick, aluminum sheet facings.
b. Exterior Finish: Clear anodized

1) Color: Dark Bronze Metal

2.3 METAL COMPOSITE MATERIAL (MCM) SYSTEM

A. PER MCM System: Provide factory-formed and -assembled, MCM panels formed into profile for PER system installation, drained at horizontal joints and at base of wall. Include attachment

assembly components, and accessories required for compartmentalized and weathertight system.

2.4 ACCESSORIES

A. Metal Subframing and Furring: ASTM C955 cold-formed, metallic-coated steel sheet ASTM A653/A653M, G90 hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of MCM system.

B. System Accessories: Provide components required for a complete, weathertight wall system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of MCM panels unless otherwise indicated.

C. Flashing and Trim: Provide flashing and trim formed from same material as MCM panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent MCM panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Use gasketed or approved coated fasteners between dissimilar metals.

1. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
2. Copper Panels: Use copper, stainless steel, or hardware-bronze fasteners.
3. Steel, Titanium, or Zinc Panels: Use stainless steel fasteners.
4. Provide exposed fasteners with heads matching color of MCM panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in MCM panels and remain weathertight; and as recommended in writing by MCM system manufacturer.

2.5 FABRICATION

A. Fabricate and finish MCM panels at the factory, by panel manufacturer's standard procedures and processes, as necessary to fulfill indicated panel performance requirements demonstrated by manufacture’s testing.

B. Shop-fabricate MCM systems and accessories by fabricator's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by manufacture’s testing. Comply with requirements of MCM panel manufacturer, of indicated system profiles, and with dimensional and structural requirements.

1. Fabricate panels to dimensions indicated on Drawings based on an assumed design temperature of 70 deg F Allow for ambient temperature range at time of fabrication.
2. Formed MCM panel lines, breaks, and angles to be sharp and straight, with surfaces free from warp or buckle.
3. Fabricate panels with sharply cut edges and no displacement of face sheet or protrusion of core.
4. Fabricated Panel Tolerances: Shop-fabricate panels to sizes and joint configurations indicated on Drawings.

    a. Width: Plus or minus 0.079 inch at 70 deg F
    b. Length: Plus or minus 0.079 inch at 70 deg F
    c. Squareness: Plus or minus 0.079 inch at 70 deg F.

5. Fabricate MCM panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
6. Attach routed-and-returned panel flanges to panel clips with manufacturer's standard fasteners

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams.
4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Anodized Aluminum Finish: Clear in accordance with AAMA 611, or thicker.

D. Color: Dark Bronze

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, MCM system supports, and other conditions affecting performance of the Work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by MCM system manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by MCM system manufacturer.

   a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and assemblies penetrating MCM system to verify actual locations of penetrations relative to seam locations of MCM panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF MCM SYSTEM

A. General: Install MCM system in accordance with system manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor MCM system securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving MCM system.
2. Flash and seal MCM system at perimeter of all openings. Fasten with self-tapping screws.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as MCM system work proceeds.
6. Align bottoms of MCM panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
7. Provide weathertight escutcheons for all items penetrating system.
8. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by MCM system manufacturer.
9. Attach MCM panels to supports at locations, spacings, and with fasteners recommended by manufacturer to meet listed performance requirements.

B. Attachment Assembly, General: Install attachment assembly required to support MCM panels and to provide a complete weathertight wall system, including tracks, drainage channels, anchor channels, perimeter extrusions, and panel clips.

1. Install subframing, furring, and other panel support members and anchorages in accordance with ASTM C955.
2. Install support system at locations, at spacings, and with fasteners recommended by MCM system manufacturer to meet listed performance requirements.

C. PER MCM System: Install vertical tracks and horizontal tracks providing compartmentalization at locations, at spacings, and with fasteners recommended by system manufacturer.

1. Attach MCM panels by interlocking panel clips into tracks .
2. Insert matching MCM spline into tracks at joint reveal locations.

D. Install panels to allow individual panels to "free float" and be installed and removed without disturbing adjacent panels.

E. Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install accessory components required for a complete MCM system assembly including trim, copings, corners, seam covers, flashings, sealants, fillers, closure strips, and similar items. Provide types indicated by MCM system manufacturer.

F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install trim to fit substrates and to result in waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 ft. with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.3 INSTALLATION TOLERANCES

A. Shim and align MCM panels within installed tolerance of 1/4 inch in 20 ft. non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Water-Spray Test: After installation, test area of assembly for water penetration in accordance with AAMA 501.2.

C. Manufacturer's Field Service: Owner will engage a factory-authorized service representative to test and inspect completed MCM system installation, including accessories.

D. MCM system will be considered defective if it does not pass test and inspections.

E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

F. Prepare test and inspection reports.

3.5 CLEANING

A. Remove temporary protective coverings and strippable films as MCM panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, clean finished surfaces as recommended by MCM panel manufacturer. Maintain in a clean condition during construction.

B. After installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

3.6 PROTECTION

A. Replace MCM panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213.23

SECTION 075000 - MEMBRANE ROOFING

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 a new roofing system

1. The Conventional system includes a torch-applied modified bitumen base sheet; tapered isocyanurate insulation board in adhesive, starting thickness 6 inches; a cover board in adhesive; a 2-ply torch-applied modified bitumen membrane; and, base flashings.

B. Related Requirements:

1. Section 074213.23 “Metal Composite Wall Panels” for vestibule construction.
2. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.3 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to Work of this Section.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Roofing Conference: Participate in conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer’s project supervisor and foreman, roofing system manufacturer's representative, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.

7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each specified product.

B. Shop Drawings: Include plans, sections, details, and attachments to other work, including the following:

1. Base flashings and membrane terminations.
2. Flashing details at penetrations.
3. Roof Insulation: Layout, profiles and product components, including anchorage, accessories and finishes of system to be installed

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, manufacturer, and testing agency.

B. Manufacturer Certificates:

1. Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for warranty.

C. Product Test Reports: For roof membrane and insulation, tests performed by a qualified testing agency, indicating compliance with specified requirements.

D. Field quality-control reports.

E. Sample Warranties: For manufacturer's warranty(s).

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Acceptable Products: Provide primary roofing products, including each type of membrane sheet and insulation board, all manufactured in the United States, supplied by a single manufacturer which has been successfully producing the specified types of primary products for not less than 10 years. Provide secondary or accessory products which are acceptable to the manufacturer of the primary roofing products.

B. Product Quality Assurance Program: Primary roofing materials shall be manufactured under a quality management system that is monitored regularly by a third party auditor under the ISO 9001 audit process. A certificate of analysis for reporting/confirming the tested values of the actual material being supplied for the project will be required prior to project close-out.

C. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.

D. Project Acceptance: Submit a completed manufacturer's application for roof warranty form along with shop drawings of the roofs showing all dimensions, penetrations, and details.

1. The form shall contain all the technical information applicable to the project including but not limited to deck types, roof slopes, base sheet and/or insulation assemblies (with method of attachment, and fastener type), and manufacturer's membrane assembly proposed for installation.
2. The form shall also contain accurate and complete information requested including proper names, addresses, zip codes and telephone numbers.
3. The project must receive approval, through this process, prior to shipment of materials to the project site.

E. Scope of Work: The work to be performed under this specification shall include but is not limited to the following:

1. Attend necessary job meetings and furnish competent and full time supervision, experienced roof mechanics, and all materials, tools, and equipment necessary to complete, in an acceptable manner, the roof installation in accordance with this specification.
2. Comply with the latest written application instructions of the manufacturer of the primary roofing products. In addition, application practice shall comply with requirements and recommendations contained in the latest edition of the Handbook of Accepted Roofing Knowledge (HARK) as published by the National Roofing Contractor's Association, amended to include the acceptance of a phased roof system installation.

F. Local Regulations: Conform to regulations of public agencies, including any specific requirements of the city and/or state of jurisdiction.

G. Manufacturer Requirements: The primary roofing materials manufacturer shall provide direct trained company personnel to attend necessary job meetings, perform periodic inspections as necessary, and conduct a Punch List and final inspection upon substantial completion and final completion of the project, respectively.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Storage: Store materials out of direct exposure to the elements. Store roll goods on a clean, flat and dry surface. All material stored on the roof overnight shall be stored on pallets. Rolls of roofing must be stored on ends. Store materials on the roof in a manner so as to preclude overloading of deck and building structure. Store materials such as solvents, adhesives and asphalt cutback products away from open flames, sparks or excessive heat. Cover all material using a breathable cover such as a canvas. Polyethylene or other non-breathable plastic coverings are not acceptable.

C. Handling: Handle all materials in such a manner as to preclude damage and contamination with moisture or foreign matter. Handle rolled goods to prevent damage to edges or ends.

D. Damaged Material: Any materials that are found to be damaged or stored in any manner other than stated above will be automatically rejected, removed and replaced at the Contractor's expense.

1.10 FIELD CONDITIONS

A. Requirements Prior to Job Start:

1. Notification: Give a minimum of 5 days' notice to the Owner and manufacturer prior to commencing any work and notify both parties on a daily basis of any change in work schedule.
2. Safety: Familiarize every member of the application crew with all fire and safety regulations recommended by OSHA, NRCA and other industry or local governmental groups.

1.11 WARRANTY

A. Membrane Roofing System Warranty: Upon successful completion of the project, and after all post-installation procedures have been completed, furnish a 20-year No-Dollar-Limit labor and material full system warranty for Conventional roof systems.

1. The full system includes all materials produced by the Manufacturer.
2. Warranty also includes metal panels in Section 074213.23 "Metal Composite Wall Panels"
3. The warranty shall provide coverage against deficiencies in material and labor resulting in roof leakage, with the costs of material and labor to correct the deficiencies the responsibility of the Manufacturer.

PART 2 - PRODUCTS

2.1 CONVENTIONAL ROOFING SYSTEM

A. Base Sheet: Torch grade modified bitumen base sheet, meeting ASTM D 6163 Type I Grade S, as manufactured by Siplast under trade name Irex 40.

B. Insulation Board: Closed cell polyisocyanurate foam core bonded both sides with fiber-reinforced felt facer, ASTM C1289 Type II, Class 1, Grade 3 (25 psi), tapered 1/8 inch per foot, except 1/4 inch per foot for crickets, and flat fill boards. All boards max. 4-ft x 4-ft. Maximum board thickness 2-1/2 inch within each layer. Starting thickness 6 inch. As manufactured by Siplast, under trade name Paratherm.

C. Adhesive: Single component, solvent-free polyurethane, as manufactured by Siplast, under trade name Para-Stik Insulation Adhesive.

D. Cover Board: Gypsum based, 3/8 inch thick, UL Class A, as manufactured by United States Gypsum Co., under trade name Securock.

E. Roofing Membrane:

1. Base Ply: Torch grade modified bitumen base ply, meeting ASTM D 6163 Type I, Grade S, as manufactured by Siplast under trade name Paradiene 20 EG TG.
2. Top Ply: Torch grade modified bitumen top ply, surfaced with highly reflective white granules, meeting ASTM D 6163 Type I Grade G, as manufactured by Siplast under trade name Paradiene 30 FR TG BW.

F. Base Flashing:

1. Base Ply: Modified bitumen base ply meeting ASTM 6163 Type II, Grade S, as manufactured by Siplast under trade name Paradiene 20 EG TG.
2. Base Ply, Wood: Modified bitumen base ply with adhesive backing, meeting ASTM 6163 Type I, Grade S, as manufactured by Siplast under trade name Paradiene 20 SA.
3. Top Ply: Reinforced modified bitumen ply with continuous metal-foil surfacing, meeting ASTM 6298, as manufactured by Siplast under trade name Veral Aluminum.
4. PMMA-Based Reinforced: Multi-component PMMA resin, cure catalyst, and reinforcing fleece, as manufactured by Siplast under trade names Parapro Flashing Resin, Pro Catalyst, and Pro Fleece.

2.2 ROOFING ACCESSORIES

A. Tapered Edge: Factory fabricated from expanded perlite-based insulation boards.

B. Backer Rod: Closed cell polyethylene foam, non-absorbent, compressible, chemically inert rod, in various sizes as needed for gaps of varying size between edge of deck and face of masonry.

C. Paste: Multi-component fast curing PMMA paste, as manufactured by Siplast, under trade name Pro Paste.

D. Primer: Asphalt solvent blend, ASTM D41 Type II, as manufactured by Siplast, under trade name PA-917 LS Primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with manufacturer's representative present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely embedded in the concrete deck.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. At voids between edge of deck and steel structure, remove debris and install backer rod. Apply paste to fill gap between top of backer rod and deck surface.

B. Install first increment of wood blocking at duct openings in deck and install temporary watertightness provisions at each opening, including the open top of the duct stub.

C. Maintain watertightness throughout project.

3.3 MEMBRANE ROOFING SYSTEM INSTALLATION

A. General:

1. Drawings show roofing membrane and base flashings in schematic form. Configure roofing membrane and base flashings in strict accordance with Roofing Manufacturer's requirements and recommendations.
2. All roofing membrane and base flashing plies shall be torch applied, except for adhesive-backed first ply at wood components and PMMA-based reinforced flashing.
3. Construction of an aesthetically pleasing overall appearance of the finished roof application is a standard requirement for this project. Make necessary preparations, utilize recommended application techniques, apply the specified materials, and exercise care in ensuring that the finished application is acceptable to the Owner.

B. Conventional Roofing:

1. Prime deck surface and base of adjoining vertical substrates and allow to fully dry before installing base sheet.
2. Install base sheet.
3. Install tapered insulation assembly. Secure insulation to base sheet and between layers in adhesive beads spaced at 4 inches throughout, in pattern as published by Manufacturer for this spacing. Offset joints minimum 12 inch within layer. Offset joints minimum 12 inch between layers. Cut boards as needed to achieve offsets.
4. Install cover board. Secure to insulation in adhesive beads spaced at 4 inches throughout, in pattern as published by Manufacturer for this spacing. Offset joints minimum 12 inch

within layer. Offset joints minimum 12 inch from top insulation/cricket board layer. Cut boards as needed to achieve offsets.

5. Install roofing membrane and base flashings.

3.4 FIELD QUALITY CONTROL

A. Site Condition: Leave all areas around job site free of debris, roofing materials, equipment, and related items after completion of job.

B. Manufacturer’s Field Services During Roof Installation:

1. Arrange for a minimum of two manufacturer technical field representative inspections during installation of the manufacturer’s roofing assembly materials, in accordance with the following protocol: the initial installation of tapered insulation assembly and at the final installation.

C. Notification of Completion: Notify the manufacturer by means of manufacturer's printed Notification of Completion form of job completion in order to schedule a final inspection date.

D. Final Inspection/Post-Installation Meeting: Hold a meeting at the completion of the project, attended by all parties that were present at the pre-job conference. A punch list of items required for completion shall be compiled by the Contractor and the manufacturer's representative. Complete, sign, and mail the punch list form to the manufacturer's headquarters.

E. Issuance of the Warranty: Complete all post installation procedures and meet the manufacturer's requirements for issuance of the specified warranty.

3.5 PROTECTING AND CLEANING

A. Protect newly installed roofing system from damage and wear during construction period.

B. Repair, or remove and replace, as necessary, roofing system damaged as a result of the Contractor’s construction activities.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075000

SECTION 078123 - INTUMESCENT FIREPROOFING

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 mastic and intumescent fire-resistive coatings.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

1. Review products, design ratings, restrained and unrestrained conditions, thicknesses, and other performance requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Framing plans or schedules, or both, indicating the following:

1. Extent of fireproofing for each construction and fire-resistance rating.

2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
3. Minimum fireproofing thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
4. Treatment of fireproofing after application.

C. Samples: For each exposed product and for each color and texture specified, 4 inch square in size.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of fireproofing.

C. Evaluation Reports: For fireproofing, from ICC-ES.

D. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is 50 degrees F or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.

B. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.

B. Source Limitations: Obtain fireproofing for each fire-resistance design from single source.

C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E 119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Steel members are to be considered unrestrained unless specifically noted otherwise.

D. VOC Content: Applied topcoat products shall comply with VOC content limits of authorities having jurisdiction:

1. Flat Paints and Coatings: 50 g/L.

2. Nonflat Paints and Coatings: 150 g/L.
3. Fireproofing Exterior Coatings: 350 g/L.

E. Low-Emitting Materials: Fireproofing used within the weatherproofing system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Emissions from Indoor Sources Using Environmental Chambers."

F. Asbestos: Provide products containing no detectable asbestos.

2.2 MASTIC AND INTUMESCENT FIRE-RESISTIVE COATINGS

A. Mastic and Intumescent Fire-Resistive Coating as defined on the drawings: Manufacturer's standard, factory-mixed consisting of intumescent base coat and topcoat to hit design rating, and complying with indicated fire-resistance design.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

   a. Albi Manufacturing, a division of StanChem, Inc.; Albi Clad 800
   b. Hilti, Inc.; CFP-S WB Fire Protection Steel Spray.
   c. Isolatek International; CAFCO SprayFilm-WB 5

2. Application: Designated for semi-conditioned interior space (building vestibule), use by a qualified testing agency acceptable to authorities having jurisdiction.
3. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design.
4. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

   a. Flame-Spread Index: 25 or less.
   b. Smoke-Developed Index: 450 or less.

5. Hardness: Not less than 65, Type D durometer, according to ASTM D 2240.
6. Finish: As selected by Architect from manufacturer's standard finishes

   a. Color and Gloss: *To match anodized aluminum. Architect to select.*

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by fireproofing manufacturer and complying with required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

C. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by fireproofing manufacturer.

D. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachment.

E. Topcoat: Suitable for application over applied fireproofing; of type recommended in writing by fireproofing manufacturer for each fire-resistance design.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design.

1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.

2. Verify that objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
3. Verify that substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.

B. Conduct tests according to fireproofing manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.

B. Clean substrates of substances that could impair bond of fireproofing.

C. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.

D. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fireproofing. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.3 APPLICATION

A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, topcoats, finishing, and other materials and procedures affecting fireproofing work.

B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.

1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.

2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.

D. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.

E. Spray apply fireproofing to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.

F. Extend fireproofing in full thickness over entire area of each substrate to be protected.

G. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.

H. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.

I. Cure fireproofing according to fireproofing manufacturer's written instructions.

J. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.

K. Finishes: Where indicated, apply fireproofing to produce the following finishes:

1. Manufacturer's Standard Finishes: Finish according to manufacturer's written instructions for each finish selected.

2. Spray-Textured Finish: Finish left as spray applied with no further treatment.
3. Rolled, Spray-Textured Finish: Even finish produced by rolling spray-applied finish with a damp paint roller to remove drippings and excessive roughness.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Test and inspect as required by the NYCBC, Subsection 1705.14, "Mastic and Intumescent Fire-Resistant Coatings”

B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.

C. Fireproofing will be considered defective if it does not pass tests and inspections.

1. Remove and replace fireproofing that does not pass tests and inspections, and retest.

2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

D. Prepare test and inspection reports.

3.5 CLEANING, PROTECTING, AND REPAIRING

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Protect fireproofing, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fireproofing is without damage or deterioration at time of Substantial Completion.

C. As installation of other construction proceeds, inspect fireproofing and repair damaged areas and fireproofing removed due to work of other trades.

D. Repair fireproofing damaged by other work before concealing it with other construction.

E. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 078123

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetration firestopping systems.
2. Penetrations in fire-resistance-rated walls.
3. Penetrations in horizontal assemblies.
4. Penetrations in smoke barriers.
5. Exposed penetration firestopping systems.

B. Related Requirements:

1. Section 078443 "Joint Firestopping" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.
2. Section 079200 "Joint Sealants" for non-fire-resistance-rated joint sealants.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Unlisted Firestopping Systems: Obtain an Engineering Judgment (EJ) from firestopping manufacturer where no UL, FM Approvals, or other listed assembly is available for particular firestop configuration. Follow International Firestop Council (IFC) recommended guidelines for evaluating firestopping systems in EJs.

C. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly developed in accordance with current International Firestop Council (IFC) guidelines. Obtain approval of authorities having jurisdiction prior to submittal.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Listed System Designs: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Entity that has been approved by FM Approvals in accordance with FM Approvals 4991 or been evaluated by UL and found to comply with UL's "UL Solutions Qualified Firestop Contractor Program."

B. Manufacturer Qualifications: Entity that has received UL's "Firestop Movement Certification," which demonstrates that manufacturer's firestopping products designated with M-Ratings are based on exposure to cyclic movement and UL 1479 fire test evaluation when tested in accordance with ASTM E3037.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping systems when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping system materials in accordance with manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be accessed and installed in accordance with specified firestopping system design.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain penetration firestopping systems for each type of opening indicated from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. A qualified testing agency, acceptable to authorities having jurisdiction, will perform penetration firestopping system tests.
2. Test in accordance with testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Penetration firestopping systems installed with products bearing the classification marking of a qualified testing agency.

1) UL in its online directory "Product iQ."
2) Intertek Group in its "Directory of Building Products."
3) FM Approvals in its "Approval Guide."

B. Provide components for each penetration firestopping system that, upon curing, do not re-emulsify, dissolve, leach, break down, or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water, or other forms of moisture characteristic during and after construction.

C. Provide components for each penetration firestopping system that do not contain ethylene glycol.

D. Provide components for each penetration firestopping system that are sufficiently flexible to accommodate movement, such as pipe vibration, water hammer, thermal expansion, and other normal building movement without damage.

E. Provide components for each penetration firestopping system that are appropriately tested for the thickness and type of insulation utilized.

2.3 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems must be compatible with one another, with the substrates forming openings, and with penetrating items if any.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M; Fire Protection Products Division.
b. Hilti, Inc.
c. Nelson Firestop Products.
d. RectorSeal Corporation (The).
e. Specified Technologies, Inc.
f. USG Corporation.
g. Tremco Commercial Sealants and Waterproofing.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined in accordance with ASTM E814 or UL 1479.

1. F-Rating: Not less than the fire-resistance rating of the wall penetrated.
2. Membrane Penetrations: Install recessed fixtures such that the required fire resistance will not be reduced.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined in accordance with ASTM E814 or UL 1479.

1. F-Rating: At least one hour, but not less than the fire-resistance rating of the floor penetrated.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined in accordance with UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84 or UL 723.

2.4 ACCESSORIES

A. Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated, including but not limited to:

1. Permanent forming/damming/backing materials.
2. Substrate primers.
3. Collars.
4. Steel sleeves.

2.5 FILL MATERIALS

A. Cast-in-Place Firestopping Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestopping Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric strips for use around combustible penetrants.

G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

H. Pillows/Bags: Compressible, removable, and reusable intumescent pillows encased in fire-retardant polyester or glass-fiber cloth. Where exposed, and when required by a listed system, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed or dislodged.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

K. Thermal and Endothermic Wraps: Flexible, insulating, and fire-resistant protective wraps tested and listed for up to 2-hour fire ratings in accordance with ASTM E814 or UL 1479; for protecting membrane penetrations of utility boxes, critical electrical circuits, communications lines, and fuel lines, and for thermal barrier and circuit integrity protection in accordance with ASTM E1725 or UL 1724.

L. Fire-Rated Cable Sleeve Kits: Complete kits designed for new or existing cable penetrations through walls which accept standard accessories.

M. Fire-Rated Cable Pathways: Single or gangable device modules composed of a steel raceway with integral intumescent material and requiring no additional action in the form of plugs, twisting closure, putty, pillows, sealant, or otherwise to achieve fire and air-leakage ratings.

1. Fire-rated cable pathway devices are the preferred product for data, video, and communications cable penetrations. Install these devices in locations where frequent cable moves, add-ons, and changes will occur. Such devices must be:

a. Capable of retrofit around existing cables.
b. Designed so that two or more devices can be ganged together.
c. Maintenance-free so no action is required to activate the smoke- and fire-sealing mechanism.

2. Where fire-rated cable pathway devices are not practical, openings within walls and floors designed to accommodate data, video, and communications cabling must be provided with re-enterable products specifically designed for retrofit, such as retrofit devices for cable bundles, firestopping putty, plugs, or pillows.

N. Retrofit Device for Cable Bundles: Factory-made, intumescent, collar-like device for firestopping existing over-filled cable sleeves and capable of being installed around projecting sleeves and cable bundles.

O. Wall-Opening Protective Materials: Intumescent, non-curing putty pads or self-adhesive inserts for protection of electrical switch and receptacle boxes.

P. Fire-Rated HVAC Retaining Angles: Steel angle system with integral intumescent firestopping gasket for use around rectangular steel HVAC ducts without fire dampers.

Q. Firestopping Plugs: Flexible, re-enterable, intumescent, foam-rubber plug for use in blank round openings and cable sleeves.

R. Fire-Rated Cable Grommet: Molded two-piece grommet made of plenum-grade polymer and foam inner core for sealing small cable penetrations in gypsum walls up to 1/2 inch (13 mm) in diameter.

S. Closet Flange Gasket: Molded, single-component, flexible, intumescent gasket for use beneath a water closet (toilet) flange in floor applications.

2.6 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings in accordance with manufacturer's written instructions and with the following requirements:

1. Remove foreign materials from substrate surfaces that could interfere with adhesion of penetration firestopping materials.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates in accordance with penetration firestopping system manufacturer's written installation instructions, using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

A. General: Install penetration firestopping systems in accordance with manufacturer's written installation instructions and published drawings for products and applications.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

C. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items to achieve required fire-resistance ratings.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 ft. from end of wall and at intervals not exceeding 30 ft.

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Owner will engage a qualified inspection agency to conduct and report on inspections in accordance with ASTM E2174.

B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

SECTION 078443 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Intumescent gypsum wall framing gaskets.
2. Perimeter fire-barrier system.
3. Joints in or between fire-resistance-rated construction.
4. Joints in smoke barriers.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers and for wall identification.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

B. Unlisted Firestopping Systems: Obtain an Engineering Judgment (EJ) from firestop manufacturer where no UL, FM Approvals, or other listed assembly is available for particular firestop configuration. Follow International Firestop Council (IFC) recommended guidelines for evaluating firestop systems in EJs.

C. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an EJ or equivalent fire-resistance-rated assembly developed in accordance with current IFC guidelines.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Listed System Designs: For each joint firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written installation instructions.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Approvals in accordance with FM Approvals 4991 or been evaluated by UL and found to comply with UL's "UL Solutions Qualified Firestop Contractor Program."

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure joint firestopping systems in accordance with manufacturer's written installation instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of joints to ensure that joint firestopping systems can be installed in accordance with specified firestopping system design.

B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain joint firestop systems for each type of joint opening indicated from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. A qualified testing agency, acceptable to authorities having jurisdiction, will perform joint firestopping system tests.

2. Test in accordance with testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:

    a. Joint firestop systems installed with products bearing the classification marking of a qualified product certification agency in accordance with listed system designs published by a qualified testing agency.

        1) UL in its online directory "Product iQ."
        2) Intertek Group in its "Directory of Building Products."

2.3 JOINT FIRESTOPPING SYSTEM TYPES

A. General: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems must accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

1. Joint firestopping systems that are compatible with one another, with the substrates forming openings, and with penetrating items, if any.
2. Provide products that, upon curing, do not re-emulsify, dissolve, leach, break down, or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture.
3. Provide firestop products that do not contain ethylene glycol.

B. Intumescent Gypsum Wall Framing Gaskets: Applied to steel tracks, runners, and studs prior to framing installation. Provide products with fire, smoke, and acoustical ratings that allow movement of up to 100 percent compression and/or extension when tested in accordance with UL 2079 or ASTM E1966; have an L Rating of less than 1 cfm/ft. (0.00115 cu. m/s x m) when tested in accordance with UL 2079; and a minimum Sound Transmission Class (STC) rating of 56 when tested in accordance with ASTM E90 or ASTM C919.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CEMCO; California Expanded Metal Products Co.
    b. ClarkDietrich.
    c. International Fireproof Technology Inc.
    d. Specified Technologies Inc.

C. Perimeter Fire-Barrier System: Provide perimeter fire-barrier system that does not require direct screw attachment to mullions and transoms to support and fasten curtain-wall insulation for aluminum curtain-wall assemblies with one- or two-piece rectangular mullions at least 2-1/2 by 5 inches. System will be tested in accordance with ASTM E2307 for up to two-hour fire resistance and with ASTM E1233/E1233M for wind cycling equivalent to 108 mph wind for 500 cycles.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CEMCO; California Expanded Metal Products Co.
b. Grabber Construction Products, Inc.
c. Specified Technologies Inc.

D. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined in accordance with ASTM E1966 or UL 2079, with published L-Ratings for ambient and elevated temperatures as evidence of the ability of the fire-resistive joint system to restrict the movement of smoke.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Building and Construction.
b. Hilti, Inc.
c. RectorSeal Firestop; a CSW Industrials Company.
d. Specified Technologies Inc.
e. Tremco Incorporated.

2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.

E. Joints in Smoke Barriers: Provide joint firestopping systems with ratings determined in accordance with UL 2079 based on testing at a positive pressure differential of 0.30 inch wg (74.7 Pa).

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Building and Construction.
b. Hilti, Inc.
c. Nelson; Emerson Electric Co., Automation Solutions.
d. RectorSeal Firestop; a CSW Industrials Company.
e. Specified Technologies Inc.
f. Tremco Incorporated.

2. L-Rating: Not exceeding 5.0 cfm/ft. (0.00775 cu. m/s x m) of joint at both ambient and elevated temperatures.

F. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined in accordance with ASTM E84.

2.4 ACCESSORIES

A. Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Before installing joint firestopping systems, clean joints in accordance with fire-resistive joint system manufacturer's written installation instructions and the following requirements:

1. Remove foreign materials from substrate surfaces that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates in accordance with joint firestopping system manufacturer's written installation instructions, using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Apply a suitable bond breaker to prevent three-sided adhesion in applications where condition occurs.

3.3 INSTALLATION

A. General: Install joint firestopping systems in accordance with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install elastomeric fill materials for joint firestopping systems by proven techniques to produce the following results:

1. Apply elastomeric fill in voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.

2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of joint edge, so labels are visible to anyone seeking to remove joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections in accordance with ASTM E2393.

B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.

C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated joint firestopping systems immediately and install new materials to produce joint firestopping systems complying with specified requirements.

END OF SECTION 078443

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Urethane joint sealants.
2. Mildew-resistant joint sealants.
3. Butyl joint sealants.
4. Latex joint sealants.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Mildew-resistant joint sealants.
2. Butyl joint sealants.
3. Latex joint sealants.

B. Samples for Initial Selection: Manufacturer's standard color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranties.

1.4 CLOSEOUT SUBMITTALS

A. Manufacturers' special warranties.

B. Installer's special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Authorized representative who is trained and approved by manufacturer.

1.6 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain joint sealants from single manufacturer for each sealant type.

2.2 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 URETHANE JOINT SEALANTS

A. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade P, Class 25, Uses T and NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Master Builders Solutions, brand of MBCC Group, a Sika company.
b. Pecora Corporation.
c. Polymeric Systems, Inc.
d. Sherwin-Williams Company (The).

B. Urethane, M, NS, 25, NT: Multicomponent, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade NS, Class 25, Use NT.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Sika Corporation; MasterSeal NP 2 or a comparable product by one of the following:

a. Sherwin-Williams Company (The).

2.4 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Sika Corporation; Sikasil-GP or comparable product by one of the following:

a. GE Construction Sealants; Momentive Performance Materials Inc.
b. The Dow Chemical Company.
c. Tremco Incorporated.

2.5 BUTYL JOINT SEALANTS

A. Butyl-Rubber-Based Joint Sealants: ASTM C1311.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Sika Corporation - Building Components; SikaLastomer-511 or comparable product by one of the following:

   a. Bostik; Arkema.
   b. Pecora Corporation.

2.6 LATEX JOINT SEALANTS

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company (The); 850A Siliconized Acrylic Latex Caulk or comparable product by one of the following:

   a. PPG Paints; PPG Industries, Inc.
   b. Pecora Corporation.
   c. Tremco Incorporated.

2.7 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.8 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or

by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants in accordance with requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile in accordance with Figure 8A in ASTM C1193 unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT SEALANT SCHEDULE

A. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.

1. Joint Locations:

   a. Control and expansion joints in tile flooring.
   b. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, S, P, 25, T, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces .

1. Joint Locations:

   a. Control and expansion joints on exposed interior surfaces of exterior walls.
   b. Perimeter joints between interior wall surfaces and frames of interior doors, windows and elevator entrances.
   c. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.

1. Joint Locations:

   a. Control joints on exposed interior surfaces of exterior walls.
   b. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
   c. Other joints as indicated on Drawings.

2. Joint Sealant: Acrylic latex.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
b. Tile control and expansion joints where indicated.
c. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Concealed mastics.

1. Joint Locations:

a. Aluminum thresholds.
b. Sill plates.
c. Other joints as indicated on Drawings.

2. Joint Sealant: Butyl-rubber based.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 080671 – DOOR HARDWARE SCHEDULE

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 references specification sections relating to commercial door hardware for the following:

1. Swinging doors.
2. Sliding Doors.
3. Other doors to the extent indicated.

B. Commercial door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical and access control door hardware.
3. Electromechanical and access control door hardware power supplies, back-ups and surge protection.
4. Automatic operators.
5. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section “All-Glass Entrances”.
2. Division 08 Section “Door Hardware”.

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 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: Reference Related Sections for requirements regarding compliance with applicable industry standards.

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, separate 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. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. 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.

F. Warranties and Maintenance: Special warranties and maintenance agreements specified in the Related Sections.

1.4 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".

1.5 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. 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.

1.6 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.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Refer to “PART 3 – EXECUTION” for required specification sections.

PART 3 - EXECUTION

3.1 DOOR HARDWARE SETS

A. The door 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.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Products listed in the hardware sets shall be supplied by and in accordance with the requirements described in the specification section as noted for each item.

1. Section 084126 – All Glass Entrances.
2. Section 087100 – Door Hardware.

C. Manufacturer's Abbreviations:

1. GS - ASSA ABLOY Glass Solutions
2. MK - McKinney
3. RU - Corbin Russwin
4. NO - Norton
5. OT - Other
6. RO - Rockwood
7. PE - Pemko

Hardware Sets

Set: 1.0

Doors: A101-G, A101-H, A101-I, A101-J, B101-G, B101-H, B101-I, B101-J

1	Door Bottom Rail	DRT-4AC-B DR-Weatherstrip_FinSet1	US32D	GS 084126
1	Door Top Rail	DRT-4AC-T DR-	US32D	GS 084126

		Weatherstrip_FinSet1			
2	Vertical Stile	DRVS-BC	US32D	GS	084126
1	Solid Header	HDS-2000x6000	US32D	GS	084126
1	Bottom Pivot	PV-ENDLOAD	AL	GS	084126
1	Dummy Panic	DDU8000-3	US32D	GS	084126
1	Concealed Closer	OHC-609-90NHO		GS	084126
1	Arm	OHC-609-ARM		GS	084126
1	Mounting Clip	OHC-609-MC		GS	084126

Set: 2.0

Doors: A101-F, B101-F

1	Door Bottom Rail	DRT-4AC-B DR-Weatherstrip_FinSet1	US32D	GS	084126
1	Door Top Rail	DRT-4AC-T DR-Weatherstrip_FinSet1	US32D	GS	084126
2	Vertical Stile	DRVS-BC	US32D	GS	084126
1	Solid Header	HDS-2000x6000	US32D	GS	084126
1	Pivot	PV-WALKBEAM	US32D	GS	084126
1	Dummy Panic	DDU8000-3	US32D	GS	084126
1	Auto Operator	In Ground		OT	087113

Set: 3.0

Doors: A101-B, A101-C, A101-D, A101-E, B101-B, B101-C, B101-D, B101-E

1	Door Bottom Rail	DRT-4AC-B DR-Weatherstrip_FinSet1	US32D	GS	084126
1	Door Top Rail	DRT-4AC-T DR-Weatherstrip_FinSet1	US32D	GS	084126
2	Vertical Stile	DRVS-BC	US32D	GS	084126
1	Solid Header	HDS-2000x6000	US32D	GS	084126
1	Bottom Pivot	PV-ENDLOAD	AL	GS	084126
1	Exit Device	PDU8000-3	US32D	GS	084126
1	Rim Cylinder	As Required x LFIC Temp Core	630	RU	087100
1	Permanent Core	Compatible with Facility's Existing System	626	RU	087100
1	Concealed Closer	OHC-609-90NHO		GS	084126
1	Arm	OHC-609-ARM		GS	084126
1	Mounting Clip	OHC-609-MC		GS	084126

Notes: Provide prep for door position switch

Set: 4.0

Doors: A101-A, B101-A

1	Door Bottom Rail	DRT-4AC-B DR-Weatherstrip_FinSet1	US32D	GS	084126	
1	Door Top Rail	DRT-4AC-T DR-Weatherstrip_FinSet1	US32D	GS	084126	
2	Vertical Stile	DRVS-BC	US32D	GS	084126	
1	Solid Header	HDS-2000x6000	US32D	GS	084126	
1	Pivot	PV-WALKBEAM	US32D	GS	084126	
1	Exit Device	PDU8000-3	US32D	GS	084126	
1	Rim Cylinder	As Required x LFIC Temp Core	630	RU	087100	
1	Permanent Core	Compatible with Facility's Existing System	626	RU	087100	
1	Electric Strike	ESK-1600-SGL	US32D	GS	084126	ϟ
1	Auto Operator	In Ground		OT	087113	

Notes: Provide prep for door position switch

Set: 5.0

Doors: B101-L

6	Hinge, Full Mortise, Hvy Wt	T4A3386 NRP 5" x 4-1/2"	US32D	MK	087100
1	Mullion	CR910BKM x Cylinder Kit x CT6B		RU	087100
2	Rim Exit Device, Exit Only	PED5201 EO M51	630	RU	087100
2	Permanent Core	Compatible with Facility's Existing System	626	RU	087100
2	Surface Closer	UNI7500	689	NO	087100
1	Gasketing	5110BL		PE	087100
1	Gasketing	S88BL		PE	087100
2	Sweep	345CNB		PE	087100
1	Threshold	171A MSES10SS		PE	087100

Set: 6.0

Doors: B101-M

3	Hinge, Full Mortise, Hvy Wt	T4A3386 NRP 5" x 4-1/2"	US32D	MK	087100
1	Rim Exit Device	PED5259 M52 102959PT CT6B	630	RU	087100
1	Permanent Core	Compatible with Facility's Existing System	626	RU	087100

1	Surface Closer	UNI7500	689	NO	087100
1	Gasketing	S88BL		PE	087100
1	Sweep	345CNB		PE	087100
1	Threshold	171A MSES10SS		PE	087100

Set: 7.0

Doors: F101-B

6	Hinge, Full Mortise, Hvy Wt	T4A3786 NRP 5" x 4-1/2"	US26D	MK	087100
2	Surface Vert Rod Exit	PED5455 M52 1028M55PT M55 CT6B	630	RU	087100
4	Permanent Core	Compatible with Facility's Existing System	626	RU	087100
2	Surface Closer	UNI7500	689	NO	087100
2	Silencer	608-RKW		RO	087100

Set: 8.0

Doors: F101-A

6	Hinge, Full Mortise, Hvy Wt	T4A3786 NRP 5" x 4-1/2"	US26D	MK	087100
2	Surface Vert Rod Exit	PED5455 A 1028M55PT M55 CT6B	630	RU	087100
2	Permanent Core	Compatible with Facility's Existing System	626	RU	087100
2	Surface Closer	PR7500	689	NO	087100
2	Wall Stop	409	US32D	RO	087100
1	Astragal	S771x6BL		PE	087100
1	Gasketing	S88BL		PE	087100

Set: 9.0

Doors: A101-K, B101-K

1	Permanent Core	Compatible with Facility's Existing System	626	RU	087100
1	Cylinder	As Required x LFIC Temp Core	630	RU	087100

Notes: Balance of hardware by gate supplier.

END OF SECTION 080671

SECTION **081113 - 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. Steel sidelight, borrowed lite and transom frames.
3. Louvers installed in hollow metal doors.
4. Light frames and glazing installed in hollow metal doors.

B. **Related Sections:**

1. **Division 01 Section "General Conditions".**
2. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
3. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
4. Division 08 Section "Door Hardware".
5. Division 09 Sections "High-Performance Coatings" and "Interior Painting" for field painting hollow metal doors and frames.

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 A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
9. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
11. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
12. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
13. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
14. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
15. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
16. 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.

D. **Samples for Verification:**

1. **Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.**

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, furnish SDI-Certified manufacturer products that 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 UL10C (neutral pressure at 40” above sill) or UL 10C.

1. **Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.**
2. 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.
3. Smoke Control Door Assemblies: Comply with NFPA 105.

a. **Smoke "S" Label: Doors to bear “S” label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.**

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.**

E. Storm Shelter Openings: Provide complete door systems for hurricane or tornado storm shelters, and other areas of refuge, complying and tested according to ICC 500 (2014/2020), ICC/NSSA Standard for the Design and Construction of Storm Shelters.

1. **Each unit to bear third party permanent label indicating compliance with the referenced testing standards.**

F. **Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.**

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.**

B. Building Information Modeling (BIM) Support: Utilize designated BIM software tools and obtain training needed to successfully participate in the Project BIM processes. All technical disciplines are responsible for the product data integration and data reliability of their Work into the coordinated BIM applications.

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 steel doors and frames from a SDI Certified manufacturer:**

1. **CECO Door Products (C).**
2. Curries Company (CU).
3. Steelcraft (S).

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 G6**0 (Z180) or A60 (ZF180)** metallic coating.

C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G6**0 (Z180) or A60 (ZF180)** metallic coating.

2.3 HOLLOW METAL DOORS

A. **General: Provide 1-3/4 inch 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 and ANSI/NAAMM HMMA 867.**

B. Exterior Doors (Energy Efficient): Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A924 A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model, ANSI/SDI A250.4 for physical performance level, and HMMA 867 for door construction.

1. **Design: Flush panel.**
2. Core Construction: Foamed in place polyurethane and steel stiffened laminated core with no stiffener face welds, in compliance with HMMA 867 “Laminated Core”.

   a. **Provide 22-gauge steel stiffeners at 6 inches on-center internally welded at 5" on- center to integral core assembly, foamed in place polyurethane core chemically bonded to all interior surfaces. No stiffener face welding is permitted.**
   b. Thermal properties to rate at a fully operable minimum U-Factor 0.37 and R-Value 2.7, including insulated door, thermal-break frame and threshold.
   c. Kerf Type Frames: Thermal properties to rate at a fully operable minimum U-Factor 0.38 and R-Value 2.6, including insulated door, kerf type frame, and threshold.

3. **Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053 inch - 1.3-mm) thick steel, Model 2.**
4. Vertical Edges: Vertical edges to be mechanically interlocked with hairline seam. Beveled Lock Edge, **1/8 inch in 2 inches (3 mm in 50 mm)**.
5. 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. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9".
7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

C. **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. **Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.**
4. Vertical Edges: Vertical edges to have the face sheets spot welded and filled full height with an epoxy filler. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, **1/8 inch in 2 inches (3 mm in 50 mm)**.
5. 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.
6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

D. **Manufacturers Basis of Design:**

1. **Curries Company (CU) - Honeycomb Core - 707 Series.**
2. Curries Company (CU) - Energy Efficient - 777 Trio-E Series.

2.4 HOLLOW METAL FRAMES

A. **General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.**

B. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.

1. **Fabricate frames with mitered or coped corners. Profile as indicated on drawings.**
2. Frames: Minimum 14 gauge (**0.067-inch -1.7-mm)** thick steel sheet.
3. Manufacturers Basis of Design:

   a. **Curries Company (CU) - CM Series.**

C. **Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.**

1. **Fabricate frames with mitered or coped corners. Profile as indicated on drawings.**
2. Frames: Minimum 16 gauge (**0.053-inch -1.3-mm)** thick steel sheet.
3. Manufacturers Basis of Design:

a. **Curries Company (CU) - C Series.**
b. Curries Company (CU) - M Series.

D. **Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.**

E. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.5 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.

2.6 ACCESSORIES

A. **Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.**

B. Grout Guards: Formed from same material as frames, not less than **0.016 inches** thick.

2.7 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. **Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.**

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 Transom Bar 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. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
5. 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.
6. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
7. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
8. 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 on-center 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.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each **24 inches** or fraction thereof above **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) Five anchors per jamb plus 1 additional anchor per jamb for each **24 inches** or fraction thereof above **96 inches** high.
        5) Two anchors per head for frames above **42 inches** wide and mounted in metal stud partitions.

9. **Door Silencers: Except on weatherstripped or 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.

2.8 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.**

1. **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 square, level, twist, and plumb condition.

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.

E. Verify tolerances against manufacturers installations instructions for tornado and hurricane storm shelter openings.

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, leveled, 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. **Jambs 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.

3.5 FIELD QUALITY CONTROL

A. **Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.**

1. **Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.**

END OF SECTION 081113

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Access doors and frames.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details material descriptions, dimensions of individual components and profiles, and finishes.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES

A. Flush Access Doors with Exposed Flanges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ACUDOR Products, Inc.
   b. Babcock-Davis.
   c. Milcor; Hart & Cooley, Inc.
   d. Nystrom, Inc.

2. Description: Face of door flush with frame, with exposed flange and concealed hinge.
3. Locations: Wall and ceiling.
4. Door Size: As required to access systems, but not less than 24 by 24 inches.
5. Uncoated Steel Sheet for Door: Nominal 0.060 inch 16 gauge, factory finished.

   a. Location: Typical unless otherwise indicated.

6. Metallic-Coated Steel Sheet for Door: Insert thickness, factory finished.

   a. Location: Masonry walls, toilet rooms, and where indicated on drawings.

7. Frame Material: Same material, thickness, and finish as door.
8. Latch and Lock: Cam latch, screwdriver operated.

2.2 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A879/A879M, with cold-rolled steel sheet substrate complying with ASTM A1008/A1008M, Commercial Steel (CS), exposed.

C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.

D. Frame Anchors: Same material as door face.

E. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.3 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.

1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.

2.4 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Factory Finished: Apply manufacturer's standard baked-enamel or powder-coat finish immediately after cleaning and pretreating, with minimum dry-film thickness of 1 mil for topcoat.

a. Color: Flat White, to match ceiling paint

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113

SECTION 084126 - ALL-GLASS ENTRANCES

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. **Exterior, vestibule, and interior, swinging and sliding all-glass entrance doors.**
2. All-glass sidelites and transoms.

B. **Related Sections:**

1. **Division 01 Section "General Conditions".**
2. Division 05 Section "Metal Fabrications" for overhead-steel support for all-glass systems.
3. Division 07 Section "Joint Sealants" at interface of all-glass entrances and other building components.
4. Division 07 Section "Metal Composite Wall Panels" for storefront systems with all-glass entrances.
5. Division 08 Section "Door Hardware" for lock cylinders installed in all-glass entrance locksets.
6. Division 08 Section "Structural Glass Façade " for structural glazing with all-glass entrances.

C. **Reference Standards:**

1. **American Architectural Manufacturers Association (AAMA): AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.**
2. ASTM International (ASTM): ASTM C1048 Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
3. Builders Hardware Manufacturers Association (BHMA): ANSI/BHMA A156 Series.
4. Code of Federal Regulations: 16 CFR 1201 Safety Standard for Architectural Glazing Materials.
5. Glass Association of America (GANA): 1999 Fully Tempered Heavy Glass Door and Entrance Systems Design Guide.

    a. **Table 3 - Recommended Maximum Interior or Exterior Swinging Door Sizes.**

6. **International Code Council (ICC): ICC A117.1 Accessible and Usable Buildings and Facilities (ANSI).**

1.3 PRE-INSTALLATION MEETINGS

A. **Pre-installation Conference: Refer to Division 01 Section "Project Requirements".**

1.4 SUBMITTALS

A. **Product Data: For each type of all-glass entrance component specified. Details of construction relative to materials, dimensions of individual components, profiles, and finishes, including:**

1. **Glass panels.**
2. Rail and Patch fittings.
3. Closer and pivots.
4. Door hardware and accessories.

B. **Shop Drawings: Show details of fabrication and installation, including the following:**

1. **Plans, elevations, and sections.**
2. Details of fittings.
3. Hardware quantities, locations, and installation requirements.
4. Anchorages and reinforcement.
5. Glazing details.
6. Door hardware locations, mounting heights, and installation requirements.

C. **Samples for Verification: For each type of exposed finish indicated, prepared on Samples of size indicated below as required by Architect.**

1. **Metal Finishes: 6-inch (150-mm) long sections of rail fittings.**
2. Glass: 12-inch (300 mm) square, showing exposed-edge finish and tint.

D. **Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing, fabrication, and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, sidelites, transoms, and related work to ensure proper size, thickness, hand, function, and finish of entrance 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.
h. Warranty information for each product.

E. **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**

F. Maintenance Data: For all-glass systems to include in maintenance manuals.

1.5 PROJECT CONDITIONS

A. **Field Measurements: Verify opening dimensions of all-glass entrances by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.**

1.6 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 Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of all-glass entrances that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:

1. **Structural failures.**
2. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
3. Failure of operating components to function normally.

C. **General Warranty Period: Two years from date of Substantial Completion.**

1. **Concealed Floor Closers: 10 years from date of Substantial Completion.**

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. **Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design all-glass entrances and storefronts.**

B. General Performance: Comply with performance requirements specified, as determined by testing of all-glass entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

C. Structural Loads:

1. **Wind Loads: As indicated on Drawings.**
2. Other Design Loads: As indicated on Drawings
3. **Deflection Limits: In accordance with GANA "Fully Tempered Heavy Glass Door and Entrance Systems Design Guide."**

D. **Seismic Performance: All-glass entrances and storefronts shall withstand the effects of earthquake motions determined according to ASCE/SEI 7. Coordinate requirements with structural engineer.**

E. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.

1. **Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.**

F. **Accessibility Standards: Comply with applicable provisions in Accessibility Guidelines for Buildings and Facilities ICC (ANSI) A117.1 and requirements of authorities having jurisdiction.**

2.2 MANUFACTURERS

A. **Basis-of-Design Products: Subject to compliance with requirements, provide the named product, or the comparable product by one of the alternate specified manufacturers. Comparable products are subject to review and approval through the submittal process specified.**

B. Manufacturers (All Glass Doors): Subject to compliance with requirements, provide products by one of the following:

1. **Rockwood (All Glass Door components).**

2.3 EXTERIOR GLASS ENTRY DOORS

A. **Provide glass entrance systems tested to the following certifications:**

1. **NFRC 102-2020 - Procedure for measuring the rate of heat transfer of fenestration systems.**
2. AAMA 1503-09 - Test method for determining condensation resistance of doors.
3. ASTM E283/E283M-19 - Test method for determining rate of air leakage through doors.

B. **DOOR MATERIALS**

1. **Type II: Laminated Safety Glass: Glass shall made up of 1/4" clear, 0.060" Saflex PVB and 1/4" AGC Energy Select 73 (e=0.148, # 4).**

   a. **Color: Clear.**
   b. Thickness: 9/16 inch (15 mm).
   c. Interlayer: PVB (Polyvinyl Butyral)SGP (SentryGlas Plus).
   d. Exposed Edges: Flat polished.
   e. Butt Edges: Flat polished.
   f. Corner Edges: Mitered.

2. **Aluminum: Alloy and temper recommended by manufacturer for use and finish indicated, but not less than the strength and durability properties of ASTM B 221 (M), alloy 6063-T5.**
3. Stainless-Steel Cladding: Type 304.

C. **Manufacturers:**

1. **Rockwood (GS) - ThermaGuard.**

2.4 DOOR COMPONENTS

A. **Floating Transom Bar: Manufacturer's standard aluminum, floating transom bar clad in metal matching fittings in size recommended by manufacturer for application indicated.**

1. **Support Fins: Tempered glass matching the transom glass.**

B. **Sidelite Channels: Provide manufacturer's standard head and sill channels for sidelite and transom-head support matching fitting-metal finish, unless otherwise indicated.**

C. Concealed Sidelite Channels: Provide manufacturer's standard recessed head and sill channels for concealed sidelite and transom-head support, unless otherwise indicated.

D. Rails: Manufacturer's standard continuous horizontal fittings and as follows:

1. **Rail Locations: As follows:**

   a. **Door tops and bottoms.**
   b. Transom tops. Provide with manufacturer's standard fixed-mounting system.
   c. Sidelite tops. Provide with manufacturer's standard fixed-mounting system.
   d. Sidelite bottoms. Provide with manufacturer's standard fixed-mounting system.

2. **Top Rail Height: 4 inch tapered (102 mm)**
3. Top Rail Profile: Tapered no less than 60 degrees from horizontal.
4. Bottom Rail Height:4 inch (102 mm)4 inch tapered
5. Bottom Rail Profile: Tapered no less than 60 degrees from horizontal.
6. One piece dry glazed compression system that accommodates 3/8” to 9/16” or 5/8” to 13/16” thick glass.
7. End Caps: One-piece solid stainless steel, beveled.
8. Material: Bright or satin stainless-steel-cladding.

9. Basis of Design: Rockwood #DRT/DRS x Height.

E. **Vertical Stiles: Manufacturer's standard continuous vertical fittings and as follows:**

1. **Stile Locations: As follows:**

   a. **Door stiles on each side.**

2. **Door Stile Dimension: 1 1/16” x 2” inch with cladding.**
3. Works in conjunction with door rails must have top and bottom rails 4” Square and Tapered.
4. Weather-stripping for rails.
5. One piece dry glazed compression system that accommodates 1/2” to 9/16” thick glass.
6. End Caps: One piece.
7. Material: Aluminum base material with cladding; Bright; Satin stainless-steel-cladding.
8. Weather-stripping: 3/16”, 3/8” black finish for vertical stile.
9. Glass Thickness: 9/16”.
10. Basis of Design: Rockwood #DRVS.

F. **Accessory Fittings: Manufacturer's standard accessory fittings matching patch fitting or rail metal and finish for the following:**

1. **Overhead doorstop.**
2. Glass-support fins.

G. **Anchors and Fastenings: Manufacturer's standard concealed anchors and fastenings.**

H. Weather Stripping; Brush type; replaceable without removing all-glass entrance doors from pivots.

2.5 ENTRANCE 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 patch fittings and rail fittings.**

B. Refer to section 080671 “Door Hardware Schedule” for specific hardware sets.

C. Pivots: ANSI/BHMA A156.4, Grade 1.

1. **Center and Offset Hung Top Pivots:**

   a. **Walking beam type (overhead).**
   b. Surface mounted offset type (top rails).

2. **Bottom Pivots:**

   a. **End load type (bottom rails).**
   b. Adjustable bottom types compatible with bottom patches.

3. **Manufacturers:**

   a. **Rockwood (GS) - PV and PF Series.**

D. **Cylinders and Keying: Refer to Section 087100 Door Hardware.**

E. Tubular Exit Device Electric Strikes: Provide electric strikes designed to work with tubular glass door exit devices that conforms to ANSI A156.31, Grade 1. Electric strikes shall be of stainless-steel construction with field selectable fail safe/fail secure and dual 12/24 VDC. Provide lock monitor when specified.

1. **Manufacturers:**

   a. **Rockwood (GS) - ESK-1600 Series.**

F. **Panic Devices: Certified panic devices conforming to ANSI/BHMA A156.3, Grade 1 Certified complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Device to be ADA compliant requiring less than 5 lbs. of force to activate and meet California Building Code (2013) Sec 11B.309.4.Post mounting with optional mechanical dogging. Provide proper fasteners as required by manufacturer to meet application requirements. Provide exit devices on both leaves of pairs of doors.**

1. **Style: Exposed vertical rod. 1-1/4” grip diameter with interior operating panic handle in combination with exterior fixed pull handle. Panic mechanism shall be concealed within brass or stainless steel tubing. Optional entrance from exterior by a keyed cylinder.**
2. Configurations (provide as specified):

   a. **Full Height Straight Pull.**

3. **Push/pull operation when dogged from the inside.**
4. Latching: Top latching. Reversed, flat, Pullman style. Roller-type latching not acceptable.
5. Options for engraved "PUSH" signage infill and boundary grooves.
6. Manufacturers:

   a. **Rockwood (GS) - PDU8000 Series.**

G. **Door Pulls, Dummy and Mating Pulls: Door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.**

1. **Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.**
2. Fasteners: Provide manufacturer's designated fastener type as indicated in hardware sets.
3. Manufacturers:

   a. **Rockwood (GS).**

H. **Overhead Concealed Closers (Medium Duty): Center hung, BHMA A156.4, Grade 1; units including arms, pivots, cover plates, mounting clips, and accessories required for**

complete installation. Provide separate closing and latching valves for closing speed, latch speed, backcheck, and optional hold open.

1. **Compact cast iron closers capable of being fully concealed in the frame head for center hung applications.**
2. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, interior or exterior application, and 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 ICC/ANSI A117.1.
3. Closer Accessories: Provide door closer accessories including custom spindles and templates as required for proper installation.
4. Double acting, non-handed with adjustable spring power size 1 through 3.
5. Manufacturers:

    a. **Rockwood (GS) - OHC 609 Series.**

I. **Thresholds: Thresholds and sweeps to be of type and design in the Hardware Sets. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.**

1. **Manufacturer's standard threshold with cutouts coordinated for operating hardware, with anchors and jamb clips; not more than 1/2 inch high with beveled edges providing a floor-level change with a slope of not more than 1:2.**
2. Manufacturers:

    a. **Pemko (PE).**

2.6 FABRICATION

A. **General: Fabricate all-glass entrance components in sizes, profiles, and configurations indicated on Drawings.**

B. Provide holes and cutouts in glass to receive hardware, fittings, and accessory fittings before tempering glass. Do not cut, drill, or make other alterations to glass after tempering.

1. **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.**

C. **Factory assemble components and factory install hardware and fittings to greatest extent possible.**

2.7 FINISHES

A. **General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.**

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

2.8 STAINLESS-STEEL FINISHES

A. **Remove or blend tool and die marks and stretch lines into finish.**

B. Grind and polish surfaces to produce uniform, directional textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

C. Bright, Directional Polish: No. 4 finish.

D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clear.

PART 3 - **EXECUTION**

3.1 EXAMINATION

A. **Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.**

B. Proceed with installation only after unsatisfactory conditions have been corrected.

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. Set, seal, and grout floor closer cases as required to suit hardware and substrate indicated.

F. Install butt-joint sealants according to manufacturer's instructions and as specified in Section 079200 "Joint Sealants" to produce weathertight installation.

3.3 ADJUSTING AND CLEANING

A. **Adjust all-glass entrance doors and hardware to produce smooth operation and tight fit at contact points and weather stripping.**

B. Remove excess sealant and glazing compounds and dirt from surfaces.

3.4 PROTECTION

A. **Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure all-glass entrances are without damage or deterioration at the time of Substantial Completion.**

3.5 FIELD QUALITY CONTROL

A. **Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.**

1. **Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.**

3.6 DOOR HARDWARE SETS

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.**

1. **Quantities listed are for each pair of doors, or for each single door.**
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. **Refer to Section 080671, Door Hardware Sets, for hardware sets.**

C.

END OF SECTION 084126

SECTION 084426 - STRUCTURAL GLASS FAÇADE

PART 1 - GENERAL

1.1 RELATED WORK

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Related Requirements:

1. Section 014339 "Mockups" for integrated exterior mockup requirements.
2. Section 079200 “Sealants” for sealants
3. Section 084126 “All Glass Entrances” for doors
4. Section 088000 “Glazing” for glass

1.2 SUMMARY

A. Work under this Section is the responsibility of the Specialty Structural Glass Manufacturer and consists of the furnishing and execution of the structural glass system and all accessory work. The complete structural glass system shall be furnished by the Specialty Structural Glass Manufacturer. The General Contractor as used herein refers to the entity contracting for the structural glass system.

B. The work includes the following:

1. The structural glass system and associated work as defined in this Section and indicated on the architectural and structural drawings
2. Engineering design and material supply of the structural glass system and all glazing components and accessory parts.
3. Fabrication, packaging and delivery to job site.
4. Installation by an installer under the direction of a technical advisor provided by the Specialty Structural Glass Manufacturer.

1.3 DESIGN RESPONSIBILITY

A. The Specialty Structural Glass Manufacturer shall be responsible for complete system design, manufacturing, and to provide installation supervision services. The Specialty Glass Manufacturer shall not subcontract engineering or design services. Scope of services to include structural design calculations, shop drawings, manufacturing and procurement of all glass wall components, coordination with the General Contractor and erector, and field supervision during erection.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Design: Design of the structural glass wall including comprehensive engineering analysis by a qualified professional engineer, employed by the Specialty Glass Manufacturer, using design and structural performance requirements outlined in these specifications.

1. Design Loads: Determine design loading based according to ASCE/SEI 7, based on heights and configuration indicated on the drawings.

B. General Performance: Comply with the performance requirements specified for this project without failure. Failure is defined as the inability of the glass wall system or its components to meet the performance criteria outlined in these specifications. Sources of failure include defective design, manufacture, fabrication, installation, and defects in construction.

1. Failure also includes the following:

a. Glass breakage.
b. Noise or vibration created by wind and thermal and structural movements.
c. Loosening or weakening of fasteners, attachments, and other components.

C. Structural Performance: Provide structural glass wall and glass support structure capable of withstanding the design loads and performance criteria outlined in these specifications. Glass wall to be designed within the limits indicated below:

1. 1. The glass sub-frame must be capable of supporting the self-weight of the glass elements, wind loads, earthquake loads, and load combinations as required by code.
2. The deflection of the glass sub-frame, when the above-mentioned loads are applied, shall not exceed 1/175 of the span.
3. The deflection of insulated glass panels shall not exceed L/100 and edge deflection shall not exceed L/175.
4. Deflection of laminated glass panels shall be calculated using effective thickness calculations outlined in ASTM E-1300.
5. The structural glass wall shall withstand the movements of the support structure as indicated on the structural drawings including, but not limited to, story drift, twist, column shortening, long-term creep, foundation settlement, and deflection from uniformly distributed and concentrated dead loads and live loads.
6. The facade shall be seismically isolated in the direction parallel to the vision panels. Isolation from all adjacent building construction shall be achieved by means of slide bearing pads. Movement of adjacent walls, roof, or support structure shall not impose stress on the system other than that generated by friction of the slide bearing pads. All finish work around the supports shall be coordinated to allow for relative movement to occur.
7. All fins shall be laminated and shall be designed for redundancy. A broken fin shall be capable of supporting wind loads based on a ten year recurrence period.
8. All fittings and structural components used to support glass shall be tested by an accredited laboratory. Laboratory test results shall be submitted with the approval drawings.

D. Design the structural glass system and components in accordance with the dimensions and conditions shown in the architectural and structural drawings and to the loading requirements and codes specified in the bid documents. In addition, if not specifically called for in the documents, consider the following:

1. Temperature variation: +/-70 degrees Fahrenheit from a medium temperature of 75 degrees Fahrenheit.
2. Loads created by installation techniques and lifting devices.

E. The Architectural and Structural Drawings shall indicate the following design criteria:

1. Deflections of edge and support beams due to applied loads
2. Side sway movements of the adjacent and support structures due to wind and seismic load.
3. Anticipated deflections due to the weight of the structural glass system.
4. The structural glass wall shall be designed to accommodate these requirements.

1.5 SUBMITTALS

A. Design Submittal: Set of drawings clearly describing the structural wall system and geometry, including all pertinent material and dimensional information; drawings to be signed and sealed by the registered professional engineer responsible for their preparation.

B. Structural Calculations: Prior to fabrication of the structural glass wall, submit design calculations prepared in accordance with applicable local codes and standards of practice. Include analysis and design of all applicable loads and load combinations. Basic load conditions to include live, dead, wind, thermal, snow, seismic, and all other specified loads.

1. Supply structural reactions.
2. Provide maximum glass deflections.
3. Supply calculations for all connections and support conditions.
4. Glass thickness shall be sized by the Specialty Structural Glass Manufacturer.
5. Existing test reports are only acceptable as proof of capacity calculations, but will
6. not be acceptable in lieu of calculations

C. Shop Drawings: submit complete set of shop drawings including glass panel layouts and details. show dimensioned layout of structural glazing in relation to adjacent work such as walls, columns, beams, slabs, and other construction elements.

1. Include details of all supports and data to show provisions for vertical and horizontal expansion/contraction and building movements as necessary.
2. Identify all materials, attachments devices and accessories.

D. Installation Drawings: After approval of shop drawings, provide a detailed set of field installation drawings and a written installation procedure. Identify each part by size and number.

E. Product Data: Material Description for fittings, glass, gaskets and other materials

F. Samples: Submit samples of glass and glazing materials required for the project.

1. Samples of glass shall be 12" x 12".
2. Samples of sealants or gaskets shall be 12" long.
3. Submit samples of fixing hardware assemblies, bolts and accessories.
4. Two glass samples of each glass type and one representative fitting sample shall be submitted for approval.

G. Test Data: Provide reports of tests performed for all fittings and components supporting glass assemblies. Tests shall be performed by an accredited laboratory, and must have been performed within the last five years.

1.6 QUALITY ASSURANCE

A. A.Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State/Province where the project is built, who is employed by the Specialty Structural Glass manufacturer, and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for design of structural glass systems that are similar to those indicated for this project in scope and extent.

C. Engineering services, including drawings, design calculations, and professional engineering stamping of the drawings, shall not be subcontracted by the Specialty Structural Glass manufacturer.

D. Glazing systems and support fittings – Manufacturer shall confirm compatibility and suitability of application. Test data shall be provided for this purpose

E. Fabricate glass associated with the system to minimum tolerances provided in ASTM C 1048, in no case shall glass manufacturing tolerances be less than those specified in section 2.2 of these specifications, or as otherwise required to produce a satisfactory installation.

F. Provide stainless steel connection fittings as shown in drawings. The connections of the fittings to the glass shall ensure that no overstressed conditions occur within the glass unit.

G. Provide glass that is fabricated using float glass from an approved float glass manufacturers. A list of approved float glass manufacturers is provided in Section 2.2-C of these specifications.

H. Glass bolted connections shall be designed as bearing connections; the use of friction connections is not permitted due to interlayer creep. Averaging of bolt forces on rows of multiple bolts is not permitted; for any given row of bolts, overall plate tension and compression forces shall be assumed to be transferred to the glass by a single bolt, and the glass stresses shall be calculated using this assumption.

I. Models of glass connections shall be performed using FEA and contact elements; alternatively, glass bearing stresses shall be limited to 4ksi.

J. Where glass is used as a structural support, including fins and diaphragms, the glass shall be laminated and designed for redundancy. The design of the laminated glass shall allow for survival of the system in case one of the plies is broken.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Glass shall be manufactured, crated, stored, handled and shipped in a manner that will provide unscratched and undamaged units delivered to the site. Fittings which engage with the glass shall be individually boxed in a way to protect edges from damage and/or scratching.

B. Time the delivery of materials to the site to ensure uninterrupted progress of the installation work.

1.8 PROJECT CONDITIONS

A. A.Field Measurements: Where the system is indicated to fit against walls and other construction, the installer shall verify dimensions by field measurements before installation and notify General Contractor of any deviations from approved shop drawings. General Contractor shall correct conditions to comply with the system tolerances specified for the project and as indicated in the approval drawings, which may be tighter than industry standard.

B. B.Structural glass shall be fabricated in accordance with approved shop drawings which shall include dimensional approval from the Architect and General Contractor.

C. Coordinate fabrication schedule with construction progress to avoid delaying the work.

1.9 WARRANTY

A. Provide a ten (10) year warranty on the design, engineering and installation workmanship.

B. Provide the standard ten (10) year warranty on all laminated and insulated glass units.

PART 2 - PRODUCTS

2.1 STRUCTURAL GLASS CONTRACTOR/MANUFACTURER

A. Structural Glass Contractor/Manufacturer: The standard of design is based on the Sentech Architectural Systems' VetraFin System. Sentech Architectural Systems is a pre-approved Structural Glass manufacturer for the scope described in this Section.

2.2 GLAZED STRUCTURAL SYSTEMS

A. System Description:

1. The vertical glass wall system is comprised of a series of vertical glass fins, as shown in the contract drawings. Glass panels shall be attached to the glass support structure by means of steel gravity shelves and structural sealant. Glass panels to be flush with adjacent panels, as shown in the contract documents. The wall shall conform to the geometric dimensions and arrangement shown in the contract drawings. The glass support fittings shall be designed so that there are no components protruding through the glass wall, and no visible glass fittings, as shown in the contract drawings. Glass fins shall be

manufactured with tempered laminated glass, with splice locations and lengths as shown in the contract drawings.

B. Metals:

1. The glass attachment shelves shall be grade A316 stainless steel. The stainless steel shall be separated from the glass with durable nylon or Delrin gaskets. Fittings shall be tested by an accredited US laboratory.
2. The system shall allow for a minimum post installation adjustment of +/- 2mm in the horizontal and vertical directions.
3. All glass fitting surfaces to be finished with an electrolytic polish or a satin finish, as selected by the architect.
4. All glass connections to be designed as bearing connections and shall be designed to avoid overstressing the glass. Glass allowable stresses to be designed in accordance with ASTM E1300
5. Perimeter Trim and Flashing: At the terminations of the glazing system to other trades, provide stainless steel or painted aluminum trim which is secured to the glass to prevent weather penetration. Additional flashing shall be as detailed in the construction documents.

C. Glass:

1. All glass must be low iron.
2. All monolithic glass must be fully tempered and heat soaked.
3. Laminated glass shall be either fully tempered and heat soaked or heat strengthened. All laminated units shall be produced using either Eastman Saflex DG-41interlayer or Kuraray SentryGlas interlayer bonded via an autoclave heat and pressure process
4. The façade glass shall consist of insulated units with a ½” aluminum spacer. The width of the IGU secondary sealant shall be designed to ensure proper transfer of wind loads from the outer to the inner layer of glass.
5. The insulated units shall have a high performance LowE coating,

    a. Minimum “u” value of 0.30.

6. Overall thickness of the glass is to be determined by the Structural Glass Manufacturer in accordance with specifications and drawings.
7. Tempered glass must be horizontally tempered, eliminating tong marks. All exposed edges must be polished. All other edges must be ground flat with a frosted appearance unless otherwise noted. Edgework, holes and notches in the tempered glass panels(vertical wall) will be completed before tempering and will comply with the requirements stated below:

    a. ASTM C1036 Standard Specification for Flat Glass.
    b. ASTM C1048 Standard Specification for Heat-Treated Flat Glass.
    c. ASTM C1172 Standard Specification for Laminated Architectural Flat Glass.
    d. Safety glazing requirements as defined in ANSI Z97.1 and CPSC 16 CFR 1201.

8. Glass fins shall be designed for out of plane buckling, in addition to stress design.
9. Float glass manufacturers are limited to:

    a. Pilkington

b. PPG
c. Guardian
d. AGC Europe
e. Saint Gobain
f. CSG
g. Glass tolerances:

10. Squareness of panels governs other tolerances and shall be within 1/8” of specified dimensions. Edge lengths shall be within 1/16” of specified dimensions. Holes shall be within 1/16” of specified locations. Bow shall be better than 0.15%.
11. Drilled holes:

    a. Diameter: +/- 1/32”
    b. Location from single datum: +/- 1/16”

12. Local distortion (roller waves)

    a. Maximum allowable distortion is to be 0.003” over 12” measured length.

2.3 FABRICATION

A. Provide glass and structural hardware, connectors, fasteners and accessories required for a complete installation of the structural glazing as indicated in approved shop drawings.

B. Code each part for easy identification. Cross reference this coding to shop/installation drawings and to shipping lists.

C. Fabricate components that, when assembled, have the following characteristics:

1. Sharp profiles, straight and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to prevent glazing-to-glazing contact and to maintain required glazing edge clearances.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Structural Glass Manufacturer’s Erector shall check all metal components upon delivery for dents, gouges or other imperfections which may result in rejection of the appearance or reduce strength.

B. Structural Glass Contractor/Manufacturer’s Erector shall check the glass panels upon delivery for scratches, imperfections and edge damage. Damaged glass shall not be installed.

C. Structural Glass Contractor/Manufacturer’s Erector shall examine areas, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide connections for temporary shoring, bracing and supports as noted on the installation drawings. Handle, lift and align pieces using padded slings, suction cups and other protection required to maintain the appearance of the system throughout the installation process.

B. Only lift at connections as approved by the Specialty Structural Glass Manufacturer Design Engineer.

3.3 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce joints free of burrs and distortion.
4. Rigidly secure non-movement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

B. Erect structural glazing and accessory items in strict accordance with the approved shop/installation drawings and installation procedures.

1. Glass shall not be positioned by the use of force. Provide temporary bracing and support as required to ensure stability during installation process.
2. Bolt Head Orientation: Exposed bolt heads shall be oriented as indicated on the approved drawings. Where bolt head alignment is specified, the orientation shall be noted for each connection on the installation drawings. Where not noted, the bolt heads in a given connection shall be oriented to one side.
3. Bolts shall be fully tightened in accordance with methods indicated in the installation drawings.
4. Clean glazing connectors receiving glazing materials of deleterious substances that might impair the work. Remove protective coatings that might fail in adhesion or interfere with bond of sealants. Comply with the manufacturer’s instructions for final wiping of surfaces immediately before the application of primer and glazing sealants. Wipe metal surfaces with an appropriate cleaning agent.
5. Sealants: Prime surfaces that are to receive glazing sealants in accordance with the manufacturer’s recommendations, using recommended primers.
6. Locate setting blocks, if required by the drawings. Use blocks of proper sizes to support the glass in accordance with the manufacturer’s recommendations.
7. Ensure nylon or delrin spacers separate the glass from attachment plates.
8. Set the glass in a manner that produces the greatest possible degree of uniformity in appearance. Face all glass, which has a dissimilar face, with matching faces in the same direction. Carefully remove all stickers and clean affected area.
9. Use masking tape or other suitable protection to limit the coverage of glazing materials on the surfaces intended for sealants.

10. Tool exposed surfaces of glazing materials.
11. Clean excess sealant from the glass and support members immediately after the application, using solvents or cleaners recommended by the manufacturers.

C. Structural glazing shall be installed clean and in one visit. General Contractor shall provide protection measures for completed structural glazing and accessories to prevent damage or deterioration from subsequent work.

D. Obtain permission for any modification or field fabrication from the Engineer of the system. Glass shall not be modified.

END OF SECTION 08 44 26 – STRUCTURAL GLASS FACADE

SECTION 087100 - 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.**
2. Cylinders specified for doors in other sections.

C. **Related Sections:**

1. **Division 06 Section "Rough Carpentry".**
2. Division 08 Section "Hollow Metal Doors and Frames".
3. Division 08 Section "All-Glass Entrances".

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 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. **Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:**

1. **ANSI/BHMA Certified Product Standards - A156 Series.**
2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
3. ANSI/UL 294 - Access Control System Units.
4. UL 305 - Panic Hardware.

5. ANSI/UL 437- Key Locks.

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.
h. Warranty information for each product.

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: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.**

D. Informational Submittals:

1. **Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.**

1.4 CLOSEOUT SUBMITTALS

A. **Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.**

B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.5 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. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door 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.

D. 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 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.

E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference 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 in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) 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 aluminum, hollow metal and wood 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.
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 according to manufacturer's instructions and recommendations and according to approved schedule.**

1.6 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".

1.7 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 and Frame Preparation: 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.

1.8 WARRANTY

A. **General Warranty: Reference Division 01, General Requirements. 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. **Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.**

PART 2 - PRODUCTS

2.1 BUTT HINGES

A. **Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.**

1. **Quantity: Provide the following hinge quantity:**

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.**
d. For doors with heights more than **120 inches,** provide 4 hinges, plus 1 hinge for every **30 inches** of door height greater than **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. **Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.**
b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. **Hinge Options: Comply with the following:**

a. **Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.**

5. **Manufacturers:**

a. **Hager Companies (HA) - BB Series, 5-knuckle.**
b. McKinney (MK) - TA/T4A Series, 5-knuckle.
c. dormakaba BEST (ST) - F/FBB Series, 5-knuckle.

2.2 CYLINDERS AND KEYING

A. **General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.**

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:

1. **Threaded mortise cylinders with rings and cams to suit hardware application.**
2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
4. Tubular deadlocks and other auxiliary locks.
5. 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.
6. Keyway: Match Facility Standard.

C. **Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.**

D. Keying System: Each type of lock and cylinders to be factory keyed.

1. **Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.**
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. Existing System: Field verify and key cylinders to match Owner's existing system.

E. **Key Quantity: Provide the following minimum number of keys:**

1. **Change Keys per Cylinder: Three (3).**
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).
4. Construction Control Keys (where required): Two (2).
5. Permanent Control Keys (where required): Two (2).

F. **Construction Keying: Provide temporary keyed construction cores.**

G. Key Registration List (Bitting List):

1. **Provide keying transcript list to Owner's representative in the proper format for importing into key control software.**
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.3 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.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

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 A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.4 CONVENTIONAL EXIT DEVICES

A. **General Requirements: All exit devices specified herein shall meet or exceed the following criteria:**

1. **Exit devices shall have a five-year warranty.**
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the

proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.

4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. **Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.**
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

7. **Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.**
8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. **Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.**

1. **Provide exit devices with functions and features as follows:**

    a. **Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.**
    b. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
    c. No catch points: addition of applied deflectors or other added components are not allowed.
    d. No visible plastic.
    e. Heavy duty end caps with flush and overlapping options made of stainless steel, brass, or bronze with architectural finishes.
    f. Constructed of all stainless steel.
    g. Stainless steel pullman type latch with deadlock feature.
    h. Narrow or wide style exterior trim as specified in the hardware sets.
    i. Center case adjustability on concealed vertical rod exit devices; single operation with hex key individually adjusts top or bottom latches. No retainer screws or clips required to maintain adjustment.
    j. Ten-year limited warranty for mechanical features.

2. **Manufacturers:**

a. **Corbin Russwin Hardware (RU) - PED4000 / PED5000 Series.**
b. Sargent Manufacturing (SA) - PE80 Series.
c. Von Duprin (VD) - 35A/98 XP Series.

2.5 SURFACE 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 door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.**
2. Standards: Closers to comply with UL-10C 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 Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. **Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.**

1. **Heavy duty surface mounted door closers shall have a 30-year warranty.**
2. Manufacturers:

a. **Corbin Russwin Hardware (RU) - DC6000 Series.**
b. Norton Rixson (NO) - 7500 Series.
c. Sargent Manufacturing (SA) - 351 Series.

2.6 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 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.

1. **Manufacturers:**

   a. **Burns Manufacturing (BU).**
   b. Hiawatha, Inc. (HI).
   c. Rockwood (RO).

2.7 ARCHITECTURAL SEALS

A. **General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.**

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

   1. **Provide smoke labeled perimeter gasketing at all smoke labeled openings.**

C. **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 NFPA 252, Standard Methods of Fire Tests of Door Assemblies.**

D. **Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.**

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

   1. **National Guard Products (NG).**
   2. Pemko (PE).
   3. Reese Enterprises, Inc. (RE).

2.8 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.**

2.9 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.**

B. Wood Doors: Comply with ANSI/DHI A115-W 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. DHI TDH-007-20: Installation Guide for Doors and Hardware.
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. 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. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

F. 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 (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.**

1. **Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.**

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. 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 SETS

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.**

1. **Quantities listed are for each pair of doors, or for each single door.**
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. **Refer to Section 080671, Door Hardware Sets, for hardware sets.**

C.

END OF SECTION 087100

SECTION 088000 - GLAZING

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 glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Door Glazing

2. Structural Glazing
3. Laminated Glazing Fins

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit.

1.4 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.5 ACTION SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of glass product; 12 inches (300 mm) square.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installers.

B. Product Certificates: For glass and glazing products, from manufacturer.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulating glass.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

D. Warranties: Sample of special warranties.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

E. Source Limitations for Glass: Obtain insulating glass from single source from single manufacturer for each glass type.

F. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."

2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

H. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

I. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F (250 deg C), and the fire-resistance rating in minutes.

J. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

K. Safety Standards: Comply with CBC Chapter 24, safety glazing requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

1.10 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass

contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to 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.

1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

B. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites of thickness indicated.

2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 STRUCTURAL GLASS FACADE (GL-01 & GL-02)

1. See Section 084426 for more information.

2.3 STRUCTURAL GLASS FACADE SPANDRAL (GL-07)

A. See Section 084426 for more information.

B. Interlayer Characteristics:

1. Material: PVB
2. Series: Vanceva Color by Saflex or similar
3. Thickness: 3 interlayersColor:

a. Color 1: White
b. Color 2: White
c. Color 3: White

2.4 FULLY TEMPERED, CLEAR (GL-03)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Glasswerks LA, Inc.
b. Oldcastle BuildingEnvelope™.
c. Vitro Architectural Glass.
d. Or equal.

2. Series/Type: Single glazed glass units, fully tempered clear float glass, PPG.

a. Total thickness: 1/2 inch.

2.5 DOOR GLAZING (GL-04 & GL-05)

A. See Section 084126 for more information

2.6 FIRE-PROTECTION-RATED GLAZING IN HOLLOW METAL DOORS (GL-08)

A. Manufacturer: Safti-First, http://www.safti.com.

B. Type: Polished clear ceramic, fire rated glazing.

C. Series: Pyran Platinum F.

D. Characteristics:

1. Total Thickness: 1/2 inch.

2. Weight: 2.5 pounds per square foot.
3. Appearance: free of amber tint.
4. Fire Rating: UL classified 20 - 180 minutes with hose stream. Permanently labeled.
5. Complies with Hose Stream Test per marking OH-45, CBC 2013.
6. Approvals: UL 9, NFPA 257.
7. Impact Safety Rating: CPSC 16 CFR 1201 Category I and II.

E. Location of surface film: Interior

2.7 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.8 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.

2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. 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.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

3.4 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

SECTION 092216 – NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing systems.
2. Suspension systems.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Framing systems.
2. Suspension systems.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of code-compliance certification for studs and tracks.

B. Evaluation Reports: For high-strength steel studs and tracks, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.4 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association, the Steel Stud Manufacturers Association, or the Supreme Steel Framing System Association.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Notify manufacturer of damaged materials received prior to installation.

B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI S202, "Code of Standard Practice for Cold-Formed Steel Structural Framing."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, in accordance with ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, in accordance with ASTM E90 and classified in accordance with ASTM E413 by an independent testing agency.

C. Horizontal Deflection: For composite wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft. .

D. Design framing systems in accordance with AISI S220, "North American Specification for the Design of Cold-Formed Steel Framing - Nonstructural Members," unless otherwise indicated.

E. Design Loads: As indicated on architectural Drawings or 5 lbf/sq. ft. minimum as required by the IBC.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with AISI S220 and ASTM C645, Section 10 for conditions indicated.

1. Steel Sheet Components: Comply with AISI S220 and ASTM C645, Section 10 requirements for metal unless otherwise indicated
2. Protective Coating: Comply with AISI S220; ASTM A653/A653M, G40; or coating with equivalent corrosion resistance. Galvannealed products are unacceptable.

a. Coating demonstrates equivalent corrosion resistance with an evaluation report acceptable to authorities having jurisdiction.

B. Studs and Track: AISI S220 and ASTM C645, Section 10.

1. Minimum Base-Steel Thickness: As required by performance requirements for horizontal deflection.
2. Depth: As indicated on Drawings.

C. High-Strength Steel Studs and Tracks: Roll-formed with surface deformations to stiffen the framing members.

1. Minimum Base-Steel Thickness: As required by horizontal deflection performance requirements.
2. Depth: As indicated on Drawings.

D. Slip-Type Head Joints: Where indicated, provide the following:

1. Single Long-Leg Track System: Top track with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Steel Thickness: 0.0296 inch.

F. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-steel thickness, with minimum 1/2-inch- wide flanges.

1. Depth: As indicated on Drawings.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches), 0.068-inch- thick, galvanized steel.

G. Hat-Shaped, Rigid Furring Channels:

1. Minimum Base-Steel Thickness: 0.0296 inch
2. Depth: As indicated on Drawings.

H. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.

1. Configuration: Asymmetrical or hat shaped as indicated on drawings.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

B. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.

C. Flat Hangers: Steel sheet, in size indicated on Drawings.

D. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538 inch and minimum 1/2-inch- wide flanges.

1. Depth: As indicated on Drawings.

E. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
2. Steel Studs and Tracks:

   a. Minimum Base-Steel Thickness: 0.0329 inch.
   b. Depth: As indicated on Drawings.

3. Hat-Shaped, Rigid Furring Channels: 7/8 inch deep.

   a. Minimum Base-Steel Thickness: 0.0329 inch

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Installation Standard: ASTM C754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 INSTALLATION OF FRAMING SYSTEMS

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.4 INSTALLATION OF SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches o.c.
2. Carrying Channels (Main Runners): 48 inches o.c.
3. Furring Channels (Furring Members): 16 inches o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

   a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
3. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
5. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
6. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

3.5 FIELD QUALITY CONTROL

A. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.

B. Related Requirements:

1. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Gypsum wallboard.
2. Gypsum board, Type X.
3. Mold-resistant gypsum board.
4. Cement board
5. Interior trim.
6. Aluminum trim.
7. Joint treatment materials.
8. Sound-attenuation blankets.

B. Shop Drawings: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.

C. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

1.3 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.4 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of gypsum panel and joint finishing material from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated in accordance with ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated in accordance with ASTM E90 and classified in accordance with ASTM E413 by an independent testing agency.

2.3 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.4 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed; SAINT-GOBAIN.
b. Georgia-Pacific Gypsum LLC.
c. Gold Bond Building Products, LLC provided by National Gypsum Company.

d. USG Corporation.

2. Thickness: 5/8 inch.
3. Long Edges: Tapered.

B. Gypsum Board, Type X: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed; SAINT-GOBAIN.
b. Georgia-Pacific Gypsum LLC.
c. Gold Bond Building Products, LLC provided by National Gypsum Company.
d. USG Corporation.

2. Thickness: 5/8 inch .
3. Long Edges: Tapered.

C. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed; SAINT-GOBAIN.
b. Georgia-Pacific Gypsum LLC.
c. Gold Bond Building Products, LLC provided by National Gypsum Company.
d. USG Corporation.

2. Core: 5/8 inch (15.9 mm), Type X.
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D3273, score of 10 as rated in accordance with ASTM D3274.

2.5 CEMENT BOARD

A. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed; SAINT-GOBAIN.
b. Custom Building Products.
c. USG Corporation.

2. Thickness: 5/8 inch (15.9 mm).
3. Mold Resistance: ASTM D3273, score of 10 as rated in accordance with ASTM D3274.

2.6 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Flannery, Inc.
b. Fry Reglet Corporation.
c. Pittcon Industries.
d. Tamlyn.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221 , Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.7 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

D. Joint Compound for Tile Backing Panels:

1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.8 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

C. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

D. Sealant: As specified in Section 079200 "Joint Sealants."

E. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

A. Comply with ASTM C840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered

edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Wallboard Type: As indicated on Drawings.
2. Type X: Where required for fire-resistance-rated assembly.
3. Mold-Resistant Type: Painted surfaces in vestibules, and where indicated on Drawings.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

a. Stagger abutting end joints not less than one framing member in alternate courses of panels.

b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.4 INSTALLATION OF CEMENT BOARD

A. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLATION OF TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints at locations indicated on Drawings, in accordance with ASTM C840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.
3. L-Bead: Use where indicated on Drawings.
4. U-Bead: Use where indicated on Drawings.

D. Aluminum Trim: Install in locations indicated on Drawings.

3.6 FINISHING OF GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and in accordance with ASTM C840:

1. Level 1: None
2. Level 2: None
3. Level 3: None
4. Level 4: At all surfaces, unless otherwise noted.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

5. Level 5: Where indicated on Drawings.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

E. Cement board: Finish to match existing exterior ceiling parge color.

1. Architect to confirm color in the field.

3.7 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Acoustical panels.
2. Metal suspension system.
3. Metal edge moldings and trim.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Acoustical panels.
2. Metal suspension system.
3. Metal edge moldings and trim.

B. Samples: For each exposed product and for each color and texture specified, 6 inches in size.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension-system members.
2. Structural members to which suspension systems will be attached.
3. Method of attaching hangers to building structure.
4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
5. Size and location of initial access modules for acoustical panels.
6. Items penetrating finished ceiling and ceiling-mounted items including the following:

    a. Lighting fixtures.
    b. Diffusers.
    c. Grilles.
    d. Speakers.
    e. Sprinklers.
    f. Access panels.
    g. Perimeter moldings.

7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.

8. Minimum Drawing Scale: 1/4 inch = 1 foot (1:48).

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.5 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. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Source Limitations for Ceiling System: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class A in accordance with ASTM E1264.
2. Smoke-Developed Index: 50 or less.

2.3 ACOUSTICAL PANELS

A. Basis-of-Design Product ACT-01: As indicated on Sheet A801.00 Finish Schedule, or approved equal.

1. Size = 24” x 24”

B. Basis-of-Design Product ACT-02: As indicated on Sheet A801.00 Finish Schedule, or approved equal.

1. Size =- 12” x 12”
2. Edges have tongue and groove construction.

C. Acoustical Panel Standard: Provide manufacturer's standard panels in accordance with ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

2.4 METAL SUSPENSION SYSTEM

A. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 15/16-inch- wide metal caps on flanges.

1. Structural Classification: Intermediate -duty system.
2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
3. Face Design: Flat, flush.
4. Cap Material: Cold-rolled steel.
5. Cap Finish: Painted to match color of acoustical unit.

2.5 ACCESSORIES

A. Wire Hangers, Braces, and Ties: Provide wires as follows:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- diameter wire.

B. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

C. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

D. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized-steel sheet complying with ASTM A653/A653M, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.

2.6 METAL EDGE MOLDINGS AND TRIM

A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

1. Edge moldings to fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.

B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION OF ACOUSTICAL PANEL CEILINGS

A. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.

2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with 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.
4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

B. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

C. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

D. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.

1. Arrange directionally patterned acoustical panels as follows:

a. As indicated on reflected ceiling plans.

2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.4 ERECTION TOLERANCES

A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-cumulative.

B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet, non-cumulative.

3.5 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 096340 - STONE FLOORING AND WALL PANELS

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. Dimension natural stone interior flooring.
2. Dimension natural stone interior and exterior sill panel

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project Site

1.4 ACTION SUBMITTALS

A. Product Data: For each stone type, stone accessory, and manufactured product.

B. Shop Drawings: Include plans, sections, details, and attachments to other work.

1. Show locations and details of joints both within stone flooring and between stone flooring and other finish materials.
2. Show direction of veining, grain, or other directional patterns.

C. Samples for Initial Selection: For joint materials involving color selection.

D. Samples for Verification:

1. For each stone type indicated, in sets of Samples not less than 12 inches, provide 3 or more Samples in each set and show the full range of color and other visual characteristics in completed Work.
2. For each color of submit compatible grout required.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Material Test Reports:

1. Stone Test Reports: For each stone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, according to referenced ASTM standards. Base reports on testing within previous five years.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For stone flooring to include in maintenance manuals. Include product data for stone-care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate stone flooring.

B. Installer Qualifications: Fabricator of stone flooring.

C. Installer Qualifications: A firm or individual experienced in installing stone flooring similar in material, design, and extent to that indicated for this Project, whose work has a record of successful in-service performance.

D. Flooring Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.

1. Build mockup of typical interior floor area consisting of 3 full size stone flooring adjacent to one another
2.

a. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
b. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Sill Mockup: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.

1. Build mockup of typical interior, sill, and exterior wall panel at the base of the facade

a. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing
b. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, and other causes.

1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
2. Store stone on wood A-frames or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.

B. Mark stone units, on surface that is concealed after installation, with designations used on Shop Drawings to identify individual stone units. Orient markings on vertical panels, so that they are right side up when units are installed.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

1.9 FIELD CONDITIONS

A. Maintain air and material temperatures to comply with requirements of installation material manufacturers, but not less than 50 deg F during installation and for seven days after completion.

B. Cold-Weather Requirements for Exterior Stone Flooring: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

C. Hot-Weather Requirements for Stone Flooring: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602 and with the following:

1. Maintain temperature of materials below 100 deg F.
2. Do not apply mortar to substrates with temperatures of 100 deg F and above.
3. When the ambient temperature exceeds 90 deg F,fog spray installed stone flooring until damp at least three times a day until flooring is three days old.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Stone: Obtain each stone from single quarry, with resources to provide materials of consistent quality in appearance and physical properties.

1. For stone types that include same list of varieties and sources, provide same variety from same source for each.
2. Make quarried blocks available for examination by Architect.

3. Make stone slabs available for examination by Architect.

   a. Architect will select aesthetically acceptable slabs and will indicate aesthetically unacceptable portions of slabs.
   b. Segregate slabs selected for use on Project and mark backs indicating approval.
   c. Mark and photograph aesthetically unacceptable portions of slabs as directed by Architect.

B. Stone Fabricators: Subject to compliance with requirements, may be incorporated into the Work include, but are not limited to, the following:

1. Stone Source

   a. 215 Park Avenue S 7th Floor

2.2 BLACK ABSOLUATE HONED GRANITE (ST-01)

A. Material Standard: Comply with ASTM C615/C615M.

B. Description: Black Absolute Honed

C. Cut stone to produce pieces of thickness, size, and shape indicated.

1. Stone Thickness: 2 inches at exterior & 1 ½ inches at interior
2. Pattern: Rectangular, 24” length X *full height of sill*
3. Stone Edges: Square cut with 1/16-inch- (1.5-mm-) wide bevel at top corner
4. Joint Width:1/8 inch

D. Finish: Honed

E. Anchorage: Delegated Design

1. Provide stainless steel anchors to fasten wall panels to backup CMU/Concrete.

F.

2.3 DANBY MARBLE, (ST-02)

A. Material Standard: Comply with ASTM C503/C503M

1. Stone Abrasion Resistance: Minimum value of 10, based on testing according to ASTM C241/C241M or ASTM C1353.

B. Description: fine- to medium-grained, White stone with slight veining of white, blue, and gray

C. Cut stone to produce pieces of thickness, size, and shape indicated.

1. Stone Thickness: 3/4 inches
2. Pattern: Rectilinear pattern to match existing pattern of +/- 3’-1” X 2’-7” panels

3. Stone Edges: Square cut with 1/16-inch- (1.5-mm-) wide bevel at top corner
4. Joint Width:1/8 inch

D. Finish: Honed

E. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.

2.4 MORTAR MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or Type II.

1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C150/C150M, Type I or Type III, and hydrated lime complying with ASTM C207, Type S.

D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in stone masonry mortar.

E. Colored Portland Cement-Lime Mix: Packaged blend of portland cement, hydrated lime, and mortar pigments. Mix shall produce color indicated or, if not indicated, as selected from manufacturer's standard colors. Pigments shall not exceed 10 percent of portland cement by weight.

F. Aggregate: ASTM C144 use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.

1. White Aggregates: Natural white sand or ground white stone.
2. Colored Aggregates: Natural-colored sand or ground marble, granite, or other durable stone; of color necessary to produce required mortar color.

G. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part of or all gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement mortar bed, and not containing a retarder.

H. Thinset Mortar:

1. Standard Dry-Set Mortar: ANSI A118.1.
2. Modified Dry-Set Mortar: ANSI A118.4.

a. Prepackaged Dry-Mortar Mix: Factory-prepared, packaged mixture of portland cement; dry, redispersible, ethylene vinyl acetate or acrylic additive; and other ingredients to which only water needs to be added at Project site.

b. Mixture of Dry-Mortar Mix and Latex Additive: Mixture of packaged dry-mortar mix and liquid-latex additive.

3. Medium-Bed Modified Dry-Set Mortar: ANSI A118.4. Provide product that is approved by manufacturer for application thickness of 5/8 inches.

a. Prepackaged Dry-Mortar Mix: Factory-prepared, packaged mixture of portland cement; dry, redispersible, ethylene vinyl acetate or acrylic additive; and other ingredients to which only water needs to be added at Project site.
b. Mixture of Dry-Mortar Mix and Latex Additive: Mixture of packaged dry-mortar mix and liquid-latex additive.

4. Improved Modified Dry-Set Mortar: ANSI A118.15.

a. Prepackaged Dry-Mortar Mix: Factory-prepared, packaged mixture of portland cement; dry, redispersible, ethylene vinyl acetate or acrylic additive; and other ingredients to which only water needs to be added at Project site.
b. Mixture of Dry-Mortar Mix and Latex Additive: Mixture of packaged dry-mortar mix and liquid-latex additive.

I. Water: Potable.

2.5 GROUT

A. Grout Colors:

1. At ST-01, provide black
2. At ST-02, provide light gray to match existing

B. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate to produce required color.

C. Standard Cement Grout: ANSI A118.6, packaged.

1. Unsanded grout mixture for joints 1/8 inch (3 mm) and narrower.
2. Sanded grout mixture for joints wider than 1/8 inch (3 mm).

D. High-Performance Cement Grout: ANSI A118.7, packaged.

1. Polymer Type: Acrylic resin in dry, redispersible form, packaged with other dry ingredients.
2. Polymer Type: Acrylic resin in liquid-latex form for addition to packaged dry-grout mix.
3. Unsanded grout mix for joints 1/8 inch (3 mm) and narrower.
4. Sanded grout mix for joints wider than 1/8 inch (3 mm).

E. Water-Cleanable Epoxy Grout: ANSI A118.3 packaged, chemical-resistant, water-cleanable, tile-setting and -grouting epoxy.

2.6 WATERPROOF MEMBRANES

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.

B. Fabric-Reinforced, Modified-Bituminous Sheet: Self-adhering, SBS-modified-bituminous sheet with woven reinforcement facing; 0.040-inch (1.01-mm) nominal thickness.

C. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.

D. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.

2.7 ACCESSORIES

A. Water-Cleanable Epoxy Adhesive: ANSI A118.3.

B. Temporary Spacers: Resilient plastic, nonstaining to stone, sized to suit joint thickness.

C. Cleavage Membrane: Polyethylene sheeting, ASTM D4397, 4.0 mils (0.1 mm) thick

D. Reinforcing Wire: Galvanized, welded, 0.062-inch- (1.57-mm-) diameter wire; 2-by-2-inch (50-by-50-mm) mesh; comply with ASTM A1064/A1064M, except for minimum wire size.

E. Divider Strips and Edging: Metal or combination of metal, designed specifically for flooring applications, in longest lengths available, and as follows:

1. Exposed-Edge Material: Stainless Steel
2. Cross-Section Profile: Straight shape
3. Height: Match stone thickness plus depth of setting bed
4. Exposed-Edge Width: 1/8 inch
5. Control-Joint Filler: Neoprene.

F. Cork Joint Filler: Preformed strips complying with ASTM D1752, Type II.

G. Joint Sealants: Manufacturer's standard sealants that comply with applicable requirements in Section 079200 "Joint Sealants" and will not stain the stone they are applied to.

1. Colors: Provide colors of exposed sealants to match other joints in stone adjoining sealed joints unless otherwise indicated.

H. Cleaner: Stone cleaner specifically formulated for stone types, finishes, and applications indicated, as recommended by stone producer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

I. Floor Sealer: Colorless, slip- and stain-resistant sealer that does not affect color or physical properties of stone surfaces, as recommended by stone producer for application indicated.

2.8 MORTAR AND GROUT MIXES

A. Mortar: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortar of uniform quality and with optimum performance characteristics.

1. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated. Do not use calcium chloride.
2. Combine mortar materials and thoroughly mix in a mechanical batch mixer unless otherwise indicated. Discard mortar when it has reached initial set.
3. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding any water. Add only enough water to produce a damp, unworkable mix that retains its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

B. Portland Cement-Lime Setting Mortar: ASTM C270, Proportion Specification, Type N for interior applications and Type S for exterior applications. Use amount of water to produce a stiff mixture with a moist surface when bed is ready to receive stone.

C. Latex-Modified Portland Cement Setting Mortar: Proportion and mix portland cement, aggregate, and latex additive to comply with latex-additive manufacturer's written instructions and to produce a stiff mixture with a moist surface when bed is ready to receive stone.

D. Mortar-Bed Bond Coat: Mix neat cement and water to a creamy consistency.

E. Cement-Paste Bond Coat: Mix either neat cement or cement and sand with water to a consistency similar to that of thick cream.

F. Latex-Modified Portland Cement Bond Coat: Proportion and mix portland cement, aggregate, and latex additive to comply with latex-additive manufacturer's written instructions.

G. Pointing Mortar: Comply with requirements indicated above for setting mortar, including type and the following:

1. Pigmented Pointing Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1:10, by weight.
2. Packaged Portland Cement-Lime Mix Mortar: Use portland cement-lime mix of selected color.
3. Colored-Aggregate Pointing Mortar: Produce color required by combining colored aggregates with portland cement of selected color.

H. Joint Grout: Comply with mixing requirements in referenced ANSI standards and with manufacturer's written instructions.

2.9 FABRICATION OF STONE

A. Select stone for intended use to prevent fabricated units from containing cracks, seams, and starts that could impair structural integrity or function.

1. Repairs that are characteristic of the varieties specified are acceptable provided they do not impair structural integrity or function and are not aesthetically unpleasing, as judged by Architect.

B. Fabricate stone to comply with requirements indicated and with the following references:

1. For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."
2. For marble, comply with recommendations in MIA's "Dimension Stone - Design Manual VII."

C. Pattern Arrangement: Fabricate and arrange stone units with veining and other natural markings to comply with the following requirements:

1. Cut stone from one block or contiguous, matched blocks in which natural markings occur.
2. Arrange units random to spread out natural variations.

a. Coordinate with architect in the field

D. Carefully inspect finished stone units at fabrication plant for compliance with appearance, material, and fabrication requirements. Replace defective units. Clean sawed backs of stones to remove rust stains and iron particles.

1. Grade and select stone for overall uniform appearance when assembled in place.
2. Natural variations in appearance are acceptable if installed stone units match range of colors and other appearance characteristics represented in approved Samples and mockups.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive stone flooring and conditions under which stone flooring will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone flooring.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of stone flooring.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Sweep and vacuum concrete substrates to remove dirt, dust, debris, and loose particles.

B. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.

C. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.

D. Before setting stone, clean dirty or stained stone surfaces by removing soil, stains, and foreign materials. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

3.3 INSTALLATION, GENERAL

A. Do necessary field cutting as stone is set. Cut lines straight and true, and finish field-cut edges to match shop-cut edges.

1. Use power saws with diamond blades to cut stone

B. Set stone to comply with requirements indicated

C. Scribe and field cut stone as necessary to fit at obstructions. Produce neat joints of size specified or indicated.

D. Provide control and expansion joints of widths and at locations indicated. Keep control and expansion joints free of mortar, grout, and other rigid materials.

3.4 INSTALLATION TOLERANCES

A. Variation in Joint Width: Do not vary from average joint width more than plus or minus 1/16 inch (1.5 mm) or one-fourth of nominal joint width, whichever is less.

B. Variation in Surface Plane: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (10 mm) maximum from level or slope indicated.

C. Variation in Plane between Adjacent Units (Lipping): Do not exceed 1/32-inch (0.8-mm) difference between planes of adjacent units.

3.5 INSTALLATION OF STONE BONDED TO CONCRETE

A. Saturate concrete with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.

B. Apply mortar-bed bond coat to damp concrete and broom to provide an even coating that completely covers the concrete. Do not exceed 1/16-inch (1.5-mm) thickness. Limit area of mortar-bed bond coat to avoid its drying out before placing setting bed.

1. Place reinforcing wire mesh over concrete, lapped at joints by at least one full mesh and supported so mesh becomes embedded in middle of mortar bed. Hold edges back from vertical surfaces about 1/2 inch (13 mm).

C. Apply mortar bed immediately after applying mortar-bed bond coat. Spread, tamp, and screed to uniform thickness at elevations required for setting stone to finished elevations indicated.

D. Mix and place only that amount of mortar bed that can be covered with stone before initial set. Cut back, bevel edge, and discard material that has reached initial set before stone can be placed.

E. Place stone before initial set of mortar occurs. Immediately before placing stone on setting bed, apply uniform 1/16-inch- (1.5-mm-) thick bond coat to mortar bed or to back of each stone unit.

F. Tamp and beat stone with a wooden block or rubber mallet to obtain full contact with mortar bed and to bring finished surfaces within indicated tolerances. Set each unit in a single operation before initial set of mortar; do not return to areas already set and disturb stone for purposes of realigning finished surfaces or adjusting joints.

G. Rake out joints to depth required to receive pointing mortar as units are set.

H. Point joints after setting. Fill full with mortar type and color indicated. Tool joints flat, uniform, and smooth, without visible voids.

3.6 INSTALLATION OF STONE OVER WATERPROOFING

A. Carefully place stone and setting materials over waterproofing, so protection materials are not displaced and waterproofing is not punctured or otherwise damaged. Replace protection materials that become displaced and arrange for repair of damaged waterproofing before covering with stone flooring

B. Provide cork joint filler, where indicated, at waterproofing that is turned up on vertical surfaces or, if not indicated, provide temporary filler or protection until stone flooring installation is complete.

C. Install waterproof membrane to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.

1. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

D. Place reinforcing wire fabric over waterproofing, lapped at least one full mesh at joints and supported so mesh becomes embedded in middle of mortar bed. Hold edges back from vertical surfaces and control and expansion joints about 1/2 inch (13 mm).

E. Place mortar bed over waterproofing with reinforcing wire fabric fully embedded in middle of mortar bed. Spread, tamp, and screed to uniform thickness at elevations required for setting stone to finished elevations indicated.

F. Mix and place only that amount of mortar bed that can be covered with stone before initial set. Cut back, bevel edge, and discard material that has reached initial set before stone can be placed.

G. Place stone before initial set of mortar occurs. Immediately before placing stone on setting bed, apply uniform 1/16-inch- (1.5-mm-) thick bond coat to mortar bed or to back of each stone unit.

H. Tamp and beat stone with a wooden block or rubber mallet to obtain full contact with mortar bed and to bring finished surfaces within indicated tolerances. Set each unit in a single operation before initial set of mortar; do not return to areas already set and disturb stone for purposes of realigning finished surfaces or adjusting joints.

I. Rake out joints to depth required to receive pointing mortar as units are set.

J. Point joints after setting. Fill full with mortar type and color indicated. Tool joints flat, uniform, and smooth, without visible voids.

3.7 GROUTING

A. Grout stone joints to comply with ANSI A108.10 and with manufacturer's written instructions.

1. Do not use sanded grout for polished stone.
2. Grout joints as soon as possible after initial set of setting bed. Force grout into joints, taking care not to smear grout on adjoining stone and other surfaces. After initial set of grout, finish joints by tooling to produce a slightly concave polished joint, free of drying cracks.

B. Grout stone joints with water-cleanable epoxy grout to comply with ANSI A108.6 and with manufacturer's written instructions.

3.8 INSTALLATION OF JOINT-SEALANT

A. Prepare joints and apply sealants of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants."

3.9 ADJUSTING AND CLEANING

A. Remove and replace stonework of the following description:

1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
2. Defective joints.
3. Stone flooring and joints not matching approved Samples and mockups.

4. Stonework not complying with other requirements indicated.

B. Replace in a manner that results in stonework matching approved Samples and mockups, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean stonework as work progresses before tooling joints.

D. Clean stonework after setting and grouting are complete. Use procedures recommended by stone fabricator for application types.

E. Apply sealer to cleaned stonework according to sealer manufacturer's written instructions.

3.10 PROTECTION

A. Prohibit traffic from installed stone for a minimum of 72 hours.

B. Protect installed stonework during construction with nonstaining kraft paper. Where adjoining areas require construction work access, cover stonework with a minimum of 3/4-inch (20-mm) untreated plywood over nonstaining kraft paper.

END OF SECTION 096340

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on interior substrates.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.3 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. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.4 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

F. Previously Painted Surfaces: Clean surface of all foreign material. Abrade existing painted surfaces. Apply test area, allowing paint to dry one week before testing adhesion. If adhesion is poor, provide additional abrasion or remove previous coating down to substrate. Retest surface for adhesion, and perform additional surface preparation until adhesion testing is successful.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in occupied spaces:

a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
h. Other items as directed by Architect.

2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Gypsum Board Ceiling – Latex Flat Finish

1. Primer: 1 coat SW ProMar 200 Zero VOC Interior Latex Primer
2. Finish: 2 coats SW ProMar 200 Zero VOC Interior Latex Flat

B. Gypsum Board Ceiling – Latex Semi-Gloss Finish

1. Primer: 1 coat SW ProMar 200 Zero VOC Interior Latex Primer
2. Finish: 2 coats SW ProMar 200 Zero VOC Interior Latex Semi-Gloss

C. Gypsum Board Ceiling – Latex Eggshell Finish

1. Primer: 1 coat SW ProMar 200 Zero VOC Interior Latex Primer
2. Finish: 2 coats SW ProMar 200 Zero VOC Interior Latex Eg-Shel

D. Gypsum Board Walls – Latex Eggshell Finish

1. Primer: 1 coat SW ProMar 200 Zero VOC Interior Latex Primer
2. Finish: 2 coats SW ProMar 200 Zero VOC Interior Latex Eg-Shel

E. Gypsum Board Walls - Latex Semi-Gloss Finish

1. Primer: 1 coat SW ProMar 200 Zero VOC Interior Latex Primer
2. Finish: 2 coats SW ProMar 200 Zero VOC Interior Latex Semi-Gloss

F. Ferrous Metal – Semi-Gloss Acrylic

1. Primer: 1 coat SW Pro Industrial Pro-Cryl Universal Primer
2. Finish: 2 coats SW Pro Industrial Semi-Gloss Acrylic

END OF SECTION 099123

SECTION 099600 - HIGH-PERFORMANCE COATINGS

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 surface preparation and the application of high-performance coating systems:

1. Semi-conditioned Interior Substrates:

a. Steel

B. Related Requirements:

1. Section 051200 "Structural Steel Framing" for shop priming of structural steel with primers specified in this Section.
2. Section 078123 “Intumescent Fireproof”

1.3 DEFINITIONS

A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.

B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.

C. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Sustainable Design Submittals:

C. Samples for Initial Selection: For each type of topcoat product indicated.

D. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inch square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

E. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 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. Coatings: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each coating system.

a. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F

B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, listed in the Exterior High-Performance Coating Schedule or Interior High-Performance Coating Schedule for the coating category indicated.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
3. Products shall be of same manufacturer for each coat in a coating system.

C. Colors: To match MCM, Dark Bronze

2.3 SOURCE QUALITY CONTROL

A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces

coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for coating and substrate indicated.
2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.

1. Contractor shall touch up and restore coated surfaces damaged by testing.
2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Steel Substrates:

1. Epoxy System [MPI EXT 5.1F]:

a. Prime Coat: Primer, epoxy, anti-corrosive, for metal[, MPI #101].
b. Intermediate Coat: Epoxy, high build, low gloss[, MPI #108].
c. Topcoat: Epoxy, gloss[, MPI #77].

2. Epoxy over Self-Priming Epoxy System [MPI EXT 5.1S]:

a. Prime Coat: Epoxy, high build, self-priming [, MPI #120].
b. Intermediate Coat: Epoxy, matching topcoat.
c. Topcoat: Epoxy, gloss[, MPI #77].

END OF SECTION 099600

SECTION 123661.16 - SOLID SURFACING COUNTERTOPS

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. Solid surface material countertops.
2. Solid surface material apron fronts.

B. Related Requirements:

1. Section 06 41 16 Plastic Laminate-Face Cabinets

1.3 ACTION SUBMITTALS

A. Product Data: For countertop materials

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

1. Show locations and details of joints.
2. Show direction of directional pattern, if any.

C. Samples for Initial Selection: For each type of material exposed to view.

D. Samples for Verification: For the following products:

1. Countertop material, 6 inches square.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of countertops.

C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.

1. Build mockup of typical countertop as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements before countertop fabrication is complete.

1.8 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

B. Provide (1) Mockett PCS90 power device and (1) turnstile controller at each countertop.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.

1. Manufacturers: Corian, or similar
2. Basis-of-Design Product: SSM-01, as identified on Finish Schedule A.801.00
3. Type: Provide Standard type unless Special Purpose type is indicated.
4. Integral Sink Bowls: Comply with CSA B45.5/IAPMO Z124.
5. Thickness: 1/2 inch.
6. Colors and Patterns: Carrara Lino

2.2 COUNTERTOP FABRICATION

A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Premium

B. Configuration:

1. Front Apron: ½” thick with straight edges.
2. Countertop: ½” thick with straight edges and built up edges at 1 ½ inches as shown on A.700.00

a. Ease all corners
b. Joints: Fabricate countertop and aprons without joints, except at edges

C. Cutouts and Holes:

1. Countertop mounted Electrical Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.

a. Cordinate Mockett PCS90 power device

2.3 INSTALLATION MATERIALS

A. Adhesive: Product recommended by solid surface material manufacturer.

B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.

D. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.

1. Install metal splines in kerfs in countertop edges at joints. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.

G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.

H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

1. Seal edges of cutouts in particleboard subtops by saturating with varnish.

I. Apply sealant to gaps at floor, comply with Section 079200 "Joint Sealants."

END OF SECTION 123661.16

SECTION 124816 - ENTRANCE FLOOR GRILLES

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. Recessed floor grilles and frames.

1.3 COORDINATION

A. Coordinate size and location of recesses in concrete to receive floor grilles and frames.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for entrance floor grilles and frames.

B. Shop Drawings:

1. Items penetrating floor grilles and frames, including door control devices.
2. Divisions between grille sections.
3. Perimeter floor moldings.

C. Samples: For the following products, in manufacturer's standard sizes:

1. Floor Grille: Assembled section of floor grille.
2. Frame Members: Sample of each type and color.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For floor grilles and frames to include in maintenance manuals.

1.6 FIELD CONDITIONS

A. Field Measurements: Indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Matter Surface, or similar

2.2 ENTRANCE FLOOR GRILLES, GENERAL

A. Structural Performance: Provide floor grilles and frames capable of withstanding the following loads and stresses within limits and under conditions indicated:

1. Uniform floor load of 300 lbf/sq. ft.
2. Wheel load of 350 lb per wheel.

B. Accessibility Standard: Comply with applicable provisions in the DOJ's "2010 ADA Standards for Accessible Design

2.3 FLOOR GRILLES

A. Basis-of-Design, MT-02, Design Track by Matter Surface

B. General: Provide manufacturer's standard floor-grille assemblies consisting of treads of type and profile indicated, interlocked or joined together by cross members, and with support legs (if any) and other components needed to produce a complete installation.

C. Aluminum Floor Grilles: Provide manufacturer's standard floor grilles with extruded members, top-surfaced tread rails, and as follows:

1. Tread Rails: Extruded- aluminum tread rails.

   a. Aluminum Color: Mill Finish

2. Depth

   a. Grille Only 1 inch
   b. Grille and Frame 1 1/8 inches
   c. Grille and Frame with Drain Pane 2 – 1/8 inches

3. Tread Rail Spacing: Custom Pattern
4. Top Surface: Heavy Gauge 6061-T6 aluminum

   a. Top Surface Color: Mill Finish

5. Grille Size: Custom Pattern

2.4 FRAMES

A. Provide manufacturer's standard frames of size and style for grille type, for permanent recessed installation in subfloor, complete with installation anchorages and accessories. Unless otherwise indicated, fabricate frame of same material and finish as grilles.

2.5 SUPPORT SYSTEM

A. Level Bed Applications: Provide manufacturer's standard, vinyl cushion support system.

B. Drainage Pit Applications: Provide manufacturer's special deep-pit frame and support extrusion system with intermediate support beams, sized and spaced as recommended by manufacturer for indicated spans and equipped with vinyl support cushions.

2.6 DRAIN PANS

A. Provide manufacturer's standard[, 0.060-inch- thick aluminum sheet drain pan with NPS 20 drain outlet for each floor-grille unit. Coat bottom of pan with protective coating recommended by manufacturer.

2.7 MATERIALS

A. Extruded Aluminum: ASTM B221, Alloy 6061-T6 as standard with manufacturer.

2.8 FABRICATION

A. Shop fabricate floor grilles to greatest extent possible in sizes as indicated. Unless otherwise indicated, provide each grille as a single unit; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in grilles are necessary, space symmetrically and away from normal traffic lanes.

B. Fabricate frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.

C. Coat surface of aluminum in contact with cementitious materials with manufacturer's standard protective coating.

2.9 ALUMINUM FINISHES

A. Mill finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and floor conditions for compliance with requirements for location, size, minimum recess depth, and other conditions affecting installation of floor grilles and frames.

B. Examine roughing-in for drainage piping systems to verify actual locations of piping connections before floor grille and frame and drain pan installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install recessed floor grilles and frames and drain pans to comply with manufacturer's written instructions at locations indicated and with top of floor grilles and frames in relationship to one another and to adjoining finished flooring as recommended by manufacturer. Set floor-grille tops at height for most effective cleaning action.

B. Coordinate top of floor-grille surfaces with doors that swing across grilles to provide clearance under door

3.3 PROTECTION

A. After completing frame installations, provide temporary filler of plywood or fiberboard in floor-grille recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 124816

SECTION 22 14 13 - FACILITY STORM DRAINAGE PIPING

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. This Section includes the following storm drainage piping inside the building:

1. Pipe, tube, and fittings.
2. Special pipe fittings.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working-pressure, unless otherwise indicated:

1. Storm Drainage Piping: 10-foot head of water.

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall be capable of withstanding the effects of seismic events determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures."

1.4 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Field quality-control inspection and test reports.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 HUBLESS CAST IRON

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Heavy-Duty, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ANACO-Husky.
b. Clamp-All Corp.
c. MIFAB, Inc.
d. Tyler Pipe.

2. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
3. Certifications and Standards

a. ASTM C 1540.
b. FM 1680 Class 1
c. CSA B 602
d. IAPMO File 6726.

2.4 PVC PIPE AND FITTINGS

A. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.

B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

C. Adhesive Primer: ASTM F 656.

1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Solvent Cement: ASTM D 2564.

1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION

3.1 EXCAVATION

A. Refer to Division 31 Section "Site Clearing" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.

B. Aboveground storm drainage piping NPS 6 and smaller shall be any of the following

1. Hubless cast-iron soil pipe and fittings; standard, shielded heavy duty stainless-steel couplings; and coupled joints.

C. Underground storm drainage piping NPS 6 and smaller shall be any of the following

1. Hubless cast-iron soil pipe and fittings; standard, shielded heavy duty stainless-steel couplings; and coupled joints.
2. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

3.3 PIPING INSTALLATION

A. Storm sewer and drainage piping outside the building are specified in Division 33.

B. Basic piping installation requirements are specified in Division 22.

C. Install seismic restraints on piping. Seismic-restraint devices are specified in Division 22.

D. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers. Cleanouts are specified in Division 22 Section "Storm Drainage Piping Specialties."

E. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping.

F. Install underground, ductile-iron, special pipe fittings according to AWWA C600.

1. Install encasement on piping according to ASTM A 674 or AWWA C105.

G. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

H. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

I. Install storm drainage piping at the following minimum slopes, unless otherwise indicated:

1. Building Storm Drain: 1 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
2. Horizontal Storm-Drainage Piping: 2 percent downward in direction of flow.

J. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.

K. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

L. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22.

M. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22.

N. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22.

3.4 JOINT CONSTRUCTION

A. Basic piping joint construction requirements are specified in Division 22.

B. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

3.5 HANGER AND SUPPORT INSTALLATION

A. Seismic-restraint devices are specified in Division 22.

B. Pipe hangers and supports are specified in Division 22. Install the following:

1. Vertical Piping: MSS Type 8 or Type 42, clamps.
2. Individual, Straight, Horizontal Piping Runs: According to the following:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Install supports according to Division 22.

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. NPS 6: 60 inches with 3/4-inch rod.
5. NPS 8 to NPS 12: 60 inches with 7/8-inch rod.
6. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

I. Install hangers for ABS piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 48 inches (1200 mm) with 3/8-inch (10-mm) rod.
2. NPS 3 (DN 80): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1200 mm) with 5/8-inch (16-mm) rod.
4. NPS 6 and NPS 8 (DN 150 and DN 200): 48 inches (1200 mm) with 3/4-inch (19-mm) rod.

J. Install supports for vertical PVC piping every 48 inches (1200 mm).

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.

C. Connect storm drainage piping to roof drains and storm drainage specialties.

3.7 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Test Procedure: Test storm drainage piping on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

3.8 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.9 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground storm drainage piping: Per plans.

C. Underground storm drainage piping: Per plans.

3.10 DISSIMILAR PIPE-MATERIAL COUPLINGS: SHIELDED, NONPRESSURE TRANSITION COUPLINGS.

PART 4 - END OF SECTION 22 14 13

SECTION 221423 - STORM DRAINAGE PIPING SPECIALTIES

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. Roof drains.
2. Downspout Nozzles
3. Miscellaneous storm drainage piping specialties.
4. Cleanouts.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Wall Cleanouts:

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. Josam Company.
   b. Smith, Jay R. Mfg. Co.
   c. Watts Water Technologies, Inc.
   d. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M, for cleanouts. Include wall access.

3. Size: Same as connected drainage piping.
4. Body Material: Hub-and-spigot, cast-iron soil-pipe T-branch as required to match connected piping.
5. Closure: Countersunk plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Wall Access: Round, deep, chrome-plated bronze cover plate with screw.
8. Wall Access: Round or stainless-steel wall-installation frame and cover.

2.2 ROOF DRAINS

A. Cast-Iron, Medium-Sump, General-Purpose Combination Roof Drain/Overflow:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Josam Company.
   b. MIFAB, Inc.
   c. Portals Plus; Commercial Products Group of Hart & Cooley, Inc.
   d. Smith, Jay R. Mfg. Co.
   e. Watts Water Technologies, Inc.
   f. Zurn Plumbing Products Group

2. Description: One-piece double drain receiver containing one roof drain and one overflow roof drain in one assembly.
3. Standard: ASME A112.6.4, for general-purpose roof drains.
4. Body Material: Cast iron
5. Dimension of Body: 15” diameter.
6. Dimension of Receiver: 48x24 inches
7. Provide on-puncturing clamp ring with integral gravel stop, non-puncturing clamp ring with internal waterguard, double drain receiver, and polypropylene locking domes
8. Flow-Control Weirs: Not required
9. Outlet: Bottom
10. Underdeck Clamp: Required
11. Dome Material: Cast iron
12. Water Dam: 3” High

2.3 OVERFLOW DOWNSPOUT NOZZLES

A. Cast-Iron, Medium-Sump, General-Purpose Combination Roof Drain/Overflow:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Josam Company.
   b. MIFAB, Inc.
   c. Portals Plus; Commercial Products Group of Hart & Cooley, Inc.
   d. Smith, Jay R. Mfg. Co.
   e. Watts Water Technologies, Inc.

f. Zurn Plumbing Products Group

2. Description: Nozzle discharges rainwater from overflow storm water piping to ground
3. Material: Cast bronze nozzle and flange.
4. Bird screen.
5. No-hub outlet
6. NPT Thread

2.4 DOWNSPOUT CONNECTOR

1. Description: Manufactured, cast-iron, with strap or ears for attaching to building; NPS 4 outlet.
2. Size: Inlet size to match downspout and NPS 4 outlet.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cleanouts in aboveground piping and building drain piping according to the following instructions unless otherwise indicated:

1. Use cleanouts the same size as drainage piping up to NPS 4.
2. Locate cleanouts at each change in direction of piping greater than 45 degrees.
3. Locate cleanouts at minimum intervals of 75 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate cleanouts at base of each vertical soil and waste stack.

B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

3.3 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221423

SECTION 230517 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves without waterstop.
2. **Silicone sealants.**

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 SLEEVES WITHOUT WATERSTOP

A. Cast-Iron Pipe Sleeves: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends.

B. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, hot-dip galvanized, with plain ends.

C. Steel Sheet Sleeves: ASTM A653/A653M, 0.0239-inch (0.6-mm) minimum thickness; hot-dip galvanized, round tube closed with welded longitudinal joint.

D. PVC Pipe Sleeves: ASTM D1785, Schedule 40.

E. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

G. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

H. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

I. Design Mix: **~~5000 psi (34.5 MPa)~~**, 28-day compressive strength.

J. Packaging: Premixed and factory packaged.

2.2 SILICONE SEALANTS

A. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. GE Construction Sealants; Momentive Performance Materials Inc.
   b. Permathane; ITW Polymer Sealants North America.
   c. Sika Corporation.
   d. The Dow Chemical Company.
   e. Tremco Incorporated.

2. Standard: ASTM C920, Type S, Grade NS, Class 25, Use NT.
3. Verify sealant has a VOC content of 250 g/L or less.
4. Verify sealant complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions do not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

B. Silicone, S, P, T, NT: Single-component, 100/50, pourable, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Sika Corporation.
   b. The Dow Chemical Company.
   c. Tremco Incorporated.

2. Standard: ASTM C920, Type S, Grade P, Class 100/50, Uses T and NT.
3. Verify sealant has a VOC content of 250 g/L or less.
4. Verify sealant complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions do not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

PART 3 - EXECUTION

3.1 INSTALLATION OF SLEEVES - GENERAL

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use sealants appropriate for size, depth, and location of joint.

C. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke-Barrier Penetrations: Maintain indicated fire or smoke rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping and fill materials specified in Section 078413 "Penetration Firestopping."

D. 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.

E. Secure nailing flanges to concrete forms.

F. Using grout or silicone sealant, seal space around outside of sleeves.

G. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal-system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Leak Test: After allowing for a full cure, test sleeves and sleeve seals for leaks. Repair leaks and retest until no leaks exist.
2. Sleeves and sleeve seals will be considered defective if they do not pass tests and inspections.

B. Prepare test and inspection reports.

3.3 SLEEVE SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Interior Walls and Partitions:

    a. Sleeves without waterstops.

END OF SECTION 230517

SECTION 230518 - ESCUTCHEONS FOR HVAC PIPING

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. Escutcheons.

1.3 DEFINITIONS

A. Existing Piping to Remain: Existing piping that is not to be removed and that is not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Stainless-Steel Type: With polished stainless-steel finish.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped steel with polished, chrome-plated finish and spring-clip fasteners.

C. Split-Plate, Stamped-Steel Type: With polished, chrome-plated finish; concealed hinge; and spring-clip fasteners.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. Escutcheons for New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep pattern.
b. Insulated Piping: One-piece stainless steel with polished stainless-steel finish.
c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece stainless steel with polished stainless-steel finish.
d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece stainless steel with polished stainless-steel finish.

C. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. Existing Piping to Remain: Split floor plate.

3.2 FIELD QUALITY CONTROL

A. Using new materials, replace broken and damaged escutcheons and floor plates.

END OF SECTION 230518

SECTION 230523.12 - BALL VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Bronze ball valves.

1.2 DEFINITIONS

A. CWP: Cold working pressure.

B. RPTFE: Reinforced polytetrafluoroethylene.

C. SWP: Steam working pressure.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of valve.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, and weld ends.
3. Set ball valves open to minimize exposure of functional surfaces.

B. 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.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of valve from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. ASME Compliance:

1. ASME B1.20.1 for threads for threaded-end valves.
2. ASME B16.5 for flanges on steel valves.
3. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
4. ASME B16.18 for cast copper solder-joint connections.
5. ASME B16.22 for wrought copper and copper alloy solder-joint connections.
6. ASME B16.34 for flanged and threaded end connections.
7. ASME B31.1 for power piping valves.

B. Provide bronze valves made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.

C. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

D. Valve Sizes: Same as upstream piping unless otherwise indicated.

E. Valve Actuator Types:

1. Hand Lever: For quarter-turn valves smaller than NPS 4 (DN 100).

F. Valves in Insulated Piping:

1. Provide 2-inch (50-mm) extended neck stems.
2. Extended operating handles with nonthermal-conductive covering material, and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
3. Memory stops that are fully adjustable after insulation is applied.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.3 BRONZE BALL VALVES

A. Bronze Ball Valves, Two Piece with Full Port and Stainless Steel Trim, Threaded or Soldered Ends:

1. <u>Manufacturers: Subject to compliance with requirements, provide products by one of the following:</u>

a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
b. Crane Fluid Systems; Crane Co.
c. Hammond Valve.
d. Jenkins Valves; a Crane Co. brand.
e. Milwaukee Valve Company.
f. NIBCO INC.
g. WATTS; A Watts Water Technologies Company.

2. Standard: MSS SP-110.
3. SWP Rating: 150 psig (1035 kPa).
4. CWP Rating: 600 psig (4140 kPa).
5. Body Design: Two piece.
6. Body Material: Bronze.
7. Ends: Threaded or soldered.
8. Seats: PTFE.
9. Stem: Stainless steel.
10. Ball: Stainless steel, vented.
11. Port: Full.
12. Standard: MSS SP-72.
13. CWP Rating: ~~**285 psig (1964 kPa)**~~.
14. Body Design: Split body.
15. Body Material: Carbon steel, ASTM A216/A216M, Type WCB.
16. Ends: Flanged or threaded.
17. Seats: M-filled PTFE.
18. Stem: Stainless steel.
19. Ball: Stainless steel, vented.
20. Port: Full.

PART 3 - EXECUTION

3.1 EXAMINATION

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 its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves. Remove defective valves from site.

3.2 INSTALLATION OF VALVES

A. Install valves with unions or flanges at each piece of equipment arranged to allow space for service, maintenance, and equipment removal without system shutdown.

B. Provide support of piping adjacent to valves such that no force is imposed upon valves.

C. Locate valves for easy access.

D. Install valves in horizontal piping with stem at or above center of pipe.

E. Install valves in position to allow full valve actuation movement.

F. Valve Tags: Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for valve tags and schedules.

G. Adhere to manufacturer's written installation instructions. When soldering or brazing valves, do not heat valves above maximum permitted temperature. Do not use solder with melting point temperature above valve manufacturer's recommended maximum.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service, but before final adjusting and balancing. Replace valves exhibiting leakage.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified SWP classes or CWP ratings are unavailable, provide the same types of valves with higher SWP classes or CWP ratings.

B. Select valves with the following end connections:

1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded ends except where solder-joint valve-end option or press-end option is indicated in valve schedules below.
2. For Steel Piping, NPS 2 (DN 50) and Smaller: Threaded ends.

3.5 HEATING-WATER VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller: bronze ball valves, two piece with stainless steel trim, full port, and threaded, solder or press-connection-joint ends.

END OF SECTION 230523.12

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

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. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Certificates: For indigenous materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project, means of transportation, and cost for each indigenous material.

C. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Fiberglass strut systems.
4. Pipe stands.
5. Equipment supports.

D. Delegated-Design Submittal: For trapeze hangers 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. Detail fabrication and assembly of trapeze hangers.
2. Include design calculations for designing trapeze hangers.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Structural-Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code, Section IX.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design trapeze pipe hangers and equipment supports.

B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

2.2 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized, hot-dip galvanized, or electro-galvanized.
3. Nonmetallic Coatings: Plastic coated, or epoxy powder-coated.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

B. Stainless Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe and Tube Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-plated steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ABB, Electrification Business.
   b. Cooper B-line; brand of Eaton, Electrical Sector.
   c. Unistrut; Atkore International.

2. Description: Shop- or field-fabricated, pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
3. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
4. Channels: Continuous slotted carbon-steel channel with inturned lips.
5. Channel Width: Selected for applicable load criteria.
6. Channel Nuts: Formed or stamped nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
7. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.
8. Metallic Coating: Gold (yellow zinc dichromate) galvanized.

2.5 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Buckaroos, Inc.
2. CADDY; brand of nVent Electrical plc.
3. National Pipe Hanger Corporation.
4. Pipe Shields Inc.

B. Insulation-Insert Material for Cold Piping: ASTM C552, Type II cellular glass with 100-psi (688-kPa) or ASTM C591, Type VI, Grade 1 polyisocyanurate with 125-psi (862-kPa) minimum compressive strength and vapor barrier.

C. Insulation-Insert Material for Hot Piping: Water-repellent-treated, ASTM C533, Type I calcium silicate with 100-psi (688-kPa), ASTM C552, Type II cellular glass with 100-psi (688-kPa) or

ASTM C591, Type VI, Grade 1 polyisocyanurate with 125-psi (862-kPa) minimum compressive strength.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type anchors for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Cooper B-line; brand of Eaton, Electrical Sector.
   b. Hilti, Inc.
   c. ITW Ramset/Red Head; Illinois Tool Works, Inc.

2. Indoor Applications: Zinc-coated or stainless steel.
3. Outdoor Applications: Stainless steel.

2.7 MATERIALS

A. Aluminum: ASTM B221 (ASTM B221M).

B. Carbon Steel: ASTM A1011/A1011M.

C. Structural Steel: ASTM A36/A36M, carbon-steel plates, shapes, and bars; galvanized.

D. Stainless Steel: ASTM A240/A240M.

E. Threaded Rods: Continuously threaded. Zinc-plated or galvanized steel for indoor applications and stainless steel for outdoor applications. Mating nuts and washers of similar materials as rods.

F. Grout: ASTM C1107/C1107M, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

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).

3.2 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A36/A36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled strut systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:

1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

G. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

H. Install lateral bracing with pipe hangers and supports to prevent swaying.

I. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65)

and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

J. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

K. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

L. Insulated Piping:

1. Attach clamps and spacers to piping.

   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

   a. Option: Thermal-hanger shield inserts may be used. ~~.~~

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

   a. Option: Thermal-hanger shield inserts may be used.

4. Shield Dimensions for Pipe: Not less than the following:

   a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.

5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm).

3.5 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 a minimum dry film thickness of 2.0 mils (0.05 mm).

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780/A780M.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-58 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports, metal trapeze pipe hangers and metal framing systems and attachments for general service applications.

F. Use copper-plated pipe hangers and copper or stainless steel attachments for copper piping and tubing.

G. Use padded hangers for piping that is subject to scratching.

H. Use thermal-hanger shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
2. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36 (DN 20 to DN 900), requiring clamp flexibility and up to 4 inches (100 mm) of insulation.
3. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 (DN 15 to DN 600) if little or no insulation is required.
4. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4 (DN 15 to DN 100), to allow off-center closure for hanger installation before pipe erection.
5. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8 (DN 20 to DN 200).
6. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
7. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
8. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8 (DN 15 to DN 200).
9. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8 (DN 10 to DN 200).
10. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3 (DN 10 to DN 80).
11. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30 (DN 15 to DN 750).
12. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
13. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30 (DN 25 to DN 750), from two rods if longitudinal movement caused by expansion and contraction might occur.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24 (DN 24 to DN 600).
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 (DN 20 to DN 600) if longer ends are required for riser clamps.

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.

4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F (49 to 232 deg C) piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb (340 kg).
    b. Medium (MSS Type 32): 1500 lb (680 kg).
    c. Heavy (MSS Type 33): 3000 lb (1360 kg).

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

N. Comply with MSS SP-58 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

O. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

P. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 230529

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Warning tape.
4. Stencils.
5. Valve tags.
6. Warning tags.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment-Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve-numbering scheme.

E. Valve Schedules: Provide for each piping system. Include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Brady Corporation.
   b. Craftmark Pipe Markers.
   c. Pipemarker.com; Brimar Industries, Inc.
   d. Seton Identification Products; a Brady Corporation company.

2.

3. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch (3.2 mm) thick, with predrilled holes for attachment hardware.
4. Letter and Background Color: As indicated for specific application under Part 3.
5. Maximum Temperature: Able to withstand temperatures of up to 160 deg F (71 deg C).
6. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
7. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances of up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
8. Fasteners: Stainless steel rivets or self-tapping screws.
9. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

2.2 WARNING SIGNS AND LABELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Craftmark Pipe Markers.
3. Pipemarker.com; Brimar Industries, Inc.
4. Seton Identification Products; a Brady Corporation company.

B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch (3.2 mm) thick, with predrilled holes for attachment hardware.

C. Letter and Background Color: As indicated for specific application under Part 3.

D. Maximum Temperature: Able to withstand temperatures of up to 160 deg F (71 deg C).

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).

F. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances of up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless steel rivets or self-taping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Arc-Flash Warning Signs: Provide arc-flash warning signs in locations and with content in accordance with requirements of OSHA and NFPA70E and other applicable codes and standards.

J. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 WARNING TAPE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Craftmark Pipe Markers.
3. Pipemarker.com; Brimar Industries, Inc.
4. Seton Identification Products; a Brady Corporation company.

B. Material: Vinyl.

C. Minimum Thickness: 0.005 inch (0.12 mm).

D. Letter, Pattern, and Background Color: As indicated for specific application under Part 3.

E. Waterproof Adhesive Backing: Suitable for indoor or outdoor use.

F. Maximum Temperature: 160 deg F (70 deg C).

G. Minimum Width: 2 inches (50 mm).

2.4 STENCILS

A. Stencils for Piping:

1. Lettering Size: Size letters in accordance with ASME A13.1 for piping.
2. Stencil Material: Aluminum, brass, or fiberboard.
3. Stencil Paint: Exterior, gloss, acrylic enamel in colors complying with recommendations in ASME A13.1 unless otherwise indicated. Paint may be in pressurized spray-can form.
4. Identification Paint: Exterior, acrylic enamel. Paint may be in pressurized spray-can form.
5. Letter and Background Color: As indicated for specific application under Part 3.
6. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings. Also include:

   a. Pipe size.

B. Flow-Direction Arrows: Include flow-direction arrows on distribution piping. Arrows may be either integral with label or applied separately.

1. Lettering Size: Minimum letter height of ~~**1-1/4 inches (32 mm)**~~ for viewing distances of up to ~~**15 ft. (4-1/2 m)**~~ and proportionately larger lettering for greater viewing distances.
2. Stencil Material: Fiberboard or metal.
3. Stencil Paint: Exterior, gloss, acrylic enamel. Paint may be in pressurized spray-can form.
4. Identification Paint: Exterior, acrylic enamel. Paint may be in pressurized spray-can form.

5. Letter and Background Color: Color as indicated for specific application under Part 3.
6. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings. Also include the following:

    a. Flow-Direction Arrows: Include flow-direction arrows on distribution ducts.

C. Stencils for Access Panels and Door Labels, Equipment Labels, and Similar Operational Instructions:

1. Lettering Size: Minimum letter height of 1/2 inch (13 mm) for viewing distances of up to 72 inches (1830 mm) and proportionately larger lettering for greater viewing distances.
2. Stencil Material: Fiberboard or metal.
3. Stencil Paint: Exterior, gloss, acrylic enamel. Paint may be in pressurized spray-can form.
4. Identification Paint: Exterior, acrylic enamel. Paint may be in pressurized spray-can form.
5. Letter and Background Color: As indicated for specific application under Part 3.

2.5 VALVE TAGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Craftmark Pipe Markers.
3. Pipemarker.com; Brimar Industries, Inc.
4. Seton Identification Products; a Brady Corporation company.

B. Description: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers.

1. Tag Material: Brass, 0.04-inch (1.0-mm) minimum thickness, with predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass S-hook.

C. Letter and Background Color: As indicated for specific application under Part 3.

D. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Include valve-tag schedule in operation and maintenance data.

2.6 WARNING TAGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.

2. Craftmark Pipe Markers.
3. Pipemarker.com; Brimar Industries, Inc.
4. Seton Identification Products; a Brady Corporation company.

B. Description: Preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.

1. Size: Approximately 4 by 7 inches (100 by 178 mm).
2. Fasteners: Reinforced grommet and wire or string.
3. Nomenclature: Large-size primary caption, such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Letter and Background Color: As indicated for specific application under Part 3.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of incompatible primers, paints, and encapsulants, as well as dirt, oil, grease, release agents, and other substances that could impair bond of identification devices.

3.2 INSTALLATION, GENERAL REQUIREMENTS

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

D. Locate identifying devices so that they are readily visible from the point of normal approach.

3.3 INSTALLATION OF EQUIPMENT LABELS, WARNING SIGNS, AND LABELS

A. Permanently fasten labels on each item of mechanical equipment.

B. Sign and Label Colors:

1. White letters on an ANSI Z535.1 safety-blue background.

C. Locate equipment labels where accessible and visible.

D. Arc-Flash Warning Signs: Provide arc-flash warning signs on electrical disconnects and other equipment where arc-flash hazard exists, as indicated on Drawings, and in accordance with requirements of OSHA and NFPA 70E, and other applicable codes and standards.

E. Heat Tracing Warning Labels: Provide warning labels on the exterior of pipe insulation which contains electric heat tracing cables. Install labels on opposite sides of pipe at 10 foot intervals in accordance with the requirements of NFPA 70.

3.4 INSTALLATION OF WARNING TAPE

A. Warning Tape Color and Pattern: Yellow background with black diagonal stripes.

B. Install warning tape on pipes and ducts, with cross-designated walkways providing less than 6 ft. (2 m) of clearance.

C. Locate tape so as to be readily visible from the point of normal approach.

3.5 INSTALLATION OF PIPE LABELS

A. Stenciled Pipe Labels: Install stenciled pipe labels, complying with ASME A13.1, with painted, color-coded bands or rectangles on each piping system.

1. Identification Paint: Use for contrasting background.
2. Stencil Paint: Use for pipe marking.

B. Pipe-Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Within 3 ft. (1 m) of each valve and control device.
2. At access doors, manholes, and similar access points that permit view of concealed piping.
3. Within 3 ft. (1 m) of equipment items and other points of origination and termination.
4. Spaced at maximum intervals of 30 ft. (8 m) along each run. Reduce intervals to 10 ft. (3.0 m) in areas of congested piping, ductwork, and equipment.
5. Within 24 inches of floor or wall penetrations, on both sides of penetration.
6. Within 24 inches of any change of direction.

C. Flow-Direction Arrows: Use arrows to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

D. Pipe-Label Color Schedule:

1. ~~**Chilled Water Piping: White letters on an ANSI Z535.1 safety-green background.**~~
2. Heating Water Piping: White letters on an ANSI Z535.1 safety-green background.
3. Potable and Other Water: White letters on an ANSI Z535.1 safety-green background.
4. For exhaust-, outside-, relief-, return-, and mixed-air ducts: White letters on blue background.

E. Stenciled Access Panels and Door Labels, Equipment Labels, and Similar Operational Instructions:

3.6 INSTALLATION OF VALVE TAGS

A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule in the operating and maintenance manual.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in "Valve-Tag Size and Shape" Subparagraph below.

1. Valve-Tag Size and Shape:

   a. **Heat Recovery Water: 1-1/2 inches (38 mm), round.**
   b. Hot Water: 1-1/2 inches (38 mm), round.

2. Valve-Tag Colors:

   a. Black text and natural brass background.

3.7 INSTALLATION OF WARNING TAGS

A. Warning Tag Color: Black letters on an ANSI Z535.1 safety-yellow background.

B. Attach warning tags, with proper message, to equipment and other items where indicated on Drawings.

END OF SECTION 230553

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

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. Balancing Air Systems:

   a. Variable-air-volume systems.

2. Balancing Hydronic Piping Systems:

   a. Variable-flow hydronic systems.

3. Testing, Adjusting, and Balancing Equipment:

   a. Motors.
   b. Heat-transfer coils.

4. Sound tests.
5. Vibration tests.
6. Duct leakage tests.
7. Control system verification.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. BAS: Building automation systems.

C. NEBB: National Environmental Balancing Bureau.

D. TAB: Testing, adjusting, and balancing.

E. TABB: Testing, Adjusting, and Balancing Bureau.

F. TAB Specialist: An independent entity meeting qualifications to perform TAB work.

G. TDH: Total dynamic head.

1.4 PREINSTALLATION MEETINGS

A. TAB Conference: If requested by the Owner, conduct a TAB conference at Project site after approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Provide a minimum of 14 days' advance notice of scheduled meeting time and location.

1. Minimum Agenda Items:

a. The Contract Documents examination report.
b. The TAB plan.
c. Needs for coordination and cooperation of trades and subcontractors.
d. Proposed procedures for documentation and communication flow.

1.5 ACTION SUBMITTALS

A. Sustainable Design Submittals:

1. TAB Report: Documentation indicating that Work complies with ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB specialist and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.

C. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

D. System Readiness Checklists: Within 30 days of Contractor's Notice to Proceed, submit system readiness checklists as specified in "Preparation" Article.

E. Examination Report: Submit a summary report of the examination review required in "Examination" Article.

F. Certified TAB reports.

G. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.7 QUALITY ASSURANCE

A. TAB Specialists Qualifications: Certified by NEBB or TABB.

1. TAB Field Supervisor: Employee of the TAB specialist and certified by NEBB or TABB.
2. TAB Technician: Employee of the TAB specialist and certified by NEBB or TABB as a TAB technician.

B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."

C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."

1.8 FIELD CONDITIONS

A. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 TAB SPECIALISTS

3.2 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan and pump curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.

J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

K. Examine strainers. Verify that startup screens have been replaced by permanent screens with indicated perforations.

L. Examine control valves for proper installation for their intended function of throttling, diverting, or mixing fluid flows.

M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

N. Examine operating safety interlocks and controls on HVAC equipment.

O. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.3 PREPARATION

A. Prepare a TAB plan that includes the following:

1. Equipment and systems to be tested.
2. Strategies and step-by-step procedures for balancing the systems.
3. Instrumentation to be used.
4. Sample forms with specific identification for all equipment.

B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Airside:

a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
b. Duct systems are complete with terminals installed.
c. Volume, smoke, and fire dampers are open and functional.
d. Clean filters are installed.
e. Fans are operating, free of vibration, and rotating in correct direction.
f. Variable-frequency controllers' startup is complete and safeties are verified.
g. Automatic temperature-control systems are operational.
h. Ceilings are installed.
i. Windows and doors are installed.
j. Suitable access to balancing devices and equipment is provided.

2. Hydronics:

a. Verify leakage and pressure tests on water distribution systems have been satisfactorily completed.
b. Piping is complete with terminals installed.
c. Water treatment is complete.
d. Systems are flushed, filled, and air purged.
e. Strainers are pulled and cleaned.
f. Control valves are functioning per the sequence of operation.
g. Shutoff and balance valves have been verified to be 100 percent open.
h. Pumps are started and proper rotation is verified.
i. Pump gage connections are installed directly at pump inlet and outlet flanges or in discharge and suction pipe prior to valves or strainers.
j. Variable-frequency controllers' startup is complete and safeties are verified.
k. Suitable access to balancing devices and equipment is provided.

3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in ASHRAE 111or SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation,", and Section 230719 "HVAC Piping Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.5 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

G. Verify that motor starters are equipped with properly sized thermal protection.

H. Check dampers for proper position to achieve desired airflow path.

I. Check for airflow blockages.

J. Check condensate drains for proper connections and functioning.

K. Check for proper sealing of air-handling-unit components.

L. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

a. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
b. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
c. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.
d. Measure static pressure directly at the fan inlet or through the flexible connection.
e. Measure static pressure across each component that makes up the air-handling system.
f. Report artificial loading of filters at the time static pressures are measured.

2. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
3. Adjust submain and branch duct volume dampers for specified airflow.
4. Re-measure each submain and branch duct after all have been adjusted.
5. Measure inlets and outlets airflow.
6. Adjust each inlet and outlet for specified airflow.
7. Re-measure each inlet and outlet after they have been adjusted.

8. Re-measure and confirm that total airflow is within design.
9. Re-measure all final fan operating data, rpms, volts, amps, and static profile.
10. Mark all final settings.
11. Test system in economizer mode. Verify proper operation and adjust if necessary.
12. Measure and record all operating data.
13. Record final fan-performance data.

3.6 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Adjust the variable-air-volume systems as follows:

1. Verify that the system static pressure sensor is located two-thirds of the distance down the duct from the fan discharge.
2. Verify that the system is under static pressure control.
3. Select the terminal unit that is most critical to the supply-fan airflow. Measure inlet static pressure, and adjust system static pressure control set point so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
4. Calibrate and balance each terminal unit for maximum and minimum design airflow as follows:

    a. Adjust controls so that terminal is calling for maximum airflow. Some controllers require starting with minimum airflow. Verify calibration procedure for specific project.
    b. Measure airflow and adjust calibration factor as required for design maximum airflow. Record calibration factor.
    c. When maximum airflow is correct, balance the air outlets downstream from terminal units.
    d. Adjust controls so that terminal is calling for minimum airflow.
    e. Measure airflow and adjust calibration factor as required for design minimum airflow. Record calibration factor. If no minimum calibration is available, note any deviation from design airflow.
    f. When in full cooling or full heating, ensure that there is no mixing of hot-deck and cold-deck airstreams unless so designed.
    g. On constant volume terminals, in critical areas where room pressure is to be maintained, verify that the airflow remains constant over the full range of full cooling to full heating. Note any deviation from design airflow or room pressure.

5. After terminals have been calibrated and balanced, test and adjust system for total airflow. Adjust fans to deliver total design airflows within the maximum allowable fan speed listed by fan manufacturer.

    a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
    b. Set terminals for maximum airflow. If system design includes diversity, adjust terminals for maximum and minimum airflow so that connected total matches fan selection and simulates actual load in the building.

c. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
d. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
e. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.

6. Measure fan static pressures as follows:

a. Measure static pressure directly at the fan outlet or through the flexible connection.
b. Measure static pressure directly at the fan inlet or through the flexible connection.
c. Measure static pressure across each component that makes up the air-handling system.
d. Report any artificial loading of filters at the time static pressures are measured.

7. Set final return and outside airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

a. Balance the return-air ducts and inlets the same as described for constant-volume air systems.
b. Verify that terminal units are meeting design airflow under system maximum flow.

8. Re-measure the inlet static pressure at the most critical terminal unit and adjust the system static pressure set point to the most energy-efficient set point to maintain the optimum system static pressure. Record set point and give to controls contractor.
9. Verify final system conditions as follows:

a. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to match design if necessary.
b. Re-measure and confirm that total airflow is within design.
c. Re-measure final fan operating data, rpms, volts, amps, and static profile.
d. Mark final settings.
e. Test system in economizer mode. Verify proper operation and adjust if necessary. Measure and record all operating data.
f. Verify tracking between supply and return fans.

3.7 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Prepare test reports for pumps, coils, and heat exchangers. Obtain approved submittals and manufacturer-recommended testing procedures. Crosscheck the summation of required coil and heat exchanger flow rates with pump design flow rate.

B. Prepare schematic diagrams of systems' "as-built" piping layouts.

C. In addition to requirements in "Preparation" Article, prepare hydronic systems for testing and balancing as follows:

1. Check liquid level in expansion tank.
2. Check highest vent for adequate pressure.

3. Check flow-control valves for proper position.
4. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
5. Verify that motor starters are equipped with properly sized thermal protection.
6. Check that air has been purged from the system.

3.8 PROCEDURES FOR VARIABLE-FLOW HYDRONIC SYSTEMS

A. Balance systems with automatic two- and three-way control valves by setting systems at maximum flow through heat-exchange terminals, and proceed as specified above for hydronic systems.

B. Adjust the variable-flow hydronic system as follows:

1. Verify that the differential-pressure sensor is located as indicated.
2. Determine whether there is diversity in the system.

C. For systems with no diversity:

1. Adjust pumps to deliver total design gpm.

a. Measure total water flow.

1) Position valves for full flow through coils.
2) Measure flow by main flow meter, if installed.
3) If main flow meter is not installed, determine flow by pump TDH or exchanger pressure drop.

b. Measure pump TDH as follows:

1) Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
2) Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
3) Convert pressure to head and correct for differences in gage heights.
4) Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
5) With valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.

c. Monitor motor performance during procedures and do not operate motor in an overloaded condition.

2. Adjust flow-measuring devices installed in mains and branches to design water flows.

a. Measure flow in main and branch pipes.
b. Adjust main and branch balance valves for design flow.
c. Re-measure each main and branch after all have been adjusted.

3. Adjust flow-measuring devices installed at terminals for each space to design water flows.

    a. Measure flow at terminals.
    b. Adjust each terminal to design flow.
    c. Re-measure each terminal after it is adjusted.
    d. Position control valves to bypass the coil and adjust the bypass valve to maintain design flow.
    e. Perform temperature tests after flows have been balanced.

4. For systems with pressure-independent valves at terminals:

    a. Measure differential pressure and verify that it is within manufacturer's specified range.
    b. Perform temperature tests after flows have been verified.

5. For systems without pressure-independent valves or flow-measuring devices at terminals:

    a. Measure and balance coils by either coil pressure drop or temperature method.
    b. If balanced by coil pressure drop, perform temperature tests after flows have been verified.

6. Prior to verifying final system conditions, determine the system differential-pressure set point.
7. If the pump discharge valve was used to set total system flow with variable-frequency controller at 60 Hz, at completion open discharge valve 100 percent and allow variable-frequency controller to control system differential-pressure set point. Record pump data under both conditions.
8. Mark final settings and verify that all memory stops have been set.
9. Verify final system conditions as follows:

    a. Re-measure and confirm that total water flow is within design.
    b. Re-measure final pumps' operating data, TDH, volts, amps, and static profile.
    c. Mark final settings.

10. Verify that memory stops have been set.

D. For systems with diversity:

1. Determine diversity factor.
2. Simulate system diversity by closing required number of control valves, as approved by the design engineer.
3. Adjust pumps to deliver total design gpm.

    a. Measure total water flow.

        1) Position valves for full flow through coils.
        2) Measure flow by main flow meter, if installed.
        3) If main flow meter is not installed, determine flow by pump TDH or exchanger pressure drop.

b. Measure pump TDH as follows:

1) Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
2) Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
3) Convert pressure to head and correct for differences in gage heights.
4) Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
5) With valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.

c. Monitor motor performance during procedures and do not operate motor in an overloaded condition.

4. Adjust flow-measuring devices installed in mains and branches to design water flows.

a. Measure flow in main and branch pipes.
b. Adjust main and branch balance valves for design flow.
c. Re-measure each main and branch after all have been adjusted.

5. Adjust flow-measuring devices installed at terminals for each space to design water flows.

a. Measure flow at terminals.
b. Adjust each terminal to design flow.
c. Re-measure each terminal after it is adjusted.
d. Position control valves to bypass the coil, and adjust the bypass valve to maintain design flow.
e. Perform temperature tests after flows have been balanced.

6. For systems with pressure-independent valves at terminals:

a. Measure differential pressure, and verify that it is within manufacturer's specified range.
b. Perform temperature tests after flows have been verified.

7. For systems without pressure-independent valves or flow-measuring devices at terminals:

a. Measure and balance coils by either coil pressure drop or temperature method.
b. If balanced by coil pressure drop, perform temperature tests after flows have been verified.

8. Open control valves that were shut. Close a sufficient number of control valves that were previously open to maintain diversity, and balance terminals that were just opened.
9. Prior to verifying final system conditions, determine system differential-pressure set point.
10. If the pump discharge valve was used to set total system flow with variable-frequency controller at 60 Hz, at completion open discharge valve 100 percent and allow variable-

frequency controller to control system differential-pressure set point. Record pump data under both conditions.

11. Mark final settings and verify that memory stops have been set.
12. Verify final system conditions as follows:

    a. Re-measure and confirm that total water flow is within design.
    b. Re-measure final pumps' operating data, TDH, volts, amps, and static profile.
    c. Mark final settings.

13. Verify that memory stops have been set.

3.9 PROCEDURES FOR MOTORS

A. Motors 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Phase and hertz.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter size and thermal-protection-element rating.
8. Service factor and frame size.

B. Motors Driven by Variable-Frequency Controllers: Test manual bypass of controller to prove proper operation.

3.10 PROCEDURES FOR HEAT-TRANSFER COILS

A. Measure, adjust, and record the following data for each water coil:

1. Entering- and leaving-water temperature.
2. Water flow rate.
3. Water pressure drop for major (more than 20 gpm) equipment coils, excluding unitary equipment such as reheat coils, unit heaters, and fan-coil units.
4. Dry-bulb temperature of entering and leaving air.
5. Wet-bulb temperature of entering and leaving air for cooling coils.
6. Airflow.

B. Measure, adjust, and record the following data for each electric heating coil:

1. Nameplate data.
2. Airflow.
3. Entering- and leaving-air temperature at full load.
4. Voltage and amperage input of each phase at full load.
5. Calculated kilowatt at full load.
6. Fuse or circuit-breaker rating for overload protection.

C. Measure, adjust, and record the following data for each steam coil:

1. Dry-bulb temperature of entering and leaving air.
2. Airflow.
3. Inlet steam pressure.

D. Measure, adjust, and record the following data for each refrigerant coil:

1. Dry-bulb temperature of entering and leaving air.
2. Wet-bulb temperature of entering and leaving air.
3. Airflow.

3.11 SOUND TESTS

A. After the systems are balanced and construction is Substantially Complete, measure and record sound levels at 10 locations as designated by the Architect.

B. Instrumentation:

1. The sound-testing meter shall be a portable, general-purpose testing meter consisting of a microphone, processing unit, and readout.
2. The sound-testing meter shall be capable of showing fluctuations at minimum and maximum levels, and measuring the equivalent continuous sound pressure level (LEQ).
3. The sound-testing meter must be capable of using 1/3 octave band filters to measure mid-frequencies from 31.5 Hz to 8000 Hz.
4. The accuracy of the sound-testing meter shall be plus or minus one decibel.

C. Test Procedures:

1. Perform test at quietest background noise period. Note cause of unpreventable sound that affects test outcome.
2. Equipment should be operating at design values.
3. Calibrate the sound-testing meter prior to taking measurements.
4. Use a microphone suitable for the type of noise levels measured that is compatible with meter. Provide a windshield for outside or in-duct measurements.
5. Record a set of background measurements in dBA and sound pressure levels in the eight un-weighted octave bands 63 Hz to 8000 Hz (NC) with the equipment off.
6. Take sound readings in dBA and sound pressure levels in the eight un-weighted octave bands 63 Hz to 8000 Hz (NC) with the equipment operating.
7. Take readings no closer than 36 inches from a wall or from the operating equipment and approximately 60 inches from the floor, with the meter held or mounted on a tripod.
8. For outdoor measurements, move sound-testing meter slowly and scan area that has the most exposure to noise source being tested. Use A-weighted scale for this type of reading.

D. Reporting:

1. Report shall record the following:

a. Location.
b. System tested.
c. dBA reading.
d. Sound pressure level in each octave band with equipment on and off.

2. Plot sound pressure levels on NC worksheet with equipment on and off.

3.12 VIBRATION TESTS

A. After systems are balanced and construction is Substantially Complete, measure and record vibration levels on equipment having motor horsepower equal to or greater than 10.

B. Instrumentation:

1. Use portable, battery-operated, and microprocessor-controlled vibration meter with or without a built-in printer.
2. The meter shall automatically identify engineering units, filter bandwidth, amplitude, and frequency scale values.
3. The meter shall be able to measure machine vibration displacement in mils of deflection, velocity in inches per second, and acceleration in inches per second squared.
4. Verify calibration date is current for vibration meter before taking readings.

C. Test Procedures:

1. To ensure accurate readings, verify that accelerometer has a clean, flat surface and is mounted properly.
2. With the unit running, set up vibration meter in a safe, secure location. Connect transducer to meter with proper cables. Hold magnetic tip of transducer on top of the bearing, and measure unit in mils of deflection. Record measurement, then move transducer to the side of the bearing and record in mils of deflection. Record an axial reading in mils of deflection by holding nonmagnetic, pointed transducer tip on end of shaft.
3. Change vibration meter to velocity (inches per second) measurements. Repeat and record above measurements.
4. Record CPM or rpm.
5. Read each bearing on motor, fan, and pump as required. Track and record vibration levels from rotating component through casing to base.

D. Reporting:

1. Report shall record location and the system tested.
2. Include horizontal-vertical-axial measurements for tests.
3. Verify that vibration limits follow Specifications, or, if not specified, follow the General Machinery Vibration Severity Chart or Vibration Acceleration General Severity Chart from the AABC National Standards. Acceptable levels of vibration are normally "smooth" to "good."
4. Include in report General Machinery Vibration Severity Chart, with conditions plotted.

3.13 DUCT LEAKAGE TESTS

A. Witness the duct pressure testing performed by Installer.

B. Verify that proper test methods are used and that leakage rates are within specified tolerances.

C. Report deficiencies observed.

3.14 CONTROLS VERIFICATION

A. In conjunction with system balancing, perform the following:

1. Verify temperature control system is operating within the design limitations.
2. Confirm that the sequences of operation are in compliance with Contract Documents.
3. Verify that controllers are calibrated and function as intended.
4. Verify that controller set points are as indicated.
5. Verify the operation of lockout or interlock systems.
6. Verify the operation of valve and damper actuators.
7. Verify that controlled devices are properly installed and connected to correct controller.
8. Verify that controlled devices travel freely and are in position indicated by controller: open, closed, or modulating.
9. Verify location and installation of sensors to ensure that they sense only intended temperature, humidity, or pressure.

B. Reporting: Include a summary of verifications performed, remaining deficiencies, and variations from indicated conditions.

3.15 TOLERANCES

A. Set HVAC system's airflow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.
3. Heating-Water Flow Rate: Plus or minus 10 percent.

B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.16 PROGRESS REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems balancing devices. Recommend changes and additions to systems balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

B. Status Reports: Prepare biweekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.17 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.
15. Test conditions for fans and pump performance forms including the following:

a. Settings for outdoor-, return-, and exhaust-air dampers.
b. Conditions of filters.
c. Cooling coil, wet- and dry-bulb conditions.
d. Face and bypass damper settings at coils.
e. Fan drive settings including settings and percentage of maximum pitch diameter.
f. Inlet vane settings for variable-air-volume systems.
g. Settings for supply-air, static-pressure controller.
h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

a. Location.
b. Make and type.
c. Model number and unit size.
d. Manufacturer's serial number.
e. Unit arrangement and class.
f. Discharge arrangement.
g. Sheave make, size in ~~**inches**~~, and bore.
h. Center-to-center dimensions of sheave and amount of adjustments in ~~**inches**~~.
i. Number, make, and size of belts.
j. Number, type, and size of filters.
k. Horsepower and rpm.
l. Volts, phase, and hertz.
m. Full-load amperage and service factor.
n. Sheave make, size in ~~**inches**~~, and bore.
o. Center-to-center dimensions of sheave and amount of adjustments in ~~**inches**~~.
p. Total system static pressure in ~~**inches wg**~~.
q. Fan rpm.
r. Discharge static pressure in ~~**inches wg**~~.
s. Filter static-pressure differential in ~~**inches wg**~~.
t. Preheat-coil static-pressure differential in ~~**inches wg**~~.
u. Cooling-coil static-pressure differential in ~~**inches wg**~~.
v. Heating-coil static-pressure differential in ~~**inches wg**~~.
w. Outdoor airflow in ~~**cfm**~~.
x. Return airflow in ~~**cfm**~~.
y. Outdoor-air damper position.
z. Return-air damper position.
aa. Vortex damper position.

E. Apparatus-Coil Test Reports:

1. Coil Data:

    a. System identification.
    b. Location.
    c. Coil type.
    d. Number of rows.
    e. Fin spacing in fins per inch o.c.
    f. Make and model number.
    g. Face area in sq. ft..
    h. Tube size in NPS.
    i. Tube and fin materials.
    j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):

    a. Airflow rate in cfm.
    b. Average face velocity in fpm.
    c. Air pressure drop in inches wg.
    d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
    e. Return-air, wet- and dry-bulb temperatures in deg F.
    f. Entering-air, wet- and dry-bulb temperatures in deg F.
    g. Leaving-air, wet- and dry-bulb temperatures in deg F.
    h. Water flow rate in gpm.
    i. Water pressure differential in feet of head or psig.
    j. Entering-water temperature in deg F.
    k. Leaving-water temperature in deg F.
    l. Refrigerant expansion valve and refrigerant types.
    m. Refrigerant suction pressure in psig.
    n. Refrigerant suction temperature in deg F.
    o. Inlet steam pressure in psig.
    p. Location.
    q. Make and type.
    r. Model number and unit size.
    s. Manufacturer's serial number.
    t. Fuel type in input data.
    u. Output capacity in ~~**Btu/h**~~.
    v. Ignition type.
    w. Burner-control types.
    x. Motor horsepower and rpm.
    y. Motor volts, phase, and hertz.
    z. Motor full-load amperage and service factor.
    aa. Sheave make, size in ~~**inches**~~, and bore.
    bb. Center-to-center dimensions of sheave and amount of adjustments in ~~**inches**~~.
    cc. Entering-air temperature in ~~**deg F**~~.
    dd. Leaving-air temperature in ~~**deg F**~~.
    ee. Air temperature differential in ~~**deg F**~~.
    ff. Entering-air static pressure in ~~**inches wg**~~.
    gg. Leaving-air static pressure in ~~**inches wg**~~.
    hh. Air static-pressure differential in ~~**inches wg**~~.
    ii. Low-fire fuel input in ~~**Btu/h**~~.

jj. High-fire fuel input in ~~**Btu/h**~~.
kk. Manifold pressure in ~~**psig**~~.
ll. High-temperature-limit setting in ~~**deg F**~~.
mm. Operating set point in ~~**Btu/h**~~.
nn. Motor voltage at each connection.
oo. Motor amperage for each phase.
pp. Heating value of fuel in ~~**Btu/h**~~.

F. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches, and bore.
h. Center-to-center dimensions of sheave and amount of adjustments in inches.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Suction static pressure in inches wg.

G. Round and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F.
d. Duct static pressure in inches wg.
e. Duct size in inches.
f. Duct area in sq. ft..

g. Indicated airflow rate in cfm.
h. Indicated velocity in fpm.
i. Actual airflow rate in cfm.
j. Actual average velocity in fpm.
k. Barometric pressure in psig.

H. Air-Terminal-Device Reports:

1. Unit Data:

a. System and air-handling unit identification.
b. Location and zone.
c. Apparatus used for test.
d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.
i. Effective area in sq. ft..

2. Test Data (Indicated and Actual Values):

a. Airflow rate in cfm.
b. Air velocity in fpm.
c. Preliminary airflow rate as needed in cfm.
d. Preliminary velocity as needed in fpm.
e. Final airflow rate in cfm.
f. Final velocity in fpm.
g. Space temperature in deg F.

I. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:

1. Unit Data:

a. System and air-handling-unit identification.
b. Location and zone.
c. Room or riser served.
d. Coil make and size.
e. Flowmeter type.

2. Test Data (Indicated and Actual Values):

a. Airflow rate in cfm.
b. Entering-water temperature in deg F.
c. Leaving-water temperature in deg F.
d. Water pressure drop in feet of head or psig.
e. Entering-air temperature in deg F.
f. Leaving-air temperature in deg F.
g. Location.
h. Service.

i. Make and size.
j. Model number and serial number.
k. Water flow rate in ~~**gpm**~~.
l. Water pressure differential in ~~**feet of head or psig**~~.
m. Required net positive suction head in ~~**feet of head or psig**~~.
n. Pump rpm.
o. Impeller diameter in ~~**inches**~~.
p. Motor make and frame size.
q. Motor horsepower and rpm.
r. Voltage at each connection.
s. Amperage for each phase.
t. Full-load amperage and service factor.
u. Seal type.
v. Pump shutoff pressure in ~~**feet of head or psig**~~.
w. Actual impeller size in ~~**inches**~~.
x. Full-open flow rate in ~~**gpm**~~.
y. Full-open pressure in ~~**feet of head or psig**~~.
z. Final discharge pressure in ~~**feet of head or psig**~~.
aa. Final suction pressure in ~~**feet of head or psig**~~.
bb. Final total pressure in ~~**feet of head or psig**~~.
cc. Final water flow rate in ~~**gpm**~~.
dd. Voltage at each connection.
ee. Amperage for each phase.

J. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.18 VERIFICATION OF TAB REPORT

A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Construction Manager or commissioning authority.

B. Construction Manager or Commissioning authority shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.

C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."

D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

E. If TAB work fails, proceed as follows:

1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB specialist to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB specialist's final payment.

F. Prepare test and inspection reports.

3.19 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 230593

SECTION 230713 - DUCT INSULATION

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 insulating the following duct services:

1. Indoor, concealed supply and outdoor air.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C553, Type II and ASTM C1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Johns Manville; a Berkshire Hathaway company.
    b. Knauf Insulation.
    c. Manson Insulation Inc.
    d. Owens Corning.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Childers Brand; H. B. Fuller Construction Products.
    b. Eagle Bridges - Marathon Industries.
    c. Foster Brand; H. B. Fuller Construction Products.
    d. Mon-Eco Industries, Inc.

2.3 MASTICS AND COATINGS

A. Materials shall be compatible with insulation materials, jackets, and substrates.

B. Vapor-Retarder Mastic: Water based; suitable for indoor use on below ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Childers Brand; H. B. Fuller Construction Products.
    b. Foster Brand; H. B. Fuller Construction Products.
    c. Knauf Insulation.
    d. Vimasco Corporation.

2. Water-Vapor Permeance: Comply with ASTM C755, Section 7.2.2, Table 2, for insulation type and service conditions.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Color: White.

2.4 SEALANTS

A. ASJ Flashing Sealants and PVC Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Childers Brand; H. B. Fuller Construction Products.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.

2.5 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C1136, Type I.

2.6 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Avery Dennison Corporation, Specialty Tapes Division.
    b. Compac Corporation.
    c. Ideal Tape Co., Inc., an American Biltrite Company.
    d. Knauf Insulation.
    e. Venture Tape.

2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

2.7 SECUREMENTS

A. Bands:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ITW Insulation Systems; Illinois Tool Works, Inc.

b. RPR Products, Inc.

2. Aluminum: ASTM B209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing seal or closed seal.
3. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch- diameter shank, length to suit depth of insulation indicated.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) AGM Industries, Inc.
2) Gemco.
3) Hardcast, Inc.
4) Midwest Fasteners, Inc.
5) Nelson Stud Welding.

2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick, stainless-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) AGM Industries, Inc.
2) Gemco.
3) Hardcast, Inc.
4) Midwest Fasteners, Inc.
5) Nelson Stud Welding.

b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.

2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Keep insulation materials dry during application and finishing.

G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

H. Install insulation with least number of joints practical.

I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

K. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.

2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

    a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.

L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 PENETRATIONS

A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.

1. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 INSTALLATION OF MINERAL-FIBER INSULATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install capacitor-discharge-weld pins and speed washers on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.

b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
d. Do not overcompress insulation during installation.
e. Impale insulation over pins and attach speed washers.
f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.

5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.7 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply and outdoor air.

B. Items Not Insulated:

1. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
2. Factory-insulated flexible ducts.
3. Factory-insulated plenums and casings.
4. Flexible connectors.
5. Vibration-control devices.
6. Factory-insulated access panels and doors.

3.8 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed, round and flat-oval, supply-air duct insulation shall be one of the following:

1. Mineral-Fiber Blanket: 1-1/2 inches thick and 3-lb/cu. ft. nominal density.

B. Concealed, rectangular, supply-air duct insulation shall be one of the following:

1. Mineral-Fiber Blanket: 1-1/2 inches thick and 3-lb/cu. ft. nominal density.

C. Concealed, supply-air plenum insulation shall be one of the following:

1. Mineral-Fiber Blanket: 1-1/2 inches thick and 3-lb/cu. ft. nominal density.

D. ~~**Exposed, round and flat-oval, supply-air duct insulation shall be the following:**~~

1. Mineral-Fiber Blanket: ~~**1-1/2 inches**~~ thick and ~~**3-lb/cu. ft.**~~ nominal density.

E. ~~**Exposed, rectangular, supply-air duct insulation shall be the following:**~~

1. Mineral-Fiber Blanket: ~~**1-1/2 inches**~~ thick and ~~**3-lb/cu. ft.**~~ nominal density.

F. Exposed, supply-air plenum insulation shall be the following:

1. Mineral-Fiber Blanket: ~~**1-1/2 inches**~~ thick and ~~**3-lb/cu. ft.**~~ nominal density.

END OF SECTION 230713

SECTION 230719 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulation for HVAC piping systems.

B. Related Requirements:

1. Section 230713 "Duct Insulation" for duct insulation.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied, if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

C. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use.

1. Preformed Pipe Insulation Materials: 12 inches (300 mm) long by NPS 2 (DN 50).
2. Sheet Form Insulation Materials: 12 inches (300 mm) square.
3. Jacket Materials for Pipe: 12 inches (300 mm) long by NPS 2 (DN 50).
4. Sheet Jacket Materials: 12 inches (300 mm) square.
5. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation

materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or craft training program, certified by the Department of Labor, Bureau of Apprenticeship and Training.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation system materials are to be delivered to the Project site in unopened containers. The packaging is to include name of manufacturer, fabricator, type, description, and size, as well as ASTM standard designation, and maximum use temperature.

1.6 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.7 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84 by a testing agency acceptable to authority having jurisdiction. Factory label insulation, jacket materials, adhesive, mastic, tapes, and cement material containers with appropriate markings of applicable testing agency.

B.

1. All Insulation Installed Indoors and Outdoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2.2 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials are applied.

B. Products do not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come into contact with stainless steel have a leachable chloride content of less than 50 ppm when tested in accordance with ASTM C871.

D. Insulation materials for use on austenitic stainless steel are qualified as acceptable in accordance with ASTM C795.

E. Foam insulation materials do not use CFC or HCFC blowing agents in the manufacturing process.

F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Comply with ASTM C552.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Owens Corning.

2. Preformed Pipe Insulation without Jacket: Type II, Class 1, unfaced.
3. Preformed Pipe Insulation with Jacket: Type II, Class 2, with factory-applied ASJ-SSL jacket.
4. Fabricated shapes in accordance with ASTM C450, ASTM C585, and ASTM C1639.
5. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

G. Flexible Elastomeric: Closed-cell, or expanded-rubber materials; suitable for maximum use temperature between minus 70 deg F (minus 57 deg C) and 220 deg F (104 deg C). Comply with ASTM C534/C534M, Type I, for tubular materials, Type II for sheet materials.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Aeroflex USA.
b. Armacell LLC.
c. K-Flex USA.

H. Glass-Fiber, Preformed Pipe: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 850 deg F (454 deg C) in accordance with ASTM C411. Comply with ASTM C547.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Johns Manville; a Berkshire Hathaway company.
   b. Knauf Insulation.
   c. Manson Insulation Inc.
   d. Owens Corning.

2. Preformed Pipe Insulation: Type I, Grade A with factory-applied ASJ-SSL.
3. Fabricated shapes in accordance with ASTM C450 and ASTM C585.
4. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

I. Mineral Wool, Preformed Pipe: Mandrel-wound mineral wool fibers bonded with a thermosetting resin, unfaced; suitable for maximum use temperature up to 1200 deg F (650 deg C) in accordance with ASTM C447. Comply with ASTM C547.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Johns Manville; a Berkshire Hathaway company.
   b. Owens Corning.
   c. ROCKWOOL.

2. Preformed Pipe Insulation: Type II, Grade A with factory-applied ASJ-SSL.
3. Fabricated shapes in accordance with ASTM C450 and ASTM C585.

2.3 ADHESIVES

A. Materials are compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F (minus73 to plus 93 deg C).

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. Foster Brand; H. B. Fuller.

2. Adhesive: As recommended by cellular glass manufacturer and with a VOC content of 80 g/L or less.
3. Verify adhesive complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions does not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

C. Flexible Elastomeric Adhesive: Solvent-based adhesive.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Aeroflex USA.
    b. Armacell LLC.
    c. K-Flex USA.

2. Adhesive: As recommended by flexible elastomeric and polyolefin manufacturer and with a VOC content of 80 g/L or less.
3. Verify adhesive complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions does not exceed 9 mcg/cu. m or 7 ppb, whichever is less.
4. Flame-spread index is 25 or less and smoke-developed index is 50 or less as tested in accordance with ASTM E84.
5. Wet Flash Point: Below 0 deg F (minus 18 deg C).
6. Service Temperature Range: 40 to 200 deg F (4 to plus 93 deg C).
7. Color: Black.

D. Glass-Fiber and Mineral Wool Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Childers Brand; H. B. Fuller Construction Products.
    b. Foster Brand; H. B. Fuller.
    c. Mon-Eco Industries, Inc.

2. Adhesive: As recommended by mineral fiber manufacturer and with a VOC content of 80 g/L or less.
3. Verify adhesive complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions does not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

E. ASJ Adhesive: Comply with MIL-A-3316C, Class 2, Grade A, for bonding insulation jacket lap seams and joints.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Childers Brand; H. B. Fuller Construction Products.
    b. Foster Brand; H. B. Fuller.
    c. Mon-Eco Industries, Inc.

2. Verify adhesives have a VOC content of 50 g/L or less.
3. Verify adhesive complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of

Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions does not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

F. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Johns Manville; a Berkshire Hathaway company.
   b. P.I.C. Plastics, Inc.
   c. Proto Corporation.
   d. Speedline Corporation.
   e. The Dow Chemical Company.

2. Adhesive: As recommended by Adhesive - PVC Jacket manufacturer and with a VOC content of 50 g/L or less.
3. Verify adhesive complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions does not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

2.4 MASTICS AND COATINGS

A. Materials are compatible with insulation materials, jackets, and substrates.

1. Mastics: As recommended by insulation manufacturer and with a VOC content of 50 g/L or less.
2. Verify mastics comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions do not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

B. Vapor-Retarder Mastic, Water Based: Suitable for indoor use on below-ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller.
   c. Knauf Insulation.
   d. Mon-Eco Industries, Inc.
   e. Vimasco Corporation.

2. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
3. Service Temperature Range: 0 to plus 180 deg F (Minus 18 to plus 82 deg C).
4. Comply with MIL-PRF-19565C, Type II, for permeance requirements.

5. Color: White.

C. Vapor-Retarder Mastic, Solvent Based, Indoor Use: Suitable for indoor use on below-ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Foster Brand; H. B. Fuller.
c. Mon-Eco Industries, Inc.

2. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249.
3. Service Temperature Range: 0 to 180 deg F (Minus 18 to plus 82 deg C).
4. Color: White.

D. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Foster Brand; H. B. Fuller.
c. Knauf Insulation.
d. Mon-Eco Industries, Inc.
e. Vimasco Corporation.

2. Water-Vapor Permeance: ASTM E96/E96M, greater than 1.0 perm (0.66 metric perm) at manufacturer's recommended dry film thickness.
3. Service Temperature Range: 0 to plus 180 deg F (Minus 18 to plus 82 deg C).
4. Color: White.

2.5 LAGGING ADHESIVES

A. Adhesives comply with MIL-A-3316C, Class I, Grade A, and are compatible with insulation materials, jackets, and substrates.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Childers Brand; H. B. Fuller Construction Products.
b. Foster Brand; H. B. Fuller.
c. Vimasco Corporation.

2. Verify adhesive is as recommended by insulation manufacturer and has a VOC content of 50 g/L or less.
3. Verify adhesive complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental

Chambers." Verify formaldehyde emissions does not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

4. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
5. Service Temperature Range: 0 to plus 180 deg F (Minus 18 to plus 82 deg C).
6. Color: White.

2.6 SEALANTS

A. Materials are as recommended by the insulation manufacturer and are compatible with insulation materials, jackets, and substrates.

B. Joint Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller.
   c. Mon-Eco Industries, Inc.
   d. Owens Corning.

2. Permanently flexible, elastomeric sealant.

   a. Service Temperature Range: Minus 150 to plus 250 deg F (Minus 101 to plus 121 deg C).
   b. Color: White or gray.

3. Verify sealant has a VOC content of 420 g/L or less.
4. Verify sealant complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions do not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

C. FSK and Metal Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller.
   c. Mon-Eco Industries, Inc.

2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
4. Color: Aluminum.
5. Verify sealant has a VOC content of 420 g/L or less.

6. Verify sealant complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions do not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

D. ASJ Flashing Sealants and PVDC and PVC Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller.

2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
4. Color: White.
5. Verify sealant has a VOC content of 420 g/L or less.
6. Verify sealant complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Verify formaldehyde emissions do not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II.
4. ASJ+: Aluminum foil reinforced with glass scrim bonded to a kraft paper interleaving with an outer film leaving no paper exposed; complying with ASTM C1136, Types I, II, III, IV, and VII.
5. PSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C1136, Type II.

2.8 FIELD-APPLIED JACKETS

A. Field-applied jackets comply with ASTM C1136, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Johns Manville; a Berkshire Hathaway company.
   b. P.I.C. Plastics, Inc.
   c. Proto Corporation.
   d. Speedline Corporation.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: Color-code jackets based on system. Color as selected by Architect.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

   a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

D. Metal Jacket:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Johns Manville; a Berkshire Hathaway company.
   b. RPR Products, Inc.

2. Aluminum Jacket: Comply with ASTM B209 (ASTM B209M), Alloy 3003, 3005, 3105, or 5005, Temper H-14.

   a. Factory cut and rolled to size.
   b. Finish and thickness are indicated in field-applied jacket schedules.
   c. Moisture Barrier for Indoor Applications: 53-mil- (0.075-mm-) thick, heat-bonded polyethylene and kraft paper.
   d. Moisture Barrier for Outdoor Applications: 53-mil- (0.075-mm-) thick, heat-bonded polyethylene and kraft paper.
   e. Factory-Fabricated Fitting Covers:

      1) Same material, finish, and thickness as jacket.
      2) Preformed two-piece or gore, 45- and 90-degree, short- and long-radius elbows.
      3) Tee covers.
      4) Flange and union covers.
      5) End caps.
      6) Beveled collars.
      7) Valve covers.
      8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

E. Underground Direct-Buried Jacket: 125-mil- (3.2-mm-) thick vapor barrier and waterproofing membrane, consisting of a rubberized bituminous resin reinforced with a woven-glass fiber or polyester scrim and laminated aluminum foil.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Owens Corning.
b. Polyguard Products, Inc.

2.9 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.

1. Width: 3 inches (75 mm).
2. Thickness: 11.5 mils (0.29 mm).
3. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Width: 2 inches (50 mm).
2. Thickness: 6 mils (0.15 mm).
3. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
4. Elongation: 500 percent.
5. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.

C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Industrial Adhesives and Tapes Division.
b. Avery Dennison Corporation, Specialty Tapes Division.
c. Ideal Tape Co., Inc., an American Biltrite Company.
d. Knauf Insulation.

2. Width: 2 inches (50 mm).
3. Thickness: 3.7 mils (0.093 mm).
4. Adhesion: 100 ounces force/inch (1.1 N/mm) in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.

2.10 SECUREMENTS

A. Bands:

1. Stainless Steel: ASTM A240/A240M, Type 304 or Type 316; 0.015 inch (0.38 mm) thick, 1/2 inch (13 mm) wide with wing seal or closed seal.
2. Aluminum: ASTM B209 (ASTM B209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch (0.51 mm) thick, 3/4 inch (19 mm) wide with wing seal or closed seal.
3. Springs: Twin spring set constructed of stainless steel, with ends flat and slotted to accept metal bands. Spring size is determined by manufacturer for application.

B. Staples: Outward-clinching insulation staples, nominal 3/4 inch (19 mm) wide, stainless steel or Monel.

C. Wire: 0.062-inch (1.6-mm) soft-annealed, stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils (0.127 mm) thick and an epoxy finish 5 mils (0.127 mm) thick if operating in a temperature range between 140 and 300 deg F (60 and 149 deg C). Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Carbon Steel: Coat carbon steel operating at a service temperature of between 32 and 300 deg F (0 and 149 deg C) with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the tradesman installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and of thicknesses required for each item of pipe system, as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, compress, or otherwise damage insulation or jacket.

D. Install insulation with longitudinal seams at top and bottom (12 o'clock and 6 o'clock positions) of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during storage, application, and finishing. Replace insulation materials that get wet during storage or in the installation process before being properly covered and sealed in accordance with the Contract Documents.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends attached to structure with vapor-barrier mastic.
3. Install insert materials and insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth, but not to the extent of creating wrinkles or areas of compression in the insulation.
2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward-clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward-clinching staples along edge at 2 inches (50 mm) o.c.
4. For below-ambient services, apply vapor-barrier mastic over staples.
5. Cover joints and seams with tape, in accordance with insulation material manufacturer's written instructions, to maintain vapor seal.
6. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches in similar fashion to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.

3.4 PENETRATIONS

A. ~~**Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.**~~

1. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
2. Extend jacket of outdoor insulation outside roof flashing at least ~~**2 inches (50 mm)**~~ below top of roof flashing.
3. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.

2. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least ~~**2 inches (50 mm)**~~.
3. Seal jacket to wall flashing with flashing sealant.

C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials, except where more specific requirements are specified in various pipe insulation material installation articles below.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, Mechanical Couplings, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, mechanical couplings, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using prefabricated fitting insulation or mitered or routed fittings made from same material and density as that of adjacent pipe insulation. Each piece is butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with prefabricated fitting insulation or sectional pipe insulation of same material and thickness as that used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using prefabricated fitting insulation or sectional pipe insulation of same material, density, and thickness as that used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using prefabricated fitting insulation or sectional pipe insulation of same material, density, and thickness as that used for adjacent pipe. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers, so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges, mechanical couplings, and unions using a section of oversized preformed pipe insulation to fit. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Stencil or label the outside insulation jacket of each union with the word "union" matching size and color of pipe labels.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket, except for flexible elastomeric, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing, using PVC tape.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers. Installation conforms to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as that of adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union at least 2 times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands, and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.

3. For insulation with jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches (150 mm) o.c.
4. For insulation with jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install prefabricated pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as that of pipe insulation. Where voids are difficult to fill with block insulation, fill the voids with a fibrous insulation material suitable for the specific operating temperature.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered or routed sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.7 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as that of pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install sections of pipe insulation and miter if required in accordance with manufacturer's written instructions.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated valve covers manufactured of same material as that of pipe insulation when available.
2. When prefabricated valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 INSTALLATION OF GLASS-FIBER AND MINERAL WOOL INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands, and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches (150 mm) o.c.
4. For insulation with jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install prefabricated pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with glass-fiber or mineral-wool blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation when available.

2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation when available.
2. When prefabricated sections are not available, install fabricated sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.9 INSTALLATION OF FIELD-APPLIED JACKETS

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch (50-mm) overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch- (1.6-mm-) thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.
2. Install lap or joint strips with same material as jacket.
3. Secure jacket to insulation with manufacturer's recommended adhesive.
4. Install jacket with 1-1/2-inch (38-mm) laps at longitudinal seams and 3-inch- (75-mm-) wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated and for horizontal applications, install with 1-inch (25-mm) overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

D. Where metal jackets are indicated, install with 2-inch (50-mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless steel bands 12 inches (300 mm) o.c. and at end joints.

E. Where PVDC jackets are indicated, install as follows:

1. Apply three separate wraps of filament tape per insulation section to secure pipe insulation to pipe prior to installation of PVDC jacket.

2. Wrap presized jackets around individual pipe insulation sections, with one end overlapping the previously installed sheet. Install presized jacket with an approximate overlap at butt joint of 2 inches (50 mm) over the previous section. Adhere lap seal using adhesive or SSL, and then apply 1-1/4 circumferences of appropriate PVDC tape around overlapped butt joint.
3. Continuous jacket can be spiral-wrapped around a length of pipe insulation. Apply adhesive or PVDC tape at overlapped spiral edge. When electing to use adhesives, refer to manufacturer's written instructions for application of adhesives along this spiral edge to maintain a permanent bond.
4. Jacket can be wrapped in cigarette fashion along length of roll for insulation systems with an outer circumference of 33-1/2 inches (850 mm) or less. The 33-1/2-inch- (850-mm-) circumference limit allows for 2-inch- (50-mm-) overlap seal. Using the length of roll allows for longer sections of jacket to be installed at one time. Use adhesive on the lap seal. Visually inspect lap seal for "fishmouthing," and use PVDC tape along lap seal to secure joint.
5. Repair holes or tears in PVDC jacket by placing PVDC tape over the hole or tear and wrapping a minimum of 1-1/4 circumferences to avoid damage to tape edges.

3.10 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099600 "High Performance Coating" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless steel jackets.

3.11 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections.

B. Engage a qualified testing agency to perform tests and inspections.

C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

D. Perform tests and inspections.

E. Tests and Inspections: Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection is limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

F. All insulation applications will be considered defective if they do not pass tests and inspections.

G. Prepare test and inspection reports.

3.12 PIPING INSULATION SCHEDULE, GENERAL

A. Insulation conductivity and thickness per pipe size comply with schedules in this Section or with requirements of authorities having jurisdiction, whichever is more stringent.

B. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

C. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.13 INDOOR PIPING INSULATION SCHEDULE

A. Condensate and Equipment Drain Water below 60 Deg F (16 Deg C):

1. All Pipe Sizes: Insulation is one of the following:

a. Flexible Elastomeric: 3/4 inch (19 mm) thick.
b. Glass-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch (13 mm) thick.
c. Mineral Wool, Preformed Pipe Insulation, Type II: 1/2 inch (13 mm) thick.

B. Chilled Water and Brine, Above 40 Deg F (5 Deg C):

1. NPS 12 (DN 300) and Smaller: Insulation is one of the following:

a. Flexible Elastomeric: 1 inch (25 mm) thick.
b. Glass-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inches (38 mm) thick.
c. Mineral Wool, Preformed Pipe Insulation, Type II: 1-1/2 inches (38 mm) thick.

C. Heating-Hot-Water Supply and Return, 140 Deg F (93 Deg C) and Below:

1. NPS 1 1/ (DN 300)4 and Smaller: Insulation is one of the following:

a. Cellular Glass: 1-1/2 inches (38 mm) thick.
b. Glass-Fiber, Preformed Pipe, Type I: 1 inch (25 mm) thick.
c. Mineral Wool, Preformed Pipe, Type II: 1 inch (25 mm) thick.

2. NPS 1 1/2 to NPS 4 (DN 350): Insulation is one of the following:

    a. Cellular Glass: 2 inches (50 mm) thick.
    b. Glass-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inches (38 mm) thick.
    c. Mineral Wool, Preformed Pipe Insuation, Type II: 1-1/2 inches (38 mm) thick.
    d. Flexible Elastomeric: ~~**2 inches (75 mm)**~~ thick.
    e. Glass-Fiber, Preformed Pipe Insulation, Type I: ~~**2 inches (75 mm)**~~ thick.
    f. Mineral Wool, Preformed Pipe Insulation, Type II: ~~**3 inches (75 mm)**~~ thick.
    g. Glass-Fiber, Preformed Pipe Insulation, Type I: ~~**2 inches (50 mm)**~~ thick.
    h. Mineral Wool, Preformed Pipe Insulation, Type II: ~~**2 inches (50 mm)**~~ thick.

3.14 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.
2. Painted Aluminum, Stucco Embossed: ~~**0.020 inch (0.51 mm)**~~ thick.

D. If more than one material is listed, selection from materials listed is Contractor's option.

E. Piping, Concealed:

1. Painted Aluminum, Stucco Embossed with Z-Shaped Locking Seam: ~~**0.020 inch (0.51 mm)**~~ thick.

END OF SECTION 230719

SECTION 230923 - DIRECT DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 - GENERAL

1.1 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. Division 01 work shall apply.

1.2 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-electronic fully modulating type unless otherwise indicated, all as hereinafter specified. Control equipment shall be as manufactured by Distech Controls. All controls 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.

C. The system shall be compatible with BACNET. The system shall have a graphic system which is compatible with the system currently installed, which is a Distech Control system, installed and maintained by ADVANTEX Solutions; contact Giovanni Natale from ADVANTEX Solutions (T: 718-278-2290, C: 917-682-2521, E-mail: gnatale@advantexsolutions.com).

D. The system shall have a new graphic.

E. The control system shall include all necessary sensors, thermostats, damper motors, transmitters, transducers, relays, switches, etc., and all necessary equipment for a complete control system, regardless of whether or not specifically mentioned, including electric relays and contactors required for control interlocking.

F. The control system shall include motor control wiring including all control and interlock wiring from switches, freezestats, firestats and relays, to motor controllers, variable frequency drives, contactors, etc. and all other motor control wiring.

G. Fan air flow measuring devices shall be by factory mounted. The air flow measuring device manufacturer’s representative shall inspect the installation when complete and shall provide certification, in writing, that the installation complies with their requirements.

H. 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.

I. Automatic dampers, smoke dampers and combination fire smoke dampers shall be provided under this section. Provision shall be made under the electrical contract for the opening and closing of the fire/smoke dampers and smoke dampers, as required for fire emergency. Provision shall be made under this section for opening and closing dampers and for normal air handler operation. Combination fire/smoke dampers and smoke dampers shall be wired under the electrical contract and controlled via the fire alarm system. Under this section, the CONTRACTOR shall coordinate with the fire alarm sub-contractor. Provide shop drawings, locating dampers on floor plans and on riser diagrams and indicating type of control for each damper, i.e., open/close under fire alarm, open/close with shutdown of specific AHU's under fire alarm, and used for smoke purge control. These shop drawings will be for use by the CONTRACTOR as part of the coordination.

J. Terms ATC subcontractor, BAS subcontractor and temperature control Contractor refer to the CONTRACTOR providing work under this section of the specification. The BAS subcontractor or automation system Contractor referred to in this and other sections shall be one and the same Contractor as the ATC subcontractor.

K. All sensors, transmitters, thermostats, automatic control valves, wells, automatic dampers, combination fire smoke dampers and smoke dampers, to be mounted in pipes or ducts shall be mounted in such pipe or ducts by the CONTRACTOR providing the piping or ducts. This subcontractor, the ATC subcontractor, shall supply these devices to the CONTRACTOR performing the mounting in a timely manner so as not to inhibit or delay his work. The final installation of these devices, i.e. connection, shall be the responsibility of this section.

L. Wiring between the fire alarm system and the automatic temperature control system shall be provided by the CONTRACTOR providing the fire alarm system. The subcontractor shall provide terminal points for the CONTRACTOR to wire to in local temperature control panels and in smoke damper panels. The subcontractor shall provide the Sub-Contractor with a wiring diagram and the location of all the interface terminal points.

M. All temperature sensors, humidity sensors, actuators and DDC controllers and all associated wiring including power wiring, damper (including fire and smoke) wiring and wiring to control duct terminal units, i.e., automatic dampers, reheat coil, VAV and CAV boxes, shall be provided under this section. This shall include extending power wiring from junction boxes left under the electrical work and making power wiring connections. See electrical drawings for location of junction boxes. Where junction boxes are not shown on the electrical drawings, provide 120 volt power wiring from the nearest power panel under this section.

N. Provide control wiring required to other equipment provided under this contract.

O. The BAS shall include the as-built narrative sequence of operation for all systems so that the operator can access the sequence of operation for any system while viewing the graphic for that system.

P. As-built sequence of operation shall be provided in BAS software. When viewing a control schematic on the BAS, the operator shall have the option of having the system display the sequence of operation.

1.3 QUALITY ASSURANCE

A. **Only firms regularly engaged in the manufacture and installation of this equipment with the characteristics and capacity similar 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 completely in all respects by competent mechanics, regularly employed by the manufacturer of the control system.

1.4 SUBMITTALS

A. **Refer to Division 01 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 descriptions. 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 the finished floor.

1.5 RELATED WORK UNDER ELECTRICAL WORK

A. **All power wiring for pumps, fans, unit heaters, clocks, air compressors, aftercooler, etc. See Special Requirements for Mechanical and Electrical Work.**

B. 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 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 Power Distribution Panel(s).

1.6 COORDINATION

A. **Refer to Division 01.**

1.7 GUARANTEE

A. **Refer to Division 01.**

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 the 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.

PART 2 - PRODUCTS

2.1 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 an 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.**

2.2 **ELECTRIC WIRING**

A. **All electric wiring, materials and installation shall be in accordance with the latest revision of the National Electric Code, and applicable Local Code, and shall carry the UL label where applicable. All wiring shall be installed in rigid galvanized steel conduit, :" minimum, and shall be a minimum of #14 AWG. All specials, such as junction boxes and connectors, shall be of type designed for use with conduit.**

2.3 AUTOMATIC DAMPERS, AND SMOKE DAMPERS

A. **Dampers shall have 14 gauge galvanized frames of not less than 3" in width and blades of 16 gauge, or double 22 gauge, galvanized steel, and shall be adequately braced to form a rigid assembly, where required in galvanized ductwork. Dampers shall have blades not more than 8" wide. The linkage and hardware shall be zinc plated steel. Damper blades and rods shall be installed in horizontal position.**

B. In copper, aluminum and stainless steel ductwork, damper material shall match the ductwork, with blades of 48 oz. copper, 16 gauge aluminum, or 16 gauge stainless steel.

C. All dampers shall be of the proportioning or opposed blade type and shall be motor operated. Dampers shall have continuous elastomer or stainless steel stops to avoid leakage. Bearings shall be oilite nonferrous sleeve type. All dampers shall be provided with continuous 3/16" x 2" closed cell neoprene gasketing around perimeter of the frame and at interlocking blade edges, to form an airtight seal.

D. All dampers shall be constructed to provide a maximum leakage of 3%, with an approach velocity of 1500 fpm flow, when closed against 4 inches of water. Submit leakage and flow characteristic data for all dampers.

E. All outside air dampers shall automatically return to closed position in the event of loss of electricity or air.

F. 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.

2.4 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 respond to a change of plus or minus 3EF. The control point shall be adjustable 15E above and below intended setting, with a minimum scale of at least 50EF. 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.**

2.5 AUTOMATIC CONTROL VALVES

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.**

2.6 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 3 1/2" 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. Each zone discharges air temperature

2.7 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.**

2.8 ROOM THERMOSTATS

A. **All proportioning thermostats shall have an adjustable throttling range. All thermostats shall be provided with an adjustable range of 55 deg F – 85 deg F., key-operated, non-indicating, locked cover type. Finish and final locations shall be approved by the Architect.**

2.9 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 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 a canopy light on top of the local control panel with a 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.

D. Instrumentation within the panel shall be identified. All electrical components within the panel shall be factory pre-wired to a numbered terminal strip. All wiring within the panel shall be in accordance with NEMA and UL standards and shall meet local codes.

PART 3 - EXECUTION

3.1 **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.

3.2 INSTALLATION

A. **Install in accordance with the manufacturer's written instructions, and with recognized industry 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.

3.3 FIELD QUALITY CONTROL

A. **Upon completion of the installation of the automatic temperature control system and after motors have been energized with a normal power source, test the system to demonstrate compliance with requirements. When possible, field correct malfunctioning controls then retest to demonstrate compliance. Replace controls that cannot be satisfactorily corrected. Refer to Section - Test and Balancing**

3.4 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 them in complete operating condition, subject to the approval of the Architect. Complete instructions shall be given to the operating personnel. There shall be one day of instruction given for the Winter cycle and one day of instruction for the Summer cycle operation.**

3.5 CONTROL SEQUENCE

A. **Control sequence shall be as specified and/or as indicated on the drawings. Pressures and temperatures indicated are approximate and shall be adjusted on the job for maximum performance. After final adjustment, and before acceptance, the control diagrams required shall be revised, or supplemented, to show coordinated settings for all controls, including pneumatic-electric switches on and off pressures, sensitivity (branch pressure change per unit change in controlled variable), throttling range, tabulated settings for instruments in sequence, branch pressures at which instrument set point and controlled variable coincide, automatic reset becomes inactive. Capacity controls for refrigeration equipment and heating equipment shall be coordinated with components furnished with the machines and the necessary controllers, relays, etc.**

B. A separate tabulation shall be provided of control settings of all automatic controls including components furnished with the machines. Tabulation shall also include upper and lower limits for all safety and operating controls on the machines. All of the above adjustments will be required at the completion of the job.

3.6 VAV WITH REHEAT

A. **The occupied setpoints (adjustable) are: heating 70 deg F and cooling 75 deg F.**

B. The unoccupied setpoints (adjustable) are: heating 55 deg F and cooling 85 deg F.

C. On a rise in temperature above the cooling setpoint, gradually modulate open the VAV box damper from minimum cfm air flow to maximum cfm air flow, to maintain setpoint. The reheat coil control valves shall be closed.

D. On a drop in temperature below the heating setpoint, the VAV box damper shall go from maximum to minimum air flow.

E. Between cooling and heating setpoint, (dead band) the VAV box damper shall maintain the position.

F. On a drop in temperature below the heating setpoint and when the VAV box is at min cfm, the reheat coil control valves shall be modulated open to maintain setpoint.

G. On a continued drop in temperature after the reheat coil valve is fully open, the VAV box damper shall be modulated gradually from minimum to maximum air flow.

H. Room setpoint conditions for each room shall be adjustable and shall be distinct setpoints for occupied heating and cooling, unoccupied heating and cooling.

3.7 CONTROL SYSTEM TESTING, ADJUSTING, CALIBRATION

A. **Work and/or systems installed under this Division shall be fully functioning prior to Demonstration, Acceptance Periods and Contract Close Out. THE CONTRACTOR shall start, test, adjust, and calibrate all work and/or systems under this contract, as described below.**

B. Verify proper electrical voltages and amperages and verify that all circuits are free from grounds or faults.

C. Verify integrity/safety of all electrical connections.

D. Verify proper interface with fire alarm system.

E. Test, calibrate, and set all digital and analog sensing, and actuating devices. Calibrate each instrumentation device by making a comparison between the Operator Interface display and the reading at the device, using an instrument traceable to the National Bureau of Standards, which shall be at least twice as accurate as the device to be calibrated (e.g., if field device is +1- 0.5% accurate, test equipment shall be +1- 0.25% accurate over same range). Record the measured value and displayed value for each device in the Control System Commissioning Report.

F. Check and set zero and span adjustments for all actuating devices. Manually activate damper and valve operators to verify free travel and fail condition. Check split range positioners to

verify proper operation. Record the results for each device in the Control System Commissioning Report.

G. Check each digital control point by making a comparison between the control command at the DPU and the status of the controlled device. Check each digital input point by making a comparison of the state of the sensing device and the Operator Interface display. Record the results for each device in the Control System Commissioning Report.

H. Verify proper sequences by using the approved checklists to record results and submit with Control System Commissioning report. Verify proper sequence and operation of all specified functions.

I. Perform testing with CONTRACTOR to setup the setpoints for chilled water system, all hot water, dual temperature system. Prior to start work, submit test plan to the Owner's representative for review and approval.

J. Tune all control loops to obtain the fastest stable response without hunting, offset or overshoot. Record tuning parameters and response test results for each control loop in the control System commissioning report. Except from a startup, maximum allowable variance from set point for controlled variables shall be as follows:

1. **Air temperature: plus or minus 0.5°F**
2. Water temperature: plus or minus 2°F
3. Relative humidity plus or minus 2%

3.8 CONTROL SYSTEM DEMONSTRATION

A. **Demonstrate the operation of the Control Systems hardware, software, and all related components and systems to the satisfaction of the Commissioning Agent. Schedule the demonstration with Owner s representative 2 weeks in advance. Demonstration shall not be scheduled until all hardware and software submittals, and the Commissioning Test Report is approved. If the Work fails to be demonstrated to conform to the Contract specifications, so as to require scheduling of additional site visits by the Commissioning Agent for re-demonstration, CONTRACTOR shall reimburse Owner for all direct and indirect costs of subsequent Commissioning Agent site visits.**

B. The CONTRACTOR shall supply all personnel and equipment for the demonstration, including but not limited to, instruments, ladders, etc. CONTRACTOR supplied personnel must be competent with and knowledgeable of all project-specific hardware, software, and the HVAC systems. All training documentation and submittals shall be at the job site.

C. The system shall be demonstrated following the same procedures used in the Commissioning Tests by using approved Commissioning Checklists. Demonstration shall include, but not necessarily be limited to the following:

D. Demonstrate that all required software is installed on workstations. Demonstrate that all graphic screens, alarms, trends and reports are installed as submitted and approved.

E. Demonstrate that all points specified and shown can be interrogated and/or commanded (as applicable) from all workstations, as specified.

F. Demonstrate that remote communication abilities are in accordance with these Specifications.

G. Demonstrate correct calibration of input/output devices using the same methods specified for the commissioning tests. A maximum of 10 percent of 110 points shall be selected at random by the Commissioning Agent for demonstration. Upon failure of any device to meet the specified end-to-end accuracy, an additional 10 percent of 110 points shall be selected at random by the Commissioning agent for demonstration. This process shall be repeated until 100 percent of randomly selected 110 points have been demonstrated to meet specified end-to-end accuracy.

H. Demonstrate that all DDC and other software programs exist at respective field panels. The Direct Digital Control (DDC) programming and point database shall be as submitted and approved.

I. Demonstrate that all DDC and other software programs accomplish the specified sequences of operation.

J. Demonstrate that the panels automatically recover from power failures, as specified.

K. Demonstrate that all alarms are received at the appropriate workstations and printers.

L. Demonstrate that the stand-alone operation of panels meets the requirements of these Specifications.

M. Identify access to equipment selected by Commissioning Agent. Demonstrate that access is sufficient to perform required maintenance.

N. Control System Demonstration shall be completed and approved prior to Substantial Completion.

END OF SECTION 230923

SECTION 232113 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper tube and fittings.
2. Steel pipe and fittings.
3. Piping joining materials.
4. Transition fittings.
5. Dielectric fittings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of the following:

1. Pipe and tube.
2. Fittings.
3. Joining materials.
4. Transition fittings.

B. Delegated Design Submittals:

1. Design calculations and detailed fabrication and assembly of pipe anchors and alignment guides, hangers and supports for multiple pipes, expansion joints and loops, and attachments of the same to the building structure.
2. Locations of pipe anchors, alignment guides, and expansion joints and loops.
3. Locations of and details for penetrations, including sleeves and sleeve seals for exterior walls, floors, basement, and foundation walls.
4. Locations of and details for penetration and firestopping for fire- and smoke-rated wall and floor and ceiling assemblies.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Piping layout, or BIM model, drawn to scale, indicating the items described in this Section, and coordinated with all building trades.

B. Qualification Data: For Installer.

C. Welding certificates.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installers of Pressure-Sealed Joints: Installers are to be certified by pressure-seal joint manufacturer as having been trained and qualified to join piping with pressure-seal pipe couplings and fittings.
2. Fiberglass Pipe and Fitting Installers: Installers of RTRF and RTRP are to be certified by manufacturer of pipes and fittings as having been trained and qualified to join fiberglass piping with manufacturer-recommended adhesive.

B. Steel Support Welding: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

C. Pipe Welding: Qualify procedures and operators in accordance with ASME Boiler and Pressure Vessel Code: Section IX.

1. Comply with ASME B31.9 for materials, products, and installation.
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

1.5 WARRANTY

A. PP-R and PP-RCT Manufacturer's Warranty: Manufacturer agrees to repair or replace PP-R and PP-RCT pipe and fittings that fail in materials or workmanship within 10 years from date of Substantial Completion.

1. Warranty is to cover labor and material costs of repairing and/or replacing defective materials and repairing any incidental damage caused by failure of the piping system due to defects in materials or manufacturing.
2. Warranty is to be in effect only upon submission by Contractor to manufacturer of valid pressure/leak documentation indicating that the system was tested and passed manufacturer's pressure/leak test and any other manufacturer requirements.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Hydronic piping components and installation are to be capable of withstanding the following minimum working pressures and temperatures unless otherwise indicated:

1. Hot-Water Heating Piping: 100 psig (689 kPa) at 200 deg F (93 deg C).

2.2 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tube: ASTM B88, Type K (ASTM B88M, Type A) and ASTM B88, Type L (ASTM B88M, Type B).

B. Annealed-Temper Copper Tube: ASTM B88, Type K (ASTM B88M, Type A).

C. DWV Copper Tube: ASTM B306, Type DWV.

D. Cast-Copper, Solder-Joint Fittings: ASME B16.18 pressure fittings. Do not use solder joints on pipe sizes greater than NPS 4 (DN 100).

E. Wrought-Copper, Solder-Joint Fittings: ASME B16.22 pressure fittings. Do not use solder joints on pipe sizes greater than NPS 4 (DN 100).

F. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends. Do not use solder joints on pipe sizes greater than NPS 4 (DN 100).

G. Cast-Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends. Do not use solder joints on pipe sizes greater than NPS 4 (DN 100).

H. Wrought-Copper Unions: ASME B16.22. Do not use solder joints on pipe sizes greater than NPS 4 (DN 100).

I. Copper-Tube, Pressure-Seal-Joint Fittings - Copper or Bronze:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
   b. Elkhart Products Corporation; a part of Aalberts Integrated Piping Systems.
   c. Mueller Streamline Co.; a company of Mueller Industries.
   d. NIBCO INC.
   e. Victaulic Company.
   f. Viega LLC.

2. Source Limitations: Obtain copper-tube pressure-seal-joint fittings from single manufacturer.
3. Housing: Copper or bronze.
4. O-Rings and Pipe Stops: EPDM.
5. Tools: Manufacturer's special tools.
6. Minimum 200 psig (1370 kPa) working pressure rating at 250 deg F (121 deg C).

2.3 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A53/A53M black steel with plain ends; welded and seamless, Grade B, and schedule number as indicated in Part 3,"Piping Applications" Article.

B. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125 and 250 as indicated in Part 3, "Piping Applications" Article.

C. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300 as indicated in Part 3, "Piping Applications" Article.

D. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in Part 3, "Piping Applications" Article.

E. Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, Classes 25, 125, and 250; raised ground face, and bolt holes spot faced as indicated in "Piping Applications" Article.

F. Wrought-Steel Fittings: ASTM A234/A234M; wall thickness to match adjoining pipe.

G. Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:

1. Material Group: 1.1.
2. End Connections: Butt welding.
3. Facings: Raised face.

H. Grooved Mechanical-Joint Fittings and Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Anvil International/Smith-Cooper International; Tailwind Capital, LLC.
b. National Fittings, Inc.
c. Victaulic Company.

2. Source Limitations: Obtain grooved mechanical-joint fittings and couplings from single manufacturer.
3. Joint Fittings: ASTM A536, Grade 65-45-12 ductile iron; ASTM A47/A47M, Grade 32510 malleable iron; ASTM A53/A53M, Type F, E, or S, Grade B fabricated steel; or ASTM A106/A106M, Grade B steel fittings with grooves or shoulders constructed to accept grooved-end couplings; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.
4. Couplings: Ductile- or malleable-iron housing and EPDM or nitrile gasket of central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.

I. Steel Pipe Nipples: ASTM A733, made of same materials and wall thicknesses as pipe in which they are installed.

2.4 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch (3.2-mm) maximum thickness unless otherwise indicated.

    a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
    b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

C. Solder Filler Metals: ASTM B32, lead-free alloys.

~~**D.**~~

2.5 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Hot-Water Heating Piping, Aboveground, NPS 2 (DN 50) and Smaller, to Be Any of the Following:

1. Type L (Type B), drawn-temper copper tubing, wrought-copper fittings, and soldered or pressure-seal joints.
2. Schedule 40, Grade B, steel pipe; Class 150, malleable-iron fittings; and threaded joints.
3. Schedule 40, Grade B steel pipe; Class 150, malleable-iron fittings; and threaded joints.
4. Outlet: ~~**Type K (Type A)**~~, annealed-temper copper tubing with soldered or flared joints.

3.2 INSTALLATION OF PIPING

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Select system components with pressure rating equal to or greater than system operating pressure.

K. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

L. Install drains, consisting of a tee fitting, NPS 3/4 (DN 20) ball valve, and short NPS 3/4 (DN 20) threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

M. Install piping at a uniform grade of 0.2 percent upward in direction of flow.

N. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

O. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.

P. Install valves according to the following:

1. Section 230523.12 "Ball Valves for HVAC Piping."

Q. Install air vents and pressure-relief valves in accordance with Section 232116 "Hydronic Piping Specialties."

R. Install unions in piping, NPS 2 (DN 50) and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.

S. Install shutoff valve immediately upstream of each connection of dissimilar materials.

T. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for identifying piping.

U. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

V. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."

W. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230518 "Escutcheons for HVAC Piping."

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Soldered Joints: Apply ASTM B813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints in accordance with ASTM B828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B32.

1. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

E. Pressure-Seal Joints: Use manufacturer-recommended tools and procedure. Leave insertion marks on pipe after assembly.

3.4 INSTALLATION OF DIELECTRIC FITTINGS

A. Install a 6-inch long brass nipple at connections of dissimilar metal piping and tubing.

3.5 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements in Section 230529 "Hangers and Supports for HVAC Piping and Equipment" for hangers, supports, and anchor devices.

B. Install hangers for copper tubing and steel piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS SP-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

C. Support horizontal piping within 12 inches (300 mm) of each fitting and coupling.

D. Support vertical runs of copper tubing and steel piping to comply with MSS SP-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.6 TERMINAL EQUIPMENT CONNECTIONS

A. Sizes for supply and return piping connections are to be the same as or larger than equipment connections.

B. Install control valves in accessible locations close to connected equipment.

C. Install ports for pressure gauges and thermometers at coil inlet and outlet connections.

3.7 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 230553 "Identification for HVAC Piping and Equipment."

3.8 SYSTEM STARTUP

A. Perform the following before operating the system:

1. Open manual valves fully.
2. Inspect pumps for proper rotation.
3. Set makeup pressure-reducing valves for required system pressure.
4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
5. Set temperature controls so all coils are calling for full flow.
6. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.
7. Verify lubrication of motors and bearings.

3.9 FIELD QUALITY CONTROL

A. Prepare hydronic piping in accordance with ASME B31.9 and as follows:

1. Leave joints, including welds, uninsulated and exposed for examination during test.
2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure is to be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
5. Install pressure-relief valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.

B. Perform the following tests on hydronic piping:

1. Use ambient-temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
3. Isolate expansion tanks and determine that hydronic system is full of water.
4. Subject piping system to hydrostatic test pressure that is not less than the greater of 150 psig or 1.5 times the system's working pressure. Test pressure is not to exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times the "SE" value in Appendix A in ASME B31.9.
5. Test duration shall be at least two hours for welded, soldered, brazed or threaded joints; or 24 hours for pressure-seal, grooved or other mechanical joints. After hydrostatic test pressure has been applied for the specified time , examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
6. Pressure tests shall be witnessed by the Energy and Utilities Department System Manager, the Maintenance Superintendent, or their designees.
7. Prepare written report of testing.

END OF SECTION 232113

SECTION 232116 - HYDRONIC PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Air vents.
2. Strainers.
3. Flexible connectors.

B. Related Requirements:

1. Section 230523.12 "Ball Valves for HVAC Piping" for specification and installation requirements for ball valves common to most piping systems.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product:

1. Include construction details and material descriptions for hydronic piping specialties.
2. Include rated capacities, operating characteristics, and furnished specialties and accessories.
3. Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For hydronic piping specialties to include in emergency, operation, and maintenance manuals.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Differential Pressure Meter: For each type of balancing valve and automatic flow control valve, include flowmeter, probes, hoses, flow charts, and carrying case.

1.5 QUALITY ASSURANCE

A. Pipe Welding: Qualify procedures and operators in accordance with ASME BPVC, Section IX.

B. Pressure-relief and safety-relief valves and pressure vessels bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME BPVC, Section VIII, Division 1.

PART 2 - PRODUCTS

2.1 AIR VENTS

A. Manual Air Vents:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
   b. Bell & Gossett; a Xylem brand.
   c. Caleffi North America.
   d. HCI; Hydronics Components Inc.
   e. Taco Comfort Solutions.
   f. WATTS; A Watts Water Technologies Company.

2. Body: Bronze.
3. Internal Parts: Nonferrous.
4. Operator: Screwdriver or thumbscrew.
5. Inlet Connection: NPS 1/2 (DN 15).
6. Discharge Connection: NPS 1/8 (DN 6).
7. CWP Rating: 150 psig (1035 kPa).
8. Maximum Operating Temperature: 225 deg F (107 deg C).

2.2 STRAINERS

A. Y-Pattern Strainers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Apollo Valves; a part of Aalberts Integrated Piping Systems.
   b. Keckley Company.
   c. Victaulic Company.
   d. WATTS; A Watts Water Technologies Company.
   e. Zurn Industries, LLC.

2. Body: ASTM A126, Class B, cast iron with bolted cover and bottom drain connection.
3. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
4. Strainer Screen: Stainless steel, 20-mesh strainer, or perforated stainless steel basket.
5. CWP Rating: 125 psig (860 kPa).

2.3 FLEXIBLE CONNECTORS

A. Stainless Steel Bellows, Flexible Connectors:

1. Body: Stainless steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket.
2. End Connections: Threaded or flanged to match equipment connected.
3. Performance: Capable of 3/4-inch (20-mm) misalignment.
4. CWP Rating: 150 psig (1035 kPa).
5. Maximum Operating Temperature: 250 deg F (121 deg C).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine all piping specialties 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. Examine threads on all devices for form and cleanliness.

C. 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 its material composition is suitable for service, and that it is free from defects and damage.

D. Do not attempt to repair defective piping specialties; replace with new devices. Remove defective piping specialties from site.

3.2 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.

B. Install manual vents at heat-transfer coils and elsewhere as required for air venting.

END OF SECTION 232116

SECTION 233113 - METAL DUCTS

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. Single-wall ducts and fittings.
2. Sheet metal materials.
3. Sealants and gaskets.
4. Hangers and supports.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.

B. Delegated-Design Submittal:

1. Sheet metal thicknesses.
2. Joint and seam construction and sealing.
3. Reinforcement details and spacing.
4. Materials, fabrication, assembly, and spacing of hangers and supports.
5. Design Calculations: Calculations for selecting hangers and supports.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.

2. AWS D9.1/D9.1M, "Sheet Metal Welding Code," for duct joint and seam welding.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and with performance requirements and design criteria indicated in "Duct Schedule" Article.

B. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible".

C. Airstream Surfaces: Surfaces in contact with airstream shall comply with requirements in ASHRAE 62.1.

D. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

E. Duct Dimensions: Unless otherwise indicated, all duct dimensions indicated on Drawings are inside clear dimensions and do not include insulation or duct wall thickness.

2.2 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

1. Construct ducts of galvanized sheet steel unless otherwise indicated.

B. Transverse Joints: Fabricate joints in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. For ducts with longest side less than 36 inches, select joint types in accordance with Figure 2-1.
2. For ducts with longest side 36 inches or greater, use flange joint connector Type T-22, T-24, T-24A, T-25a, or T-25b. Factory-fabricated flanged duct connection system may be used if submitted and approved by engineer of record.

C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-

support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

1. Construct ducts of galvanized sheet steel unless otherwise indicated.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Ductmate Industries, Inc.
b. McGill AirFlow LLC.
c. SEMCO, LLC; part of FlaktGroup.

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

C. Transverse Joints: Select joint types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.

D. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

E. Tees and Laterals: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials

involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.4 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A653/A653M.

1. Galvanized Coating Designation: G60.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Carbon-Steel Sheets: Comply with ASTM A1008/A1008M, with oiled, matte finish for exposed ducts.

D. Reinforcement Shapes and Plates: ASTM A36/A36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

E. Tie Rods: Galvanized steel, 1/4-inch-minimum diameter for lengths 36 inches or less; 3/8-inch-minimum diameter for lengths longer than 36 inches.

2.5 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.

B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 4 inches.
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10 inch wg, positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10 inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Flanged Joint Sealant: Comply with ASTM C920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.6 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Galvanized-steel rods and nuts.

B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

C. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A603.

D. Steel Cable End Connections: Galvanized-steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

E. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

F. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and coordination drawings.

B. Install ducts in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install ducts in maximum practical lengths with fewest possible joints.

D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

J. Install all duct-mounted accessories in air ducts where indicated on Drawings.

K. Protect duct interiors from moisture, construction debris and dust, and other foreign materials both before and after installation. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

L. Elbows: Use long-radius elbows wherever they fit.

1. Fabricate 90-degree rectangular mitered elbows to include turning vanes.
2. Fabricate 90-degree round elbows with a minimum of three segments for 12 inches and smaller and a minimum of five segments for 14 inches and larger.

M. Branch Connections: Use lateral or conical branch connections.

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

B. Seal ducts at a minimum to the following seal classes in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
3. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
4. Unconditioned Space, Exhaust Ducts: Seal Class C.
5. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
6. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
7. Conditioned Space, Exhaust Ducts: Seal Class B.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
5. Do not use powder-actuated concrete fasteners for seismic restraints.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at maximum intervals of 16 feet.

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.

C. Duct system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.7 DUCT CLEANING

A. Clean new duct system(s) before testing, adjusting, and balancing.

B. Use duct cleaning methodology as indicated in NADCA ACR.

3.8 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

1. Fabricate all ducts to achieve SMACNA pressure class, seal class, and leakage class as indicated below.

a. Minimum SMACNA Seal Class: C if negative pressure.
b. SMACNA Leakage Class for Rectangular: 2.
c. SMACNA Leakage Class for Round and Flat Oval: 2
d.

B. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

a. Velocity 1000 fpm or Lower:

1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
2) Mitered Type RE 4 without vanes.

b. Velocity 1000 to 1500 fpm:

1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

c. Velocity 1500 fpm or Higher:

1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."

   a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.

      1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
      2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
      3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
      4) Radius-to Diameter Ratio: 1.5.

   b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
   c. Round Elbows, 14 Inches and Larger in Diameter: Welded.

C. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."

   a. Rectangular Main to Rectangular Branch: 45-degree entry.
   b. Rectangular Main to Round Branch: Conical spin in.

2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.

   a. Velocity 1000 fpm or Lower: 90-degree tap.
   b. Velocity 1000 to 1500 fpm: Conical tap.
   c. Velocity 1500 fpm or Higher: 45-degree lateral.

D. Supply/Outside Air Ducts:

1. Ducts Connected downstream of Terminal Units (VAV-X):

   a. Pressure Class: Positive 2-inch wg.
   b. Minimum SMACNA Seal Class: A.
   c. SMACNA Leakage Class for Rectangular: 6.
   d. SMACNA Leakage Class for Round and Flat Oval: 6.

2. Ducts Connected to Variable-Air-Volume Air-Handling Units:

   a. Pressure Class: Positive 3-inch wg.
   b. Minimum SMACNA Seal Class: A.
   c. SMACNA Leakage Class for Rectangular: 6.
   d. SMACNA Leakage Class for Round and Flat Oval: 6.

3. Ducts Connected to Equipment Not Listed Above:

    a. Pressure Class: Positive 3-inch wg.
    b. Minimum SMACNA Seal Class: A.
    c. SMACNA Leakage Class for Rectangular: 6.
    d. SMACNA Leakage Class for Round and Flat Oval: 6.

END OF SECTION 233113

SECTION 233300 - AIR DUCT ACCESSORIES

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. Manual volume dampers.
2. Control dampers.
3. Flange connectors.
4. Turning vanes.
5. Duct-mounted access doors.
6. Flexible connectors.
7. Duct accessory hardware.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:

a. Special fittings.
b. Manual volume damper installations.
c. Control-damper installations.
d. Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling, and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
e. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.

B. Source quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.6 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. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A653.

1. Galvanized Coating Designation: G90.
2. Exposed-Surface Finish: Mill phosphatized.

B. Aluminum Sheets: Comply with ASTM B209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.

C. Extruded Aluminum: Comply with ASTM B221, Alloy 6063, Temper T6.

D. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

E. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 MANUAL VOLUME DAMPERS

A. Low-Leakage, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. American Warming and Ventilating; a Mestek Architectural Group company.
    b. Pottorff.
    c. Ruskin Company.
    d. United Enertech.

2. Comply with AMCA 500-D testing for damper rating.
3. Low-leakage rating and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
4. Suitable for horizontal or vertical applications.
5. Frames:

    a. Hat shaped.
    b. 0.094-inch- thick, galvanized sheet steel, 0.05-inch- thick stainless steel.
    c. Mitered and welded corners.
    d. Flanges for attaching to walls and flangeless frames for installing in ducts.

6. Blades:

    a. Multiple or single blade.
    b. Parallel- or opposed-blade design.
    c. Stiffen damper blades for stability.
    d. Galvanized, roll-formed steel, 0.064 inch thick.

7. Blade Axles: Stainless steel.
8. Bearings:

    a. Oil-impregnated stainless-steel sleeve.
    b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

9. Blade Seals: Neoprene.
10. Jamb Seals: Cambered stainless steel.
11. Tie Bars and Brackets: Galvanized steel.
12. Accessories:

    a. Include locking device to hold single-blade dampers in a fixed position without vibration.

B. Low-Leakage, Aluminum, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Warming and Ventilating; a Mestek Architectural Group company.
b. Pottorff.
c. Ruskin Company.
d. United Enertech.

2. Comply with AMCA 500-D testing for damper rating.
3. Low-leakage rating and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
4. Suitable for horizontal or vertical applications.
5. Frames: Hat-shaped, 0.10-inch- thick, aluminum sheet channels; frames with flanges for attaching to walls and flangeless frames for installing in ducts.
6. Blades:

a. Multiple or single blade.
b. Parallel- or opposed-blade design.
c. Roll-Formed Aluminum Blades: 0.10-inch- thick aluminum sheet.
d. Extruded-Aluminum Blades: 0.050-inch- thick extruded aluminum.

7. Blade Axles: Nonferrous metal.
8. Bearings:

a. Molded synthetic.
b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

9. Blade Seals: Neoprene.
10. Jamb Seals: Cambered aluminum.
11. Tie Bars and Brackets: Aluminum.
12. Accessories:

a. Include locking device to hold single-blade dampers in a fixed position without vibration.

C. Jackshaft:

1. Size: 0.5-inch diameter.
2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

D. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.4 CONTROL DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Warming and Ventilating; a Mestek Architectural Group company.
2. Pottorff.
3. Ruskin Company.
4. United Enertech.

B. Low-leakage rating and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.

C. Frames:

1. Hat shaped.
2. 0.094-inch- thick, galvanized sheet steel.
3. Mitered and welded corners.

D. Blades:

1. Multiple blade with maximum blade width of 6 inches.
2. Opposed-blade design.
3. Galvanized-steel.
4. 0.0747-inch- thick dual skin.
5. Blade Edging: Closed-cell neoprene.
6. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.

E. Blade Axles: 1/2-inch- diameter; stainless steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.

1. Operating Temperature Range: From minus 40 to plus 200 deg F.

F. Bearings:

1. Oil-impregnated stainless-steel sleeve.
2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
3. Thrust bearings at each end of every blade.

2.5 FLANGE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CL WARD & Family Inc.
2. Ductmate Industries, Inc.
3. Elgen Manufacturing.

B. Description: Add-on or roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

C. Material: Galvanized steel.

D. Gage and Shape: Match connecting ductwork.

1. Vibro-Acoustics.

E. General Requirements:

1. Fire-Performance Characteristics: Adhesives, sealants, packing materials, and accessory materials shall have flame-spread index not exceeding 25 and smoke-developed index not exceeding 50 when tested according to ASTM E84.
2. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

F. Principal Sound-Absorbing Mechanism:

1. Suspended Units: Factory-installed suspension hooks or lugs attached to frame in quantities and spaced to prevent deflection or distortion.
2. Reinforcement: Cross or trapeze angles for rigid suspension.
3. Factory-installed end caps to prevent contamination during shipping.
4. Record acoustic ratings, including dynamic insertion loss and generated-noise power levels with an airflow of at least ~~**2000 fpm**~~ face velocity.
5. Leak Test: Test units for airtightness at 200 percent of associated fan static pressure or ~~**6-inch wg**~~ static pressure, whichever is greater.

2.6 TURNING VANES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CL WARD & Family Inc.
2. Ductmate Industries, Inc.
3. Elgen Manufacturing.

B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."

D. Vane Construction: Single wall for ducts up to 48 inches wide and double wall for larger dimensions.

2.7 DUCT-MOUNTED ACCESS DOORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Warming and Ventilating; a Mestek Architectural Group company.
2. CL WARD & Family Inc.
3. Ductmate Industries, Inc.
4. Pottorff.
5. United Enertech.
6. Ventfabrics, Inc.

B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."

1. Door:

a. Double wall, rectangular.
b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
c. Vision panel.
d. Hinges and Latches: 1-by-1-inchbutt or piano hinge and cam latches.
e. Fabricate doors airtight and suitable for duct pressure class.

2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Number of Hinges and Locks:

a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
c. Access Doors up to 24 by 48 Inches: Three hinges and two compression latches.
d. Access Doors Larger Than 24 by 48 Inches: Four hinges and two compression latches with outside and inside handles.

2.8 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CL WARD & Family Inc.
2. Ductmate Industries, Inc.
3. Ventfabrics, Inc.

B. Materials: Flame-retardant or noncombustible fabrics.

C. Coatings and Adhesives: Comply with UL 181, Class 1.

D. Metal-Edged Connectors: Factory fabricated with a fabric strip 5-3/4 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Provide metal compatible with connected ducts.

E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd..
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.
4. Tensile Strength: ~~**530 lbf/inch**~~ in the warp and ~~**440 lbf/inch**~~ in the filling.
5. Service Temperature: ~~**Minus 50 to plus 250 deg F**~~.

F. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.

1. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
2. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
7. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch movement at start and stop.

2.9 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Compliance with ASHRAE/IESNA 90.1-2004 includes Section 6.4.3.3.3 - "Shutoff Damper Controls," restricts the use of backdraft dampers, and requires control dampers for certain applications. Install control dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

1. Install steel volume dampers in steel ducts.
2. Install aluminum volume dampers in aluminum ducts.

E. Set dampers to fully open position before testing, adjusting, and balancing.

F. Install test holes at fan inlets and outlets and elsewhere as indicated.

G. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. On both sides of duct coils.
2. Upstream and downstream from duct filters.
3. At outdoor-air intakes and mixed-air plenums.
4. At drain pans and seals.
5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
7. At each change in direction and at maximum 50-foot spacing.
8. Upstream and downstream from turning vanes.
9. Control devices requiring inspection.
10. Elsewhere as indicated.

H. Access Door Sizes:

1. One-Hand or Inspection Access: 8 by 5 inches.
2. Two-Hand Access: 12 by 6 inches.
3. Head and Hand Access: 18 by 10 inches.
4. Head and Shoulders Access: 21 by 14 inches.
5. Body Access: 25 by 14 inches.
6. Body plus Ladder Access: 25 by 17 inches.

I. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

J. Install flexible connectors to connect ducts to equipment.

K. Install duct test holes where required for testing and balancing purposes.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.
5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 233300

SECTION 233346 - FLEXIBLE DUCTS

PART 1 - GENERAL

1.1 HYPERLINK "HTTP://CONTACT.ARCOMNET.COM/CONTENTCONTACT.ASPX?SECT=233346&VER=12/01/16&FORMAT=FL&SID=13418" 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. Insulated flexible ducts.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product data showing compliance with ASHRAE 62.1.
2. Product Data: For adhesives and sealants, indicating VOC content.
3. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.
4. Laboratory Test Reports: For Insulation, indicating compliance with requirements for low-emitting materials.
5. Product Data : For insulation, indicating that R-values comply with tables in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air Conditioning."

C. Shop Drawings: For flexible ducts.

1. Include plans showing locations and mounting and attachment details.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from installers of the items involved.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

C. Comply with the Air Diffusion Council's "ADC Flexible Air Duct Test Code FD 72-R1."

D. Comply with ASTM E 96/E 96M, "Test Methods for Water Vapor Transmission of Materials."

2.2 INSULATED FLEXIBLE DUCTS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on drawings or comparable product by one of the following:

1. Flexmaster USA, Inc
2. JP Lamborn Co.
3. McGill Airflow LLC

B. Insulated, Flexible Duct: UL 181, Class 0, interlocking spiral of aluminum foil; fibrous-glass insulation; aluminized vapor-barrier film.

1. Pressure Rating: 8-inch wg positive or negative.
2. Maximum Air Velocity: 5000 fpm.
3. Temperature Range: Minus 20 to plus 250 deg F.
4. Insulation R-Value: R8.

2.3 FLEXIBLE DUCT CONNECTORS

A. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action in sizes 3 through 18 inches, to suit duct size.

B. Non-Clamp Connectors: Liquid adhesive plus tape.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install flexible ducts according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install in indoor applications only. Flexible ductwork should not be exposed to UV lighting.

C. Connect terminal units to supply ducts with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.

D. Connect diffusers or light troffer boots to ducts directly or with maximum 60-inch lengths of flexible duct clamped or strapped in place.

E. Connect flexible ducts to metal ducts with draw bands.

F. Install duct test holes where required for testing and balancing purposes.

G. Installation:

1. Install ducts fully extended.
2. Do not bend ducts across sharp corners.
3. Bends of flexible ducting shall not exceed a minimum of one duct diameter.
4. Avoid contact with metal fixtures, water lines, pipes, or conduits.
5. Install flexible ducts in a direct line, without sags, twists, or turns.

H. Supporting Flexible Ducts:

1. Suspend flexible ducts with bands 1-1/2 inches wide or wider and spaced a maximum of 48 inches apart. Maximum centerline sag between supports shall not exceed 1/2 inch per 12 inches.
2. Install extra supports at bends placed approximately one duct diameter from center line of the bend.
3. Ducts may rest on ceiling joists or truss supports. Spacing between supports shall not exceed the maximum spacing per manufacturer's written installation instructions.
4. Vertically installed ducts shall be stabilized by support straps at a maximum of 72 inches o.c.

END OF SECTION 233346

SECTION 233600 - AIR TERMINAL UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Modulating, single-duct air terminal units.
2. Casing liner.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of air terminal unit.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for air terminal units.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For air terminal units.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.
4. Hangers and supports, including methods for duct and building attachment and vibration isolation.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Floor plans and other details, or BIM model, drawn to scale, indicating the items described in this Section, and coordinated with all building trades.

B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air terminal units to include in emergency, operation, and maintenance manuals.

a. Instructions for resetting minimum and maximum air volumes.
b. Instructions for adjusting software set points.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a Qualified Electrical Testing Laboratory, and marked for intended location and application.

B. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment," and Section 7 - "Construction and System Start-up."

C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, "Section 6 - Heating, Ventilating, and Air Conditioning."

2.2 MODULATING, SINGLE-DUCT AIR TERMINAL UNITS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. ENVIRO-TEC; brand of Johnson Controls International plc, Building Solutions North America.
2. Johnson Controls, Inc.
3. Krueger-HVAC; brand of Johnson Controls International plc, Global Products.
4. Price Industries Limited.
5. Titus; brand of Johnson Controls International plc, Global Products.

B. Description: Volume-damper assembly inside unit casing with control components inside a protective metal shroud.

C. Casing: Minimum 20-gauge- thick galvanized steel.

1. Casing Liner: Comply with requirements in "Casing Liner" Article below for "Casing Liner, Flexible Elastomeric" Paragraph.
2. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.
3. Air Outlet: S-slip and drive connections.
4. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket.

D. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.

1. Maximum Damper Leakage: AHRI 880 rated, 1 percent of nominal airflow at 3-inch wg (750-Pa) inlet static pressure.

E. Velocity Sensors: Multipoint array with velocity inlet sensors.

F. Attenuator Section: Casing material and thickness matching associated air terminal unit casing. Provide absorptive attenuator integral with the air terminal unit, with noise transmission loss performance as required in schedules on Drawings.

G. Hydronic Heating Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.08 inch (2.0 mm). Include manual air vent and drain valve. Provide hydronic heating coils for air terminal units scheduled on Drawings.

H. Direct Digital Controls:

1. Terminal Unit Controller: Pressure-independent, VAV controller and integrated actuator, and electronic airflow transducer with multipoint velocity sensor at air inlet, factory calibrated to minimum and maximum air volumes.

   a. Occupied and unoccupied operating mode.
   b. Remote reset of airflow or temperature set points.
   c. Adjusting and monitoring with portable terminal.
   d. Communication with temperature-control system specified in Section 230923 "Direct Digital Control (DDC) System for HVAC."

2. Terminal Unit Controller, Section 230923: Controller is to be factory mounted and wired by air terminal manufacturer; unit controllers, integrated actuators, and room sensors to be furnished under Section 230923 "Direct Digital Controls (DDC) for HVAC."

I. Control Sequence: See Drawings for control sequences.

2.3 CASING LINER

A. Casing Liner, Flexible Elastomeric: Flexible elastomeric duct liner fabricated of preformed, cellular, closed-cell, sheet materials complying with ASTM C534/C534M, Type II, Grade 1; and with NFPA 90A or NFPA 90B.

1. Minimum Thickness: 1/2 inch (13 mm).
2. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.
3. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

2.4 SOURCE QUALITY CONTROL

A. AHRI 880 Certification: Test, rate, and label assembled air terminal units in accordance with AHRI 880.

B. Water Coils: Factory pressure test to 300 psig (2070 kPa) in accordance with AHRI 410 and ASHRAE 33.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with Section 230529 "Hangers and Supports for HVAC Piping and Equipment" and Section 233113 "Metal Ducts" for hangers and supports.

B. Install air terminal units according to NFPA 90A.

C. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.

D. Install wall-mounted thermostats.

3.2 PIPING CONNECTIONS

A. Where installing piping adjacent to air terminal unit, allow space for service and maintenance.

B. Hot-Water Piping: Comply with requirements in Section 232113 "Hydronic Piping" and Section 232116 Hydronic Piping Specialties," and connect heating coils to supply piping with shutoff valve, strainer, control valve, and union or flange; and to return piping with balancing valve and union or flange.

3.3 DUCTWORK CONNECTIONS

A. Comply with requirements in Section 233113 "Metal Ducts" for connecting ducts to air terminal units.

B. Make connections to air terminal units with flexible connectors complying with requirements in Section 233300 "Air Duct Accessories."

3.4 ELECTRICAL CONNECTIONS

A. Install field power to each air terminal unit electrical power connection. Coordinate with air terminal unit manufacturer and installers.

B. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

D. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

E. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate shall be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate shall be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch (13 mm) high.

3.5 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

3.6 IDENTIFICATION

A. Label each air terminal unit with drawing designation, nominal airflow, maximum and minimum factory-set airflows, and coil type. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for equipment labels and warning signs and labels.

3.7 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks in accordance with manufacturer's written instructions.
2. Verify that inlet duct connections are as recommended by air terminal unit manufacturer to achieve proper performance.
3. Verify that controls and control enclosure are accessible.
4. Verify that control connections are complete.
5. Verify that nameplate and identification tag are visible.
6. Verify that controls respond to inputs as specified.

3.8 ADJUSTING

A. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for air terminal unit testing, adjusting, and balancing.

3.9 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.
2. Leak Test: After installation, fill water coils and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Air terminal unit will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.10 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain air terminal units.

END OF SECTION 233600

SECTION 233713.13 - AIR DIFFUSERS

PART 1 - GENERAL

1.1 HYPERLINK "HTTP://CONTACT.ARCOMNET.COM/CONTENTCONTACT.ASPX?SECT=23371313&VER=09/01/14&FORMAT=FL&SID=6197" 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. Rectangular and square ceiling diffusers.
2. Linear slot diffusers.

B. Related Requirements:

1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers.
2. Section 233713.23 "Air Registers and Grilles" for adjustable-bar register and grilles, fixed-face registers and grilles, and linear bar grilles.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.

PART 2 - PRODUCTS

2.1 RECTANGULAR AND SQUARE CEILING DIFFUSERS – **“D-1, D-2”**

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carnes Company.
2. Nailor Industries Inc.
3. Titus.
4. Price.

B. Devices shall be specifically designed for variable-air-volume flows.

C. Material: Steel

1. Provide with Aluminum face diffusers in all wet applications (toilets, etc.).

D. Finish: Baked enamel, color by arch.

E. Characteristics: See Drawings.

2.2 LINEAR SLOT DIFFUSERS – **"L-1, L-2"**

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carnes Company.
2. Nailor Industries Inc.
3. Titus.
4. Price.

B. Devices shall be specifically designed for variable-air-volume flows.

C. Material - Shell: Steel, insulated.

D. Characteristics: See Drawings

2.3 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install diffusers level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.2 ADJUSTING

A. After installation, adjust diffusers to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713.13

SECTION 233713.23 - REGISTERS AND GRILLES

PART 1 - GENERAL

1.1 HYPERLINK "HTTP://CONTACT.ARCOMNET.COM/CONTENTCONTACT.ASPX?SECT=23371323&VER=09/01/14&FORMAT=FL&SID=6196" 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. Adjustable blade face registers and grilles.

B. Related Requirements:

1. Section 233300 "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to registers and grilles.
2. Section 233713.13 "Air Diffusers" for various types of air diffusers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.

PART 2 - PRODUCTS

2.1 ~~**REGISTERS**~~

A. ~~**Adjustable Blade Face Register:**~~

1. ~~**Manufacturers: Subject to compliance with requirements, provide products by one of the following:**~~

a. ~~**Carnes Company.**~~
b. ~~**Nailor Industries Inc**~~.
c. ~~**Titus**~~.
d. Price.

2. Characteristics: See Drawings.

2.2 GRILLES – **"G-1"**

A. Adjustable Blade Face Grille:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Carnes Company.
   b. Nailor Industries Inc.
   c. Titus.
   d. Price.

2. Material: Steel

   a. Provide with Aluminum face diffusers in all wet applications (toilets, etc.).

3. Finish: Baked enamel, white.
4. Characteristics: See Drawings.

2.3 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate registers and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install registers and grilles level and plumb.

B. Outlets and Inlets Locations: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install registers and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.2 ADJUSTING

A. After installation, adjust registers and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713.23

SECTION 238219 - FAN COIL UNITS

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. Ductless fan coil units and accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, and furnished specialties and accessories.

B. Shop Drawings:

1. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Include diagrams for power, signal, and control wiring.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of fan coil unit indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Floor plans, reflected ceiling plans, and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which fan coil units will be attached.
3. Method of attaching hangers to building structure.
4. Size and location of initial access modules for acoustical tile.
5. Perimeter moldings.

B. Field quality-control reports.

C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fan coil units to include in emergency, operation, and maintenance manuals.

1. Maintenance schedules and repair part lists for motors, coils, integral controls, and filters.

1.6 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.7 COORDINATION

A. Coordinate layout and installation of fan coil units and suspension system components with other construction that penetrates or is supported by ceilings, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

B. Coordinate size and location of wall sleeves for outdoor-air intake.

PART 2 - PRODUCTS

2.1 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. Factory-packaged and -tested units rated according to AHRI 440, ASHRAE 33, and UL 1995.

2.2 DUCTLESS FAN COIL UNITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carrier Global Corporation.
2. Daikin Applied.

3. ENVIRO-TEC; brand of Johnson Controls International plc, Building Solutions North America.
4. Greenheck Fan Corporation.
5. IEC (International Environmental Corporation); LSB Industries.
6. Trane Inc.
7. YORK; brand of Johnson Controls International plc, Building Solutions North America.
8. Kampmann

B. Fan Coil Unit Configurations: Row split.

C. Coil Section Insulation: 1/2-inch- (13-mm-) thick, matte-finish, closed-cell foam complying with ASTM C1071 and attached with adhesive complying with ASTM C916.

1. Surface-Burning Characteristics: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E84 by a qualified testing agency.
2. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

D. Coil Section Insulation: Insulate coil section

1. Surface-Burning Characteristics: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E84 by a qualified testing agency.
2. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

E. Drain Pans: Stainless steel. Fabricate pans and drain connections to comply with ASHRAE 62.1.

F. Chassis: Galvanized steel where exposed to moisture. Floor-mounting units shall have leveling screws.

G. Filters: Minimum arrestance and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2 and all addendums.

1. MERV Rating: 6 when tested according to ASHRAE 52.2.
2. Glass Fiber Treated with Adhesive: 80 percent arrestance and MERV[**5**].

H. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch (2.5 mm), rated for a minimum working pressure of 200 psig (1378 kPa) and a maximum entering-water temperature of 220 deg F (104 deg C). Include manual air vent and drain valve.

I. Fan and Motor Board: Removable.

1. Fan: Forward curved, double width, centrifugal; directly connected to motor. Thermoplastic or painted-steel wheels, and aluminum, painted-steel, or galvanized-steel fan scrolls.

2. Motor: Permanently lubricated, electronically commutated; resiliently mounted on motor board.
3. Wiring Termination: Connect motor to chassis wiring with plug connection.

J. Electrical Connection: Factory wire motors and controls for a single electrical connection.

K. Capacities and Characteristics: As scheduled on the drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, to receive fan coil units for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for piping and electrical connections to verify actual locations before fan coil unit installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install fan coil units level and plumb.

B. Install fan coil units to comply with NFPA 90A.

C. Verify locations of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices 48 inches (1220 mm) above finished floor.

D. Install new filters in each fan coil unit within two weeks after Substantial Completion.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:

1. Install piping adjacent to machine to allow service and maintenance.
2. Connect condensate drain to indirect waste.

    a. Install condensate trap of adequate depth to seal against fan pressure. Install cleanouts in piping at changes of direction.

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

B. Remove and replace malfunctioning units and retest as specified above.

C. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust initial temperature and humidity set points.

B. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.6 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain fan coil units.

END OF SECTION 238219

SECTION 238229 - RADIATORS

PART 1 - GENERAL

1.1 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.

1.2 SUMMARY

A. Section includes flat-pipe steel radiators.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, and details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Indicate location and size of each field connection.
4. Indicate location and arrangement of piping valves and specialties.
5. Indicate location and arrangement of integral controls and other accessories.

C. Samples: For each exposed product and for each color and texture specified.

D. Color Samples for Initial Selection: For radiators with factory-applied color finishes.

E. Color Samples for Verification: For each type of exposed finish.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Floor plans 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. Structural members, including wall construction, to which radiators will be attached.
2. Method of attaching radiators to building structure.
3. Penetrations of fire-rated wall and floor assemblies.

B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 FLAT-PIPE STEEL RADIATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hydro-Air Components Inc.
2. Quincy Hydronic Technology Inc.
3. Runtal North America, Inc.

B. Heating Elements: Steel, welded and formed into flat, square, steel header with minimum thickness of 0.109 inch (2.76 mm). Include threaded piping and air-vent connections.

1. Working Pressure: 128 psig (881 kPa); 0.078 inch (1.98 mm).

C. Mounting: See plans (914 mm).

D. Finish: Baked-enamel finish in manufacturer's custom color as selected by Architect.

E. Accessories:

1. Steel piping covers finished to match radiator finish.
2. Flexible Expansion Compensation Hoses: Minimum 400-psig (2758-kPa) working pressure, and operating temperatures from 33 to 211 deg F (0.5 to 99.5 deg C).

a. Length: 24 inches (600 mm).
b. Minimum Diameter: Equal to connection size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive radiators for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for hydronic-piping connections to verify actual locations before installation of radiators.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install units level and plumb.

B. Install expansion compensation hoses.

C. Install piping covers.

3.3 CONNECTIONS

A. Piping installation requirements are specified in Section 232113 "Hydronic Piping" and Section 232116 "Hydronic Piping Specialties." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect radiators and components to piping according to Section 232113 "Hydronic Piping" and Section 232116 Hydronic Piping Specialties."

1. Install shutoff valves on inlet and outlet.

C. Install piping adjacent to radiators to allow service and maintenance.

3.4 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

B. Units will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 238229

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

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. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Fire Rated Sleeves for cables.
4. Grout.
5. Common electrical installation requirements.

1.3 DEFINITIONS

A. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

B. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

C. "Provide": Furnish and install, complete and ready for the intended use.

1.4 ACTION SUBMITTALS

A. Product Data: For Fire Rated Sleeves for cables.

1.5 COORDINATION

A. Trade Coordination: Include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and connections as required per Division 26, Electrical Coordination Documents. For equipment with electrical connections, furnish copy of approved submittal for inclusion in Division 26, Electrical submittal.

B. Location of electrical outlets and equipment:

1. Location of electrical outlets and equipment shown on electrical drawings are diagrammatic. Unless indicated otherwise do not use electrical drawings to locate electrical outlets and equipment.
2. Luminaires and outlets:

    a. Ceiling mounted luminaires and outlets: use architectural reflected ceiling plans and details to determine location unless indicated otherwise.
    b. Wall mounted luminaires and outlets:

        1) Use architectural elevation and section drawings to determine location unless indicated otherwise.
        2) Where architectural elevation and section drawings do not indicate location of wall outlets then locate the outlet within 12 inches of location shown on electrical drawings considering field conditions.
        3) Coordinate location with consideration of owner provided equipment such as wall mounted televisions, white boards, furniture, cabinets and the like.

    c. Floor mounted outlets: use architectural drawings to determine location unless indicated otherwise. If not clearly indicated, then send request for information to Architect.

3. Electrical equipment: Utilize approved manufacturer's shop drawing dimensions to determine location of equipment in space. Comply with NEC 110.26 access, working space and dedicated equipment space requirements. Maintain manufacturer requirements for maintenance access.

C. Shop Drawings: Provide coordinated shop drawings which include physical characteristics of all systems, device layout plans, and control wiring diagrams. Reference individual Division 26, Electrical specification sections for additional requirements for shop drawings outside of these requirements.

D. Electrical connections to equipment supplied by owner or other trades:

1. Prior to procurement of electrical equipment and field work coordinate with shop drawings and/or manufacturer's installation instructions the actual electrical characteristics of the equipment to be connected.
2. Notify engineer of significant deviations or conflicts between the shop drawings and/or the manufacturer's installation instructions and information in the contract documents.

E. 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 so connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

F. 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."

G. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

H. Coordinate and install wiring for appliances and systems furnished under other specification Divisions or furnished by the Owner. Install electrical wiring in accordance with manufacturer’s instructions.:

1. Motorized door operators.
2. Owner provided equipment

1.6 PERMITS AND FEES

A. Obtain and pay all fees for permits, licensing, and inspections applicable to work of Division 26, 27and 28.

1.7 QUALITY ASSURANCE

A. Regulatory Requirements: Install work and materials to conform with local, State and Federal codes, and other applicable laws and regulations.

B. Drawings are intended to be diagrammatic and reflect the Basis of Design manufacturer's equipment. Drawings are not intended to show every item in its exact location, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e. distribution equipment, duct banks, light fixtures, etc.) and equipment proposed to assure that systems and equipment will ft in available space. Contractor is responsible for design and construction costs incurred for equipment other than Basis of Design, including, but not limited to, architectural, structural, electrical, HVAC, fire sprinkler, and plumbing systems.

C. Manufacturer's Instructions: Follow manufacturer's written instructions. If in conflict with Contract Documents, obtain clarification. Notify Engineer/Architect, in writing, before starting work.

D. Items shown on Drawings are not necessarily included in Specifications or vice versa. Confirm requirements in all Contract Documents. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

E. Provide Qualified Personnel that are thoroughly knowledgeable of applicable codes related to electrical systems to perform the electrical work. Installations shall be performed by skilled electrical tradesmen fully aware of the latest techniques, practices, and standards of the industry. Refer to N.E.C. Article 100-Definitions, Qualified Person.

F. Install electrical equipment and components in a neat and workmanlike manner in accordance with recognized practices and industry standards. Refer to N.E.C.110-12. Haphazard or poor installation practice will be cause for rejection of the work.

PART 2 - PRODUCTS

2.1 SUBSTITUTION LIMITATIONS FOR ELECTRICAL EQUIPMENT

A. Substitution requests for electrical equipment will be entertained under the following conditions:

1. Substitution requests may be submitted for consideration if accompanied by value analysis data indicating that substitution will comply with Project performance requirements while significantly increasing value for Owner throughout life of facility.
2. Substitution requests may be submitted for consideration concurrently with submission of power system study reports when those reports indicate that substitution is necessary for safety of maintenance personnel and facility occupants.
3. Contractor is responsible for sequencing and scheduling power system studies and electrical equipment procurement. Insufficient lead time for electrical equipment delivery will not be considered a valid reason for substitution.

B. Substitution and Variation from Basis of Design:

1. The Basis of Design designated product establishes the qualities and characteristics for the evaluation of any comparable products by other listed acceptable manufacturers if included in this Specification or included in an approved Substitution Request as judged by the Design Professional.

2. Proposed substitutions: Verify that that proposed substitution If substitutions are proposed, it is the responsibility of parties concerned, involved in, and furnishing the substitute and/or equivalent equipment to verify and compare the characteristics and requirements of that furnished to that specified and/or shown. If greater capacity and/or more materials and/or more labor is required for the rough-in, circuitry or connections than for the item specified and provided for, then provide compensation for additional charges required for the proper rough-in, circuitry and connections for the equipment being furnished. No additional charges above the Base Bid, including resulting charges for work performed under other Divisions, will be allowed for such revisions. Coordinate with the requirements of "Submittals". For any product marked "or approved equivalent", a substitution request must be submitted to Engineer for approval prior to purchase, delivery or installation.

2.2 SLEEVES FOR RACEWAYS AND CABLES

A. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.

B. Sleeves for Rectangular Openings: Galvanized sheet steel.

1. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side more than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches (1270 mm) and 1 or more sides equal to, or more than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

C. EMT: Electrical Metallic Tubing.

2.3 FIRE RATED SLEEVES FOR CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. 3M
2. Hilti
3. Specified Technologies, Inc (STI)
4. Wiremold.

B. Factory assembled rectangular steel pathway containing an intumescent insert material that adjusts automatically to cable addition or subtraction.

C. Sleeve shall have an F Rating equal to or greater than the rating of the wall in which the sleeve is installed.

D. Sleeve shall be UL listed and bear the UL Classification marking.

E. Sleeve shall be tested in accordance with ASTM E814 (ANSI/UL1479).

F. Provide square wall plate kits for single sleeve applications. Provide multi-gang wall/floor plate kits for ganged applications.

G. Subject to compatibility with requirements and field conditions, i.e. sleeve size, wall thickness, etc., acceptable products include the following:

1. 3M Fire Barrier Pass-Through Devices
2. Hilti Speed Sleeves
3. Specified Technologies Inc. EZ-Path Fire Rated Pathway (series 33).
4. Wiremold Flamestopper FS4 Series

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 INSTALLATION OF ELECTRICAL WORK

A. Unless more stringent requirements are specified in the Contract Documents or manufacturers' written instructions, comply with NFPA 70 and NECA NEIS 1 for installation of Work specified in Division 26. Consult Architect for resolution of conflicting requirements.

B. Comply with NECA 1.

C. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

D. 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.

E. 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.

F. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete, masonry and gypsum board walls, or fire-rated floor and wall assemblies.

B. Sleeves are required where cables (not in raceway) penetrate walls or floors. Sleeves are not required where raceways penetrate walls, except where raceways penetrate exterior walls/foundations below grade.

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 firestop system used are fabricated during construction of floor or wall.

E. Provide insulated bushings on EMT sleeves for cable not in conduit. Bushings shall be plenum rated where installed in a plenum.

F. Extend sleeves installed in floors 4 inches (100 mm) above finished floor level unless noted otherwise.

G. Size pipe sleeves to provide 1/4-inch (6.4-mm) 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. Fire Rated Sleeves for cables: Fabricate openings in wall or floor assemblies per manufacturer’s recommendations.

3.3 SLEEVE APPLICATION

A. Sleeves for cables not in conduit:

1. Through Non-Rated Interior Walls: EMT sleeves.
2. Through Non-Rated Floors: EMT sleeves.
3. Through Fire Rated Interior Walls: Fire Rated Sleeves for cables.
4. Through Fire Rated Floors: Fire Rated Sleeves for cables.

3.4 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 materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 260500

SECTION 260503 – DEMOLITION OF ELECTRICAL SYSTEMS

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. Demolition and removal of selected portion of electrical systems, including special systems normally specified in Division 27 and 28.
2. Salvage of existing items to be reused.
3. Salvage of existing items to be delivered to the Owner.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Remove and salvage items noted as ‘salvage’, ‘return to Owner’ or similar manner on the Drawings.

C. Remove and salvage items as requested by the Owner. Conduct a meeting with the Owner prior to commencing demolition to determine items that the Owner wishes to retain.

1.5 PRE-TESTING

A. Prior to commencing work, perform testing of devices and systems to verify devices and systems to remain are in good working condition. Devices shall include wiring devices and lighting control devices. Systems shall include, but is not limited to, fire alarm, clocks.

B. Prepare a type written report documenting any items found to be damaged or in a non-working condition. Submit report to the Owner and Architect prior to commencing work. All devices and systems shall be considered in good working conditions if a report is not submitted and acknowledged by the Owner prior to commencing work.

C. Arrange a time to perform testing with the Owner with at least two weeks advanced notice.

D. Provide tests as follows on existing feeders to remain and notify engineer of any abnormalities:

1. Megger testing.
2. Infrared scanning at terminations.

E. Provide tests as follows on existing branch panels, switchboards, switchgear, motor control centers, and other electrical distribution equipment:

1. Infrared scanning.
2. Grounding/bonding continuity.

F. Existing Branch Circuits that Remain: Trace and ring-out existing branch circuits. Update panel schedules and relabel outlets, disconnect switches, boxes, and the like with actual branch circuit designations. Include such information in record drawings.

G. Where infrared scanning results indicate excessive heat, tighten the mechanical lugs and retest after 24 hours.

H. Include testing reports for above in closeout documentation. Record measurements and actions taken.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 ELECTRICAL SYSTEMS DEMOLITION

A. Remove items depicted or denoted for demolition on the Drawings. Unless noted otherwise, removal of the items shall include devices, boxes, cable, supporting elements, raceway, etc. associated with the item back to the panelboard or nearest j-box or device to remain.

B. Drawings are intended to indicate the general scope of demolition work. Visit the Project site to verify existing conditions prior to bidding. Determine means and methods for performing work.

Identify existing building finishes, ceiling types, access, and fire walls. Determine locations, routings, and distances as necessary. Coordinate with the Owner to gain access to the facility.

1. Wherever walls, ceilings, structures, or electric-powered equipment are indicated as being removed on the Drawings (including architectural demolition plans and mechanical demolition plans) remove associated electrical system components, equipment, devices, fixtures, raceways, and wiring. Remove, relocate, and extend existing installations, as necessary, to accommodate demolition work, new work, and to maintain the existing electrical installations that shall remain operational. Repair adjacent construction and finishes damaged during demolition and extension work. Patch openings to match existing surrounding finishes.
2. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
3. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories

C. Verify that abandoned wiring and equipment serve only abandoned equipment or facilities. Extend conduit and wire to loads that remain in operation (i.e., facilities, luminaires, wiring devices, equipment, etc.). Extension of conduit and wire to equipment shall be compatible with the surrounding area.

1. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel and/or junction boxes where appropriate.
2. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces. Remove all associated clamps, hangers, supports, etc. associated with raceway removal.

D. Where existing conduits and/or cables, which remain in service, pass through areas to be renovated and where such conduits and/or cables interfere with new work, reroute these conduits and/or cables to avoid new construction. Provide necessary boxes, cables, splicing and fittings for the rerouting of the circuits. Field-verify to determine complete scope of work prior to bidding.

E. Existing conduit may remain if all the following are true:

1. Conduit will be reused to feed items installed under this contract.
2. Conduit does not interfere with other trades.
3. Conduit was originally installed meeting specifications related to this project.
4. Conduit will not be exposed in a finished area (unless noted otherwise).

F. Provide plugs on boxes to remain where conduits have been removed.

G. Conduits concealed in masonry walls or under concrete slabs may be cut back, sealed and abandoned.

H. Provide blank cover-plates on all abandoned boxes to remain in existing masonry or stud walls. Plate color and material shall match wiring devices plates specified for the project. In the absence of such specification, match the color and material of existing wiring devices in the area.

I. Maintain power to end-of-line or downstream devices to remain. Provide raceways, boxes, conductors and all other necessary materials as required to re-establish damaged or interrupted feeders and branch circuits. Intercept existing feeders or branch circuits at nearest accessible space or device and reconnect to original feeder or branch circuit source.

J. Repair or replace ceilings, ceiling tiles, and ceiling-grids that are damaged by this contractor.

K. Electrical installations that remain shall be concealed, unless otherwise indicated or unless located within unfinished utility-type spaces. Cut and patch existing walls and ceilings as required. Exposed conduits and raceways will be rejected, unless prior approval has been obtained. Confirm scope of work and specific requirements for all such work directly with the Owner and the Architect.

L. Prior to drilling existing precast concrete walls, detect and locate existing structural members imbedded within the precast panels to ensure they are not damaged.

3.2 SPECIAL SYSTEMS DEMOLITION

A. Remove items depicted or denoted for demolition on the Drawings. Unless noted otherwise, removal of the items shall include devices, boxes, cable, supporting elements, etc. associated with the item back to the control panel, terminal block, punch block, patch panel, or similar type of termination point.

3.3 REMOVED MATERIALS

A. Existing wiring removed shall be regarded as scrap materials to be recycled by this contractor. Scrap value shall be determined by the contractor and accounted for in the contractor's bid.

1. All other demolished electrical items (e.g., power panels, luminaires, receptacles, switches, controllers, system devices, etc.) shall be regarded as the Owner's property. The Owner reserves the right to identify which items shall be salvaged—and, thus, carefully removed by this contractor and placed in storage on site as directed by the Owner. The contractor shall be responsible for the proper disposal of all demolished materials that the Owner does not want to salvage. Coordinate specific requirements directly with Owner.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

1. Ballasts in luminaires installed prior to 1980 shall be incinerated in EPA approved incinerator or disposed of in EPA certified containers and deposited in an EPA landfill certified for PCB disposal or recycled by permitted ballast recycler. Punctured or leaking ballasts must be disposed of according to Federal Regulations under the Toxic Substance Control Act. Provide to Owner and architect/engineer with a Certificate of Destruction to verify proper disposal.

2. HID and fluorescent lamps, determined by the Toxicity Characteristic Leachate procedure (TCLP), to be hazardous waste shall be disposed of in a permitted hazardous waste disposal facility or by a permitted lamp recycler.

END OF SECTION 260503

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

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. Copper building wire rated 600 V or less.
2. Aluminum building wire rated 600 V or less.
3. Metal-clad cable, Type MC, rated 600 V or less
4. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:

1. Section 260533 “Raceway and Boxes for Electrical Systems” for allowable applications of raceways and cable assemblies. Cable assemblies, such as Type MC cable, shall not be permitted unless noted otherwise.
2. Section 260553 “Identification for Electrical Systems” for conductor color coding.

1.3 DEFINITIONS

A. RoHS: Restriction of Hazardous Substances.

B. VFC: Variable-frequency controller.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cerro Wire
2. CME Wire and Cable
3. Encore Wire Corporation
4. General Cable.
5. Houston Wire & Cable Company.
6. Okonite Company (The)
7. Southwire Company.

B. Copper Building Wire

1. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
2. Conductors: complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductor Insulation:

1. Type THHN and Type THWN-2: Comply with UL 83.
2. Type XHHW-2: Comply with UL 44.

E. Temperature Ratings: All conductors shall be rated 90-degree C minimum.

2.2 METAL-CLAD CABLE, TYPE MC

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alan Wire Company
2. Belden
3. CME Wire and Cable
4. Encore Wire Corporation
5. General Cable.
6. Houston Wire & Cable Company.
7. Okonite Company (The)

B. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 1569.
3. RoHS compliant.

D. Circuits:

E. Single circuit. Separate neutral conductors shall be included for each circuit originating from a unique overcurrent protection device.

F. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

G. Ground Conductor: Insulated.

H. Conductor Insulation:

1. Type THHN/THWN-2: Comply with UL 83.
2. Type XHHW-2: Comply with UL 44.

I. Armor: Steel or Aluminum, interlocked.

J. Jacket: PVC applied over armor.

2.3 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AFC Cable Systems, a part of Atkore International
2. Appleton, a brand of Emerson

3. Gardner Bender
4. Hubbell Power Systems
5. Ideal Industries, Inc
6. Ilsco
7. Neer, a brand of Emerson
8. NSI Industries
9. O-Z Gedney, a brand of Emerson
10. Thomas & Betts Corporation

B. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Lugs for attachment to telecommunications systems grounding busbars shall be two-hole with long barrels and irreversible crimp terminations.

PART 3 - EXECUTION

3.1 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.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Feeders to Distribution Equipment and Panelboards: Type XHHW-2, single conductors in raceway.

B. Conductors serving circuits downstream of a device with GFCI or GFP protection shall have XHHW-2 insulation.

C. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.

D. Metal Clad Cable

1. Uses permitted:

a. Branch circuits rated less than 50amps

b. In areas that have accessible ceiling space

2. Uses not permitted:

a. Feeders
b. Homeruns.
c. Areas where there is no access to the ceiling space
d. Areas that have no ceiling or exposed structure
e. Exposed
f. Wet or damp areas

3.3 CONDUCTOR SIZES

A. Minimum Wire Size (Interior Work): No. 12 AWG, except No. 14 AWG shall be permitted for signal, pilot control circuits and fixture whips.

B. Use #10 AWG minimum conductor size in lieu of #12 AWG minimum for 20 ampere, 120 volt branch circuits where homeruns are longer than 75 feet and for 20 ampere, 277 volt branch circuits where homeruns are longer than 175 feet. Increase in size as required for a maximum of 3 percent voltage drop from panel to load.

C. Derate conductors based on quantity of current carrying conductors in each conduit. Refer to the NEC for derating factors.

D. Derate conductors for high ambient temperatures. Refer to the NEC for derating factors.

3.4 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. Branch circuits serving receptacles and lighting loads shall have dedicated neutral conductors and shall not share a common neutral conductor. The use of handle ties across single pole circuit breakers to allow the use of a common neutral is not acceptable.

H. Multiwire Branch Circuits and Shared Neutrals:

1. Multiwire branch circuits (as defined by the NEC) and shared neutrals (common grounded conductors) are not permitted, except as follows:

a. Wherever a multiwire branch circuit is specifically indicated on the Drawings and a multi-pole breaker is provided in the panel from which it originates as a means to simultaneously disconnect all ungrounded conductors.

2. Derating factors shall be applied, per NEC Article 310, to multiple current-carrying conductors installed within the same conduit. Neutral conductors shall be regarded as current-carrying conductors. Wire sizes shall be increased as needed to maintain the ampacity that corresponds to the overcurrent protection device rating.

I.

3.5 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-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 6 inches (150 mm) of slack.

3.6 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.

3.7 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 078413 "Penetration Firestopping."

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

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 grounding and bonding systems and equipment.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 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 UL 467 for grounding and bonding materials and equipment.

2.2 CONDUCTORS

A. Insulated Conductors: tinned-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 B3.
2. Stranded Conductors: ASTM B8.
3. Tinned Conductors: ASTM B33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. 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.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.3 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. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

C. Bus-Bar Connectors: Compression type, copper or copper alloy, with two wire terminals.

D. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.

E. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

F. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.

G. Conduit Hubs: Mechanical type, terminal with threaded hub.

H. Straps: Solid copper, cast-bronze clamp. Rated for 600 A.

I. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.

2.4 GROUNDING ELECTRODES

PART 3 - EXECUTION

3.1 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. Grounding Conductors: Green-colored insulation with continuous yellow stripe.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. 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.

3.3 TELECOMMUNICATIONS GROUNDING

A. Provide grounding in accordance with TIA 607 and as indicated on the Drawings.

3.4 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. Grounding and Bonding for Piping:

1. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

C. 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.

D. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections with the assistance of a factory-authorized service representative.

C. 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. 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.

4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

D. Grounding system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

F. 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 or Panelboards Serving Electronic Equipment: 3 ohm(s).
5. Substations and Pad-Mounted Equipment: 5 ohms.
6. Manhole Grounds: 10 ohms.

G. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

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. Steel slotted support systems.
2. Conduit and cable support devices.
3. Support for conductors in vertical conduit.
4. Structural steel for fabricated supports and restraints.
5. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
6. Fabricated metal equipment support assemblies.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.4 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M – Structural Welding Code - Steel.
2. AWS D1.2/D1.2M – Structural Welding Code - Aluminum.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-(10-mm-) diameter holes at a maximum of 8 inches (200 mm) o.c. in at least one surface.

1. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
2. Material for Channel, Fittings, and Accessories: Galvanized steel.
3. Channel Width: Selected for applicable load criteria.
4. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.

D. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. 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 where used.
2. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
3. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325 (Grade A325M).
5. Toggle Bolts: All-steel springhead type.
6. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 - EXECUTION

3.1 APPLICATION

1. NECA 1.
2. NECA 101
3. NECA 105.

B. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted 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.

F. Damp or wet locations: Utilize hot dipped galvanized steel slotted support systems. Apply galvanizing-repair paint to comply with ASTM A780 on cut edges.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT may be supported by openings through structure members, according to NFPA 70.

C. 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).

D. 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: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
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 comply with seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 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.

3.4 PAINTING

A. Touchup: Comply with requirements in Section 099123 "Interior Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

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. Metal conduits and fittings.
2. Boxes, enclosures, and cabinets.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for firestopping at conduit and box entrances.
2. Section 260519 “Low-Voltage Power Conductors and Cables” for cable assemblies such as metal clad cable.

1.3 DEFINITIONS

A. GRC: Galvanized rigid steel conduit.

B. IMC: Intermediate metal conduit.

C. LFMC: Liquidtight flexible metal conduit.

D. LFNC: Liquidtight flexible nonmetallic conduit.

E.

1.4 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Metal Conduit:

1. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. GRC: Comply with ANSI C80.1 and UL 6.
3. IMC: Comply with ANSI C80.6 and UL 1242.
4. EMT: Comply with ANSI C80.3 and UL 797.
5. FMC: Comply with UL 1; zinc-coated steel.
6. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings:

1. Comply with NEMA FB 1 and UL 514B.
2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Fittings, General: Listed and labeled for type of conduit, location, and use.
4. Fittings for EMT:

a. Material: Steel.
b. Type: compression.

C. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, 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.

2.2 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. 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.

E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

F. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

G. Device Box Dimensions: 4 inches by 2-1/8 inches by 2-1/8 inches deep (100 mm by 60 mm by 60 mm deep).

H. Gangable boxes are allowed.

I. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 for indoor dry locations and Type 4 for wet and outdoor locations with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Severe Physical Damage: EMT.
2. Concealed in Ceilings and Interior Walls and Partitions: EMT.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
4. Damp or Wet Locations: IMC.

B. Minimum Raceway Size:

1. Indoor areas: 1/2-inch trade size minimum

C. 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. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

D. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

E.

3.2 INSTALLATION

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

B. 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 limitations for types of raceways allowed in specific occupancies and number of floors.

C. 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.

D. Complete raceway installation before starting conductor installation.

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. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.

H. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines. The following are exceptions for concealing conduits:

1. Where specifically noted or indicated on the drawings
2. Electrical rooms with surface mounted panels
3. Mechanical rooms
4. In open ceilings with exposed structure

I. Support conduit within 12 inches (300 mm) of enclosures to which attached.

J. Stub-Ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

M. 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.

N. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

P. 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.

Q. 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.

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. or from conditioned spaces to non-conditioned spaces or to exterior structures.
2. Where an underground service raceway enters a building or structure.
3. Conduit extending from interior to exterior of building.
4. Conduit extending into pressurized duct and equipment.
5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
6. Where otherwise required by NFPA 70.

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 semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC or LFNC 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. Existing Building Surfaces: In finished rooms where an existing wall or ceiling remains in place, cut and patch to match the surrounding finishes as required to conceal all raceways. Coordinate work directly with contractor responsible ceiling, walls, and partition finishes.

BB. Conceal raceways within existing finished ceilings, walls, and partitions, unless otherwise indicated on the drawings or as follows:

1. Existing Hollow Walls (such as stud walls, hollow masonry walls, or other wall types with internal voids or vertical cavities):

   a. Outlet Boxes: If possible, use existing openings in wall, provided the opening is positioned within 24-inches of the location shown on plan for the new outlet. Otherwise, cut and patch wall as needed to install box flush.
   b. Conduit: If possible, fish FMC (or MC cabling where permitted) down within the existing wall cavity. Otherwise, saw-cut and patch wall as needed to conceal conduit within the wall. Finish wall to match original.
   c. This Contractor shall visit the facility to review existing conditions and determine means and methods of installation prior to bidding.
   d. Where specifically identified on the drawings, use surface-mounted boxes and surface-mounted conduit painted to match the surrounding finishes.

2. Existing Solid Walls (such as precast panels or filled masonry walls):

   a. Use surface-mounted boxes and or surface-mounted conduit painted to match the surrounding finishes.

3. Existing Floors: Cut and patch existing floors as needed to accommodate new installations. Coordinate all such work with the general contractor prior to bidding.

3.3 INSTALLATION OF CONDUIT IN EXTERIOR MASONRY WALLS

A. Run conduit vertically in non-grout-filled masonry cells where possible. This should be the first choice in locating conduits in exterior walls. Total conduit bends from a technology outlet (including stub-out above ceiling) shall be limited to 180-degrees or less.

B. In rooms where masonry between windows is filled/grouted solid, conduit may be run vertically in first grouted cell adjacent to window opening (first cell should not have rebar in it). Any conduit that needs to run vertically above the masonry opening will be passing through masonry lintel above. At locations where a steel beam frames the masonry opening, a different conduit location should be selected as this will block any vertical routing of conduit in the first cell location.

C. Avoid any conduit runs in masonry cells with rebar. If this is not possible in some locations due to the number of windows and non-grouted wall space provided, the architect/engineer will need to review this on a case by case basis. Data and power outlets may be shifted slightly, provided they are shifted together and not more than 24-inches, unless specifically coordinated with and approved by the architect/engineer.

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

END OF SECTION 260533

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

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. Color and legend requirements for raceways, conductors, and warning labels and signs.
2. Labels.
3. Bands and tubes.
4. Tapes and stencils.
5. Tags.
6. Signs.
7. Cable ties.
8. Paint for identification.
9. Fasteners for labels and signs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70.

B. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

C. Comply with ANSI Z535.4 for safety signs and labels.

D. Comply with NFPA 70E requirements for arc-flash warning labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded branch-circuit conductors.

1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
2. Colors for 208/120-V Circuits:

a. Phase A: Black.
b. Phase B: Red.
c. Phase C: Blue.
d. Neutral: White

3. Colors for 480/277-V Circuits:

a. Phase A: Brown.
b. Phase B: Orange.
c. Phase C: Yellow.
d. Neutral: Gray

4. Color for Equipment Grounds: Green.
5. Colors for Isolated Grounds: Green with two or more yellow stripes.

C. Warning Label Colors:

1. Identify system voltage with black letters on an orange background.

D. Warning labels and signs 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. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.3 LABELS

A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

B. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.

C. Self-Adhesive Wraparound Labels: Preprinted, 3-mil- (0.08-mm-) thick, polyester or vinyl flexible label with acrylic pressure-sensitive adhesive.

1. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
2. Marker for Labels: Permanent, waterproof, black ink marker recommended by tag manufacturer.
3. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

D. Self-Adhesive Labels: Polyester or Vinyl, thermal, transfer-printed, 3-mil- (0.08-mm-) thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

1. Minimum Nominal Size:

a. 1-1/2 by 6 inches (37 by 150 mm) for raceway and conductors.
b. 3-1/2 by 5 inches (76 by 127 mm) for equipment.
c. As required by authorities having jurisdiction.

2.4 BANDS AND TUBES

A. Snap-around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches (50 mm) long, with diameters sized to suit diameters and that stay in place by gripping action.

2.5 TAPES AND STENCILS

A. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide; compounded for outdoor use.

B. Floor Marking Tape: 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.

2.6 TAGS

A. Nonmetallic Preprinted Tags: Polyethylene tags, 0.015 inch (0.38 mm) thick, color-coded for phase and voltage level, with factory printed permanent designations; punched for use with self-locking cable tie fastener.

2.7 SIGNS

A. Laminated Acrylic or Melamine Plastic Signs:

1. Engraved legend.
2. Thickness:

   a. For signs up to 20 sq. in. (129 sq. cm), minimum 1/16 inch (1.6 mm) thick.
   b. For signs larger than 20 sq. in. (129 sq. cm), 1/8 inch (3.2 mm) thick.
   c. Engraved legend with black letters on white face.
   d. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.8 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and 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 D638: 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, and 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 D638: 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, and self-locking.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 Deg F (23 Deg C) according to ASTM D638: 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.

2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain 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

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

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. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

K. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER."
2. "POWER."
3. "UPS."

L. Vinyl Wraparound Labels:

1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

M. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.

N. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.

O. Self-Adhesive Labels:

1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. 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.

P. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.

Q. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.

R. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.

1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

S. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.

T. Nonmetallic Preprinted Tags:

1. Place in a location with high visibility and accessibility.
2. Secure using UV-stabilized cable ties.

U. Laminated Acrylic or Melamine Plastic Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. 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 sign; where two lines of text are required, use labels 2 inches (50 mm) high.

V. Cable Ties: General purpose, for attaching tags, except as listed below:

1. In Spaces Handling Environmental Air: Plenum rated.

3.3 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120V to Ground: Identify with self-adhesive raceway labels or vinyl tape applied in bands.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.
2. Apply the following identification colors:

a. 480Y/277 Volt Distribution System: Orange.
b. 208Y/120 Volt, Distribution System: White.
c. Fire Alarm System: Red.
d. Motor and Other Control Systems: Black.
e. Telephone System: Green/Yellow.
f. Clock, Sound, Intercom, Data: Blue.
g. Emergency 480Y/277 Volt Distribution System: Orange/Yellow.
h. Emergency 208Y/120 Volt Distribution System: White/Yellow.
i. Nurse Call: Green.
j. Security System: Blue/Yellow.
k. Ground: Green.

D. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:

1. "EMERGENCY POWER."
2. "POWER."
3. "UPS."

E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use vinyl wraparound labels to identify the phase.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

F. Auxiliary Electrical Systems Conductor Identification: Marker tape or Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
3. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
4. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
5. Identify the following systems with color-coded, self-adhesive vinyl tape applied in bands or snap-around color-coding bands:

a. Fire Alarm System: Red.
b. Mechanical and Electrical Supervisory System: Brown.
c. Telecommunication System: Blue and yellow.
d. Control Wiring: Orange and red.

G. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

H. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.

I. Arc Flash Warning Labeling: Self-adhesive labels.

J. Operating Instruction Signs: Self-adhesive labels.

K. Equipment Identification Labels:

1. Indoor Equipment: Self-adhesive label.
2. Equipment to Be Labeled:

a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of a self-adhesive, engraved, laminated acrylic or melamine label.
b. Enclosures and electrical cabinets.
c. Remote-controlled switches, dimmer modules, and control devices.
d. Battery-inverter units.

END OF SECTION 260553

SECTION 260800 - COMMISSIONING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Electrical equipment connected to Normal electrical systems, including the following:

   a. branch-circuit panelboards.
   b. Grounding systems.

2. Controls and instrumentation, including the following:

   a. Lighting control systems.
   b. Security systems.
   c. Fire-alarm systems.

3. Systems testing and verification, including Normal and Emergency electrical systems.

1.2 DEFINITIONS

A. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they mean "as-built" systems, assemblies, subsystems, equipment, and components.

1.3 INFORMATIONAL SUBMITTALS

A. Construction Checklists by CxA: Draft construction checklists will be created by CxA for Contractor review.

1.4 QUALITY ASSURANCE

A. Testing Equipment and Instrumentation Quality and Calibration: For test equipment and instrumentation required to perform electrical Cx work, perform the following:

1. Submit test equipment and instrumentation list. For each equipment or instrument, identify the following:

   a. Equipment/instrument identification number.
   b. Planned Cx application or use.
   c. Manufacturer, make, model, and serial number.
   d. Calibration history, including certificates from agencies that calibrate the equipment and instrumentation.

2. Test equipment and instrumentation must meet the following criteria:

   a. Capable of testing and measuring performance within the specified acceptance criteria.
   b. Be calibrated at manufacturer's recommended intervals with current calibration tags permanently affixed to the instrument being used.
   c. Be maintained in good repair and operating condition throughout duration of use on Project.
   d. Be recalibrated/repaired if dropped or damaged in any way since last calibrated.

B. Proprietary Test Instrumentation and Tools:

1. Equipment Manufacturer's Proprietary Instrumentation and Tools: For installed equipment included in the Cx process, test instrumentation and tools manufactured or prescribed by equipment manufacturer to service, calibrate, adjust, repair, or otherwise work on its equipment or required as a condition of equipment warranty, perform the following:

   a. Submit proprietary instrumentation and tools list. For each instrument or tool, identify the following:

      1) Instrument or tool identification number.
      2) Equipment schedule designation of equipment for which the instrument or tool is required.
      3) Manufacturer, make, model, and serial number.
      4) Calibration history, including certificates from agencies that calibrate the instrument or tool, where appropriate.

   b. Electrical proprietary test instrumentation and tools become property of Owner at the time of Substantial Completion.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CONSTRUCTION CHECKLISTS

A. Prepare detailed construction checklists for electrical systems, subsystems, equipment, and components. Complete and submit construction checklists.

3.2 CONSTRUCTION CHECKLIST REVIEW

A. Review and provide written comments on draft construction checklists. CxA will create required draft construction checklists and provide them to Contractor.

B. Return draft Construction Checklist review comments within 10 days of receipt.

C. When review comments have been resolved, CxA will provide final construction checklists, marked "Approved for Use, (date)."

D. Use only construction checklists, marked "Approved for Use, (date)."

3.3 GENERAL TESTING REQUIREMENTS

A. Certify that electrical systems, subsystems, and equipment have been installed, calibrated, and started and that they are operating according to the Contract Documents and approved Shop Drawings and submittals.

B. Certify that electrical instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents and approved Shop Drawings and submittals, and that pretest set points have been recorded.

C. Set systems, subsystems, and equipment into operating mode to be tested according to approved test procedures (for example, normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

D. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions to verify compliance with acceptance criteria.

E. Test systems, assemblies, subsystems, equipment, and components operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and response according to acceptance criteria.

F. Construction Checklists: Prepare and submit detailed construction checklists for electrical systems, subsystems, equipment, and components.

1. Contributors to development of construction checklists must include, but are not limited to, the following:

a. Electrical systems and equipment installers.
b. Electrical instrumentation and controls installers.

G. Perform tests using design conditions, whenever possible.

1. Simulated conditions may, with approval of Architect, be imposed using an artificial load when it is impractical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by CxA, and document simulated conditions and methods of simulation. After tests, return configurations and settings to normal operating conditions.
2. Cx test procedures may direct that set points be altered when simulating conditions is impractical.
3. Cx test procedures may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are impractical.

H. If tests cannot be completed because of a deficiency outside the scope of the electrical system, document the deficiency and report it to Owner. After deficiencies are resolved, reschedule tests.

I. Coordinate schedule with, and perform Cx activities at the direction of the CxA.

J. Comply with Construction Checklist requirements, including material verification, installation checks, startup, and performance tests requirements specified in Sections specifying electrical systems and equipment.

K. Provide qualified testing and inspecting agency personnel instrumentation, tools, and equipment to complete and document the following:

1. Performance tests.
2. Demonstration of a sample of performance tests.
3. Cx tests.
4. Cx test demonstrations.

3.4 CX TESTS FOR ELECTRICAL SYSTEMS

A. Verification of Normal Electrical System Operation:

1. Prerequisites: Acceptance of results for construction checklists for Division 26 electrical components associated with Normal electrical system.
2. Equipment and Systems to Be Tested: Division 26 electrical equipment.
3. Test Purpose: Verify operation of Normal electrical system.
4. Test Conditions: Energize components of Normal electrical system, one at a time.
5. Acceptance Criteria: Proper operation of Normal electrical system over a 24-hour period.

B. Verification of Emergency Electrical System Operation:

1. Prerequisites:

a. Acceptance of results for construction checklists for Division 26 electrical components associated with Essential electrical system.
b. Completion of "Verification of Normal Electrical System Operation" tests.

2. Equipment and Systems to Be Tested: Division 26 electrical equipment.
3. Test Purpose: Verify operation of Emergency electrical system.
4. Test Conditions:

a. Energize components of Normal electrical system.
b. Simulate a failure of Normal electrical system.

5. Acceptance Criteria: Transfer of power from Normal to Emergency electrical system within OPR.

C. Verification of Control and Instrumentation:

D. Test Purpose: Verify operation of control and monitoring systems for Normal and Essential electrical systems.

E. Test Conditions:

1. Energize components of Normal and Emergency electrical system.
2. Test operation of equipment.

F. Acceptance Criteria: Operation of equipment according to OPR.

END OF SECTION 260800

SECTION 260923 - LIGHTING CONTROL SYSTEMS AND DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Digital lighting management systems.
2. Emergency lighting shunt relay (UL-924).
3. Conductors and cables.

1.2 SUBMITTALS

A. Product Data and Shop Drawings:

1. Submit manufacturer's technical product data for each type of lighting control system and its components.
2. Manufacturer's warranty documentation specifically for this contract.
3. Detailed point to point wiring diagrams.
4. Wiring schedules.
5. Typical wiring diagrams for each component.
6. System diagrams showing contactor panels, number and type of switches and sensors, low-voltage switches, and building energy management system computer.
7. Provide sequence of operations for each space type in a format suitable for programming requirements of the specific system and meeting the intent of the sequence of operation provided by the architect/engineer.
8. Room schedule showing devices listed by room, their serial numbers, and the loads they control.

B. Closeout Documentation:

1. Field quality-control test reports.
2. Record drawings reflecting as-built information, including floor plans, wiring diagrams, equipment and wiring schedules, and room schedules.
3. Operation and Maintenance Manuals:

    a. Manufacturer's technical product data and maintenance data.
    b. Manufacturer's warranty documentation.

4. Software and Firmware Operational Documentation:

    a. Software service agreement.
    b. Software operating and upgrade manuals.

1.3 WARRANTY

A. Manufacturer and Installer warrant that installed lighting control devices perform in accordance with specified requirements and agree to repair or replace, including labor, materials, and equipment, software, and devices that fail to perform as specified within extended warranty period.

1. Special Extended Warranty Period: Shall exceed four (4) years starting from the date of Substantial Completion.

a. If the manufacturer's warranty commences upon the date materials are delivered, then the manufacturer's warranty period shall be at least five (5) years to meet the requirement stated above.

1.4 SOFTWARE AND FIRMWARE SERVICE AGREEMENT

A. Technical Support: Beginning at Substantial Completion provide a 5-year software service agreement to the Owner.

B. Software and Firmware Upgrades:

1. At Substantial Completion, update software and firmware to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Verify upgrading software includes operating system and new or revised licenses for using software.
2. Upgrade Notice: Provide a 30-day notice to Owner to allow scheduling and access to the system and to allow Owner upgrade to computer equipment if necessary.
3. Upgrade Reports: Prepare written report after each update, documenting upgrades installed.

1.5 QUALITY ASSURANCE

A. Codes and Standards:

1. NFPA 70, National Electrical Code (NEC).
2. UL 508, Standard for Industrial Control Panels.
3. UL 916, Standard for Energy Management Equipment.
4. UL 917, Standard for Clock Operated Switches.
5. UL 924, Standard for Emergency Lighting and Power Equipment.
6. 47 CFR, Subparts A and B, for Class A digital devices.

B. Comply with NEC, NEMA, and FCC emission requirements for Class A applications. Comply with applicable city, county, and state codes and ordinances.

C. Certification: Manufacturer shall certify that products will meet product specifications and local energy codes. If any additional equipment is required to meet coverage patterns and local energy codes, provide additional equipment at no additional cost to the Owner.

D. Selection, quantity, and placement of all lighting control sensors as indicated on the drawings shall be regarded as the basis of design. Under this contract, engage a factory-authorized representative to determine optimal selection, quantity, and placement of sensors and other system components using the manufacturer's actual devices, and to guarantee the proper application and correct operation of such devices. Any deviation from the basis of design still must comply with these specifications and must result in function and performance that meets or exceeds that of the basis of design.

E. Manufacturer's Field Service and Commissioning: Engage a factory-authorized service representative to inspect, test, and adjust sensors and associated system components, and to guarantee sensor performance.

F. Ceiling-mount devices and wall-mount devices installed above 6 ft. shall be flat and/or textured white. Wall-mount devices installed 42-inch above floor shall match device color and wall plate specified in Section 262726 "Wiring Devices".

PART 2 - PRODUCTS

2.1 DIGITAL LIGHTING MANAGEMENT SYSTEMS

A. Source Limitations: Obtain lighting control module and power distribution components through one source from a single manufacturer

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Lutron Athena
2. Acuity Brands, Inc. (nLight / Sensor Switch).
3. Crestron Electronics, Inc. (Green Light).
4. Eaton / Greengate / Cooper Lighting Controls, Inc.
5. Encelium / Osram Sylvania, Inc.
6. Hubbell Building Automation / Lighting Controls (NX Distributed Intelligence).
7. Intelligent Lighting Controls, Inc.
8. Leviton Manufacturing Co.
9. Watt Stopper/Legrand Vantage Controls/Digital Lighting Management.

C. System Architecture: System shall have an architecture that is based upon three main concepts; 1) intelligent lighting control devices, 2) standalone lighting control zones, and 3) network backbone for remote or time-based operation utilizing lighting control relay panels.

D. System Description and Operation

1. Intelligent lighting control devices shall consist of one or more basic lighting control components; occupancy sensors, photoelectric sensors, relays, dimming outputs, manual switch stations, and manual dimming stations. Combining one or more of these components into a single device enclosure should be permissible to minimize overall device count of system.

2. Lighting control zones shall consist of one or more intelligent lighting control components, be capable of stand-alone operation, and be capable of being connected to a higher-level network backbone.
3. Lighting control zone shall be capable of automatically configuring itself for default operation without any startup labor required.
4. Individual lighting zones must continue to provide a user defined default level of lighting control in the event of a system communication failure with the backbone network or the management software becoming unavailable.
5. Power for devices within a lighting control zone shall come from either resident devices already present for switching (relay device) or dimming purposes, or from the network backbone. Standalone “bus power supplies” shall not be required in all cases.
6. All switching and dimming for a specific lighting zone shall take place within the devices located in the zone itself (i.e., not in a remotely located devices such as panels) to facilitate system robustness and minimize wiring requirements. Specific applications that require centralized or remote switching shall be capable of being accommodated.
7. System shall have a primary wall mounted network control “gateway” device capable of accessing and controlling connected system devices and linking into an Ethernet LAN.
8. System shall use “bridge” devices that route communication and distribute power for up to 8 lighting zones together for purposes of decreasing system wiring requirements.
9. System shall have a web-based software management program that enables remote system control, status monitoring, and creation of lighting control profiles.
10. Individual lighting zones shall be capable of being segmented into several channels of occupancy, photoelectric sensor, and switch functionality for more advanced configurations and sequences of operation.
11. System shall be capable of operating a lighting control zone according to several sequences of operation. Note operating modes should be utilized only in manners consistent with local energy codes.

    a. Auto-on / auto-off (via occupancy sensors)
    b. Manual-on / auto-off
    c. Auto-to-override on
    d. Manual-to-override on
    e. Auto on /predictive off
    f. Multi-level on (multiple lighting levels per manual button press)

12. System programming shall be done in the following fashion:

    a. For completely networked systems, system programming and control adjustments can be done via software from a single point in the network.
    b. For stand-alone systems, programming shall be done by hand-held remote control or by software app via standard wireless protocol such as Wi-Fi or Bluetooth.

13. Control software shall enable integration with a BAS via BACNET IP.

E. System Cabling: Intelligent devices shall be connected to the LRC (lighting room controller). Communications and Class 2 low voltage power shall be provided to each intelligent device via standard low-voltage UTP Category 5 cabling with RJ45 connectors. RJ45 adapters may be used to allow standard analog sensors to be used.

1. All cabling for intra-room connectivity of control devices (example, between power packs and from power packs to sensors and switches) shall be pre-manufactured and provided by controls manufacturer.
2. Intelligent lighting control devices shall communicate digitally and possesses at least two RJ45 connectors.
3. Devices within a lighting control zone shall be connected using low-voltage cabling, in a daisy-chain fashion, and in any order.
4. System shall provide the option of having pre-terminated plenum rated Category 5 cabling supplied with hardware.
5. Field prepared cables may be used in the following situations:

    a. Long cable lengths (ex. Between relay panels) or other cabling where the standard available lengths would provide a significant excess or shortage of cable.
    b. Instances, if any, where cabling will have to be pulled in conduit, and pulling a terminated cable will add excessive difficulty and/or risk damaging the cable.

F. Management Software

1. Every device parameter (e.g., sensor time delay and photoelectric sensor set-point) shall be available and configurable remotely from the software.
2. The following status monitoring information shall be made available from the software for all devices for which it is applicable: current occupancy status, current occupancy sensor status, remaining occupancy time delay(s), current photoelectric sensor reading, current photoelectric sensor inhibiting state, photoelectric sensor transitions time remaining, current dim level, device temperature, and device relay state(s).
3. The following device identification information shall be made available from the software: model number, model description, serial number, manufacturing date code, custom labels, and parent network device.
4. A printable network inventory report shall be available via the software.
5. A printable report detailing all system profiles shall be available via the software.
6. Software shall require all users to login with a username and password.
7. Software shall provide at least three permission levels for users.
8. All sensitive stored information and privileged communication by the software shall be encrypted.
9. All device firmware and system software updates must be available for automatic download and installation via the internet.
10. Software shall be capable of managing systems interconnected via a WAN (wide area network).

G. Applications:

1. Furnish and install digital lighting management systems in each room, space, or area as indicated on the Drawings, or wherever the following applies:

    a. Wherever lighting is controlled by a low-voltage multi-button control station (as opposed to a line-voltage switch).
    b. Wherever the Energy Code requires the lighting to be turned on via manual operation only and/or a room where the lighting is controlled by one or more vacancy sensors.

H. Intelligent Lighting Room Controller (LRC)

1. The LRC associated with each Digital Lighting Management System is not necessarily shown on the plans.

    a. Each controller shall be mounted above the accessible ceiling, unless otherwise noted. Where there are no suspended ceilings, mount controller above nearest accessible ceiling or near the associated power panelboard. The contractor shall be responsible for determining the optimum locations in the field.
    b. Controllers mounted above accessible ceilings shall be furnished with a plenum-rated enclosure. If ceiling is not accessible, provide an access panel in the ceiling or coordinate with the Owner an acceptable location for a surface-mounted enclosure.

2. System shall be true digital control with digital sensors and other components. Hybrid analog systems are not acceptable.
3. The installation of software shall not be required. At a minimum, the user interface shall provide the following functions:

    a. Automatic discovery of system devices.
    b. Commissioning of devices into logical control zones and areas.
    c. Display the entire system in a logical navigation tree view
    d. Allow the user to name zones, groups, presets, schedules, and individual loads.
    e. Setup control functions for system inputs and outputs.
    f. Monitor status and override individual relays and dimmers.

4. User Interface through Personal Electronic Device:

    a. Provide user control capabilities from each user's personal smartphone or laptop. This feature shall include basic control functions such as enable-on, off, and dimming similarly to each room control station. Include required accessories, hardware, software, programming, and ongoing software updates in this contract. Provide one or both of the following communications interfaces:

        1) Bluetooth with application for each personal device.
        2) Web-based application via internet link for each user.

5. Network Capabilities:

    a. LRC shall have the ability to communicate by means of TCP/IP over Ethernet allowing enterprise connectivity between the Lighting Control System and external LAN or WAN networks.
    b. Provide integral capability to communicate with the Building Automation System via BACnet IP protocol.
    c. The LRC shall function as a web server allowing the user interface to be accessible through a standard web browser.
    d. Once programming is complete, any time-clock functionality in the LRC shall be disabled to prevent conflicts with scheduling signals from the BAS system via Bacnet.

6. Programming shall be stored in non-volatile memory, so that all field-settings and programming are retained in the event of a power outage.
7. Unit power supply shall be dual-rated or rated to match its branch lighting circuit connection of 120-volt or 277-volt AC as indicated on the plans.
8. Each LRC that is required in a space shall be capable of accommodating and controlling at least two (2) line-voltage lighting circuits. Provide additional units as required for application indicated on the Lighting Plans and/or Schedules.
9. Unit must be capable of providing 0-10 VDC 200 mA dimming controls for each zone (or "switchleg") of LED dimmable drivers. Dimmer interface shall be achieved via lighting control stations with programmable pushbuttons. Applications, zones, and quantities shall be determined per the drawings.
10. Unit must interface with presence sensors that are designated as vacancy sensors to enable lights to be turned on only manually—not automatically unless the lights had timed-out within the previous 30 seconds.
11. Integral surge protection: Meets ANSI/IEEE Standard C62.41-1980, tested to withstand momentary voltage surges up to 6000V and current surges up to 200A without damage.
12. Furnish and install a completely functioning turnkey system. Include all necessary accessories, programming, settings, commissioning, and testing.
13. Communications and Class 2 low-voltage power connection between LRC and input devices (control stations, sensors, etc.) shall be standard low-voltage UTP Category 5 cabling with RJ45 connectors.

I. Low-Voltage Momentary-Contact Programmable Pushbutton Lighting Control Stations

1. Provide programmable 1-, 2-, 3-, 4-, 5-, 6-. 7-, or 8-button control stations corresponding to each application indicated on the lighting plans and lighting control diagrams, including power enable/disable and dimming controls. "Buttons" may also be provided via an optional touchscreen interface device.
2. Include an LED status indictor integral to each programmable button or a touchscreen status indicator.
3. Include factory-produced symbols etched into each programmable button to indicate its general function, such as on/off, up, down (dimming), etc. Refer to details on the drawings. If an optional touchscreen interface device is provided, labeling and symbols may be programmed on the display.
4. Multiple control stations located within in the same vicinity shall be mounted in a common wall-box with a multi-gang faceplate.
5. Initial Programming: Upon energizing luminaires, each control station shall be programmed to provide basic manual on/off functions (so that no luminaire remains on or off 24/7 without manual control). This initial programming shall be provided prior to the manufacturer's factory-authorized technician performing their official system programming, configuration, startup, and system commissioning services.
6. Communications and Class 2 low-voltage power connection between device and LRC shall be standard low-voltage UTP Category 5 cabling with RJ45 connectors.

J. Network Communication Bridges

1. Device shall surface mount to a standard 4" x 4" square junction box.
2. Device shall have a minimum 4 RJ-45 ports.

3. Device shall be capable of aggregating communication from multiple lighting control zones for purposes of minimizing backbone wiring requirements back to Control Gateway or central head end.
4. Device shall be powered with Class 2 low voltage supplied locally via a directly wired power supply or delivered via a low voltage cabled connection.
5. Device shall be careful of redistributing power from its local supply and connect lighting control zones with excess power to lighting control zones with insufficient local power.

2.2 EMERGENCY LIGHTING SHUNT RELAYS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Entertainment Networks Corp.
2. Electronic Theater Controls, Inc. (ETC)
3. Bodine/Philips
4. Hubbell Building Automation, Inc.
5. Intelligent Lighting Controls, Inc.
6. LVS Controls, Inc.
7. Nine 24, Inc.
8. Watt Stopper
9. Or, where applicable, the same manufacturer as LRC associated with digital lighting management systems (listed above).

B. Description: NC, electrically-held relay in NEMA 1 enclosure, arranged for wiring in parallel with manual or automatic switching contacts; complying with UL 924. Provide with test station integral to relay where ceiling-mounted or in a single-gang box where remote mounting is required.

1. Rated 1000 W at 120 V(ac) and 277 V(ac) for LED lighting.
2. Voltage: Match the circuit voltage.
3. Test Station: LED status indicators (normal/utility power, emergency, test), test button, white faceplate where mounted flush in the ceiling, unless indicated otherwise on the drawings.
4. LED Dimming Applications: Provide 0-10V dimming override feature that forces the control line to “full on” in the emergency bypass mode, unless indicated otherwise on the drawings.

C. Function: The UL-924 device shall control luminaires designated for emergency lighting during both normal and emergency modes by interfacing with associated normal switching means and by monitoring for loss of power to the normal lighting branch circuit. In the event of a power outage, luminaires connected to the emergency branch lighting circuit shall automatically be switched-on regardless of the status or position of associated normal lighting control devices (switches, dimmers, sensors, LRCs, contactors, etc.). Under normal power, the UL-924 device shall mimic the normal switching means, as indicated on the drawings.

2.3 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. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 DELEGATED DESIGN

A. This contract shall include the complete design and application of lighting control systems. Determine all system components, cabling specifications, and programming required for complete and functional operation. If necessary, obtain clarification from Architect/Engineer prior to bidding regarding intent of contract documents.

B. Provide additional quantities and placement of sensors as needed to achieve coverage of area served at actual mounting heights.

C. The wiring methods indicated on the electrical drawings are to indicate design intent only. Approved manufacturer controls products may have different driver and sensor requirements and different wiring methods than what is shown on the electrical drawings. Contractors are required to familiarize themselves with all required wiring, additional part and pieces, required installation labor, etc. to provide for a complete installed system that meets the intent and functionality of the specified system.

D. The Contractor shall provide as part of the shop drawing submittals, complete lighting drawings including all wiring, equipment, equipment locations, etc. for the submitted system.

E. All costs shall be included in the bid for a complete operational system that meets the specified and designed system.

F. Control Intent: Control Intent includes, but is not limited to the following:

1. Defaults and initial calibration settings for such items as time delay, sensitivity, fade rates, etc.
2. Initial sensor and switching zones
3. Initial time switch settings

3.2 EXAMINATION

A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.

B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PRE-INSTALLTION COORDINATION

A. Pre-Submittal Meeting: Prior to submitting shop drawings, the General Contractor shall organize a coordination meeting to discuss the specifics of the lighting control design intent, sequence of operation, and specifics of the selected lighting control system to ensure that all appropriate parties are knowledgeable of the install and to make any last-minute adjustments to the system or sequence of operation. This meeting shall include the lighting designer, General contractor, Division 26 contractor, lighting control system manufacturer (or manufacturer’s representative, and Owner’s representatives.

3.4 INSTALLATION OF WIRING

A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch.

B. Wiring within Enclosures: Separate power-limited and nonpower-limited conductors in accordance with conductor manufacturer's instructions.

C. Size conductors in accordance with lighting control device manufacturer's instructions unless otherwise indicated.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, device, and outlet boxes; terminal cabinets; and equipment enclosures.

E. Include a neutral conductor connected to every “switch point”, such as wall-switch occupancy sensors, in accordance with NEC 404.2(C).

F. Open cabling methods may be utilized above accessible ceilings for Class 2 wiring. All cabling in exposed areas, above inaccessible ceilings, and inside walls shall be installed in raceway.

G. IDENTIFICATION

H. Identify components and power and control wiring in accordance with 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.

I. Label switches and contactors with a unique designation as specified or as indicated on the drawings.

3.5 PROGRAMMING AND DEVICE SETTINGS

A. Manufacturer's Field Service and Commissioning: Engage a factory-authorized service representative to program, configure, test, and adjust components associated with each lighting control system and each lighting control device.

B. Initial Programming: Upon energizing luminaires associated with lighting control stations, each control station shall be programmed to provide basic manual on/off functions (so that no luminaire remains on or off 24/7 without manual control). This initial programming shall be provided prior to the manufacturer's factory-authorized technician performing their official system programming, configuration, startup, and system commissioning services.

3.6 SYSTEM STARTUP AND SYSTEM COMMISSIONING

A. System Startup: Manufacturer's authorized technician shall confirm proper installation and operation of system components.

1. Confirm lighting controls are located, installed, and adjusted as required by the factory and the contract documents for each room.
2. Verify operation of each lighting control device as specified. Measure light levels throughout the room with a grid spacing of no greater than five foot on-center and adjust each photo sensor to confirm uniform light levels in compliance with values listed in the initial footcandle settings listed in the contract documents. Confirm time-delay settings comply with initial time-delay settings listed in the contract documents.
3. Verify lighting controls function as a complete and operational system to meet requirements of the Energy Code and the contract documents.
4. Manufacturer shall submit test documentation for each room including light level grid showing light levels and time delay test results and a written statement verifying that system meets above requirements. Include copy of test reports in the Operation and Maintenance Manual.

B. System Commissioning: Commissioning of lighting control devices and digital lighting management systems shall be as indicated in Section 260800. Manufacturer's certified installer of lighting control systems shall coordinate and assist in all commissioning requirements by third party. Each system and devices shall be fully programmed and functioning as specified prior to commissioning.

C. Factory authorized representative will be available for a pre-wiring meeting to review submittal drawings, recommended wiring practices and programing requirements.

D. Upon completion of the installation, the system shall be commissioned by the manufacturer's factory authorized representative who will verify a complete fully functional system. Provide notice no-less than three weeks prior to a startup visit. Several business days may be required to confirm dates and times.

E. The Division 26 contractor shall provide both the manufacturer's representative and the electrical engineer with ten working days written notice of the system startup and adjustment date.

F. Provide written or computer-generated documentation on the commissioning of the system including room by room description including:

1. System programming (e.g., manual on, auto off, dimming levels, zone switching, etc.).

3.7 FIELD QUALITY CONTROL

A. Tests and Inspections:

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.

B. Nonconforming Work:

1. Lighting control devices will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

C. Prepare test and inspection reports.

3.8 DEMONSTRATION

A. Coordinate demonstration of products and training of Owner's maintenance personnel to adjust, operate, and maintain lighting control devices. Refer to Division 01 Section "Demonstration and Training" for requirements, excluding requirements related to video-recordings. Include in this contract training/demonstration time plus any necessary travel time/expenses.

1. Digital Lighting Management Systems: 2 hours
2. Emergency Lighting Shunt Relays: 0.5 hour.

3.9 MAINTENANCE

A. Software and Firmware Service Agreement: Install and program software upgrades that become available as specified above.

END OF SECTION 260923

SECTION 262416 - PANELBOARDS

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. Lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS

A. ATS: Acceptance testing specification.

B. GFCI: Ground-fault circuit interrupter.

C. GFEP: Ground-fault equipment protection.

D. MCCB: Molded-case circuit breaker.

E. SPD: Surge protective device.

F. VPR: Voltage protection rating.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
2. 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.
2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.

4. Detail bus configuration, current, and voltage ratings.
5. Short-circuit current rating of panelboards and overcurrent protective 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.

1.5 INFORMATIONAL SUBMITTALS

A. Panelboard Schedules: For installation in panelboards Submit final version to match installed conditions and additional loads.

1.6 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.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.7 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 GFEP Types: Two spares for each panelboard.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: ISO 9001 or ISO 9002 certified.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Handle and prepare panelboards for installation according to NEMA PB 1.

1.10 FIELD CONDITIONS

A. Environmental Limitations:

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 23 deg F (minus 5 deg C) to plus 104 deg F (plus 40 deg C).
    b. Altitude: Not exceeding 6600 feet (2000 m).

1.11 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

    1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace SPD that fails in materials or workmanship within specified warranty period.

    1. SPD Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS COMMON REQUIREMENTS

A. 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.

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 PB 1.

D. Comply with NFPA 70.

E. Enclosures: Surface-mounted, dead-front cabinets.

    1. Rated for environmental conditions at installed location.

        a. Indoor Dry and Clean Locations: NEMA 250, Type 1.

    2. Height: 84 inches (2.13 m) maximum.
    3. Finishes:

        a. Panels and Trim: 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.

F. Incoming Mains:

1. Location: Convertible between top and bottom.
2. Main Breaker: Main lug interiors up to 400 amperes shall be field convertible to main breaker.

G. Phase, Neutral, and Ground Buses:

1. Material: Tin-plated aluminum.

   a. Plating shall run entire length of bus.
   b. Bus shall be fully rated the entire length.

2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.

H. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Terminations shall allow use of 75 deg C rated conductors without derating.
3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
4. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.

I. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

1. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.
2. Panelboards and overcurrent protective devices rated above 240 V and less than 600 V shall have short-circuit ratings as shown on Drawings, but not less than 14,000 A rms symmetrical.

2.2 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

B. Mains: Circuit breaker as indicated on plans.

C. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

D. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Provide Arc Energy Reducing Maintenance Switch on any breaker or fusible disconnect switch which can be adjusted 1,200 A or higher per NEC 240.87.

B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents. Circuit breaker types, frame sizes, and functionality shall be as required to meet the overcurrent device selectivity requirements, but not less than as noted below:

1. Thermal-Magnetic Circuit Breakers:

   a. Inverse time-current element for low-level overloads.
   b. Instantaneous magnetic trip element for short circuits.
   c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. Subfeed Circuit Breakers: Vertically mounted.
3. MCCB Features and Accessories:

   a. Standard frame sizes, trip ratings, and number of poles.
   b. Breaker handle indicates tripped status.
   c. UL listed for reverse connection without restrictive line or load ratings.
   d. Lugs: Mechanicalstyle, suitable for number, size, trip ratings, and conductor materials.
   e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
   f. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
   g. Rating Plugs: Three-pole breakers with ampere ratings greater than 150 amperes shall have interchangeable rating plugs or electronic adjustable trip units.
   h. Alarm Switch: Single-pole, normally open contact that actuates only when circuit breaker trips.
   i. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function with other upstream or downstream devices.
   j. Multipole units enclosed in a single housing with a single handle.

2.4 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

2.5 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.

B. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.

D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

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. Comply with NECA 1.

C. Install panelboards and accessories according to NEMA PB 1.1.

D. Equipment Mounting:

1. Attach panelboard to the vertical finished or structural surface behind the panelboard.

E. Mount top of trim 90 inches (2286 mm) above finished floor unless otherwise indicated.

F. Mount panelboard cabinet plumb and rigid without distortion of box.

G. Mount surface-mounted panelboards to steel slotted supports 1-1/4 inch (32 mm) in depth. Orient steel slotted supports vertically.

H.

I. Install overcurrent protective devices and controllers not already factory installed.

1. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.

J. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

K. Install filler plates in unused spaces.

L. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

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 power panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

E. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.4 FIELD QUALITY CONTROL

A. 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.

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:

D.

E.

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA ATS, Paragraph 7.6 Circuit Breakers. Do not perform optional tests. 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.

F. Panelboards will be considered defective if they do not pass tests and inspections.

G. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

3.6 PROTECTION

A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

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. GFCI receptacles, 125 V, 20 A.
2. Tamper-Resistant receptacles
3. Wall plates.
4. Poke-through assemblies.

1.3 DEFINITIONS

A. BAS: Building automation system.

B. EMI: Electromagnetic interference.

C. GFCI: Ground-fault circuit interrupter.

D. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

E. RFI: Radio-frequency interference.

1.4 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.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 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

2.1 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 use.

B. Comply with NFPA 70.

C. RoHS compliant.

D. Comply with NEMA WD 1.

E. 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 requirements in this Section.

F. Devices for Owner-Furnished Equipment:

1. Receptacles: Match plug configurations.

G. 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.

H. Wall Plate Color: For plastic covers, match device color.

I. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

J. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
3. Leviton Mfg. Company Inc. (Leviton).
4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.2 GFCI RECEPTACLES, 125 V, 20 A

A. Duplex GFCI Receptacles, 125 V, 20 A

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Cooper: SGF20
   b. Hubbell: GFRST20_ST (AutoGuardTM)
   c. Leviton: G5362
   d. Pass & Seymour: 2095

2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Type: Feed through.
5. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

B. Tamper-Resistant Duplex GFCI Receptacles, 125 V, 20 A

1. Provide tamper resistant versions of the straight blade receptacles series specified above.
2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Type: Feed through.
5. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.
6. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.

C. Tamper- and Weather-Resistant, GFCI Duplex Receptacles, 125 V, 20 A

1. Provide tamper resistant and weather resistant version of the straight blade receptacles series specified above.
2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Type: Feed through.
5. Standards: Comply with UL 498 and UL 943 Class A.

2.3 WALL PLATES

A. Single Source: Obtain wall plates from same manufacturer of wiring devices.

B. 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 Indoor Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

C. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, thermoplasticwith lockable in-use cover.

2.4 POKE-THROUGH ASSEMBLIES

A. Description: Factory-fabricated and -wired assembly of below-floor junction box with multichanneled, through-floor raceway/firestop unit and detachable matching floor service-outlet assembly.

B. Standards: Comply with scrub water exclusion requirements in UL 514.

C. Service-Outlet Assembly: Flush type with four simplex receptacles and space for four RJ-45 jacks

D. Size: Selected to fit nominal 4-inch (100-mm) cored holes in floor and matched to floor thickness.

E. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.

F. Closure Plug: Arranged to close unused cored openings and reestablish fire rating of floor.

G. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors and a minimum of four, four-pair cables

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. 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 comply with 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. Pigtailing 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.
8. Tighten 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 up, and on horizontally mounted receptacles to the left.

    a. In existing buildings, match the configuration of existing devices.

F. Tamper Resistant Receptacles: Provide as required by the current adopted NEC 406.12. regardless of how receptacles are indicated on the drawings.

G. Wet locations: Provide weatherproof cover plates at exterior and interior wet locations as required by the current adopted NEC whether indicated as such on the drawings or not, in addition to those devices that are specifically denoted on the drawings with a “W” or “WP” to receive weatherproof covers

H. Maintenance Receptacles for HVAC equipment: whether denoted on the drawing or not, provide accessible 125V, 20A, duplex GFCI receptacle located within 25 feet of HVAC equipment per current adopted NEC. Connect to 20 amp general purpose circuit

I. 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.

J. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

3.2 GFCI RECEPTACLES

A. Install non-feed-through GFCI receptacles where protection of downstream receptacles is not required.

B. Provide GFCI receptacles or GFCI breaker as required by NEC 210.8 at the following locations whether denoted on the drawings or not:

1. Within 6-feet of the outside edge of ta sink or other “wet location” applications unless exception is applicable by the most current adopted NEC.
2. Outdoors, including mechanical rooftop units unless exception is applicable by the most current adopted NEC.
3. Other locations as required by the current adopted edition of the NEC

3.3 IDENTIFICATION

A. Comply with Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

B. Tests for Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
3. Using the test plug, verify that the device and its outlet box are securely mounted.
4. 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.

END OF SECTION 262726

SECTION 265100 - LIGHTING

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. LED interior lighting.
2. LED exterior lighting.
3. Exit lighting.
4. Emergency power units—internal or external.
5. Luminaire accessories and support components.

B. Related Requirements:

1. Section 260923 "Lighting Control Systems and Devices" for automatic control of lighting, including controllers/dimmers, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color Rendering Index.

C. Emergency Lighting Unit: A lighting unit with internal or external emergency battery powered supply and the means for controlling and charging the battery and unit operation.

D. EPA: Effective projected area (as it relates to the wind force exerted on an object, in accordance with the standard, AASHTO LTS-5).

E. Fixture: See "Luminaire."

F. IP: International Protection or Ingress Protection Rating.

G. LED: Light-emitting diode.

H. Lumen: Measured delivered output of luminaire.

I. Luminaire: Complete lighting unit, including light source, reflector, integral or remote driver, internal or external emergency power unit, circuitry, lens, diffuser, housing, and accessories.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description, profiles, and dimensions of luminaires.
4. Include data on EPA, cable entrances, materials, dimensions, weight, rated design load, and ultimate strength of individual components.
5. Include finishes for lighting poles and luminaire-supporting devices.
6. Anchor bolts.
7. Manufactured pole foundations.
8. Include emergency lighting units, including batteries and chargers.
9. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
10. Photometric data and adjustment factors based on laboratory tests, complying with IES LM-79 and IES LM-80.

    a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
    b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

11. Use same luminaire designations as indicated on Drawings.

B. Shop Drawings: For nonstandard or custom luminaires

1. Include plans, elevations, sections, unique configurations, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Detail fabrication and assembly of poles and pole accessories.
4. Foundation construction details, including material descriptions, dimensions, anchor bolts, support devices, and calculations, signed and sealed by a professional engineer licensed in the state of installation.
5. Anchor bolt templates keyed to specific poles and certified by manufacturer
6. Include diagrams for power, signal, and control wiring.

C. Finish/Color Samples for Initial Selection or Verification: As specified for specific luminaire types on the Luminaire Schedule for each type of luminaire requiring a custom factory-applied finishes/colors.

1. Include samples of luminaires and accessories involving color and finish selection.

2. Include samples for each type of lighting pole, standard, and luminaire-supporting device and for each color and texture specified.

D. Luminaire Samples for Verification: As specified for specific luminaire types on the Luminaire Schedule.

1. Include samples of luminaires and accessories to verify finish selection.
2. Include samples for each type of lighting pole, standard, and luminaire-supporting device and for each color and texture specified.

1.5 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. Suspended ceiling components.
2. Partitions and millwork that penetrate the ceiling or extend to within 12 inches of the plane of the luminaires.
3. Structural members to which luminaires will be attached.
4. Initial access modules for acoustical tile, including size and locations.
5. Items penetrating finished ceiling, including the following:

a. Air outlets and inlets.
b. Speakers.
c. Sprinklers.
d. Access panels.
e. Ceiling-mounted projectors.

B. Qualification Data: For Installer

C. Product Test Reports: For each type of luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency

D. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires, and lighting systems to include in operation and maintenance manuals.

B. Warranty documents.

C. Field quality control test and inspection reports.

D. Documentation of extra maintenance materials as specified—confirmed and signed by the Owner’s representative.

1.7 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. LED Drivers: **Ten for every 50** of each type and rating installed. Furnish at least one of each type
2. Diffusers and Lenses: One for every 50 of each type and rating installed. Furnish at least one of each type.
3. Globes and Guards: One for every 10 of each type and rating installed. Furnish at least one of each type.

1.8 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications:

1. Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
2. Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.

B. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

C. Mockups: For interior luminaires in room or module mockups, complete with power and control connections.

1. Obtain Architect/Engineer's approval of luminaires in mockups before starting installations.
2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect/Engineer specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. IESNA RP-16-05 Addendum “A”: Industry-standard nomenclature and definitions of lighting terms and lighting technologies, including solid-state (LED) luminaires.

E. UL Compliance: Comply with UL 1598 and listed for wet locations, as specified.

F. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70 and UL 924, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application. Comply with NFPA 101.

G. Source Limitations:

1. Provide luminaires from a single manufacturer for each luminaire type
2. Obtain poles from single manufacturer or producer.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

B. Package aluminum poles for shipping according to ASTM B660.

C. Store poles on decay-resistant skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.

D. Retain factory-applied pole wrappings on metal poles until right before pole installation. Handle poles with web fabric straps.

1.10 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

1. Structural failures, including luminaire support components.
2. Faulty operation of luminaires and accessories.
3. Deterioration or corrosion of metals, metal finishes, color retention, and other materials beyond normal weathering.

B. Battery Warranty Period:

1. Full Warranty: One (1) year.
2. Pro Rata: Nine (9) years.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Characteristics: Comply with AASHTO LTS-6-M.

B. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied according to AASHTO LTS-6-M.

C. Live Load: Single load of 500 lbf (2200 N) distributed according to AASHTO LTS-6-M.

D. Ice Load: Load of 3 lbf/sq. ft. (145 Pa), applied according to AASHTO LTS-6-M for applicable areas on the Ice Load Map.

E. Strength Analysis: For each pole, multiply the actual EPA of luminaires and brackets by a factor of 1.1 to obtain the EPA to be used in pole selection strength analysis.

F. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

G. Ambient Temperature (Indoor Lighting): 5 to 104 deg F (-15 to +40 deg C).

H. Exterior Temperature (Outdoor Lighting): minus 20 to plus 120 deg F (-29 to +50 deg C).

1. Relative Humidity: Zero to 95 percent.

I. Altitude: Sea level to 1000 feet (300 m).

2.2 LUMINAIRE REQUIREMENTS

A. Luminaire Types and Acceptable Manufacturers: As indicated on the Drawings. Refer to the Luminaire Schedule.

1. Model numbers shall not be regarded as complete or entirely accurate. Do not order products based solely on a model number. For each luminaire type, the contractor shall reconcile its description, including options and accessories, with its intended application derived from relevant information conveyed throughout the entirety of contract documents.
2. The manufacturer listed first for each luminaire type shall be regarded as the Basis of Design. Alternative products by other listed manufacturers must be at least equivalent in style, quality, features, and performance to that of the Basis of Design.

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. Factory-Applied Labels: Comply with UL 1598. Include CCT and CRI ratings. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

D. Recessed luminaires shall comply with NEMA LE 4.

E. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

F. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

G. California Title 24 compliant.

H. ENERGY STAR certified.

I. RoHS compliant.

2.3 LED LUMINAIRES

A. Delivered lumen output as indicated on the Luminaire Schedule.

B. IESNA LM-79 compliant, latest edition.

C. IESNA LM-80 compliant, latest edition; 50,000 hours minimum, unless otherwise noted.

D. CRI and CCT as indicated on Luminaire Schedule in accordance with ANSI C78.377.

E. NEMA.SSL-1 compliant for operational characteristics and electrical safety of LED drivers and power supplies. ANSI/NEMA C82.77 compliant for maximum allowable harmonic distortion produced by power supplies/drivers.

F. Power Factor > 0.9, unless noted otherwise.

G. Total Harmonic Distortion (THD) < 20%, unless noted otherwise.

H. Provide integral Type 4 surge protective device (SPD) rated for 10 kA peak surge per UL 1449 standards.

I. Internal or External Type Emergency Power Unit:

1. Self-contained, modular, battery-inverter unit, factory mounted on luminaire, within luminaire body, or remotely, as indicated on the Drawings.
2. Emergency Connection: Operate luminaire continuously at least 90-percent of rated lumen output of luminaire upon loss of normal power. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire ballast.
3. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
4. Battery: Sealed, maintenance-free, nickel-cadmium type.
5. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
6. Remote Test Push-Button and Indicator Light: Visible and accessible without opening luminaire or entering ceiling space. Refer to Drawings.

    a. Tester/indicator shall be contained within a single-gang white faceplate with factory labeling. Faceplate shall be unbreakable thermoplastic.
    b. Mount tester/indicator adjacent to its associated lighting fixture. If the lighting fixture is installed in a suspended grid ceiling, tester/indicator shall be mounted flush and centered in an adjacent ceiling tile.
    c. Furnish and install wiring between emergency lighting unit and tester/indicator in accordance with these specifications and the manufacturer’s instructions.
    d. Tester/indicator light shall not be mounted integral to the lighting fixture. If tester/indicator is furnished integral to the lighting fixture, the lighting fixture shall be regarded as damaged, and shall be replaced by this contractor.

7. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
8. Remote Test: Switch in handheld remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit

triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.

9. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

2.4 EXIT SIGNS

1. General Characteristics: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
2. Internally Lighted Sign:

    a. LED; 100,000 hours minimum rated lamp life.
    b. Provide AC-only non-emergency type (without battery) for exit signs connected to line-voltage emergency power circuit as indicated on the Drawings.
    c. Self-Powered Exit Signs (Battery Type): Provide internal emergency power unit. Refer to the Luminaire Schedule for application.

        1) Integral automatic charger in a self-contained power pack.
        2) Battery: Sealed, maintenance-free, nickel-cadmium type.
        3) Charger: Fully automatic, solid-state type with sealed transfer relay.
        4) Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
        5) LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
        6) Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and flashing red LED.

2.5 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Steel:

1. ASTM A36/A36M for carbon structural steel.
2. ASTM A568/A568M for sheet steel.
3. Epoxy-coated.

C. Stainless Steel:

1. Manufacturer's standard grade.
2. Manufacturer's standard type, ASTM A240/240M.

D. Galvanized Steel: ASTM A653/A653M.

E. Aluminum: ASTM B209. Corrosion-resistant.

F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit servicing without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during servicing and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.

G. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation (UV-stabilized). Lens Thickness: At least 0.125 inch minimum, unless otherwise indicated.

H. Glass Lenses, Diffusers, or Globes: Annealed crystal glass, tempered Fresnel glass, unless otherwise indicated. Acrylic lenses

2.6 FINISHES

A. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Finishes and Color Selections: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping.

1. Finishes/colors to be selected by the Architect/Engineer from the manufacturer’s full range of standard finishes/colors during the review of action submittals, unless the color is specifically indicated on the Luminaire Schedule.
2. If noted on the Luminaire Schedule, provide custom color matching Architect’s color sample or RAL designation.
3. For pole-mounted luminaires, match finish process and color of pole, unless otherwise indicated.

D. Factory-Applied Finish for Aluminum Luminaires and Poles: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20 requirements; and seal aluminum surfaces with clear, hard-coat wax.
3. Class I, Clear-Anodic Finish: AA-M32C22A41 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

4. Class I, Color-Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker), complying with AAMA 611.

E. Factory-Applied Finish for Steel Luminaires and Poles: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.

F. Powder-Coat Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.

1. Surface Preparation: Clean surfaces according to SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair powder coat bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, according to SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
2. Powder Coat: Comply with AAMA 2604. Electrostatic-applied powder coating; single application and cured to a minimum 2.5- to 3.5-mil dry film thickness. Coat interior and exterior of pole for equal corrosion protection

2.7 LUMINAIRE SUPPORT

A. Comply with requirements in 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 steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Wires: ASTM A641/A641M, Class 3, soft temper, zinc-coated steel, 12-gage.

D. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

2.8 LUMINAIRE ACCESSORIES

A. Luminaire-Mounted Photoelectric Relays

1. Comply with UL 773 or UL 773A.

2. Contact Relays: Factory mounted, single throw, designed to fail in the on position, and factory set to turn light unit on at 1.5 to 3 fc (16 to 32 lx) and off at 4.5 to 10 fc (48 to 108 lx) with 15-second minimum time delay. Relay shall have directional lens in front of photocell to prevent artificial light sources from causing false turnoff.

    a. Relay with locking-type receptacle shall comply with ANSI C136.10.
    b. Adjustable window slide for adjusting on-off set points.

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. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.

C. Examine walls, roofs, canopy ceilings, and overhang ceilings for suitable conditions where luminaires will be installed.

D. Examine poles, luminaire-mounting devices, and pole accessories before installation. Components that are scratched, dented, marred, wet, moisture damaged, or visibly damaged are considered defective.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

A. If approved by the Architect/Engineer, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting.

3.3 INSTALLATION

A. Comply with NECA 1.

B. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

C. Coordinate layout and installation of luminaires with other construction. Do not modify layout or locations of luminaires without documented approval to do so, unless indicated otherwise on the Drawings.

D. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

E. Adjust luminaires that require field adjustment or aiming to provide optimum illumination. Coordinate and confirm final adjustments with Owner.

F. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

G. Fasten luminaire to structural support.

H. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and servicing.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

I. Flush-Mounted Luminaires:

1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

J. Wall-Mounted Luminaires:

1. Attached to structural members in walls or a minimum 20-gauge or 1/8-inch thick backing plate attached to wall structural members.
2. Attached using through bolts and backing plates on either side of wall as recommended by luminaire manufacturer.
3. Do not attach luminaires directly to gypsum board.

K. Suspended Luminaires:

1. Pendant mount, where indicated, minimum 5/32-inch-diameter aircraft cable supports, adjustable, and quantity of supports as indicated or as recommended by luminaire manufacturer, whichever is greater.
2. Hook mount, where applicable.
3. Rods: Where longer than 48 inches, brace to limit swinging.
4. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
5. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and tubing or rod or wire support as indicated for suspension for each unit length of luminaire chassis, including one at each end.
6. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

L. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.

2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.
3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

M. Ground-Mounted Luminaires and Bollard Luminaires:

1. Install on concrete base with top 4 inches above finished grade or surface at luminaire location. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified under Division 03.

3.4 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch-thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.6 FIELD QUALITY CONTROL

A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.

B. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Verify settings, programming, functions, and operation of components integral to the luminaire, whether dimming drivers, integral presence sensors, or photoelectric sensors—in addition to other control systems specified in Section 260923 “Lighting Control Systems and Devices.”
3. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
4. Inspect luminaires and poles for nicks, mars, dents, scratches, and other damage.

C. Illumination Tests for Exterior Lighting:

1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IES testing guide(s):

a. IES LM-5.

b. IES LM-50.
c. IES LM-52.
d. IES LM-64.
e. IES LM-72.

D. Luminaire will be considered defective if it does not pass operation tests and inspections.

E. 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.

3.7 STARTUP AND SYSTEMS COMMISSIONING

A. Comply with requirements for startup and system commissioning specified in Section 260923 "Lighting Control Systems and Devices."

B. Emergency Power Units and Exit Signs: Charge batteries and depress switch to conduct short-duration test.

3.8 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two (2) visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.

1. During adjustment visits, inspect all luminaires. Replace LED boards or luminaires that are defective.
2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
3. Adjust the aim of luminaires in the presence of the Architect/Engineer.

B. CLEANING

1. Thoroughly clean each installed luminaire within one month of substantial completion.

END OF SECTION 265100

SECTION 270005 – SPECIAL CONDITIONS FOR COMMUNICATIONS SYSTEMS

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.

B. The latest edition (revision) of the Fashion Institute of Technology Telecommunications Standard(s).

1.2 SUMMARY

A. Section Includes:

1. Communications equipment coordination and installation.
2. Common communications installation requirements.

1.3 ABBREVIATIONS AND DEFINITIONS

A. Coordinate abbreviations listed here with abbreviations indicated on drawings. Bring any possible discrepancies to the attention of the Architect/Engineer/Designer for determination of which applies to which condition(s)

B. AASHTO: American association of State Highway and Transportation Officials.

C. AHJ: the Authority Having Jurisdiction.

D. ASTM: ASTM International, formerly known as American Society for Testing and Materials.

E. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.

F. BBC: Bonding Backbone Conductor, also commonly referred to as a BCT, Bonding Conductor for Telecommunications.

G. BICSI: Building Industry Consulting Service International.

H. Cable Runway: Also referred to as “Cable Ladder,” a relatively flat fabricated structure consisting of two longitudinal side rails (typically 1” to 1-1/2” high) connected by transverse members (typically 1” to 1-1/2” wide.)

I. Cable Tray: A “generic” term commonly referring to Basket Tray, Channel Cable Tray, Ladder Cable Tray, and/or Cable Runway.

J. Channel Cable Tray, also referred to as “Cable Channel”: A fabricated structure consisting of a one-piece, ventilated-bottom or solid-bottom channel.

K. Consolidation Point: A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways.

L. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

M. EMI: Electromagnetic interference.

N. EPDM: Ethylene-propylene-diene terpolymer rubber.

O. Ground(ing): more appropriately “Bonding” (or earthing), connecting metallic items together to reduce voltage potential to reduce injury and/or damage.

P. IDC: Insulation displacement connector.

Q. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails (typically 3” to 6” high) connected by individual transverse members (“rungs” typically 1” to 1-3/4” in diameter).

R. LAN: Local area network.

S. MUTOA: Multiuser telecommunications outlet assembly, a grouping in one location of several telecommunications outlet/connectors.

T. NBR: Acrylonitrile-butadiene rubber.

U. NEMA: National Electrical Manufacturers Association.

V. NRTL: Nationally Recognized Testing Laboratory: A testing and labeling laboratory acceptable to the Authority Having Jurisdiction (examples include U.L and ETL)

W. OSP: Outside Plant

X. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.

Y. PBB: Primary Bonding Busbar, also commonly referred to as the TMGB, Telecommunications Main Grounding Bar.

Z. RCDD: Registered Communications Distribution Designer.

AA. SBB: Secondary Bonding Bar, also commonly referred to as the TGB, Telecommunications Ground Bar.

BB. Solid-Bottom (Nonventilated) Cable Tray: A fabricated structure consisting of longitudinal side rails and a bottom without ventilation openings.

CC. Trough (Ventilated Cable Tray): A fabricated structure consisting of longitudinal side rails and a bottom having openings for the passage of air.

DD. U.L.: Underwriter's Laboratories, Inc.

EE. UTP: Unshielded twisted pair.

FF. WAN: Wide Area Network.

1.4 STANDARDS, REFERENCED IN VARIOUS DIVISION 27 DOCUMENTS:

A. Building Code and Edition noted in Codes Section of Documents

B. Electrical Code and Edition referenced in Codes Section of Documents.

C. ANSI/BICSI 001-2017, Information and Communication Technology Systems Design and Implementation Best Practices for Educational Institutions and Facilities

D. ANSI/BICSI 002-2019, Data Center Design and Implementation Best Practices

E. ANSI/BICSI 004-2018, Communication Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities

F. ANSI/BICSI 007-2017- Information Communication Technology Design and Implementation Practices for Intelligent Buildings and Premises

G. ANSI/BICSI 008-2018 - Wireless Local Area Network (WLAN) Systems Design and Implementation Best Practices

H. ANSI/BICSI N1-2019: Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure

I. ANSI/BICSI N2-17: Installation of Telecommunications and ICT Cabling to Support Remote Power Applications

J. ANSI/BICSI N3-20: Planning and Installation Methods for the Bonding and Grounding of Telecommunications and ICT Systems and Infrastructure

K. ANSI/TIA-568.0-E Generic Telecommunications Cabling for Customer Premises

L. ANSI/TIA-568.1-E Commercial Building Telecommunications Cabling Standard

M. ANSI/TIA-568.2-D Balanced Twisted-Pair Telecommunications Cabling and Components Standards

N. ANSI/TIA-569-E, Telecommunications Pathways and Spaces.

O. ANSI/TIA-606-D, Administration Standard for Commercial Telecommunications Infrastructure.

P. ANSI/TIA-607-D, Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises

Q. ANSI/TIA TSB-162-B Telecommunications Cabling Guidelines for Wireless Access Points

R. ANSI/TIA-862-B, Structured Cabling Infrastructure Standard For Intelligent Building Systems

S. ANSI/TIA-942-D, Data Center Cabling

T. ANSI/TIA-1005-A, Telecommunications Infrastructure Standard for Industrial Premises

U. ANSI/TIA-1152-A, Requirements for Field Test Instruments and Measurements for Balanced Twisted Pair Cabling

V. ANSI/TIA-1179-B, Healthcare Facility Telecommunications Infrastructure Standard

W. ANSI/TIA-5017, Telecommunications Physical Network Security

X. BICSI; Telecommunications Distribution Methods Manual (TDMM), 14th Edition

Y. BICSI; Information Technology Systems Installation Methods Manual (ITSIMM), 8th Edition

Z. NESC: National Electrical Safety Code.

AA. TIA TSB-184-A Power Delivery (4-pair)

1.5 SUBMITTALS

A. Current Certifications for:

1. Installation Supervisor.
2. Installer(s).
3. Testing Supervisor.
4. Installer(s) as a “Manufacturer’s Certified Contractor.”

B. Firm demonstration of a minimum of 5 years’ experience installing structured cabling of the same or similar type and occupancy.

C. Reference list of 5 previous successful projects of similar size and scope including:

1. Name of project
2. Location of Project.
3. Description of work.
4. Time of Completion.
5. Clint’s name (an individual) as reference.
6. Contact information of Refence.

1.6 COORDINATION

A. Coordinate arrangement, mounting, and support of communications 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 pathways, 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 communications 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

2.1 REFER TO OTHER DIVISION 27 SPECIFICATIONS FOR SPECIFIC PRODUCT REQUIREMENTS

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR COMMUNICATIONS INSTALLATION

A. Comply with NECA 1.

B. 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.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both communications equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

D. Right of Way: Give way to piping systems installed at a required slope.

3.2 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for communications installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 270005

SECTION 270526 – INTERIOR PATHWAYS FOR COMMUNICATIONS SYSTEMS

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. Metal conduits and fittings.
2. Metal wireways and auxiliary gutters.
3. Boxes, enclosures, and cabinets.

B. Related Requirements:

1. Section 260533 "Raceways and Boxes for Electrical Systems" for conduits, wireways, surface raceways, boxes, enclosures, cabinets, handholes, and faceplate adapters serving electrical systems.
2. Section 270005 “Special Conditions for Communications Systems”

1.3 DEFINITIONS

A. Refer to Section 270005 “Special Conditions for Communications Systems” and drawings for definitions and abbreviations.

1.4 ACTION SUBMITTALS

A. Product Data: For surface pathways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. LEED Submittals:

1. Laboratory Test Reports for Credit IEQ 4: For solvent cements and adhesive primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

D. Samples: For wireways, nonmetallic wireways and surface pathways and for each color and texture for final color/texture selection by Architect. Samples to be 12 inches (300 mm) long.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Pathway 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 pathway groups with common supports.
2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Provide products in compliance with Division 26 Specifications and this section.

B. General Requirements for Metal Conduits and Fittings:

1. Listed and labeled as defined in NFPA 70, by a NRTL, and marked for intended location and application.
2. Comply with TIA-569.

2.2 METAL WIREWAYS AND AUXILIARY GUTTERS

A. 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:

1. Cooper B-Line, Inc.
2. Hoffman; a Pentair company.
3. Mono-Systems, Inc.
4. Square D; a brand of Schneider Electric.

B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 or Type 4X as described in Part 3 or as otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed Type 4X and labeled as defined in NFPA 70, by a NRTL, and marked for intended location and application.
2. Comply with TIA-569.

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. Wireway Covers: Hinged, flanged-and-gasketed type unless otherwise indicated.

E. Finish: Manufacturer's standard enamel finish.

2.3 BOXES, ENCLOSURES, AND CABINETS

A. General Requirements for Boxes, Enclosures, and Cabinets:

1. Comply with Division 26 Specifications for electrical conditions for boxes, enclosures and cabinets.
2. Comply with TIA-569-B.
3. Boxes, enclosures and cabinets installed in wet locations shall be listed as NEMA 4X.

B. Device Box Dimensions: minimum size of 4-11/16 inches square by 2-1/2 inches deep (120 mm square by 65 mm deep).

C. Gangable boxes are prohibited.

D. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 or Type 4X as noted with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures:

a. Material: Fiberglass.
b. Finished inside with radio-frequency-resistant paint.

E. Fire Rated poke-through(s): Complying with UL fire rating for drilled hole insertion flush in the floor.

1. Legrand Evolution Series: 8AT Series.
2. Round “flush” 9-1/4 inch diameter die-cast aluminum cover assembly with sliding cable doors, finish to be selected by the Architect.
3. Power receptacle insert: Provide one power insert per poke-through, Catalog No. 68REC, with two 20 amp, 125 volt power receptacles.
4. Data Jack mounting plate: Provide one data jack mounting plate per poke through, Catalog No. 682A, with two data jacks as described in the Cabling Section and drawings.
5. AV mounting plates: Provide three Decora Device mounting plates per poke-through, Catalog No. 8DEC. Provide blank covers for unused openings, quantity of 1 per poke-through.

F. Cabinets:

1. NEMA 250, Type 1 except as noted, 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.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.1 PATHWAY APPLICATION

A. Indoors: Apply pathway 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 or IMC. Pathway locations include the following:

   a. Loading dock.
   b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
   c. Mechanical rooms.
   d. Gymnasiums

4. Concealed in Ceilings and Interior Walls and Partitions: EMT, except as noted on drawings.
5. Damp or Wet Locations: GRC or IMC, except as noted on drawings.
6. Pathways for Optical-Fiber or Communications Cable in Spaces Used for Environmental Air: Plenum-type, optical-fiber-cable pathway or EMT.
7. Pathways for Optical-Fiber or Communications-Cable Risers in Vertical Shafts: Riser-type, optical-fiber-cable pathway or EMT.
8. Boxes and Enclosures: NEMA 250 Type 1, except use NEMA 250 Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

B. Minimum Pathway Size, unless noted otherwise: 1-1/4 inch (32-mm) trade size. Minimum size.

C. Pathway Fittings: Compatible with pathways 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 or compression, steel fittings. Comply with NEMA FB 2.10.

D. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

E. Install surface pathways only where indicated on Drawings.

F. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 INSTALLATION

A. Comply with NECA 1, NECA 101, and TIA-569-B for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum pathways. Comply with NFPA 70 limitations for types of pathways allowed in specific occupancies and number of floors.

B. Keep pathways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and below steam piping.

C. Complete pathway 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 two 90-degree bends in any pathway run. Support within 12 inches (300 mm) of changes in direction. Utilize long radius ells for all optical-fiber cables.

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. Pathways 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 pathways to reinforcement at maximum 10-foot (3-m) intervals.
2. Arrange pathways to cross building expansion joints at right angles with expansion fittings.
3. Arrange pathways 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 RNC to GRC or IMC before rising above floor.

J. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for pathways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

K. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of pathway and fittings before making up joints. Follow compound manufacturer's written instructions.

L. Coat field-cut threads on PVC-coated pathway with a corrosion-preventing conductive compound prior to assembly.

M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install insulated bushings on conduits terminated with locknuts.

N. Install pathways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

P. Cut conduit perpendicular to the length. For conduits of 2-inch (53-mm) trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.

Q. Install pull wires in empty pathways. 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 pathways designated as spare above grade alongside pathways in use.

R. Surface Pathways:

1. Install surface pathway for surface telecommunications outlet boxes only where indicated on Drawings.
2. Install surface pathway with a minimum 2-inch (50-mm) radius control at bend points.
3. Secure surface pathway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight pathway section. Support surface pathway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

S. Pathways for Optical-Fiber and Communications Cable: Install pathways, metal and nonmetallic, rigid and flexible, as follows:

1. 1-Inch (25-mm) Trade Size and Smaller: Install pathways in maximum lengths of 50 feet (15 m).
2. 1 1/4-Inch (32-mm) Trade Size and Larger: Install pathways in maximum lengths of 75 feet (23 m).
3. Install with a maximum of two 90-degree bends or equivalent for each length of pathway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

T. Install pathway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed pathways, 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 pathway sealing fittings according to NFPA 70.

U. Install devices to seal pathway 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 pathways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.

2. Where an underground service pathway enters a building or structure.
3. Where otherwise required by NFPA 70.

V. Comply with manufacturer's written instructions for solvent welding PVC conduit and fittings.

W. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C), and that has straight-run length that exceeds 25 feet (7.6 m). Install in each run of aboveground RMC[and EMT] conduit that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

   a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
   b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
   c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
   d. Attics: 135 deg F (75 deg C) temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

X. 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 match Div 26 boxes, unless specifically noted otherwise.

Y. 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 surface to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

Z. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

AA. 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.

BB. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

CC. Set metal floor boxes level and flush with finished floor surface.

DD. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR COMMUNICATIONS PENETRATIONS

A. Install sleeves where cables penetrate interior walls and floor. Provide conduit support for all sleeves greater than (1) sleeve and all sleeves over 2 inch diameter.

B. Provide bushings on both ends of sleeves, prior to installation of cabling."

C. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Provide mechanical conduit seals to eliminate liquid entry.

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage or 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 270526

SECTION 271510 - COMMUNICATIONS CABLING CAT6

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. UTP cable.
2. Cable connecting hardware, patch panels, and cross-connects.
3. Telecommunications outlet/connectors.

B. Related Sections:

1. Specification Section 270005 – Special Conditions for Division 27 for special conditions applicable to the furnishing and Installation of Division 27 systems.

1.3 DEFINITIONS

A. Refer to Specification Section 270005 and drawings for abbreviations and definitions.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Category cabling system shall comply with transmission standards in TIA/EIA-568, when tested according to test procedures of the standard.

B. All cabling, since it is connecting to the existing FIT infrastructure shall be provided in accordance with these specifications by Linear Tech. the Linear Tech contact is Edgar.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:

1. System Labeling Schedules: Example of labeling schedules.
2. Cabling administration drawings indicating proposed cable routings and termination locations.

3. Cross-connects and patch panels. Detail mounting assemblies and show elevations and physical relationship between the installed components.

C. Samples: For workstation outlets, jacks, jack assemblies, in specified finish, one for each size and outlet configuration complete in faceplates for color selection and review of technical features.

D. Sample of "Field quality-control reports."

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings, Cabling Administration Drawings, and field-testing program development by an RCDD.
2. Installation Supervision: Installation shall be under the direct supervision of a Registered Technician or Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency and compliance to Electrical Code classification as plenum, riser or general use as appropriate and allowed for this project.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive and store cables in accordance with manufacturer's requirements and recommendations.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at levels in accordance with manufacturer's requirements and recommendations.

1.9 COORDINATION

A. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.

1.10 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Patch-Panel Units: One of each type.
2. Connecting Blocks: One of each type.
3. Device Plates: One of each type.
4. Multiuser Telecommunications Outlet Assemblies: One of each type.

PART 2 - PRODUCTS

2.1 UTP CABLE – INDOOR PLENUM

A. Suppliers: Subject to compliance with requirements, provide products by one of the following:

1. GM Data for Category Cable moves adds and changes.
2. Converge One for WAP moves adds and changes.

B. Description: 100-ohm, 8-conductor (formed into 4-pairs) UTP, Category 6 covered with an overall jacket.

1. Conductors to be 23 AWG solid copper.
2. Comply with ICEA S-90-661 for mechanical properties.
3. Comply with TIA/EIA-568 for Category 6 performance requirements.
4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, NFPA 70, and NFPA 262 as Plenum Rated: CMP.
5. Capable of PoE Types 1, 2, 3 and 4 (90 watt minimum).
6. Jacket color(s) as noted on the drawings.

2.2 UTP CABLE HARDWARE

A. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of Category 6 or higher.

B. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors or modular punch with matching jack for permanent termination of installed cables.

1. Number of Jacks per Field: One for each UTP cable minimum.

C. Faceplate Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.

1. Jack color(s) as noted on drawings.

D. Patch Cords: Factory-made, four-pair cables in 36-inch (900 mm), 48-inch (1200-mm), 72-inch (1800 mm) and 120-inch (3000 mm); 50% of horizontal cables installed of each length for a total to match the twice the number of installed horizontal cables; all terminated with eight-position modular plug at each end.

1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.
2. Patch cords shall be color coded and have color-coded boots for circuit identification.

2.3 TELECOMMUNICATIONS OUTLET/CONNECTORS

A. Jacks: Category 6 (or higher) 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568.

B. Workstation Outlets: Number of ports as indicated on the drawings; connector assemblies mounted in furniture of faceplate(s) as indicated on the drawings.

1. Faceplates:
2. Stainless Steel (polished, brushed, or painted as noted),
3. Brass,
4. High-impact plastic, (to match the electrical devices in the same area).
5. Coordinate color with Architect and Division 26 Section "Wiring Devices."
6. For use with snap-in jacks accommodating any combination of UTP, optical fiber, Audio Video and coaxial connectors.
7. Legend: Snap-in, clear-label covers and machine-printed paper inserts.

2.4 GROUNDING

A. Comply with ANSI-J-STD-607.

2.5 IDENTIFICATION PRODUCTS

A. Comply with requirements in Division 27 Section "Identification for Communications Systems."

PART 3 - EXECUTION

3.1 WIRING METHODS

A. Wiring Method: Install cables in raceways and cable trays except as noted on the drawings. Conceal cables except in unfinished spaces and as specifically noted.

1. Install plenum cable in environmental air spaces, including plenum ceilings.
2. Comply with requirements for raceways and boxes specified in Division 27 Section "Pathways for Communications Systems."

B. Wiring Method:

1. Conceal conductors and cables in accessible ceilings, walls, and floors.
2. Where cables are exposed, including in cable tray, cables shall be enclosed in inner duct or shielded with solid bottom tray panels.

C. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.2 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

1. Comply with TIA/EIA-568.
2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
3. MUTOA shall not be used as a cross-connect point.
4. Consolidation points may be used only as indicated on drawings:
5. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
6. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
7. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
8. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.
9. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
10. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
11. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
12. In the communications equipment room, install a 10-foot- (3-m-) long service loop and at the “Workstation” end provide a 3-foot (1-m) service loop.
13. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend UTP cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1524 mm) apart.

3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

D. Installation of Cable Routed Exposed under Raised Floors:

1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.
3. Coil cable 6 feet (1800 mm) long not less than 12 inches (300 mm) in diameter below each feed point.

E. Installation of Cable Routed Outdoors and In/under Slab on Grade Floors:

1. Install Indoor/outdoor rated cable only.

F. Group connecting hardware for cables into separate logical fields.

G. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA/EIA-569 for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:

   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:

   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).

4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:

   a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).

5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.3 FIRESTOPPING

A. Comply with requirements in Division 07 Section "Penetration Firestopping."

B. Comply with TIA/EIA-569, Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.4 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with ANSI-J-STD-607.

3.5 IDENTIFICATION

A. Comply with requirements for identification specified in Division 27 Section "Identification for Communications Systems."

1. Administration Class: 4.
2. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.

B. Using a digital method, develop Cabling Administration Drawings and Schedules for system identification, testing, and management. Use unique, alphanumeric designation in accordance with Client Requirements for each cable. Label all cable, jacks, connectors, and terminals to which a cable connects with same designation.

C. Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

D. Paint and label colors for equipment identification shall comply with TIA/EIA-606 for Class 4 level of administration, including optional identification requirements of this standard.

E. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606. Furnish electronic record of all drawings, in software and format selected by Owner.

F. Cable and Wire Identification:

1. Label each cable within 4 inches (100 mm) of each termination, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
3. Label each terminal strip and screw terminal in each cabinet, rack, or panel.

   a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
   b. Label each unit and field within distribution racks and frames.

4. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

G. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606.

1. Use flexible vinyl or polyester on cables that flex as cables are bent.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Visually inspect UTP cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568.
2. Visually confirm specified Category marking of outlets, cover plates, outlet/connectors, and patch panels.
3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
4. UTP Performance Tests:

   a. Test for each outlet. Perform the following tests according to TIA/EIA-568:

      1) Wire map.
      2) Length (physical vs. electrical, and comparison to length requirements).
      3) Insertion loss.
      4) Near-end crosstalk (NEXT) loss.
      5) Power sum near-end crosstalk (PSNEXT) loss.
      6) Equal-level far-end crosstalk (ELFEXT).

7) Power sum equal-level far-end crosstalk (PSELFEXT).
8) Return loss.
9) Propagation delay.
10) Delay skew.

5. As ports are subjected to a “final performance verification tests after the complete communications cabling and workstation outlet/connectors are installed.

   a. Voice Tests: These tests assume that dial tone service has been installed. And test connection to a network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, making and receiving a local, long distance, and digital subscription line telephone call. Repair or replace any cable that fails.
   b. Data Tests: These tests assume the Information Technology Staff has a network installed and is available to test. Connecting to the network interface device at the demarcation point. Logging onto the network and ensuring proper connection to the network. Repair/replace all cables that fail final testing.

C. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as a program native file, a text files, and printed and submitted in all three forms.

D. End-to-end cabling will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets.

END OF SECTION 271510

SECTION 280005 – SPECIAL CONDITIONS FOR SAFETY AND SECURITY SYSTEMS

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. Safety and Security equipment coordination and installation.
2. Common safety and security installation requirements.

1.3 ABBREVIATIONS AND DEFINITIONS

A. Coordinate abbreviations listed here with abbreviations indicated on drawings. Bring any possible discrepancies to the attention of the Architect/Engineer/Designer for determination of which applies to which condition(s).

B. AASHTO: American association of State Highway and Transportation Officials.

C. ADA (ADAG): Americans with Disabilities Act.

D. AHJ: the Authority Having Jurisdiction.

E. ASTM: ASTM International, formerly known as American Society for Testing and Materials.

F. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.

G. BHMA: Builders Hardware Manufacturers' Association.

H. EMI: Electromagnetic interference.

I. ETL: Electrical Testing Laboratories, a division of Intertek Testing Laboratories.

J. Ground(ing): more appropriately "Bonding" (or earthing), connecting metallic items together to reduce voltage potential to reduce injury and/or damage.

K. IEC: International Electrotechnical Commission.

L. IEEE: Institute of Electrical and Electronics Engineers.

M. ISO: International Standards Organization.

N. LAN: Local area network.

O. NEMA: National Electrical Manufacturers Association.

P. NFPA: National Fire Protection Association.

Q. NRTL: Nationally Recognized Testing Laboratory: A testing and labeling laboratory acceptable to the Authority Having Jurisdiction (examples include U.L and ETL)

R. OSP: Outside Plant

S. SIA: Security Industry Association

T. U.L.: Underwriter's Laboratories, Inc.

U. UTP: Unshielded twisted pair.

V. WAN: Wide Area Network.

1.4 STANDARDS, REFERENCED IN VARIOUS DIVISION 28 DOCUMENTS:

A. Client Standard and Requirements.

B. Electrical Code and Edition referenced in Codes Section of Documents.

C. AG-01, Architectural Graphics for Security Standard.

D. ANSI/SIA CP-01-2019. Control Panel Standard – Features for False Alarm Reduction.

E. ANSI/SIA MSD-01-2000, Mobile Security Devices Standard – Monitoring Practices for False Dispatch Prevention.

F. ANSI/SIA OSIPS-01:2008, Open Systems Integration and Performance Standards – Framework.

G. ANSI/SIA OSIPS-DVI-01:2008, Open, Systems Integration and Performance Standards – Digital Video Interface Data Model.

H. ANSI/SIA PIR-01-2000, Passive Infrared Motion Detector Standard – Features for Enhancing False Alarm Immunity Standard.

I. ANSI/TIA-1179-B, Healthcare Facility Telecommunications Infrastructure Standard

J. ANSI/TIA-5017, Telecommunications Physical Network Security

K. BICSI; Telecommunications Distribution Methods Manual (TDMM), 14th Edition

L. BICSI; Information Technology Systems Installation Methods Manual (ITSIMM), 8th Edition

M. DC-01-1988 (R2001.04), DCS Computer Interface (CIS-1) Technical Report.DC-02-1992.02 (R2000.05), DCS Generic Protocols Technical Report.

N. DC-03-2017, DCS SIA Format Standard.

O. DC-04-2000.05, DCS SIA 2000 Standard.

P. DC-05-2016-DCS Ademco, Ademco Contact ID Protocol – Alarm System Communications.

Q. DC-07-2001.04, Receiver-to-Computer Interface Protocol (Type2) – for Central Station Equipment Communications.

R. DC-09-2021, SIA DCS-Internet Protocol Event Reporting.

S. GB-01-2014, Acoustic Glass break Detector Standard – Features for Optimizing False Alarm Reduction and Detection.

T. GB-02-2014, Acoustic Glass break Sensor.

U. ISO/IEC 14443-3:2011 – Identification Cards.

V. NESC: National Electrical Safety Code.

W. OSDP v2.2, Open Supervised Device Protocol Standard Version 2.2.

X. OSDP v2.17, Open Supervised Device Protocol Standard Version 2.1.7.

Y. SIA AC-01-1996.10, Access Control Standard Protocol for the 26-BIT Wiegand Reader Interface.

Z. SIA AC-03-2000.06, Access Control Guideline – Dye Sublimation Printing practices for PVC Access Control Cards.

AA. SAI AV-01-2014, Protocol for Audio Verification and Two-Way Voice – Monitoring Service Command Set.

BB. SAI BIO-01-1993.02 (R2000.06), Biometric Standard – Vocabulary for Testing.

CC. SIA PID-01-1995.12 (2000.06), SIA Point Identification Multiplex Protocol – Security and Life Safety Applications – Addressable.

DD. SIA RF-01-2014, On-Premises RF Products – Technical Report – Terminology for Use in Specifying Product Parameters.

EE. SIA TVAC-01-2001.04, CCTV to Access Control Standard – Message Set for System Integration.

FF. UL 294, Standard for Access Control System Units.

1.5 SUBMITTALS

A. Current Certifications for:

1. Installation Supervisor.
2. Installer(s).
3. Testing Supervisor.
4. Installer(s) as a “Manufacturer’s Certified Contractor.”

B. Firm demonstration of a minimum of 5 years’ experience installing security systems of the same or similar type and occupancy.

C. Reference list of 5 previous successful projects of similar size and scope including:

1. Name of project
2. Location of Project.
3. Description of work.
4. Time of Completion.
5. Clint’s name (an individual) as reference.
6. Contact information of Refence.

1.6 COORDINATION

A. Coordinate arrangement, mounting, and support of security system 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 pathways, 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 communications 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

2.1 REFER TO OTHER DIVISION 27 SPECIFICATIONS FOR SPECIFIC PRODUCT REQUIREMENTS

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR COMMUNICATIONS INSTALLATION

A. Comply with NECA 1.

B. 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.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both communications equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

D. Right of Way: Give way to piping systems installed at a required slope.

E. Code and Standards Compliance: All work of this division shall be in accordance with the referenced codes and standards.

3.2 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for communications installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 280005

SECTION 280513 - CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY

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.

B. Division 27 - Specifications for Communications Cabling

C. Division 27- Specifications for Communications Grounding and Bonding

D. Division 28 - Special Conditions for Safety and Security Systems.

E. Division 28 - Pathways for Electronic Safety and Security

1.2 SUMMARY

A. Section Includes:

1. RS-232 cabling.
2. RS-485 cabling.
3. Low-voltage control cabling.
4. Control-circuit conductors.
5. Fire alarm wire and cable.
6. Identification products.

1.3 DEFINITIONS AND STANDARDS

A. Refer to Section 280005, Special Conditions for Safety and Security Systems.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, receive and store cables on site in accordance with manufacturer’s recommendations.

1.7 FIELD CONDITIONS

A. Do not install conductors and cables that are wet, moisture damaged, or mold damaged.

1. Indications that wire and cables are wet or moisture damaged include, but are not limited to, discoloration and sagging of factory packing materials.

B. Environmental Limitations: Do not deliver or cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at manufacturer's recommended environmental levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: All cable, except fire rated cables, shall be Plenum rated; and tested by a NRTL. Identify products with appropriate markings of applicable testing agency.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a NRTL, and marked for intended location and application.

2.2 UTP CABLE

A. UTP cable shall comply with Division 27 Specifications.

2.3 UTP CABLE HARDWARE

A. UTP Cable hardware shall comply with Division 27 Specifications.

2.4 OPTICAL FIBER CABLE

A. Optical fiber cable shall comply with Division 27 Specifications.

2.5 RS-485 CABLE

A. Plenum-Rated Cable: NFPA 70, Type CMP.

1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. Flame Resistance: NFPA 262, Flame Test.

2.6 LOW-VOLTAGE CONTROL CABLE

A. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.

1. One pair, twisted, No. 16 AWG, stranded (19x29) and No. 18 AWG, stranded (19x30) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with NFPA 262.

2.7 COMPOSITE ACCESS CONTROL CABLE – WEIGAND CONNECTION

A. Plenum-Rated, Jacketed Cable: NFPA 70, Type CMP.

1. One pair, twisted, No. 22 AWG, shielded, tinned copper conductors, white jacket.
2. Four conductor, No. 18 AWG, shielded, tinned copper conductors, gray jacket.
3. Four conductor, No. 22 AWG, shielded, tinned copper conductors, blue jacket.
4. Three pair, twisted, No. 22 AWG, shielded, tinned copper conductors, orange jacket.
5. No overall shield.
6. Overall CMP rated jacket
7. Flame Resistance: Comply with NFPA 262.

B. Plenum-Rated, Un-jacketed Cable: NFPA 70, Type CMP.

1. One pair, twisted, No. 22 AWG, shielded, tinned copper conductors, white jacket.
2. Four conductor, No. 18 AWG, shielded, tinned copper conductors, gray jacket.
3. Four conductor, No. 22 AWG, shielded, tinned copper conductors, blue jacket.
4. Three pair, twisted, No. 22 AWG, shielded, tinned copper conductors, orange jacket.
5. No overall shield.
6. Bundled but unjacketed
7. Flame Resistance: Comply with NFPA 262.

2.8 COMPOSITE ACCESS CONTROL CABLE – OSDP CONNECTION

A. Plenum-Rated, Jacketed Cable: NFPA 70, Type CMP.

1. One pair, twisted, No. 24, shielded & one pair #18 AWG, tinned copper conductors, orange jacket.
2. Four conductor, No. 18 AWG, shielded, tinned copper conductors, gray jacket.
3. Four conductor, No. 22 AWG, shielded, tinned copper conductors, blue jacket.
4. One pair, twisted, No. 22 AWG, shielded, tinned copper conductors, white jacket.
5. No overall shield.
6. Overall CMP rated jacket
7. Flame Resistance: Comply with NFPA 262.

B. Plenum-Rated, Un-jacketed Cable: NFPA 70, Type CMP.

1. One pair, twisted, No. 24, shielded & one pair #18 AWG, tinned copper conductors, orange jacket.
2. Four conductor, No. 18 AWG, shielded, tinned copper conductors, gray jacket.
3. Four conductor, No. 22 AWG, shielded, tinned copper conductors, blue jacket.
4. One pair, twisted, No. 22 AWG, shielded, tinned copper conductors, white jacket.
5. No overall shield.
6. Bundled but unjacketed
7. Flame Resistance: Comply with NFPA 262.

2.9 DOOR CONNECTION CABLES

A. OSDP Reader, plenum-rated cable: NFPA 70, Type CMP.

1. One pair, twisted, No. 22 AWG, shielded, & one pair #18, tinned copper conductors, orange jacket.

B. Weigand Reader, plenum-rated cable: NFPA 70, Type CMP.

1. Three pair, twisted, No. 22 AWG, shielded, tinned copper conductors, orange jacket.

C. Lock power, plenum-rated cable: NFPA 70, Type CMP.

1. Four conductor, No. 18 AWG, shielded, tinned copper conductors, gray jacket.

D. Request to exit, plenum-rated cable: NFPA 70, Type CMP.

1. Four conductor, No. 22 AWG, shielded, tinned copper conductors, blue jacket.

E. Door contact, plenum-rated cable: NFPA 70, Type CMP.

1. One pair, No. 22 AWG, shielded, tinned copper conductors, white jacket.

2.10 FLAME RESISTANCE: COMPLY WITH NFPA 262CONTROL-CIRCUIT CONDUCTORS

A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, complying with UL 83, in raceway.

B. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, complying with UL 83, in raceway, power-limited cable, complying with UL 83, concealed in building finishes, or power-limited tray cable, complying with UL 83, in cable tray.

C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or TF, complying with UL 83.

2.11 FIRE ALARM WIRE AND CABLE

A. 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:

1. Marmon Industrial Energy & Infrastructure - Vitalink.
2. Southwire - Genesis Cable Products.
3. Prysmian Group, Draka cable products
4. West Penn Wire.

B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

C. Signaling Line Circuits: Twisted, shielded pair, not less than No. 16 AWG or size as recommended by system manufacturer.

1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a 2-hour rating.

D. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.

1. Low-Voltage Circuits: No. 16 AWG, minimum.
2. Line-Voltage Circuits: No. 12 AWG, minimum.

2.12 IDENTIFICATION PRODUCTS

A. 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:

1. Brady Worldwide, Inc.
2. HellermannTyton North America.
3. Kroy LLC.
4. Panduit Corp..

B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

C. Comply with requirements in Section 260553 "Identification for Electrical Systems."

PART 3 - EXECUTION

3.1 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements in Division 26 "Hangers and Supports for Electrical Systems" for installation of supports for cables.

3.2 WIRING METHOD

A. Install wiring in concealed metal pathways and wireways, except as noted otherwise.

1. Minimum conduit size shall be 3/4 inch (21 mm). Control and data transmission wiring shall not share conduit with other building wiring systems.

B. Wiring within Enclosures:

1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
2. Install lacing bars and distribution spools.
3. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer.
4. Install conductors parallel with or at right angles to sides and back of enclosure.
5. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks.
6. Mark each terminal according to system's wiring diagrams.
7. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1.

B. Conductors: Size according to system manufacturer's written instructions unless otherwise indicated.

C. General Requirements for Cabling:

1. Comply with TIA/EIA-568.
2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
3. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
5. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
6. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
7. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
8. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
9. Label all cables inside pull boxes and junction boxes.

D. UTP Cable Installation: Install using techniques, practices, and methods described in Division 27 that ensure performance of completed and linked signal paths, end to end.

E. Open-Cable Installation, where indicated:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1525 mm) apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

F. Installation of Cable Routed Exposed under Raised Floors, where indicated:

1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.
3. Coil cable 72 inches (1830 mm) long shall be neatly coiled not less than 12 inches (300 mm) in diameter below each feed point.

G. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569 recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:

    a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
    b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
    c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (600 mm).

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:

    a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
    b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
    c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).

4. Separation between cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:

    a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
    b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (75 mm).
    c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).

5. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).

6. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.4 FIRE ALARM WIRING INSTALLATION

A. Comply with NECA 1 and NFPA 72.

B. Wiring Method: Install wiring in accordance with Division 28 Fire Alarm Section.

C. Risers: Install vertical cable risers as indicated on drawings.

3.5 POWER AND CONTROL-CIRCUIT CONDUCTORS

A. 120-V Power Wiring: Install according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables" unless otherwise indicated.

B. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits, No. 14 AWG.
2. Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.
3. Class 3 low-energy, remote-control, alarm and signal circuits, No. 12 AWG.

3.6 FIRESTOPPING

A. Comply with requirements in Division 07 "Penetration Firestopping."

B. Comply with TIA-569, "Firestopping" Annex A.

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.7 GROUNDING

A. For communications wiring, comply with J-STD-607 and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. For low voltage wiring and cabling, comply with requirements in Division 27 "Grounding and Bonding for Communication Systems."

3.8 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606. Comply with requirements for identification specified in Division 26 "Identification for Electrical Systems."

3.9 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Visually inspect UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test UTP cabling in accordance with Division 27 Category Cable Specifications.
4. Optical Fiber Cable Tests:

    a. Test in accordance with Division 27 Optical Cable Specifications.

B. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, transfer the data from the instrument to the computer memory device, save as pdf files, print, and submit.

C. End-to-end cabling will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 280513

SECTION 281307 - ACCESS CONTROL AND ALARM SYSTEM

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. Security access controllers connected to the existing FIT Access Control System.
2. System modificzations and additions shall be provided by Linear Tech
3. Network connecting all access control controllers, control station, and workstations.
4. Security access control devices.
5. Connection wiring between access controller(s) and access control devices.

1.3 DEFINITIONS AND STANDARDS

A. Refer to Section 280005, Special Conditions for Safety and Security Systems.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Reference each product to a location on Drawings. Test and evaluation data presented in Product Data shall comply with SIA BIO-01.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Diagrams for cable management system.
2. System labeling schedules, including SAMPLE(S) of labeling schedules.
3. Wiring Diagrams. For power, signal, and control wiring. Show typical wiring schematics.
4. Battery and charger calculations for central station, workstations, and controllers.

C. Samples: For each exposed product and for each color and texture specified.

D. Other Action Submittals:

1. Project planning documents as required by Client Standard.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For security system to include in emergency, operation, and maintenance manuals. In addition to items specified in division 01--"Operation and Maintenance Data," include the following:

1. Hard copies of manufacturer's specification sheets, operating specifications, design guides, user's guides for software and hardware, and PDF files on CD-ROM of the hard-copy submittal.
2. System installation and setup guides with data forms to plan and record options and setup decisions.

1.6 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 of all kinds, power and electronic, equal to [**10**] percent of amount installed for each size used, but no fewer than three units.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain controllers, Identifier readers, and all software through one source from single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a NRTL, and marked for intended location and application.

D. Comply with NFPA 70, "National Electrical Code."

E. Comply with SIA DC-01, SIA DC-03 and SIA DC-07.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Controllers:

1. Store in temperature- and humidity-controlled environment in original manufacturer's sealed containers. Maintain ambient temperature and humidity in accordance with manufacturer’s recommendations.

1.9 PROJECT CONDITIONS

A. Environmental Conditions: System shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Indoor, Controlled Environment: NEMA 250, Type 1 enclosure. System components, except the central-station control unit, installed in temperature-controlled indoor environments shall be rated for continuous operation in ambient conditions of 36 to 122 deg F (2 to 50 deg C) dry bulb and 20 to 90 percent relative humidity, noncondensing.
2. Indoor, Uncontrolled Environment: NEMA 250, Type 4X enclosures. System components installed in non-temperature-controlled indoor environments shall be rated for continuous operation in ambient conditions of 0 to 122 deg F (minus 18 to plus 50 deg C) dry bulb and 20 to 90 percent relative humidity, noncondensing.
3. Outdoor Environment: NEMA 250, NEMA 250, Type 4X enclosures. System components installed in locations exposed to weather shall be rated for continuous operation in ambient conditions of minus 30 to plus 122 deg F (minus 34 to plus 50 deg C) dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation where exposed to rain as specified in NEMA 250, winds up to 85 mph (137 km/h) and snow cover up to 24 inches (610 mm) thick.
4. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
5. Corrosive Environment: For system components subjected to corrosive fumes, vapors, and wind-driven salt spray in coastal zones, provide NEMA 250, Type 4X enclosures.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by:

1. Linear Technologies.

2.2 DESCRIPTION

A. Security Access System: PC-based central station based system, with field-installed controllers, connected by a high-speed electronic-data transmission network.

1. The Access Control System at client site is an existing System.
2. Devices and controllers shall be fully functional with the existing system.

B. System Software: Based on central-station, workstation operating system, server operating system, and application software:

1. Provide all licenses required for devices and for system modifications

C. Network connecting the central station and workstations shall be a LAN using TCP/IP.

D. Network(s) connecting PCs and controllers shall consist of one or more of the following:

1. Local area, IEEE 802.3 Fast Ethernet Gigabit-Ethernet, star topology network based on TCP/IP.

2.3 OPERATION

A. The existing system modifications shall operate without interruption as it currently exists.

B. Door Hardware Interface:

1. Comply with requirements in Section 084126 “All Glass Entrances” for door hardware required to be monitored or controlled by the security access system.
2. Electrical characteristics of controllers shall match the signal and power requirements of door hardware.

2.4 APPLICATION SOFTWARE

A. Controller Software:

1. Controllers shall operate as autonomous, intelligent processing units.

   a. Controllers shall make decisions about access control, alarm monitoring, linking functions, and door-locking schedules for their operation, independent of other system components.
   b. Controllers shall be part of a fully distributed processing-control network.
   c. The portion of the database associated with a controller, and consisting of parameters, constraints, and the latest value or status of points connected to that controller, shall be maintained in the controller.

2. The following functions shall be fully implemented and operational within each controller:

   a. Monitoring inputs.
   b. Controlling outputs.
   c. Automatically reporting alarms to the central station.
   d. Reporting of sensor and output status to the central station on request.
   e. Maintaining real time, automatically updated by the central station at least once a day.
   f. Communicating with the central station.
   g. Executing controller resident programs.
   h. Diagnosing.
   i. Downloading and uploading data to and from the central station.

3. Controller Operations at a Location:

   a. In the event of communication failure between the central station and a Location, there shall be no degradation in operations at the controllers at that Location. Controllers at each Location shall be connected to a memory buffer with a capacity to store up to 10,000 events; there shall be no loss of transactions in system history files until the buffer overflows.
   b. Buffered events shall be handled in a first-in-first-out mode of operation.

4. Individual Controller Operation:

a. Controllers shall transmit alarms, status changes, and other data to the central station when communications circuits are operable. If communications are not available, controllers shall function in a stand-alone mode; operational data, including the status and alarm data normally transmitted to the central station, shall be stored for later transmission to the central station. Storage capacity for the latest 1024 events shall be provided at each controller.
b. Card-reader ports of a controller shall match the current Reader connectivity standard of client

B. Alarm Monitoring: Monitor sensors, controllers, and DTS circuits and notify operators of an alarm condition, in the format currently used by the client system.

C. Monitor Display: Display text and graphic maps in the format currently used by the client System.

D. Anti-Passback:

1. Controllers shall have anti-passback feature, selectable by opening. System shall support hard and soft anti-passback.

2.5 SYSTEM DATABASE

A. Database Operations:

1. System data management shall be in the format and arrangement currently used by the client system.

2.6 SURGE AND TAMPER PROTECTION

A. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor-entry connection to components.

1. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors
2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections as recommended by manufacturer for type of line being protected.

B. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station control-unit alarm display shall identify tamper alarms and indicate locations.

2.7 CONTROLLERS

A. Controllers: Shall be fully compatible with the existing Access Control System.

B. Entry-Control Controller:

1. Function: Provide local entry-control functions including one- and two-way communications with access-control devices such as card readers, keypads, biometric personnel identity-verification devices, door strikes, magnetic latches, gate and door operators, and exit push buttons.

   a. Operate as a stand-alone portal controller using the downloaded database during periods of communication loss between the controller and the field-device network.

2.8 CARD READERS, CREDENTIAL CARDS, AND KEYPADS

A. Card-Reader Shall be MultiTech reader capable of reading mag stripe, smart card and mobile device, HID Reader RMP40.

2.9 PUSH-BUTTON SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by:

1. Securitron Magnalock Corporation; an ASSA ABLOY Group company.

B. Push-Button Switches: Momentary-contact back-lighted push buttons with stainless-steel switch enclosures.

C. Electrical Ratings:

1. Minimum continuous current rating of 10 A at 120-V ac or 5 A at 240-V ac.
2. Contacts that will make 720 VA at 60 A and that will break at 720 VA at 10 A.

D. Enclosures: Flush or surface mounting. Push buttons shall be suitable for flush mounting in the switch enclosures.

E. Enclosures shall additionally be suitable for installation in the following locations:

1. Indoors, controlled environment.
2. Indoors, uncontrolled environment.
3. Outdoors.

F. Power: Push-button switches shall be powered from their associated controller, using dc control.

2.10 REQUEST TO EXIT MOTION DETECTORS

1. Shall be Bosch DS-160i.
2. Shall provide a means to bypass the Door Module Switch and/or the unlocking of the controlled door upon exiting.
3. The built-in sounder shall alarm upon forced entry or held door position.

4. Shall connect to the ACM or RM-4 module.

2.11 EXTERIOR DOOR CONTACTS

A. Provide balanced high security contacts at all exteriors and doors indicated on the plans.

2.12 EXIT DEVICE, DOOR AND GATE HARDWARE INTERFACE

A. Exit Device with Alarm: Operation of the exit device shall generate an alarm and annunciate a local alarm. Exit device and alarm contacts are specified in Section 087100 "Door Hardware."

B. Exit Alarm: Operation of a monitored door shall generate an alarm. Exit devices and alarm contacts are specified in Section 087100 "Door Hardware."

C. Electric Door Strikes: Use end-of-line resistors to provide power-line supervision. Signal switches shall transmit data to controller to indicate when the bolt is not engaged and the strike mechanism is unlocked, and they shall report a forced entry. Power and signal shall be from the controller. Electric strikes are specified in Section 087100 "Door Hardware."

D. Electromagnetic Locks: Where specifically approved by client shall include end-of-line resistors shall provide power-line supervision. Lock status sensing signal shall positively indicate door is secure. Power and signal shall be from the controller. Electromagnetic locks are specified in Section 087100 "Door Hardware."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.

B. Examine roughing-in for LAN and control cable conduit systems to PCs, controllers, card readers, and other cable-connected devices to verify actual locations of conduit and back boxes before device installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Comply with recommendations in SIA CP-01.

B. Comply with TIA/EIA 606, "Administration Standard for Commercial Telecommunications Infrastructure."

C. Obtain detailed Project planning forms from manufacturer of access-control system; develop custom forms to suit Project. Fill in all data available from Project plans and specifications and publish as Project planning documents for review and approval.

1. Record setup data for control station and workstations.
2. For each Location, record setup of controller features and access requirements.
3. Propose start and stop times for time zones and holidays, and match up access levels for doors.
4. Set up groups, facility codes, linking, and list inputs and outputs for each controller.
5. Assign action message names and compose messages.
6. Set up alarms. Establish interlocks between alarms, intruder detection, and video surveillance features.
7. Prepare and install alarm graphic maps.
8. Develop user-defined fields.
9. Develop screen layout formats.
10. Propose setups for guard tours and key control.
11. Discuss badge layout options; design badges.
12. Complete system diagnostics and operation verification.
13. Prepare a specific plan for system testing, startup, and demonstration.
14. Develop acceptance test concept and, on approval, develop specifics of the test.
15. Develop cable and asset-management system details; input data from construction documents. Include system schematics and Visio Technical Drawings in electronic format.

D. In meetings with Architect and Owner, present Project planning documents and review, adjust, and prepare final setup documents. Use final documents to set up system software.

3.3 CABLING

A. Comply with NECA 1, "Good Workmanship in Electrical Construction."

B. Install cables and wiring according to requirements in Section 280513 "Conductors and Cables for Electronic Safety and Security."

3.4 GROUNDING

A. Comply with Division 26 "Grounding and Bonding for Electrical Systems."

B. Comply with IEEE 1100, "Recommended Practice for Power and Grounding Electronic Equipment."

C. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

D. Bond shields and drain conductors to ground at only one point in each circuit.

3.5 INSTALLATION

A. Push Buttons: Where multiple push buttons are housed within a single switch enclosure, they shall be stacked vertically with each push-button switch labeled with 1/4-inch- (6.4-mm-) high text and symbols as required. Push-button switches shall be connected to the controller associated with the portal to which they are applied, and shall operate the appropriate electric strike, electric bolt, or other facility release device.

B. Install card readers, keypads, push buttons, and biometric readers.

3.6 IDENTIFICATION

A. In addition to requirements in this article, comply with applicable requirements in Division 26 "Identification for Electrical Systems" and with TIA/EIA 606.

B. Using software specified in "Cable and Asset Management Software" Article, develop cable administration drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable, and label cable and jacks, connectors, and terminals to which it connects with the same designation. Use logical and systematic designations for facility's architectural arrangement.

C. Label each terminal strip and screw terminal in each cabinet, rack, or panel.

1. All wiring conductors connected to terminal strips shall be individually numbered, and each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with the name and number of the particular device as shown.
2. Each wire connected to building-mounted devices is not required to be numbered at the device if the color of the wire is consistent with the associated wire connected and numbered within the panel or cabinet.

D. At completion, cable and asset management software shall reflect as-built conditions.

3.7 SYSTEM SOFTWARE AND HARDWARE

A. Develop, install, and test software and hardware, and perform database tests for the complete and proper operation of systems involved. Assign software license(s) to client.

3.8 FIELD QUALITY CONTROL

A. 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.

B. Tests and Inspections:

1. LAN Cable Procedures: Inspect for physical damage and test each conductor signal path for continuity and shorts. Use Class 2, bidirectional, Category 6A tester. Test for faulty connectors, splices, and terminations. Test according to TIA/EIA 568, "Commercial Building Telecommunications Cabling Standards - Part 1: General Requirements." Link performance for UTP cables must comply with minimum criteria in TIA/EIA 568.
2. Test each circuit and component of each system. Tests shall include, but are not limited to, measurements of power-supply output under maximum load, signal loop resistance, and leakage to ground where applicable. System components with battery backup shall be operated on battery power for a period of not less than 10 percent of the calculated battery operating time. Provide special equipment and software if testing requires special or dedicated equipment.
3. Operational Test: After installation of cables and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance from each end of all pairs installed. Remove temporary connections when tests have been satisfactorily completed.

C. Devices and circuits will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.9 STARTUP SERVICE

A. Engage a factory-authorized service representative to supervise and assist with startup service.

1. Complete installation and startup checks according to approved procedures that were developed in "Preparation" Article and with manufacturer's written instructions.
2. Enroll and prepare badges and access cards for Owner's operators, management, and security personnel.

3.10 PROTECTION

A. Maintain strict security during the installation of equipment and software. Rooms housing the control station, and workstations that have been powered up shall be locked and secured with an activated burglar alarm and access-control system reporting to a central station complying with UL 1610, "Central-Station Burglar-Alarm Units," during periods when a qualified operator in the employ of Contractor is not present.

END OF SECTION 281307

EXHIBIT D: DRAWINGS

Addendum No. 3

FIT LOBBY RENOVATION

DUBINSKY (BUILDING A) & BUSINESS & LIBERAL ARTS (BUILDING B)

344 8TH AVENUE, NEW YORK, NY 10001 - BUILDING A
340-356 8TH AVENUE, NEW YORK, NY 10001 - BUILDING B

C1667 - ISSUE FOR ADDENDUM #3

01.23.25

DRAWING LIST

.GENERAL.

G.000.00 COVER SHEET & NOTES

.CODE.

CP.100.00 LEVEL 00 - CODE PLAN
CP.101.00 LEVEL 01 - CODE PLAN
CP.201.00 OCCUPANT PROTECTION PLAN (TEMPORARY EGRESS)

.DEMOLITION.

AD.100.00 LEVEL 00 - DEMOLITION PLAN
AD.101.00 LEVEL 01 - DEMOLITION PLAN

.ARCHITECTURAL.

A.100.00 LEVEL 00 - FLOOR PLAN
A.101.00 LEVEL 01 - FLOOR PLAN
A.101A.00 LEVEL 01 - AREA A - FLOOR PLAN
A.101B.00 LEVEL 01 - AREA B - FLOOR PLAN
A.300.00 LEVEL 00 - REFLECTED CEILING PLAN - PHASE I
A.301.00 LEVEL 01 - REFLECTED CEILING PLAN PHASE I
A.302.00 LEVEL 02 - REFLECTED CEILING PLAN PHASE I
A.311.00 LEVEL 01 - REFLECTED CEILING PLAN PHASE II
A.312.00 LEVEL 02 - REFLECTED CEILING PLAN - PHASE II
A.400.00 EXTERIOR ELEVATIONS
A.500.00 EXTERIOR DETAILS
A.501.00 EXTERIOR DETAILS
A.600.00 INTERIOR ELEVATIONS
A.800.00 DOOR TYPES & SCHEDULE
A.700.00 MILLWORK DETAILS
A.801.00 FINISH SCHEDULE & INTERIOR DETAILS

.STRUCTURAL.

S.101.00 LEVEL 01 STRUCTURAL PLANS
S.102.00 LEVEL 02 STRUCTURAL PLANS
S.103.00 LEVEL 03 STRUCTURAL PLANS

.MECHANICAL.

M.101.00 LEVEL 01 - OVERALL HVAC PLAN - PHASE I
M.101.10 LEVEL 01 - AREA A/B - HVAC PLAN - PHASE I

M.000.10 MECHANICAL GENERAL NOTES & SYMBOLS
M.000.20 MECHANICAL ABBREVIATIONS

MD.100.00 LEVEL 00 - HVAC DEMOLITION PLAN - PHASE I
MD.101.00 LEVEL 01 - HVAC DEMOLITION PLAN - PHASE I
MD.102.00 LEVEL 02 - HVAC DEMOLITION PLAN - PHASE I
MD.102.01 LEVEL 02 - HVAC DEMOLITION PLAN - PHASE II

M.100.00 LEVEL 00 - OVERALL HVAC PLAN - PHASE I
M.102.21 LEVEL 02 - OVERALL HVAC PLAN - PHASE I
M.102.22 LEVEL 02 - AREA A/B - HVAC PLAN - PHASE I
M.102.23 LEVEL 02 - OVERALL HVAC PLAN - PHASE II
M.102.24 LEVEL 02 - AREA A/B - HVAC PLAN - PHASE II

M.700.00 MECHANICAL DETAILS AND SCHEDULES

.PLUMBING.

P.000.10 PLUMBING GENERAL NOTES, SYMBOLS, SCHEDULES & DETAILS

PD.100.00 LEVEL 00 - PLUMBING DEMOLITION PLAN

P.100.00 LEVEL 00 - PLUMBING PLAN
P.101.00 LEVEL 01 - PLUMBING PLAN

.ELECTRICAL.

E001.00 ELECTRICAL SYMBOLS, ABBREVIATIONS & NOTES
ED102.00 LEVEL 02 - ELECTRICAL DEMOLITION PLAN - PHASE I
EL100A.00 LEVEL 00 - AREA A - LIGHTING PLAN - PHASE I
EL100B.00 LEVEL 00 - AREA B - LIGHTING PLAN - PHASE I
EL101A.00 LEVEL 01 - AREA A - LIGHTING PLAN - PHASE I
EL101B.00 LEVEL 01 - AREA B - LIGHTING PLAN - PHASE I
EL102A.00 LEVEL 02 - AREA A - LIGHTING PLAN - PHASE I
EL102B.00 LEVEL 02 - AREA B - LIGHTING PLAN - PHASE I
E100A.00 LEVEL 00 - AREA A - POWER PLAN - PHASE I
E100B.00 LEVEL 00 - AREA B - POWER PLAN - PHASE I
E101A.00 LEVEL 01 - AREA A - POWER PLAN - PHASE I
E101B.00 LEVEL 01 - AREA B - POWER PLAN - PHASE I
ED100.00 LEVEL 00 - ELECTRICAL DEMOLITION PLAN - PHASE I
ED101.00 LEVEL 01 - ELECTRICAL DEMOLITION AND TEMPORARY EGRESS PLAN - PHASE I
E301.00 LEVEL 01 - FIRE ALARM PLAN - PHASE I
E701.00 ELECTRICAL SCHEDULES
EL701.00 LUMINAIRE SCHEDULE

.TELECOMMUNIATION / SECURITY.

TE001.00 TELECOM GENERAL NOTES, SYMBOLS & ABBREVIATIONS

TE101A.00 FIRST FLOOR TELECOM/ SECURITY PLAN AREA A
TE101B.00 FIRST FLOOR TELECOM/ SECURITY PLAN AREA B

TE601.00 TELECOM DETAILS

GENERAL ABBREVIATIONS

#	NUMBER	OC	ON CENTER
&	AND	OPP	OPPOSITE
@	AT	OVHD	OVERHEAD
ADA	AMERICANS WITH DISABILITY ACT	PAR	PARALLEL
ADDN	ADDITION OR ADDITIONAL	PENT	PENTHOUSE
AFF	ABOVE FINISHED FLOOR	PLYWD	PLYWOOD
AFG	ABOVE FINISHED GRADE		
AHJ	AUTHORITY HAVING JURISDICTION	QTY	QUANTITY
ALT	ALTERNATE		
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	REQ(D)	REQUIRE(D)
APPROX	APPROXIMATE	REV	REVISION(S)
ARCH	ARCHITECTURAL	RM	ROOM
		RND	ROUND
BLDG	BUILDING		
BSMT	BASEMENT	S	SOUTH
		SCHED	SCHEDULE
CL	CENTER LINE	SECT	SECTION
CLG	CEILING	SHT	SHEET
CM	CENTIMETER	SIM	SIMILAR
CONC	CONCRETE	SPEC	SPECIFICATION(S)
CONN(S)	CONNECTION(S)	STD	STANDARD
CONST	CONSTRUCTION	STL	STEEL
CONT	CONTINUOUS	STOR	STORAGE
CONTR	CONTRACT(OR)	STRUCT	STRUCTURAL
CTR	CENTER	SYM	SYMETRICAL
D	DEPTH	TEMP	TEMPORARY
DEG	DEGREE	TYP	TYPICAL
DEMO	DEMOLISH OR DEMOLITION		
DIA	DIAMETER	UNEX	UNEXCAVATED
DIM	DIMENSION	UNFIN	UNFINISHED
DIV	SPECIFICATION DIVISION	UNO	UNLESS NOTED OTHERWISE
DN	DOWN		
DTL	DETAIL	VERT	VERTICAL
DWG(S)	DRAWING(S)	VEST	VESTIBULE
		VIF	VERIFY IN FIELD
E	EAST		
EA	EACH	W	WEST
EC	ELECTRICAL CONTRACTOR	W/	WITH
EHS	ENVIRONMENT, HEALTH, AND SAFETY PLAN	W/O	WITHOUT
EL	ELEVATION		
ELEC	ELECTRICAL		
ENG	ENGINEER		
EQ	EQUAL		
EQUIP	EQUIPMENT		
EQUIV	EQUIVALENT		
EXST	EXISTING		
EXT	EXTERIOR		
FIN	FINISHED		
FL	FLOOR		
FT	FEET		
FUT	FUTURE		
GC	GENERAL CONTRACTOR		
GOVT	GOVERNMENT		
H	HEIGHT		
HORIZ	HORIZONTAL		
HT	HEIGHT		
i.e.	THAT IS		
IBC	INTERNATIONAL BUILDING CODE		
IN	INCH		
INT	INTERIOR		
LB(S)	POUND(S)		
M	METER		
MAX	MAXIMUM		
MC	MECHANICAL CONTRACTOR		
MECH	MECHANICAL		
MEZZ	MEZZANINE		
MFR	MANUFACTURER		
MIN	MINIMUM		
MISC	MISCELLANEOUS		
MM	MILLIMETER		
N	NORTH		
N/A	NOT APPLICABLE		
NIC	NOT IN CONTRACT		
NTS	NOT TO SCALE		

ARCHITECTURAL SYMBOLS

- DETAIL NUMBER / CROSS REFERENCE / SHEET NUMBER
- SIMILAR OR TYPICAL REFERENCE
- WALL SECTION
- BUILDING ELEVATION
- INTERIOR ELEVATION
- SHEET NOTE
- COLUMN GRID LINE
- ROOM NUMBER/NAME
- REVISION NUMBER
- LEVEL ELEVATION
- CENTERLINE
- 24" X 24" ACCESS PANEL
- RELOCATED SPRINKLER
- NEW SECURITY CAMERA
- EXISTING SECURITY CAMERA
- RELOCATE SECURITY CAMERA
- RELOCATE WIRELESS ACCESS POINT (WIFI ROUTER)
- RELOCATE SMOKE DETECTOR SEE FIRE ALARM FOR MORE INFO.
- RELOCATE OCCUPANCY SENSOR SEE ELECTRIC FOR MORE INFO.
- DOOR NUMBER
- EXTERIOR WINDOW / CURTAIN WALL NUMBER
- WALL TYPE
- CEILING TYPE / CEILING HEIGHT
- EARTH
- SAND
- CONCRETE
- PRECAST CONCRETE
- STEEL
- WOOD (CONTINUOUS BLOCKING)
- WOOD (NON-CONTINUOUS BLOCKING)
- WOOD (TRIM/FINISH)
- GLASS
- GYPSUM WALL BOARD
- BLANKET INSULATION
- RIGID INSULATION
- MINERAL WOOL INSULATION

PROJECT DESCRIPTION

SCOPE: ALTERATIONS TO THE LOBBY AND CELLAR LOCATED IN BUILDING "A" AND "B" OF F.I.T. CAMPUS.

WORK: THE WORK INCLUDES ALTERATIONS TO EXISTING STRUCTURAL, MECHANICAL, ELECTRICAL, AND FIRE ALARM SYSTEMS. THERE ARE NO CHANGES TO USE GROUP, OCCUPANCY OR MEANS OF EGRESS.

PUBLIC DESIGN COMMISSION NOTE: BUILDING HAS BEEN REVIEWED AND APPROVED BY COMMISSION.

ADDRESS:
FASHION INSTITUTE OF TECHNOLOGY
344 8TH AVENUE
NEW YORK, NY 10001-592
BIN: 1014250
BLOCK 777, LOT 1, HOUSE NUMBER 340
PUBLIC ASSEMBLY PERMIT: 110253305
JOB TYPE:ALTERATION TYPE II

PROJECT DATA:
PROGRESS INSPECTIONS
-FIRE-RESISTANCE RATED CONSTRUCTION — BC 109.3.4
-ENERGY CODE COMPLIANCE — BC 109.3.5

FINAL INSPECTIONS
-FIRESTOP, DRAFTSTOP, AND FIREBRICK SYSTEMS — BC 1704.25
-FINAL — PER DIR 14

NOTES: TR-1, TR-2 & TR-7 REQUIRE REPORTS INSPECTIONS & TESTS

HAZARDOUS MATERIALS

THE CONTRACTOR SHALL NOTE THAT BOTH ASBESTOS CONTAINING MATERIALS AND SUSPECT ASBESTOS CONTAINING MATERIALS HAVE BEEN IDENTIFIED IN THE VICINITY OF WORK FOR THIS PROJECT. SPECIFICALLY, IT WAS OBSERVED AT THE GLAZING SEALANT AT THE EXTERIOR SIDE OF THE WINDOWS BETWEEN THE GLASS PANE AND WINDOW FRAME. THESE MATERIALS WILL BE REMOVED BY THE OWNER AT THE START OF EACH CONSTRUCTION PHASE IN COORDINATION WITH THE PROJECT'S SCHEDULE. THE CONTRACTOR SHALL CONTACT EPM- ENVIRONMENTAL PLANNING & MANAGEMENT, INC FOR MORE INFORMATION.

TOM ZABRANSKY, CIEC
TZABRANSKY@EPMCO.COM
516-328-1194 (OFFICE)

ENERGY CODE COMPLIANCE

TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE ENERGY COMPLIANCE
CONSTRUCTION CODE OF NEW YORK STATE.

FIRE SEPARATION(S)

PENETRATIONS OF EXISTING CONSTRUCTION ELEMENTS SHALL BE FIREPROOFED IN ACCORDANCE WITH THE FIRE SEPARATION AND THE CONSTRUCTION CLASSIFICATION TABLES OF THE 1968 BUILDING CODE.

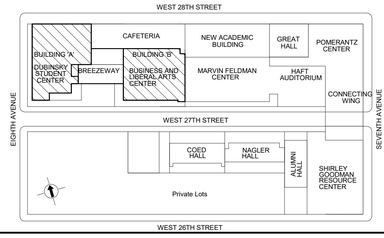
TABLE 5-1 FIRE SEPARATIONS

Key: Fire-resistance ratings are given in hours. For Table 5-1, read down-hours; for Table 5-2, read below heavy line.
NR—No Requirement

OCCUPANCY	A	B-1	B-2	C	D-1	D-2	E	F-1a	F-1b	F-2	F-3	F-4	G	H-1	H-2	J-1	J-2	J-3
A	4	4	4	4	4	4	4*	4	4	4	4	4	4	4	4	4	4	4
B-1	4	4	NR	1**	NR	NR	4*	4	4	4	4	4	4	4	4	3	3	3
B-2	4	3	2	NR	NR	NR	NR	NR	NR	NR	NR	NR	1*	NR	NR	NR	NR	NR
C	4	4	2	2	NR	NR	NR	NR	NR	NR	NR	NR	NR	1	1	1	1	1
D-1	4	3	2	1	1	NR	1*	1	1	1	1	1	1	1½	1½	1½	1	1
D-2	4	3	2	1	1	1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
E	4	3	2	2	1	1	2	NR	NR	NR	NR	NR	NR	1*	1*	1*	1*	1*
F-1a	4	3	2	1	1	1	1	2	NR	NR	NR	NR	NR	NR	1	1	1	1
F-1b	4	3	2	1	1	1	1	1	2	NR	NR	NR	NR	1	1	1	1	1
F-2	4	3	2	1	1	1	1	1	1	2	NR	NR	NR	1	1	1	1	1
F-3	4	3	2	2	1	1	2	1	1	1	2	NR	NR	1	1	1	1	1
F-4	4	2	2	2	1	1	2	1	1	1	1	2	NR	1½	1½	1½	1	1
G	4	3	2	2	1	1	2	1	1	1	1	1	2	NR	NR	NR	NR	NR
H-1	4	3	2	2	1	1	2	1	1	1	1	1	2	2	NR	1	1	1
H-2	4	3	2	2	1	1	2	1	1	1	1	1	2	1	2	NR	1	1
J-3	4	3	2	2	1	1	2	1	1	1	1	1	2	1	2	1	NR	NR
J-2	4	3	2	2	1	1	2	1	1	1	1	1	2	1	2	1	2	NR
J-3	4	3	2	2	1	1	2	1	1	1	1	1	2	1	2	1	2	2

TABLE 5-2 FIRE DIVISIONS

SITE PLAN (NOT TO SCALE)



CONSTRUCTION CLASSIFICATION

ARTICLE 15: CONSTRUCTION GROUP E - NONCOMBUSTIBLE — 27-277 CONSTRUCTION CLASS IB - NONCOMBUSTIBLE

INCLUDES BUILDINGS AND SPACES IN WHICH THE COLUMNS AND OTHER STRUCTURAL ELEMENTS ARE GENERALLY OF TWO-HOUR FIRE RESISTANCE RATING.

TABLE 3-4 OF THE 1948 BUILDING CODE PROVIDES CLASSIFICATIONS BY COMPONENT AND EXPOSURE.

TABLE 3-4

"TABLE 3-4 CONSTRUCTION CLASSIFICATIONS"	CONSTRUCTION ELEMENT		CLASS I-A Rating	CLASS I-A Exp.[1]	CLASS I-B Rating	CLASS I-B Exp.[1]	CLASS I-C Rating	CLASS I-C Exp.[1]	CLASS I-D Rating	CLASS I-D Exp.[1]	CLASS I-E Rating	CLASS I-E Exp.[1]
CONSTRUCTION GROUP I NONCOMBUSTIBLE	Walls	3-0[2] or less	Fencing	[3]	SLP	[3]	SLP	[3]	SLP	[3]	SLP
		More than 3-0[2] but less than 6-0[2]	Fencing	[3]	1½ S	[3]	1½ S	[3]	1½ S	[3]	2-1½ S
		15'-0[2] or more but less than 30'-0[2]	Fencing	[3]	1½ S	[3]	1½ S	[3]	1½ S	[3]	1½ S
		30'-0[2] or more	Fencing	[3]	SLL	[3]	SLL	[3]	SLL	[3]	SLL
			Non-bearing[4]	[3]	SLL	[3]	SLL	[3]	SLL	[3]	SLL
Required fire-resistive ratings of structural elements in hours, based on the new fire-resistive requirements adopted 10-1-1-1.	Columns, girders, trusses (other than roof trusses) and framing		Supporting more than one floor	3	2	1½	1	0*			
			Supporting more than one floor	2	1½	1	1	0*			
	Structural members supporting a wall		Same as required fire resistance of wall supported, but not less than rating required for member in the case of construction								
Key:	Floor construction including beams			3	2	1½	1	0*			
S.P.—Not permitted	Roof construction, including roof trusses and framing, including arches, domes, shells, cable supported roofs and roof decks[5]	15'-0" or more to or above floor or lowest member		2	1½	1	1	0*			
N.L.—No limit		10'-0" but less than 15'-0" above floor or lowest member		2*or1.5[6]	1½*or1.5[6]	1*	1*	0*			
Noncombustible Materials		20'-0" or more or the above floor or lowest member		2*or1.5[6]	1½*or1.5[6]	1*or1.5[6]	1*	0*			

PROJECT CODE REFERENCES

NOTE: THIS IS AN EXISTING BUILDING. PER BC-28-101, THE PROJECT WILL REFERENCE THE 1968 BUILDING CODE OF NEW YORK CITY EXCEPT THAT THE FOLLOWING WILL COMPLY WITH THE CODE.

1. ADMINISTRATION, INCLUDING: FEES, APPROVAL OF CONSTRUCTION DOCUMENTS, ISSUANCE OF PERMITS, ISSUANCE OF CERTIFICATE OF OCCUPANCY , SPECIAL INSPECTIONS, USE OF MATERIALS.

2. ENFORCEMENT, VIOLATIONS, FINES, PENALTIES

3. SAFETY OF PUBLIC AND PROPERTY DURING CONSTRUCTION.

4. MECHANICAL WORK.

5. FIRE PROTECTION WORK.

NOTE: THIS PROJECT WILL NOT ALTER THE OCCUPANCY OF THE BUILDING OR ANY PART THEREOF. THE PROJECT DOES NOT INCLUDE ANY FUEL GAS WORK AND DOES NOT INCLUDE ANY ENCROACHMENTS INTO THE PUBLIC RIGHT OF WAY.

ADMINISTRATION: THE NEW YORK CITY BUILDING CODE OF THE AND THE 1968 BUILDING CODE OF NEW YORK CITY

BUILDING: THE NEW YORK CITY BUILDING CODE AND THE 1968 BUILDING CODE BUILDING CODE OF NEW YORK CITY.

MECHANICAL: THE NEW YORK CITY MECHANICAL CODE,

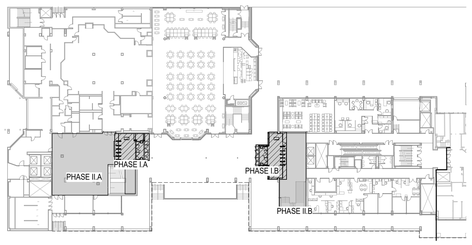
ELECTRICAL: THE NEW YORK CITY ELECTRICAL CODE.

ENERGY: NEW YORK CITY ENERGY CONSERVATION CODE OF 2020

FIRE PROTECTION: THE NEW YORK CITY BUILDING CODE (CHAPTER 9) AND THE 1968 BUILDING CODE, NFPA 13, NFPA 13D, NFPA 13R, NFPA 14, NFPA 72

ACCESSIBILITY CODE: ICC/ANSI A117.1-2003 ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES; AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG)

PHASING DIAGRAM (NOT TO SCALE)



NOTES:

1. SEQUENCING SHALL FOLLOW AS INDICATED BELOW. SEE SECTION 00 06 00 - FRONT END - FOR MORE DETAILED INFORMATION.
   PHASE I.A & PHASE I.B *SPRING - WINTER 2025* — DURING WORK, ONE LOBBY SHALL REMAIN UNDISRUPTED. PROJECT WILL START WITH PHASE I.A AT BUILDING A. AT SUBSTANTIAL COMPLETION, TURNSTILE AND NEW GLAZING SHALL BE FULLY OPERATIONAL AND SIGNED OFF BY THE SPECIAL INSPECTOR AND FDNY. WORK ON PHASE I.B AT BUILDING B SHALL START IMMEDIATELY AFTER SIGN OFFS FOR PHASE I.A.
   PHASE II.A & PHASE II.B *SUMMER 2026* — DURING WORK, BOTH LOBBIES SHALL REMAIN OPERATIONAL IN TERMS OF EGRESS & VERTICAL CIRCULATION. WORK PROHIBITING THE USE OF EITHER SHALL BE DONE AT OFF-HOURS AND COORDINATED WITH THE OWNER. WORK FOR PHASE II.A & PHASE II.B MAY OVERLAP AS DETERMINED BY THE CONTRACTOR.
2. CONTRACTOR IS RESPONSIBLE FOR PROVIDING A EHS & LOGISTIC PLAN TO THE OWNER TO HIGHLIGHT SEQUENCING WITHIN ALL PHASES.
3. PHASING DIAGRAM IS DIAGRAMMATIC AND ITS SOLE PURPOSE IS TO DELINEATE BETWEEN PHASES FOR GENERAL INFORMATION AND FAMILIARITY.
4. CONTRACTOR IS RESPONSIBLE FOR UNDERSTANDING SUPPORTING SPACES (INCLUDING, BUT NOT LIMITED TO CORRIDORS, ELECTRICAL AND TELEPHONE ROOMS) REQUIRED TO SUPPORT THE WORK AT EACH PHASE

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COVER SHEET & NOTES

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LEVEL 00 - CODE PLAN

SCALE: 3/32" = 1'-0"

LEGEND - CODE FLOOR PLANS

ROOM NUMBER
OCCUPANT LOAD TAG (NET)
- THIS LOAD DOES NOT EXTEND BEYOND THIS SPACE
- SEE PATTERN FOR APPLIED LOAD FACTOR

###
XXXX SF
XXX

AREA (SF)

OCCUPANT LOAD

EXIT TAG
- CUMULATIVE OCCUPANT LOAD
- EGRESS CAPACITY

REQUIRED OCCUPANT LOAD

REQUIRED WIDTH FOR OCCUPANT LOAD (INCHES)

0	1"	
0	0"	

CAPACITY OF EGRESS COMPONENT (WIDTH IN INCHES)

CAPACITY OF EGRESS COMPONENT (OCCUPANTS)

LOAD FACTOR (INCHES/OCCUPANT)
- WHEN CAPACITY FACTOR TRIANGLE IS FILLED - THIS IS TOTAL OCCUPANT LOAD AT THIS EXIT FROM THIS STORY

EXIT SIGN

EXIT LIGHT, ARROWS INDICATE DIRECTION

A MAX TRAVEL = Length — EXIT ACCESS TRAVEL DISTANCE

MAX CP = Length — COMMON PATH OF EGRESS TRAVEL DISTANCE

1 — EXIT DOOR NUMBER

SEPARATION LEGEND

HOURLY RATING

1	=	1 HOUR
2	=	2 HOUR
3	=	3 HOUR
4	=	4 HOUR
SP	=	SMOKE PARTITION

CODE PLAN NOTES

1. DOORS SHALL COMPLY WITH THE REQUIREMENTS OF SECTION 27-371.
2. EGRESS SHALL BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 21-365.
3. TRAVEL DISTANCES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 21-360.
4. CORRIDORS SHALL COMPLY WITH THE REGUIREMENTS 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 PONER SHALL BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 27-3964.

FIRE SEPERATION NOTE:
1. SECTION 27-364 (EXIT DISCHARGE) OF THE NTO BUILDING CODE REQUIRING THAT "WHEN VERTICAL EXITS SERVING FLOORS ABOVE GRADE CONTINUE IN THE SAME ENCLOSURE TO SERVE FLOORS BELON GRADE, THE PORTION OF SUCH VERTICAL EXITS ABOVE GRADE SHALL BE SEPARATED FROM THE PORTION BELOW GRADE BY CONSTRUCTION HAVING AT LEAST A ONE HOUR FIRE-RESISTANCE RATING SHALL NOT APPLY, AS PER THAT SECTION 'BUILDINGS CLASSIFIED IN RESIDENTIAL OCCUPANCY GROUP J-3 AND EDUCATIONAL OCCUPANCY GROUP G SHALL BE EXEMPT FROM THIS REQUIREMENT.

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STATE OF NEW YORK · REGISTERED ARCHITECT

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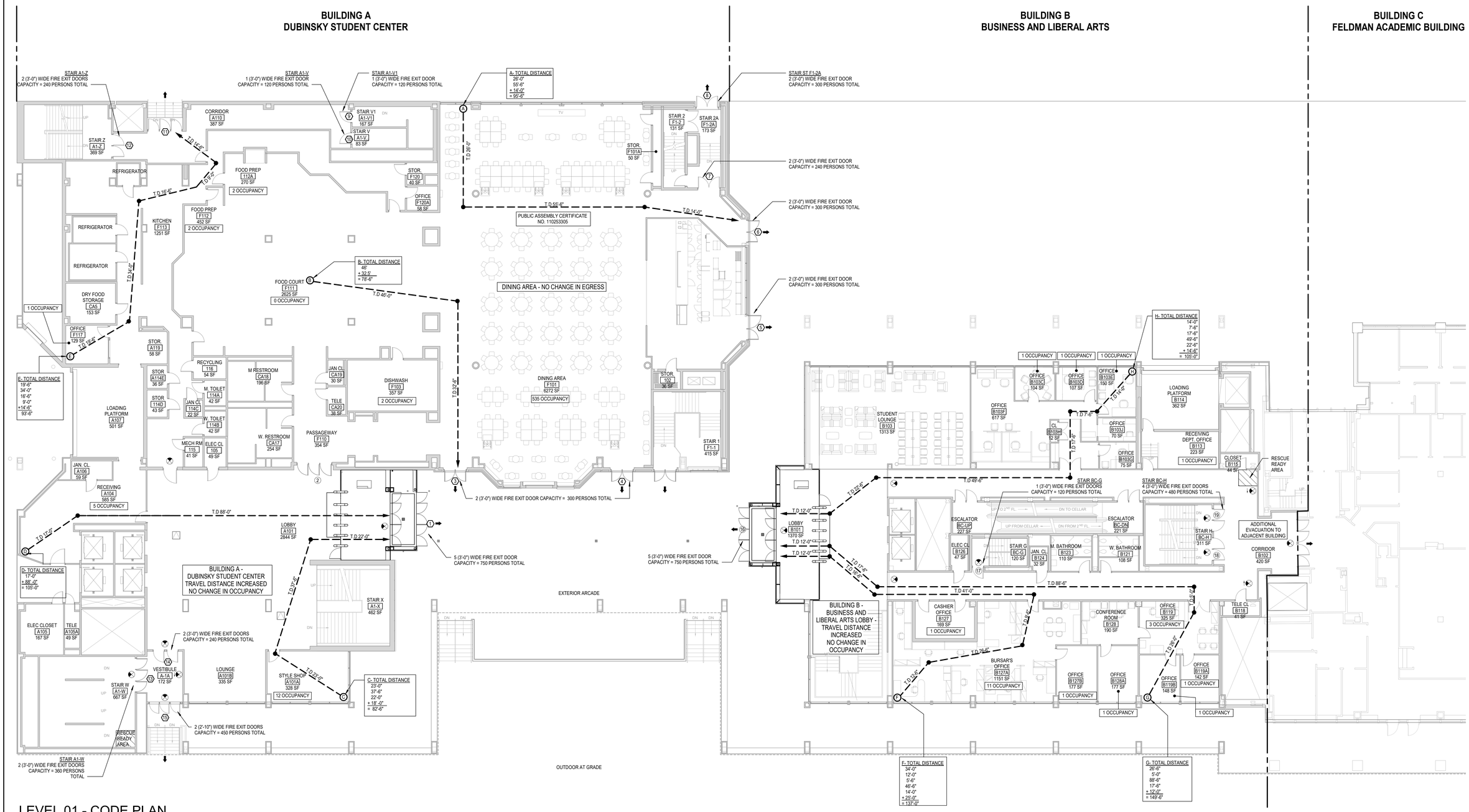

LEVEL 01 - CODE PLAN

SCALE: 3/32" = 1'-0"

LEGEND - CODE FLOOR PLANS

ROOM NUMBER
AREA (SF)
OCCUPANT LOAD

OCCUPANT LOAD TAG (NET)
- THIS LOAD DOES NOT EXTEND BEYOND THIS SPACE
- SEE PATTERN FOR APPLIED LOAD FACTOR

EXIT TAG
- CUMULATIVE OCCUPANT LOAD
- EGRESS CAPACITY

REQUIRED OCCUPANT LOAD
REQUIRED WIDTH FOR OCCUPANT LOAD (INCHES)
CAPACITY OF EGRESS COMPONENT (WIDTH IN INCHES)
CAPACITY OF EGRESS COMPONENT (OCCUPANTS)
LOAD FACTOR (INCHES/OCCUPANT)
- WHEN CAPACITY FACTOR TRIANGLE IS FILLED - THIS IS TOTAL OCCUPANT LOAD AT THIS EXIT FROM THIS STORY

EXIT SIGN
EXIT LIGHT, ARROWS INDICATE DIRECTION
MAX TRAVEL = Length — EXIT ACCESS TRAVEL DISTANCE
MAX CP = Length — COMMON PATH OF EGRESS TRAVEL DISTANCE
EXIT DOOR NUMBER

SEPARATION LEGEND

HOURLY RATING

1 = 1 HOUR
2 = 2 HOUR
3 = 3 HOUR
4 = 4 HOUR
SP = SMOKE PARTITION

TRAVEL DISTANCE

PATH	TOTAL TRAVEL DISTANCE	MAXIMUM TRAVEL DISTANCE PER BC 27-360 & TABLE 6-1
A	95'-6"	150'-00" (UNSPRINKLERED)
B	78'-6"	150'-00" (UNSPRINKLERED)
C	82'-6"	150'-00" (UNSPRINKLERED)
D	105'-0"	150'-00" (UNSPRINKLERED)
E	93'-6"	150'-00" (UNSPRINKLERED)
F	137'-0"	150'-00" (UNSPRINKLERED)
G	149'-6"	150'-00" (UNSPRINKLERED)
H	105'-0"	150'-00" (UNSPRINKLERED)

GROSS AREA

OCCUPANCY	SQUARE FOOTAGE
OFFICE	6,304
SALES - RETAIL	319
STORAGE	558
KITCHEN	2,312
DINING	9,570
UNINHABITABLE	9,121
EXIT STAIRS	2,966
ESCALATOR	462
TOTAL:	31,612

DOOR EGRESS CALCULATIONS

LOCATION	DOOR NUMBER	WIDTH	UNITS OF WIDTH	CAPACITY	MAXIMUM ALLOWABLE CAPACITY	PROPOSED CAPACITY
BUILDING A	1	(3) 3'-0"	4.5	100	450	212
BUILDING A	2	(3) 3'-0"	4.5	80	360	12
BUILDING A	3	(2) 3'-0"	3	100	300	107
BUILDING A	4	(2) 3'-0"	3	100	300	107
BUILDING A	5	(2) 3'-0"	3	100	300	107
BUILDING A	6	(2) 3'-0"	3	100	300	107
BUILDING A	7	(2) 3'-0"	3	80	240	107
BUILDING A	8	(2) 3'-0"	3	100	300	107
BUILDING A	9	(1) 3'-0"	1.5	80	120	120
BUILDING A	10	(3) 3'-0"	4.5	100	450	120
BUILDING A	11	(3) 3'-0"	4.5	100	450	450
BUILDING A	12	(2) 3'-0"	3	80	240	210
BUILDING A	13	(3) 3'-0"	4.5	80	360	360
BUILDING A	14	(2) 3'-0"	3	80	240	212
BUILDING A	15	(3) 2'-10"	4.5	100	450	212
BUILDING B	16	(3) 3'-0"	4.5	100	450	450
BUILDING B	17	(1) 3'-0"	1.5	80	120	75
BUILDING B	18	(1) 3'-0"	3	80	240	170
BUILDING B	19	(1) 3'-0"	3	80	240	170

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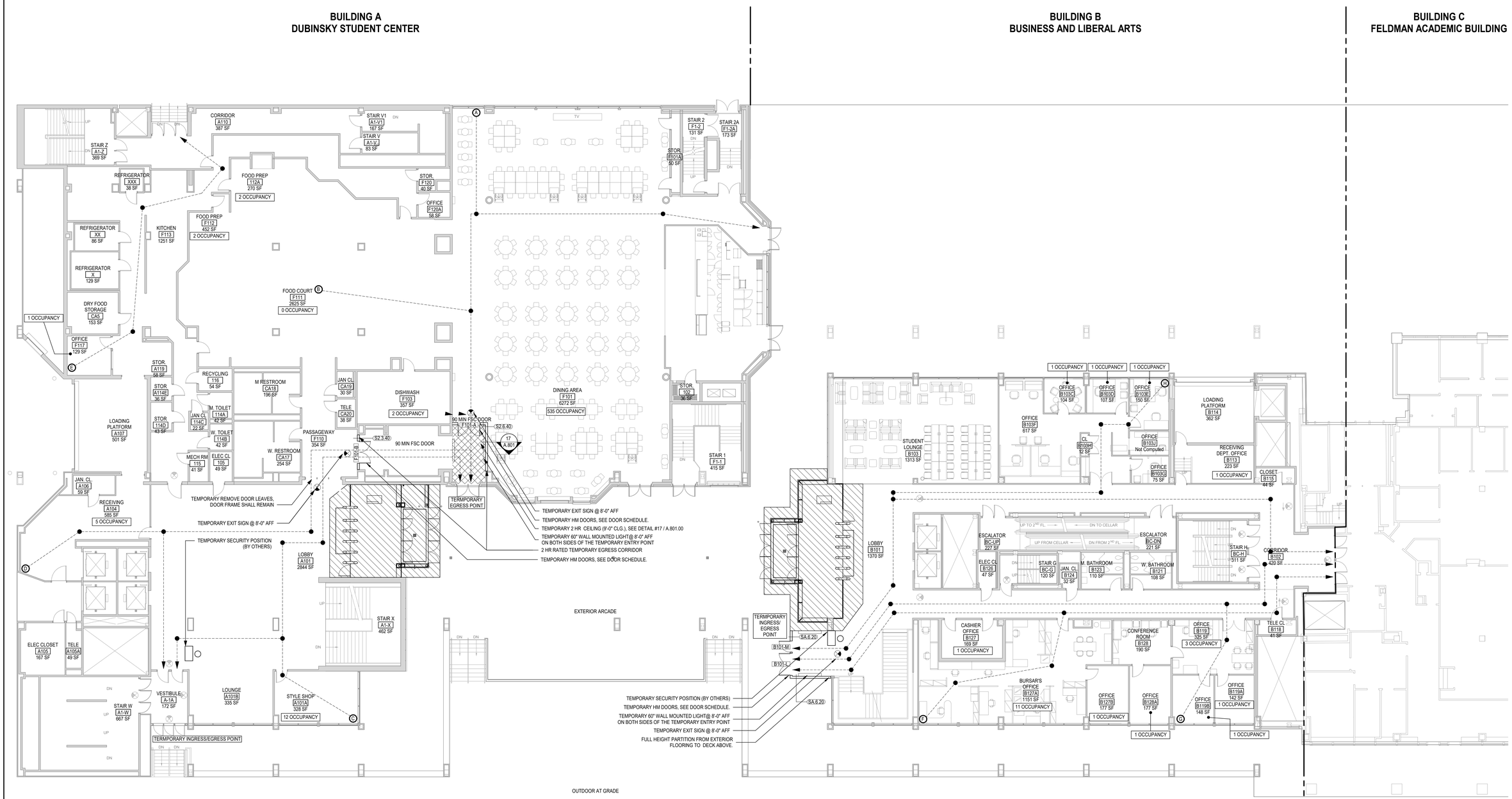

LEVEL 01 - CODE PLAN TEMPORARY EGRESS

SCALE: 3/32" = 1'-0"

LEGEND - CODE FLOOR PLANS

- ROOM NUMBER
- AREA (SF)
- OCCUPANT LOAD

OCCUPANT LOAD TAG (NET)
- THIS LOAD DOES NOT EXTEND BEYOND THIS SPACE
- SEE PATTERN FOR APPLIED LOAD FACTOR

EXIT TAG
- CUMULATIVE OCCUPANT LOAD
- EGRESS CAPACITY

- REQUIRED OCCUPANT LOAD
- REQUIRED WIDTH FOR OCCUPANT LOAD (INCHES)
- CAPACITY OF EGRESS COMPONENT (WIDTH IN INCHES)
- CAPACITY OF EGRESS COMPONENT (OCCUPANTS)
- LOAD FACTOR (INCHES/OCCUPANT)
- WHEN CAPACITY FACTOR TRIANGLE IS FILLED - THIS IS TOTAL OCCUPANT LOAD AT THIS EXIT FROM THIS STORY

- EXIT SIGN
- EXIT LIGHT, ARROWS INDICATE DIRECTION
- MAX TRAVEL = Length — EXIT ACCESS TRAVEL DISTANCE
- MAX CP = Length — COMMON PATH OF EGRESS TRAVEL DISTANCE
- EXIT DOOR NUMBER

SEPARATION LEGEND

HOURLY RATING

1 = 1 HOUR
2 = 2 HOUR
3 = 3 HOUR
4 = 4 HOUR
SP = SMOKE PARTITION

CODE PLAN HATCH KEY

- NEW CONSTRUCTION
- EXISTING CONSTRUCTION
- AREA OF WORK TO BE PROTECTED FROM ADJACENT SPACE
- 2-HOUR CEILING

TEMPORARY EGRESS NOTES

1. ANY CHANGES MADE TO THESE DRAWINGS DURING DEMOLITION, CONSTRUCTION OR ABATEMENT SHALL REQUIRE NOTIFICATION OF THE ENGINEER IN ORDER TO PREPARE / FILE AMENDED DRAWINGS.
2. FLOOR PROTECTION IS TO BE CONSTRUCTED OF MASONITE OR APPROVED EQUAL.
3. FIRE RETARDANT TARPS ARE TO BE USED FOR ALL DUST BARRIERS.
4. SMOKE DETECTORS AND CARBON MONOXIDE DETECTORS ARE TO BE MAINTAINED AND PERIODICALLY INSPECTED TO ENSURE THEY ARE IN WORKING ORDER THROUGHOUT CONSTRUCTION.
5. THROUGHOUT CONSTRUCTION, ON OCCUPIED FLOORS, WHEN THE PERIODIC REMOVAL OF DEBRIS IS REQUIRED AN ESCORT SHALL ACCOMPANY ANY WORKERS REMOVING DEBRIS TO ENSURE THE SAFETY OF ALL TENANTS.
6. WHERE APPLICABLE NEW TEMPORARY WALLS ARE TO BE OF 2 HOUR FIRE RATINGS AND DOORS ARE TO BE 90 MINUTE FIRE RATED HOLLOW METAL.
7. CONSTRUCTION OPERATIONS WILL BE CONFINED TO: 7 A.M. TO 6 P.M. MONDAYS THROUGH ERIDAYS, EXCEPT LEGAL HOLIDAYS. APPLICATION FOR NYC DOB AFTER HOUR VARIANCE SHALL BE OBTAINED FOR SATURDAY WORK.
8. NOISE AND DUST DURING CONSTRUCTION SHALL BE KEPT TO A MINIMUM AND COMPLY WITH DEP REGULATIONS.
9. ALL EGRESS / ENTRY DOORS ARE TO SE MODIFIED TO PROVIDE EMERGENCY SELF CLOSING SECURITY PANIC EQUIPMENT.
10. AT LEAST 2 MEANS OF EGRESS SHALL BE KEPT AT ALL TIMES.
11. WHERE CHANGES IN ELEVATION OF LESS THAN 12", SLOPED SURFACE SHALL BE USED. WHERE THE DIFFERENCE IN ELEVATION IS 6", THE FLOOR FINISH MATERIAL SHALL CONTRACT WITH ADJACENT.
12. AREAS NOT DESIGNATED AS ACCESSIBLE FOR PUBLIC (HATCHED) SHALL REMAIN AS CONSTRUCTION SITE. PUBLIC ACCESS IS STRICTLY PROHIBITED. PROPER SIGNAGE WILL BE PROVIDED.
13. DESIGNATED SITE SAFETY MANAGER, SAFETY COORDINATOR, QUALIFIED PERSONNEL OR SUPERINTENDENT TO EXECUTE 3 INSPECTIONS OF ENTIRE JOB SITE, INCLUDING FLOORS WITHOUT CONSTRUCTION OPERATIONS.
14. ALL CONDITIONS TO BE NOTED IN DAILY LOG. SITE WALK-THROUGH TO TAKE PLACE AT START OF DAY, LUNCH BREAK, AND CONCLUSION OF WORK.
15. ALL SAFETY DISCREPANCIES AT AREAS OF TENANT USAGE TO BE REMEDIED PROMPTLY.

GENERAL SAFETY PRACTICES

1. ALL CORRIDORS LEADING TO EXITS TO BE INSULATED WITH 2 HOUR FIRE RATED WALLS. EMERGENCY EXITS TO BE UTILIZED AS EMERGENCY ZONES FOR ASSISTANCE WITH PANIC HARDWARE
2. ALL DOORS LEADING TO CONSTRUCTION AREAS / LOCATIONS OF WORKER MOVEMENT TO BE LOCKED WHEN CONSTRUCTION IS IN SESSION AND AFTER OPERATIONS CONCLUDE FOR THE DAY
3. ALL AREAS OF CONSTRUCTION TO BE DESIGNATED AS CONTROLLED ACCESS ZONES

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OCCUPANT PROTECTION PLAN (TEMPORARY EGRESS)

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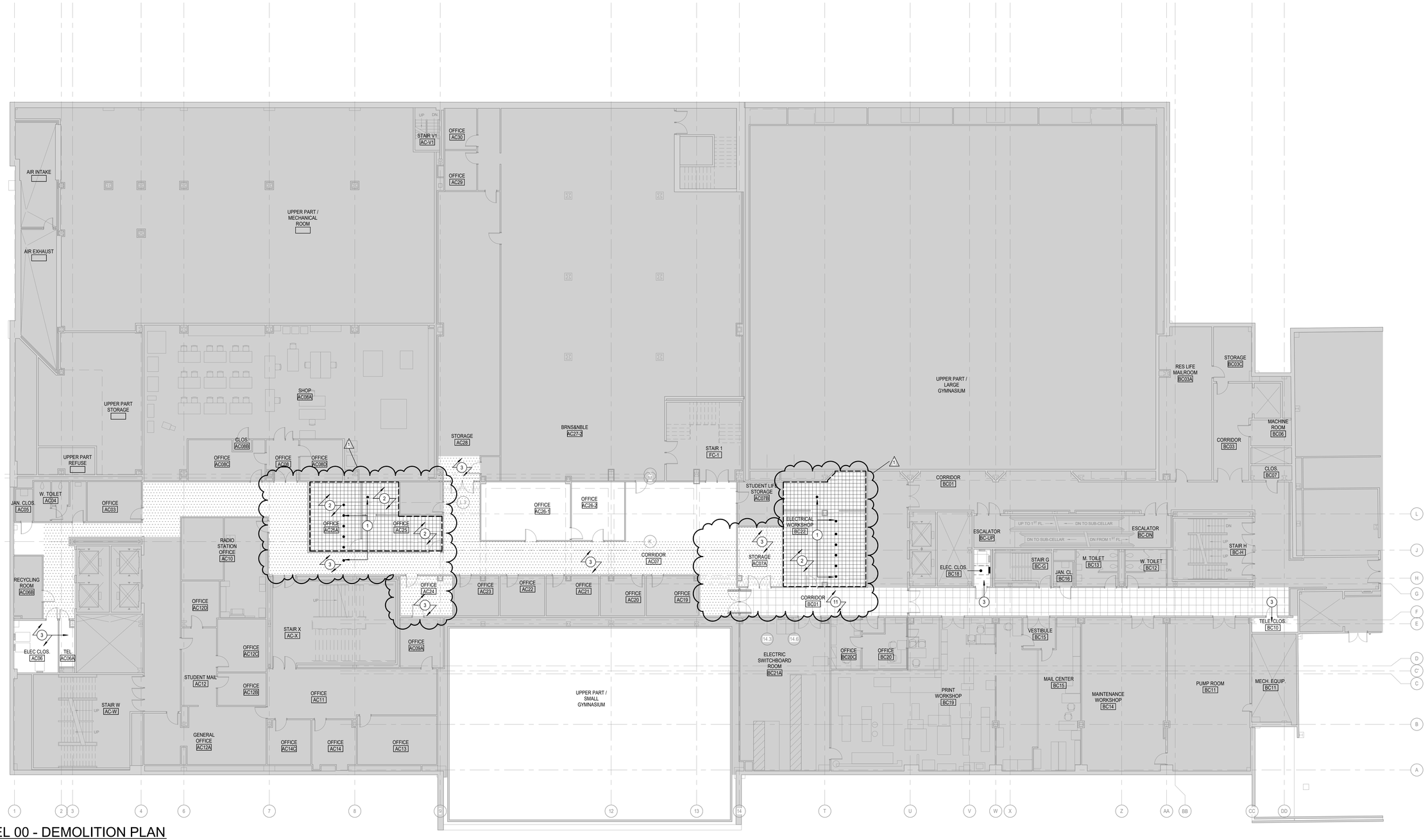

LEVEL 00 - DEMOLITION PLAN

SCALE: 3/32" = 1'-0"

DEMOLITION GENERAL NOTES

A. COORDINATE ALL DEMOLITION AND PHASING EFFORTS WITH THE ARCHITECT AND OWNER'S REPRESENTATIVE. EVERY EFFORT SHALL BE MADE TO MINIMIZE DISRUPTION OF OWNER'S OPERATIONS. EXCESSIVE NOISE OR VIBRATION SHALL BE PRE-APPROVED AND COORDINATED WITH THE OWNER'S REPRESENTATIVE. IN ALL CASES, PROVISIONS SHALL BE MADE FOR USER'S SAFETY.
B. COORDINATE ANY DISRUPTION OF UTILITY SERVICES WITH THE OWNER AND AS SPECIFIED.
C. CONSTRUCT TEMPORARY CONSTRUCTION PARTITIONS WITHIN THE EXISTING BUILDING WHICH OFFER A ONE-HOUR ENCLOSURE TO ISOLATE ANY DEMOLITION/CONSTRUCTION WORK FROM THE GENERAL PUBLIC AND AS DEEMED NECESSARY BY THE OWNER AND CODE OFFICIAL HAVING JURISDICTION. COORDINATE LOCATIONS WITH THE OWNER AND MAINTAIN MEANS OF EGRESS THROUGHOUT THE WORK.
D. MAINTAIN A SECURE, WEATHER-TIGHT ENCLOSURE AT ALL TIMES.
E. VERIFY ALL EXISTING CONDITIONS, DIMENSIONS AND ELEVATIONS AND NOTIFY THE ARCHITECT OF ANY DISCREPANCIES.
F. REMOVE IN THEIR ENTIRETY ALL EXISTING WALLS, DOORS, MILLWORK, PLUMBING FIXTURES, CEILINGS, SOFFITS, MARKERBOARDS, AND OTHER ITEMS, AS REQUIRED TO EXECUTE THE DEMOLITION/CONSTRUCTION WORK DESCRIBED BY THE DRAWINGS.
G. THE OWNER SHALL RESERVE THE RIGHT TO SALVAGE ANY MATERIALS.
H. PROVIDE PROTECTION FOR ALL EXISTING BUILDING MATERIALS AND EQUIPMENT FROM DAMAGE DUE TO ANY DEMOLITION OR CONSTRUCTION-RELATED INCIDENT PERFORMED UNDER THIS CONTRACT.
I. REPAIR OR REPLACE ITEMS THAT ARE DAMAGED AS A RESULT OF DEMOLITION OR CONSTRUCTION TO MATCH EXISTING FINISH AND/OR CONDITION.
J. EXISTING MATERIALS SHALL NOT BE REUSED UNLESS NOTED OTHERWISE OR AS AUTHORIZED BY ARCHITECT.
K. VERIFY AND MAINTAIN THE LOCATION OF EXISTING POWER, COMMUNICATION AND DATA CABLES TO PREVENT INTERRUPTION OF THEIR SERVICE.
L. PATCH FLOOR, WALL AND CEILING PENETRATIONS RESULTING FROM REMOVAL OR RE-ROUTING OF NEW OR EXISTING PIPING, DUCTWORK, CONDUIT, AND OTHER ITEMS, AS REQUIRED TO MAINTAIN FIRE-RESISTANCE-RATED SEPARATIONS. FINISH AS REQUIRED FOR NEW OR EXISTING ADJACENT SURFACES.
M. CAP ALL DISCONNECTED MECHANICAL PIPING LINES WITHIN THE WALL OR FLOOR. PATCH AND FINISH AS REQUIRED TO MATCH NEW OR EXISTING ADJACENT SURFACES.
N. SEE MECHANICAL AND ELECTRICAL DRAWINGS AND NOTES FOR FURTHER SEQUENCING AND SCOPE OF WORK.
O. AVOID ANY DISTURBANCE OF SOILS WITHIN THE ZONE OF INFLUENCE AROUND EXISTING FOOTINGS AND FLOOR SLABS AS DIRECTED BY GEOTECHNICAL ENGINEER.
P. WHERE CMU WALLS ARE INDICATED TO BE REMOVED, PREPARE ADJACENT WALLS TO RECEIVE NEW PATCH/FINISH BY REMOVING CMU IN TOOTH-IN PATTERN BOTH SIDES OF DEMOLITION FOR CONTRACTOR TO TOOTH-IN NEW CMU PATCHES.
Q. WHERE PLASTER/STUD WALLS ARE INDICATED TO BE REMOVED, PREPARE ADJACENT WALLS TO RECEIVE NEW PATCH/FINISH BY SAWCUTTING ADJACENT PLASTER FINISH A MINIMUM OF 1'-0" BEYOND DEMOLITION.

DEMOLITION SYMBOL/HATCH KEY

AREA NOT IN SCOPE

FULL DEMOLITION OF SPLINE CEILING SYSTEM
SEE SHEET NOTE 2 FOR SCOPE

PARTIAL DEMOLITION OF INDIVIDUAL SPLINE CEILING TILES AS NEEDED
SEE SHEET NOTE 3 FOR SCOPE

ACOUSTIC CEILING TILE TO REMAIN
SEE SHEET NOTE 11 FOR SCOPE

SHEET NOTES

1. AT FIRST FLOOR SLAB, PROVIDE CORE DRILL 6" FOR TURNSTILE & SECURITY DESK. SEE ELECTRICAL AND TELECOM DRAWINGS FOR MORE INFORMATION
2. DEMOLISH 1X1 CEILING SPLINE SYSTEM INCLUSIVE OF FRAMING, CEILING TILES AND LIGHTS. PROTECT WALLS TO REMAIN. SEE MECHANICAL FOR DIFFUSER RELOCATION. SEE A.300.00 FOR SPRINKLER RELOCATION.
3. REMOVE INDIVIDUAL 1X1 SPLINE CEILING SYSTEM TILES AS NEEDED ALONG PATHWAY BETWEEN TURNSTILES, ELECTRIC ROOM, AND TELE ROOMS FOR ELECTRICAL AND PLUMBING SCOPE. SEE ELECTRICAL, TELECOMMUNICATION, AND PLUMBING DRAWINGS FOR AREA OF WORK. GC TO COORDINATE THE ROUTING IN THE FIELD WITH THE ARCHITECT.
4. REMOVE STOREFRONT INCLUSIVE OF MULLIONS, GLASS, VESTIBULE, DOORS, AND WALK OFF MAT. PROTECT ADJACENT STONE SLAB FLOORING TO REMAIN AND TIE INTO NEW FLOORING. NOTE: ASBESTOS CONTAINING MATERIALS HAVE BEEN OBSERVED AT THE GLAZING SEALANT AT THE EXTERIOR SIDE OF THE WINDOWS BETWEEN THE GLASS PANE AND WINDOW FRAME. SEALANT TO BE REMOVED BY OWNER AND CONTRACTOR TO COORDINATE REMOVAL IN SCHEDULE.
5. AT FLOOR, SCARIFY CONCRETE TOPPING LAYER TO RECEIVE NEW UNDERLAYMENT FILL AND FOR LEVEL FLOOR. AT CEILING, REMOVE PLASTER LATH CEILING AND DOWNLIGHTS IN AREA OF WORK FOR NEW CEILING
6. REMOVE BIKE RACKS AND FILL (2) HOLES WITH CEMENTITIOUS FILL AT EACH BIKE RAKE FOR INSTALLATION OF STRUCTURAL GLAZING. SEE CONSTRUCTION PLANS FOR RELOCATION OF BIKE RACKS
7. AT CEILING AT LOBBY A101, SEE PHASING PLAN ON G.000.00 FOR DELINEATING WORK BETWEEN PHASE I.A & II.A. GC TO SUBMIT SITE SAFETY EHS PLAN TO OWNERSHIP TO DELINEATE AREA OF WORK AND STAGING AREA. SEE 06 00 00 FOR MORE INFORMATION. WORK BEYOND THE GROUND FLOOR AREA OF WORK TO BE COORDINATED WITH OWNERSHIP.
8. AT CEILING AT LOBBY B101, SEE PHASING PLAN ON G.000.00 FOR DELINEATING WORK BETWEEN PHASE I.B & II.B. GC TO SUBMIT SITE SAFETY EHS PLAN TO OWNERSHIP TO DELINEATE AREA OF WORK AND STAGING AREA. SEE 06 00 00 FOR MORE INFORMATION. WORK BEYOND THE GROUND FLOOR AREA OF WORK TO BE COORDINATED WITH OWNERSHIP.
9. DEMOLISH MILLWORK AT OLD SECURITY STAND. COORDINATE SEQUENCE WITH OWNERSHIP TO ENSURE TEMPORARY EGRESS PROVISIONS ARE MET AT THE TIME OF REMOVAL.
10. TEMPORARILY REMOVE STOREFRONT INCLUSIVE OF MULLIONS & GLASS TO PROVIDE TEMPORARY EGRESS. STORE GLAZING AND MULLIONS FOR REINSTALLATION. TEMPORARILY REMOVE FIN TUBE RADIATOR COVER AND CAP HYDRONIC PIPING. SEE MECHANICAL DRAWINGS FOR MORE INFORMATION. NOTE: ASBESTOS CONTAINING MATERIALS HAVE BEEN OBSERVED AT THE GLAZING SEALANT AT THE EXTERIOR SIDE OF THE WINDOWS BETWEEN THE GLASS PANE AND WINDOW FRAME. SEALANT TO BE REMOVED BY OWNER AND CONTRACTOR TO COORDINATE REMOVAL IN SCHEDULE.
11. REMOVE AND REINSTALL EXISTING 2X2 ACT TILES AS NEEDED FOR ELECTRICAL AND LOW VOLTAGE WORK. SEE ELECTRIAL AND TELECOMMUNICATION DRAWINGS FOR ADDITIONAL INFORMATION.

SHEET NOTE 4 & 10

ASBESTOS CONTAINING MATERIALS HAVE BEEN OBSERVED AT THE GLAZING SEALANT AT THE EXTERIOR SIDE OF THE WINDOWS BETWEEN THE GLASS PANE AND WINDOW FRAME. SEALANT TO BE REMOVED BY OWNER AND CONTRACTOR TO COORDINATE REMOVAL IN SCHEDULE.

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LEVEL 00 - DEMOLITION PLAN

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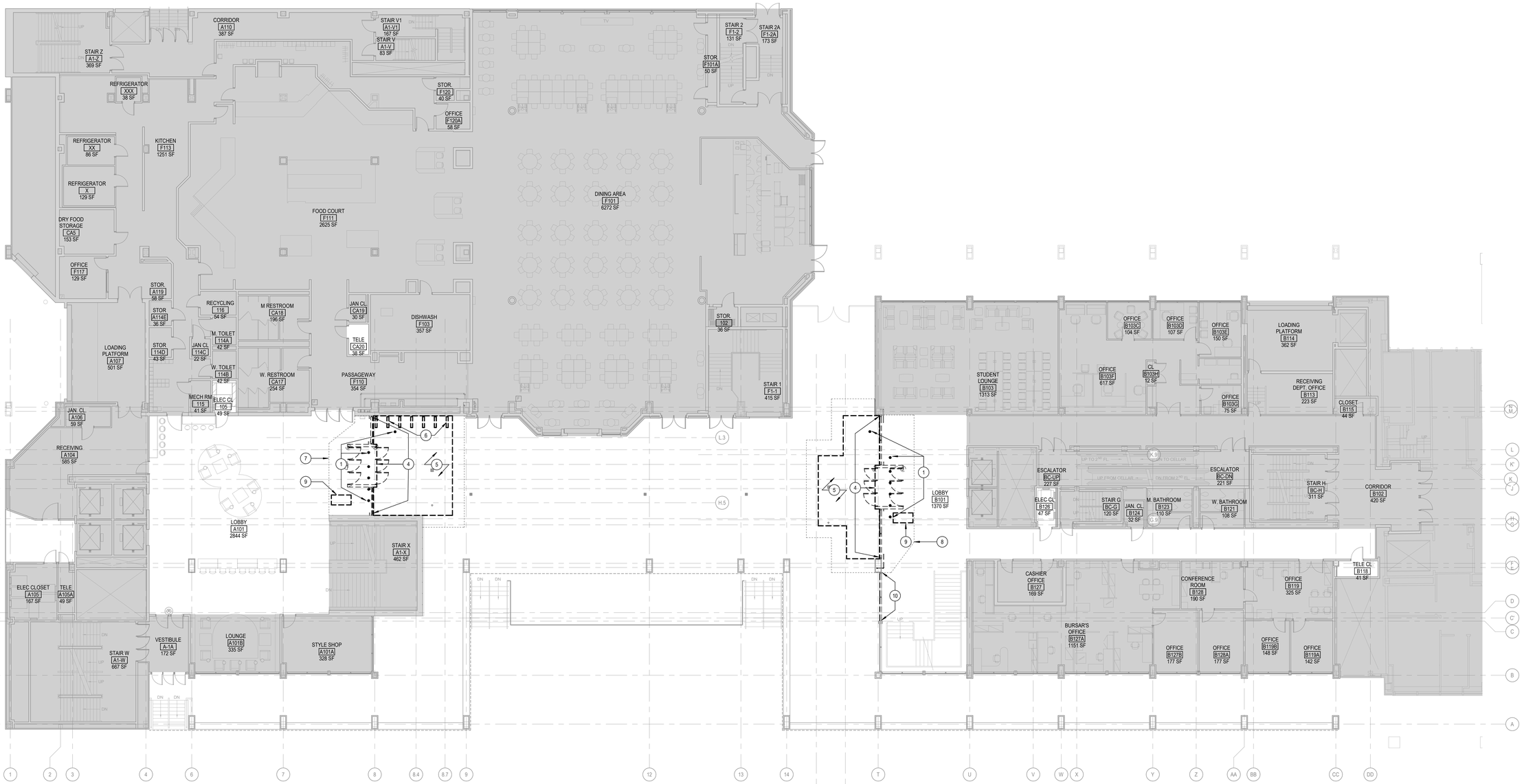

LEVEL 01 - DEMOLITION PLAN

SCALE: 3/32" = 1'-0"

DEMOLITION GENERAL NOTES

A. COORDINATE ALL DEMOLITION AND PHASING EFFORTS WITH THE ARCHITECT AND OWNER'S REPRESENTATIVE. EVERY EFFORT SHALL BE MADE TO MINIMIZE DISRUPTION OF OWNER'S OPERATIONS. EXCESSIVE NOISE OR VIBRATION SHALL BE PRE-APPROVED AND COORDINATED WITH THE OWNER'S REPRESENTATIVE. IN ALL CASES, PROVISIONS SHALL BE MADE FOR USER'S SAFETY.
B. COORDINATE ANY DISRUPTION OF UTILITY SERVICES WITH THE OWNER AND AS SPECIFIED.
C. CONSTRUCT TEMPORARY CONSTRUCTION PARTITIONS WITHIN THE EXISTING BUILDING WHICH OFFER A ONE-HOUR ENCLOSURE TO ISOLATE ANY DEMOLITION/CONSTRUCTION WORK FROM THE GENERAL PUBLIC AND AS DEEMED NECESSARY BY THE OWNER AND CODE OFFICIAL HAVING JURISDICTION. COORDINATE LOCATIONS WITH THE OWNER AND MAINTAIN MEANS OF EGRESS THROUGHOUT THE WORK.
D. MAINTAIN A SECURE, WEATHER-TIGHT ENCLOSURE AT ALL TIMES.
E. VERIFY ALL EXISTING CONDITIONS, DIMENSIONS AND ELEVATIONS AND NOTIFY THE ARCHITECT OF ANY DISCREPANCIES.
F. REMOVE IN THEIR ENTIRETY ALL EXISTING WALLS, DOORS, MILLWORK, PLUMBING FIXTURES, CEILINGS, SOFFITS, MARKERBOARDS, AND OTHER ITEMS, AS REQUIRED TO EXECUTE THE DEMOLITION/CONSTRUCTION WORK DESCRIBED BY THE DRAWINGS.
G. THE OWNER SHALL RESERVE THE RIGHT TO SALVAGE ANY MATERIALS.
H. PROVIDE PROTECTION FOR ALL EXISTING BUILDING MATERIALS AND EQUIPMENT FROM DAMAGE DUE TO ANY DEMOLITION OR CONSTRUCTION-RELATED INCIDENT PERFORMED UNDER THIS CONTRACT.
I. REPAIR OR REPLACE ITEMS THAT ARE DAMAGED AS A RESULT OF DEMOLITION OR CONSTRUCTION TO MATCH EXISTING FINISH AND/OR CONDITION.
J. EXISTING MATERIALS SHALL NOT BE REUSED UNLESS NOTED OTHERWISE OR AS AUTHORIZED BY ARCHITECT.
K. VERIFY AND MAINTAIN THE LOCATION OF EXISTING POWER, COMMUNICATION AND DATA CABLES TO PREVENT INTERRUPTION OF THEIR SERVICE.
L. PATCH FLOOR, WALL AND CEILING PENETRATIONS RESULTING FROM REMOVAL OR RE-ROUTING OF NEW OR EXISTING PIPING, DUCTWORK, CONDUIT, AND OTHER ITEMS, AS REQUIRED TO MAINTAIN FIRE-RESISTANCE-RATED SEPARATIONS. FINISH AS REQUIRED FOR NEW OR EXISTING ADJACENT SURFACES.
M. CAP ALL DISCONNECTED MECHANICAL PIPING LINES WITHIN THE WALL OR FLOOR. PATCH AND FINISH AS REQUIRED TO MATCH NEW OR EXISTING ADJACENT SURFACES.
N. SEE MECHANICAL AND ELECTRICAL DRAWINGS AND NOTES FOR FURTHER SEQUENCING AND SCOPE OF WORK.
O. AVOID ANY DISTURBANCE OF SOILS WITHIN THE ZONE OF INFLUENCE AROUND EXISTING FOOTINGS AND FLOOR SLABS AS DIRECTED BY GEOTECHNICAL ENGINEER.
P. WHERE CMU WALLS ARE INDICATED TO BE REMOVED, PREPARE ADJACENT WALLS TO RECEIVE NEW PATCH/FINISH BY REMOVING CMU IN TOOTH-IN PATTERN BOTH SIDES OF DEMOLITION FOR CONTRACTOR TO TOOTH-IN NEW CMU PATCHES.
Q. WHERE PLASTER/STUD WALLS ARE INDICATED TO BE REMOVED, PREPARE ADJACENT WALLS TO RECEIVE NEW PATCH/FINISH BY SAWCUTTING ADJACENT PLASTER FINISH A MINIMUM OF 1'-0" BEYOND DEMOLITION.

DEMOLITION SYMBOL/HATCH KEY

AREA NOT IN SCOPE

AREA OF DEMOLITION SCOPE
SEE SCOPE NOTES FOR MORE INFORMATION

AREA OF GROUND FLOOR WORK
SEE SCOPE NOTES 7 & 8 FOR MORE INFORMATION

SHEET NOTES

1. AT FIRST FLOOR SLAB, PROVIDE CORE DRILL 6" FOR TURNSTILE & SECURITY DESK. SEE ELECTRICAL AND TELECOM DRAWINGS FOR MORE INFORMATION
2. DEMOLISH 1X1 CEILING SPLINE SYSTEM INCLUSIVE OF FRAMING, CEILING TILES AND LIGHTS. PROTECT WALLS TO REMAIN. SEE MECHANICAL FOR DIFFUSER RELOCATION. SEE A.300.00 FOR SPRINKLER RELOCATION.
3. REMOVE INDIVIDUAL 1X1 SPLINE CEILING SYSTEM TILES AS NEEDED ALONG PATHWAY BETWEEN TURNSTILES, ELECTRIC ROOM, AND TELE ROOMS FOR ELECTRICAL AND PLUMBING SCOPE. SEE ELECTRCIAL, TELECOMMUNICATION, AND PLUMBING DRAWINGS FOR AREA OF WORK. GC TO COORDINATE THE ROUTING IN THE FIELD WITH THE ARCHITECT.
4. REMOVE STOREFRONT INCLUSIVE OF MULLIONS, GLASS, VESTIBULE, DOORS, AND WALK OFF MAT. PROTECT ADJACENT STONE SLAB FLOORING TO REMAIN AND TIE INTO NEW FLOORING. NOTE: ASBESTOS CONTAINING MATERIALS HAVE BEEN OBSERVED AT THE GLAZING SEALANT AT THE EXTERIOR SIDE OF THE WINDOWS BETWEEN THE GLASS PANE AND WINDOW FRAME. SEALANT TO BE REMOVED BY OWNER AND CONTRACTOR TO COORDINATE REMOVAL IN SCHEDULE.
5. AT FLOOR, SCARIFY CONCRETE TOPPING LAYER TO RECEIVE NEW UNDERLAYMENT FILL AND FOR LEVEL FLOOR. AT CEILING, REMOVE PLASTER LATH CEILING AND DOWNLIGHTS IN AREA OF WORK FOR NEW CEILING
6. REMOVE BIKE RACKS AND FILL (2) HOLES WITH CEMENTITIOUS FILL AT EACH BIKE RAKE FOR INSTALLATION OF STRUCTURAL GLAZING. SEE CONSTRUCTION PLANS FOR RELOCATION OF BIKE RACKS
7. AT CEILING AT LOBBY A101, SEE PHASING PLAN ON G.000.00 FOR DELINEATING WORK BETWEEN PHASE I.A & II.A. GC TO SUBMIT SITE SAFETY EHS PLAN TO OWNERSHIP TO DELINEATE AREA OF WORK AND STAGING AREA. SEE 06 00 00 FOR MORE INFORMATION. WORK BEYOND THE GROUND FLOOR AREA OF WORK TO BE COORDINATED WITH OWNERSHIP.
8. AT CEILING AT LOBBY B101, SEE PHASING PLAN ON G.000.00 FOR DELINEATING WORK BETWEEN PHASE I.B & II.B. GC TO SUBMIT SITE SAFETY EHS PLAN TO OWNERSHIP TO DELINEATE AREA OF WORK AND STAGING AREA. SEE 06 00 00 FOR MORE INFORMATION. WORK BEYOND THE GROUND FLOOR AREA OF WORK TO BE COORDINATED WITH OWNERSHIP.
9. DEMOLISH MILLWORK AT OLD SECURITY STAND. COORDINATE SEQUENCE WITH OWNERSHIP TO ENSURE TEMPORARY EGRESS PROVISIONS ARE MET AT THE TIME OF REMOVAL.
10. TEMPORARILY REMOVE STOREFRONT INCLUSIVE OF MULLIONS & GLASS TO PROVIDE TEMPORARY EGRESS. STORE GLAZING AND MULLIONS FOR REINSTALLATION. TEMPORARILY REMOVE FIN TUBE RADIATOR COVER AND CAP HYDRONIC PIPING. SEE MECHANICAL DRAWINGS FOR MORE INFORMATION. NOTE: ASBESTOS CONTAINING MATERIALS HAVE BEEN OBSERVED AT THE GLAZING SEALANT AT THE EXTERIOR SIDE OF THE WINDOWS BETWEEN THE GLASS PANE AND WINDOW FRAME. SEALANT TO BE REMOVED BY OWNER AND CONTRACTOR TO COORDINATE REMOVAL IN SCHEDULE.
11. REMOVE AND REINSTALL EXISTING 2X2 ACT TILES AS NEEDED FOR ELECTRICAL AND LOW VOLTAGE WORK. SEE ELECTRIAL AND TELECOMMUNICATION DRAWINGS FOR ADDITIONAL INFORMATION.

SHEET NOTE 4 & 10

ASBESTOS CONTAINING MATERIALS HAVE BEEN OBSERVED AT THE GLAZING SEALANT AT THE EXTERIOR SIDE OF THE WINDOWS BETWEEN THE GLASS PANE AND WINDOW FRAME. SEALANT TO BE REMOVED BY OWNER AND CONTRACTOR TO COORDINATE REMOVAL IN SCHEDULE.

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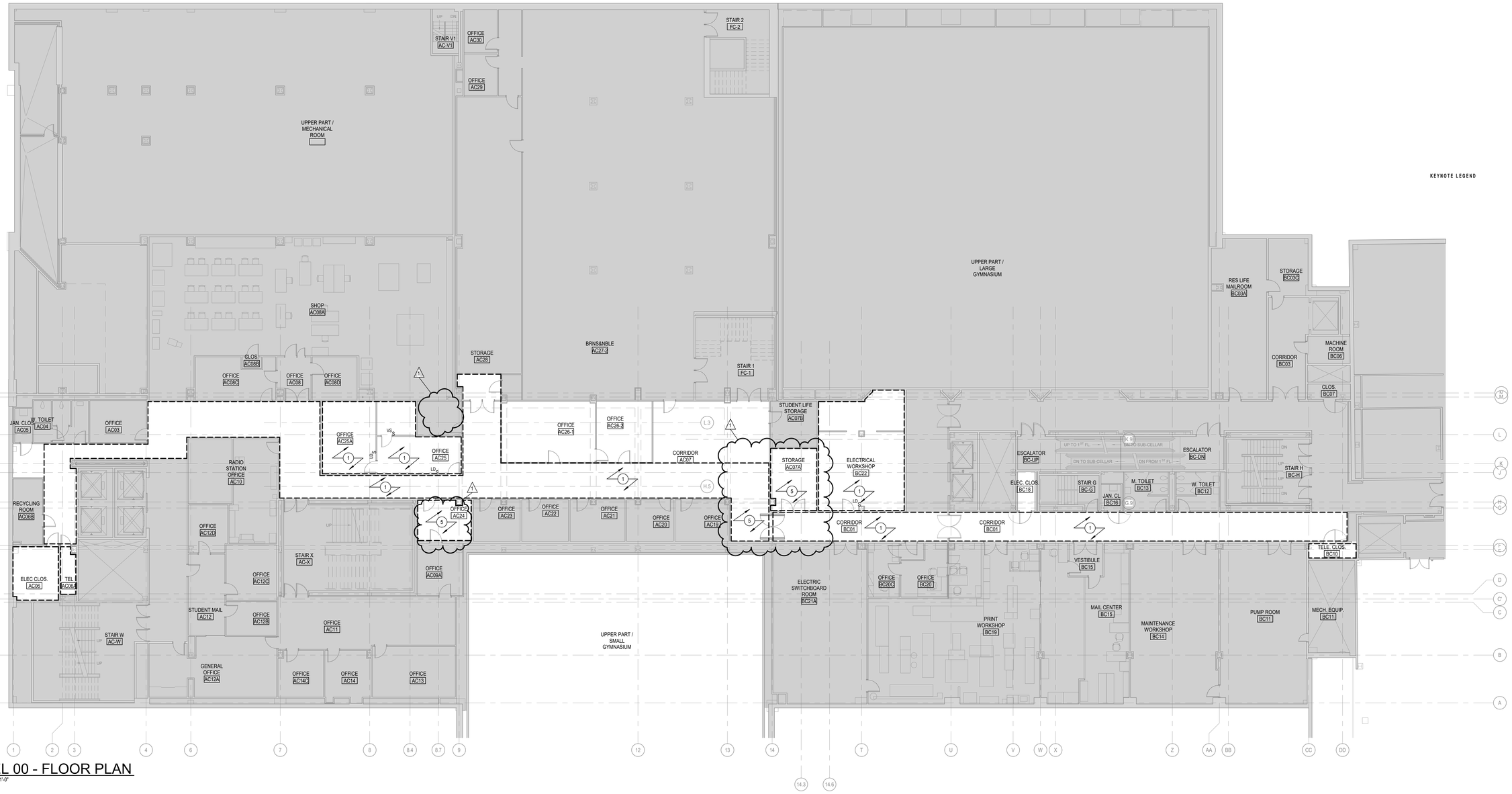


LEVEL 00 - FLOOR PLAN

SCALE: 3/32" = 1'-0"

KEYNOTE LEGEND

GENERAL ARCHITECTURAL NOTES

1. ALL INTERIOR CMU WALLS SHALL BE 8 INCHES NOMINAL THICKNESS, UNLESS NOTED OTHERWISE.
2. PARTITION TYPES SHALL BE DESIGNATED ON FLOOR PLANS (XX.X.XX) THUS: SEE SHEET XX.X FOR TYPES. ALL INTERIOR PARTITIONS ARE TYPE XX.X.XX UNLESS NOTED OTHERWISE.
3. ALL MASONRY WALLS AND INTERIOR STUD WALLS SHALL EXTEND TO UNDERSIDE OF FLOOR OR ROOF DECK ABOVE UNLESS NOTED OTHERWISE, PER PARTITION TYPE.
4. PROVISIONS SHALL BE MADE AT ALL FULL HEIGHT NON-BEARING WALLS FOR 1-INCH VERTICAL MOVEMENT OF THE BUILDING STRUCTURE WITHOUT TRANSFER OF COMPRESSIVE LOADS TO WALL. FILL IRREGULARITIES BETWEEN TOP OF WALL AND DECK ABOVE WITH MINERAL WOOL INSULATION OR FIRE STOPPING MATERIALS AS REQUIRED TO MEET FIRE RATING OF RESPECTIVE WALLS. SEE DETAILS ON SHEET XX.X.
5. SEE STRUCTURAL DRAWINGS FOR BRACING OF NON-LOAD BEARING MASONRY WALLS.
6. FURNISH AND INSTALL FIRE-TREATED WOOD BLOCKING OR METAL BACKING PLATE IN METAL STUD PARTITIONS FOR THE PROPER ANCHORAGE OF ALL WALL ATTACHED ITEMS; I.E. TOILET ACCESSORIES, CASEWORK, MILLWORK, WALL-MOUNTED FIXTURES, MARKER BOARDS, TACK BOARDS, DOOR STOPS, AUDIO VISUAL BRACKETS, AND OTHER WALL ATTACHED ITEMS.
7. GYPSUM BOARD SURFACES SHALL BE ISOLATED WITH CONTROL JOINTS WHERE SHOWN ON DRAWINGS AND AS DESCRIBED IN THE SPECIFICATIONS.
8. MASONRY CONTROL JOINTS (CJ) AND CONTROL JOINTS ABOVE (CJA) SHALL BE LOCATED AS SHOWN ON THE FLOOR PLAN AND BUILDING ELEVATIONS, AND WHERE LARGE PLUMBING VENTS OR RISERS OCCUR IN SINGLE WYTHE MASONRY WALLS, AND WHERE MASONRY WALLS BEARING ON THE CONCRETE FLOOR SLAB ABUT MASONRY WALLS BEARING ON CONCRETE FOOTINGS OR AS INDICATED ON DRAWINGS.
9. EXTEND FURRING CHANNELS AND GYPSUM BOARD UP 4 INCHES ABOVE FINISHED CEILING ON CMU WALLS.
10. SCRIBE GYPSUM WALL BOARD OF WALLS AND PARTITIONS TO IRREGULARITIES OF DECK ABOVE. SEAL TIGHTLY AROUND ALL PENETRATIONS.

CONSTURCTION HATCH KEY

AREA NOT IN SCOPE

AREA OF WORK
SEE SCOPE NOTE 1 FOR MORE INFORMATION

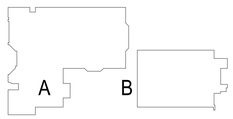
NEW CONSTRUCTION

EXISTING CONSTRUCTION

SHEET NOTES

1 AREA OF WORK BELOW TURNSTILES. GC TO BLOCK OFF ACCESS TO ROOMS AC25, AC25A, & BC01A. WORK THAT OCCURS IN CORRIDOR AC07 & BC01 SHALL BE COORDINATED WITH OWNERSHIP AND ACCESS SHALL REMAIN THROUGH CORRIDORS DURING DURATION OF WORK.
2 AREA OF WORK AT GROUND FLOOR. ACCESS SHALL REMAIN THROUGH LOBBY FOR DURING DURATION OF WORK.
3 SEE MHA 00 & AHTB 00 FOR REVISED PLANS AT GROUND FLOOR.
4 FURNISH AND INSTALL VINYL SIGNAGE ON CURTAIN WALL. SEE A.400 FOR MORE INFORMATION.
5 AREA OF WORK BELOW VESTIBULE FOR PLUMBING WORK. GC TO BLOCK OFF ACCESS TO ROOMS AC24 & AC07A. WORK THAT OCCURS IN CORRIDOR AC07 & BC01 SHALL BE COORDINATED WITH OWNERSHIP AND ACCESS SHALL REMAIN THROUGH CORRIDORS DURING DURATION OF WORK. SEE PLUMBING DRAWINGS FOR MORE INFORMATION.
6 AT EACH BIKE RACK, PROVIDE (2) CORE DRILLS 2" DEEP INTO EXTERIOR CONCRETE AND SET EPOXY AT EACH BIKE RAKE. SPACED OUT EACH RAKE EQUALLY TO THE SPACING AT THE EXISTING RACK.
7 REINSTALL FIN TUBE RADIATOR COVER, HYDRONIC PIPING, AND STOREFRONT INCLUSIVE OF MULLIONS & GLASS AFTER TEMPORARY EGRESS IS REMOVED. SEE MECHANICAL DRAWINGS FOR MORE INFORMATION.

KEY PLAN



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LEVEL 00 - FLOOR PLAN

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LEVEL 01 - FLOOR PLAN

SCALE: 3/32" = 1'-0"

GENERAL ARCHITECTURAL NOTES

1. ALL INTERIOR CMU WALLS SHALL BE 8 INCHES NOMINAL THICKNESS, UNLESS NOTED OTHERWISE.
2. PARTITION TYPES SHALL BE DESIGNATED ON FLOOR PLANS (XX.X.XX) THUS: SEE SHEET XX.X FOR TYPES. ALL INTERIOR PARTITIONS ARE TYPE XX.X.XX UNLESS NOTED OTHERWISE.
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5. SEE STRUCTURAL DRAWINGS FOR BRACING OF NON-LOAD BEARING MASONRY WALLS.
6. FURNISH AND INSTALL FIRE-TREATED WOOD BLOCKING OR METAL BACKING PLATE IN METAL STUD PARTITIONS FOR THE PROPER ANCHORAGE OF ALL WALL ATTACHED ITEMS; I.E. TOILET ACCESSORIES, CASEWORK, MILLWORK, WALL-MOUNTED FIXTURES, MARKER BOARDS, TACK BOARDS, DOOR STOPS, AUDIO VISUAL BRACKETS, AND OTHER WALL ATTACHED ITEMS.
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9. EXTEND FURRING CHANNELS AND GYPSUM BOARD UP 4 INCHES ABOVE FINISHED CEILING ON CMU WALLS.
10. SCRIBE GYPSUM WALL BOARD OF WALLS AND PARTITIONS TO IRREGULARITIES OF DECK ABOVE. SEAL TIGHTLY AROUND ALL PENETRATIONS.

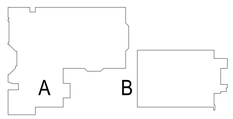
CONSTURCTION HATCH KEY

- AREA NOT IN SCOPE
- ST-02, SEE FINISH SCHEDULE
- MT-01, SEE FINISH SCHEDULE
- NEW CONSTRUCTION
- EXISTING CONSTRUCTION

SHEET NOTES

1. AREA OF WORK BELOW TURNSTILES. GC TO BLOCK OFF ACCESS TO ROOMS AC25, AC25A, & BC01A. WORK THAT OCCURS IN CORRIDOR AC07 & BC01 SHALL BE COORDINATED WITH OWNERSHIP AND ACCESS SHALL REMAIN THROUGH CORRIDORS DURING DURATION OF WORK.
2. AREA OF WORK AT GROUND FLOOR. ACCESS SHALL REMAIN THROUGH LOBBY FOR DURING DURATION OF WORK.
3. SEE A.101A.00 & A.101B.00 FOR ENLARGED PLANS AT GROUND FLOOR.
4. FURNISH AND INSTALL VINYL SIGNAGE ON CURTAIN WALL. SEE A.400 FOR MORE INFORMATION.
5. AREA OF WORK BELOW VESTIBULE FOR PLUMBING WORK. GC TO BLOCK OFF ACCESS TO ROOMS AC24 & AC07A. WORK THAT OCCURS IN CORRIDOR AC07 & BC01 SHALL BE COORDINATED WITH OWNERSHIP AND ACCESS SHALL REMAIN THROUGH CORRIDORS DURING DURATION OF WORK. SEE PLUMBING DRAWINGS FOR MORE INFORMATION.
6. AT EACH BIKE RACK, PROVIDE (2) CORE DRILLS 2" DEEP INTO EXTERIOR CONCRETE AND SET EPOXY AT EACH BIKE RAKE. SPACED OUT EACH RAKE EQUALLY TO THE SPACING AT THE EXISTING RACK.
7. REINSTALL FIN TUBE RADIATOR COVER, HYDRONIC PIPING, AND STOREFRONT INCLUSIVE OF MULLIONS & GLASS AFTER TEMPORARY EGRESS IS REMOVED. SEE MECHANICAL DRAWINGS FOR MORE INFORMATION.

KEY PLAN



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LEVEL 01 - FLOOR PLAN

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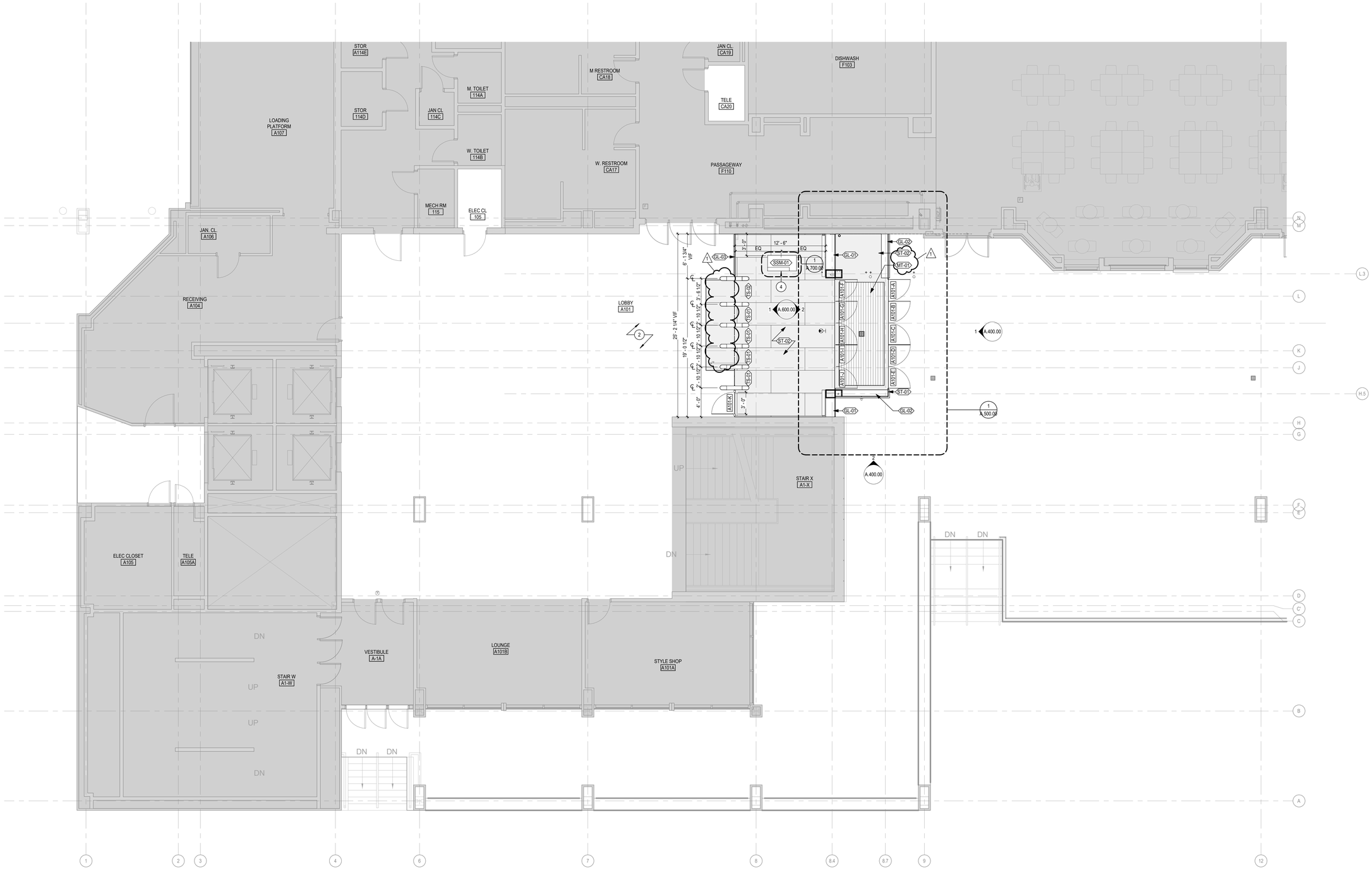

LEVEL 01 - AREA A - FLOOR PLAN

SCALE: 3/16" = 1'-0"

GENERAL ARCHITECTURAL NOTES

1. ALL INTERIOR CMU WALLS SHALL BE 8 INCHES NOMINAL THICKNESS, UNLESS NOTED OTHERWISE.
2. PARTITION TYPES SHALL BE DESIGNATED ON FLOOR PLANS (XX. X. XX) THUS: SEE SHEET XX.X FOR TYPES. ALL INTERIOR PARTITIONS ARE TYPE XX.X.XX UNLESS NOTED OTHERWISE.
3. ALL MASONRY WALLS AND INTERIOR STUD WALLS SHALL EXTEND TO UNDERSIDE OF FLOOR OR ROOF DECK ABOVE UNLESS NOTED OTHERWISE, PER PARTITION TYPE.
4. PROVISIONS SHALL BE MADE AT ALL FULL HEIGHT NON-BEARING WALLS FOR 1-INCH VERTICAL MOVEMENT OF THE BUILDING STRUCTURE WITHOUT TRANSFER OF COMPRESSIVE LOADS TO WALL. FILL IRREGULARITIES BETWEEN TOP OF WALL AND DECK ABOVE WITH MINERAL WOOL INSULATION OR FIRE STOPPING MATERIALS AS REQUIRED TO MEET FIRE RATING OF RESPECTIVE WALLS. SEE DETAILS ON SHEET XX.X.
5. SEE STRUCTURAL DRAWINGS FOR BRACING OF NON-LOAD BEARING MASONRY WALLS.
6. FURNISH AND INSTALL FIRE-TREATED WOOD BLOCKING OR METAL BACKING PLATE IN METAL STUD PARTITIONS FOR THE PROPER ANCHORAGE OF ALL WALL ATTACHED ITEMS: I.E. TOILET ACCESSORIES, CASEWORK, MILLWORK, WALL-MOUNTED FIXTURES, MARKER BOARDS, TACK BOARDS, DOOR STOPS, AUDIO VISUAL BRACKETS, AND OTHER WALL ATTACHED ITEMS.
7. GYPSUM BOARD SURFACES SHALL BE ISOLATED WITH CONTROL JOINTS WHERE SHOWN ON DRAWINGS AND AS DESCRIBED IN THE SPECIFICATIONS.
8. MASONRY CONTROL JOINTS (CJ) AND CONTROL JOINTS ABOVE (CJA) SHALL BE LOCATED AS SHOWN ON THE FLOOR PLAN AND BUILDING ELEVATIONS, AND WHERE LARGE PLUMBING VENTS OR RISERS OCCUR IN SINGLE WYTHE MASONRY WALLS, AND WHERE MASONRY WALLS BEARING ON THE CONCRETE FLOOR SLAB ABUT MASONRY WALLS BEARING ON CONCRETE FOOTINGS OR AS INDICATED ON DRAWINGS.
9. EXTEND FURRING CHANNELS AND GYPSUM BOARD UP 4 INCHES ABOVE FINISHED CEILING ON CMU WALLS.
10. SCRIBE GYPSUM WALL BOARD OF WALLS AND PARTITIONS TO IRREGULARITIES OF DECK ABOVE. SEAL TIGHTLY AROUND ALL PENETRATIONS.

CONSTURCTION HATCH KEY

- AREA NOT IN SCOPE
- ST-02, SEE FINISH SCHEDULE
- MT-01, SEE FINISH SCHEDULE
- NEW CONSTRUCTION
- EXISTING CONSTRUCTION

SHEET NOTES

1. AREA OF WORK BELOW TURNSTILES. GC TO BLOCK OFF ACCESS TO ROOMS AC25, AC25A, & BC01A. WORK THAT OCCURS IN CORRIDOR AC07 & BC01 SHALL BE COORDINATED WITH OWNERSHIP AND ACCESS SHALL REMAIN THROUGH CORRIDORS DURING DURATION OF WORK.
2. AREA OF WORK AT GROUND FLOOR. ACCESS SHALL REMAIN THROUGH LOBBY FOR DURING DURATION OF WORK.
3. SEE A.101A.00 & A.101B.00 FOR REVISED PLANS AT GROUND FLOOR.
4. FURNISH AND INSTALL VINYL SIGNAGE ON CURTAIN WALL. SEE A.400 FOR MORE INFORMATION.
5. AREA OF WORK BELOW VESTIBULE FOR PLUMBING WORK. GC TO BLOCK OFF ACCESS TO ROOMS AC24 & AC07A. WORK THAT OCCURS IN CORRIDOR AC07 & BC01 SHALL BE COORDINATED WITH OWNERSHIP AND ACCESS SHALL REMAIN THROUGH CORRIDORS DURING DURATION OF WORK. SEE PLUMBING DRAWINGS FOR MORE INFORMATION.
6. AT EACH BIKE RACK, PROVIDE (2) CORE DRILLS 2" DEEP INTO EXTERIOR CONCRETE AND SET EPOXY AT EACH BIKE RAKE. SPACED OUT EACH RAKE EQUALLY TO THE SPACING AT THE EXISTING RACK.
7. REINSTALL FIN TUBE RADIATOR COVER, HYDRONIC PIPING AND STOREFRONT INCLUSIVE OF MULLIONS & GLASS AFTER TEMPORARY EGRESS IS REMOVED. SEE MECHANICAL DRAWINGS FOR MORE INFORMATION.

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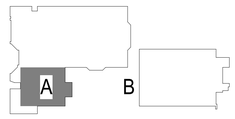
KEY PLAN



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REVISIONS

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LEVEL 01 - AREA A - FLOOR PLAN

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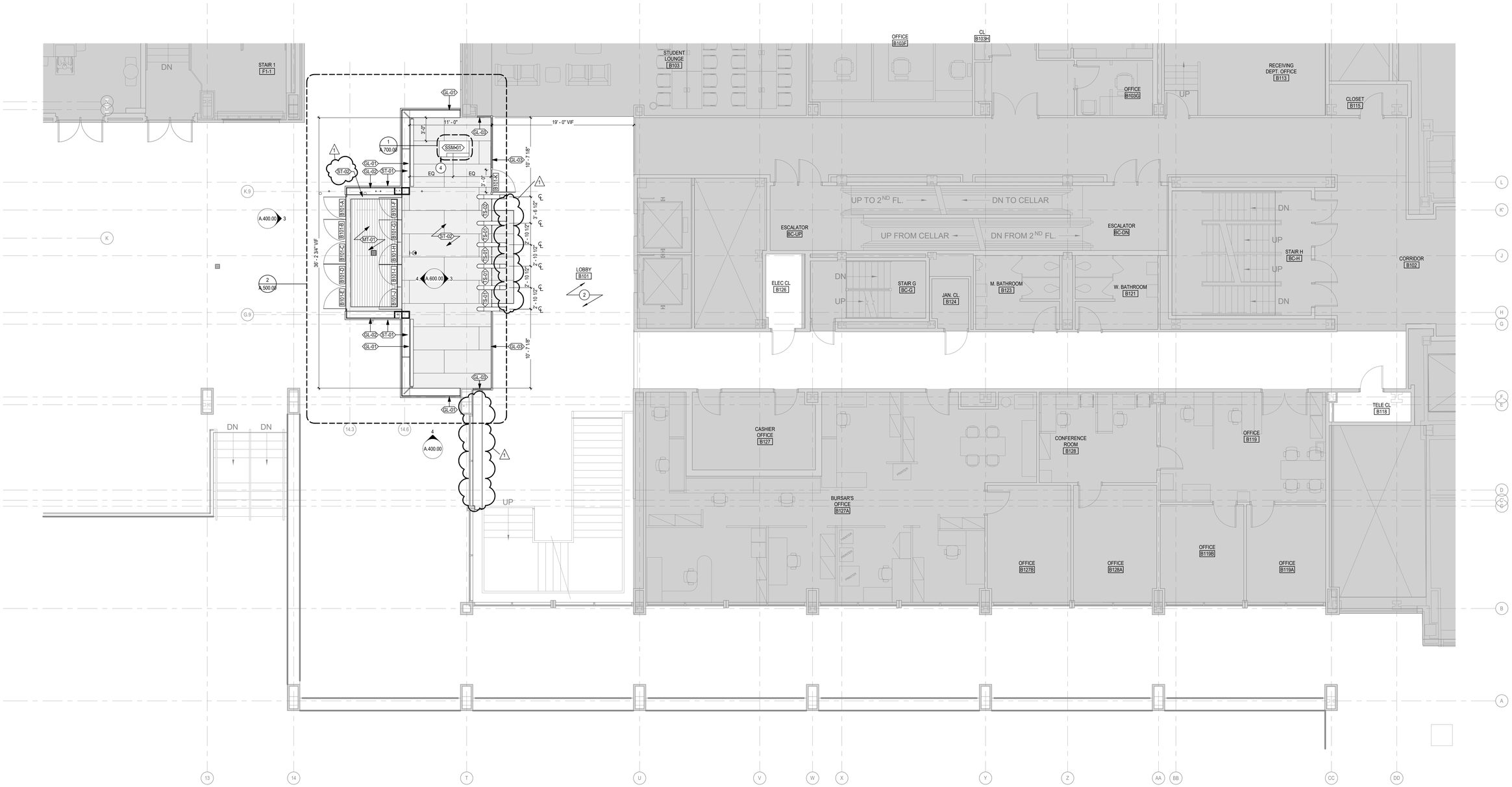


LEVEL 01 - AREA B - FLOOR PLAN

SCALE: 3/16" = 1'-0"

GENERAL ARCHITECTURAL NOTES

1. ALL INTERIOR CMU WALLS SHALL BE 8 INCHES NOMINAL THICKNESS, UNLESS NOTED OTHERWISE.
2. PARTITION TYPES SHALL BE DESIGNATED ON FLOOR PLANS (XX. X. XX) THUS: SEE SHEET XX.X FOR TYPES. ALL INTERIOR PARTITIONS ARE TYPE XX.X.XX UNLESS NOTED OTHERWISE.
3. ALL MASONRY WALLS AND INTERIOR STUD WALLS SHALL EXTEND TO UNDERSIDE OF FLOOR OR ROOF DECK ABOVE UNLESS NOTED OTHERWISE. PER PARTITION TYPE.
4. PROVISIONS SHALL BE MADE AT ALL FULL HEIGHT NON-BEARING WALLS FOR 1-INCH VERTICAL MOVEMENT OF THE BUILDING STRUCTURE WITHOUT TRANSFER OF COMPRESSIVE LOADS TO WALL. FILL IRREGULARITIES BETWEEN TOP OF WALL AND DECK ABOVE WITH MINERAL WOOL INSULATION OR FIRE STOPPING MATERIALS AS REQUIRED TO MEET FIRE RATING OF RESPECTIVE WALLS. SEE DETAILS ON SHEET XX.X.
5. SEE STRUCTURAL DRAWINGS FOR BRACING OF NON-LOAD BEARING MASONRY WALLS.
6. FURNISH AND INSTALL FIRE-TREATED WOOD BLOCKING OR METAL BACKING PLATE IN METAL STUD PARTITIONS FOR THE PROPER ANCHORAGE OF ALL WALL ATTACHED ITEMS, I.E. TOILET ACCESSORIES, CASEWORK, MILLWORK, WALL-MOUNTED FIXTURES, MARKER BOARDS, TACK BOARDS, DOOR STOPS, AUDIO VISUAL BRACKETS, AND OTHER WALL ATTACHED ITEMS.
7. GYPSUM BOARD SURFACES SHALL BE ISOLATED WITH CONTROL JOINTS WHERE SHOWN ON DRAWINGS AND AS DESCRIBED IN THE SPECIFICATIONS.
8. MASONRY CONTROL JOINTS (CJ) AND CONTROL JOINTS ABOVE (CJA) SHALL BE LOCATED AS SHOWN ON THE FLOOR PLAN AND BUILDING ELEVATIONS, AND WHERE LARGE PLUMBING VENTS OR RISERS OCCUR IN SINGLE WYTHE MASONRY WALLS, AND WHERE MASONRY WALLS BEARING ON THE CONCRETE FLOOR SLAB ABUT MASONRY WALLS BEARING ON CONCRETE FOOTINGS OR AS INDICATED ON DRAWINGS.
9. EXTEND FURRING CHANNELS AND GYPSUM BOARD UP 4 INCHES ABOVE FINISHED CEILING ON CMU WALLS.
10. SCRIBE GYPSUM WALL BOARD OF WALLS AND PARTITIONS TO IRREGULARITIES OF DECK ABOVE. SEAL TIGHTLY AROUND ALL PENETRATIONS.

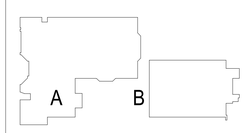
CONSTURCTION HATCH KEY

- AREA NOT IN SCOPE
- ST-02, SEE FINISH SCHEDULE
- MT-01, SEE FINISH SCHEDULE
- NEW CONSTRUCTION
- EXISTING CONSTRUCTION

SHEET NOTES

1. AREA OF WORK BELOW TURNSTILES. GC TO BLOCK OFF ACCESS TO ROOMS AC25, AC25A, & BC01A. WORK THAT OCCURS IN CORRIDOR AC07 & BC01 SHALL BE COORDINATED WITH OWNERSHIP AND ACCESS SHALL REMAIN THROUGH CORRIDORS DURING DURATION OF WORK.
2. AREA OF WORK AT GROUND FLOOR. ACCESS SHALL REMAIN THROUGH LOBBY FOR DURING DURATION OF WORK.
3. SEE A.101A.00 & A.101B.00 FOR ENLARGED PLANS AT GROUND FLOOR.
4. FURNISH AND INSTALL VINYL SIGNAGE ON CURTAIN WALL. SEE A.400 FOR MORE INFORMATION.
5. AREA OF WORK BELOW VESTIBULE FOR PLUMBING WORK. GC TO BLOCK OFF ACCESS TO ROOMS AC24 & AC07A. WORK THAT OCCURS IN CORRIDOR AC07 & BC01 SHALL BE COORDINATED WITH OWNERSHIP AND ACCESS SHALL REMAIN THROUGH CORRIDORS DURING DURATION OF WORK. SEE PLUMBING DRAWINGS FOR MORE INFORMATION.
6. AT EACH BIKE RACK, PROVIDE (2) CORE DRILLS 2" DEEP INTO EXTERIOR CONCRETE AND SET EPOXY AT EACH BIKE RAKE. SPACED OUT EACH RAKE EQUALLY TO THE SPACING AT THE EXISTING RACK.
7. REINSTALL FIN TUBE RADIATOR COVER, HYDRONIC PIPING. AND STOREFRONT INCLUSIVE OF MULLIONS & GLASS AFTER TEMPORARY EGRESS IS REMOVED. SEE MECHANICAL DRAWINGS FOR MORE INFORMATION.

KEY PLAN



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BLK: 577
LOT: 001

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REVISIONS

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LEVEL 01 - AREA B - FLOOR PLAN

A.101B.00

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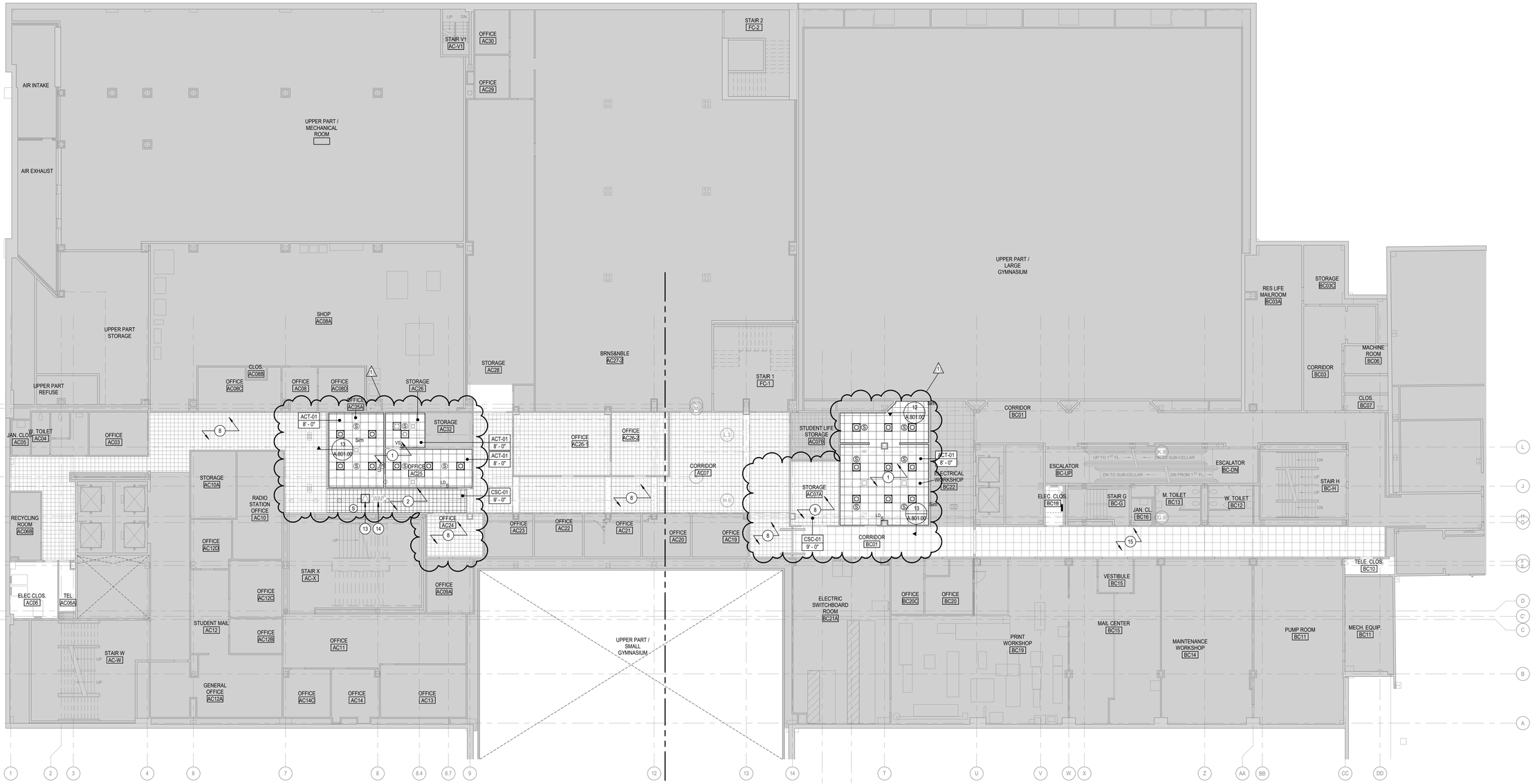


LEVEL 00 - REFLECTED CEILING PLAN

SCALE: 3/32" = 1'-0"

REFLECTED CEILING PLAN GENERAL NOTES

A. REFLECTED CEILING PLAN GENERAL NOTES APPLY TO ALL REFLECTED CEILING PLAN SHEETS.
B. ALL CEILING GRIDS/PANELS SHALL BE CENTERED IN EACH ROOM UNLESS NOTED OTHERWISE.
C. CEILING HEIGHTS ARE NOTED ON THE REFLECTED CEILING PLANS ARE MEASURED FROM THE FINISH FLOOR OF THE ROOM.
D. ALL ELECTRICAL FIXTURES, SPEAKERS, SMOKE AND THERMAL DETECTORS, MECHANICAL GRILLES, SPRINKLER HEADS, AND OTHER CEILING MOUNTED DEVICES, SHALL BE CENTERED BETWEEN CEILING GRIDS UNLESS NOTED OTHERWISE. SPRINKLER HEADS SHALL BE WITHIN A 3-INCH RADIUS CENTERED BETWEEN CEILING GRIDS.
E. IN ACOUSTICAL CEILING PANELS WITH SCORE IN THE CENTER, CENTER DEVICES REFERENCE IN NOTE D IN ONE HALF OF THE TILE. DO NOT LOCATE ON THE SCORE. FOR ACP WITH MULTIPLE SCORED PATTERNS, COORDINATE LOCATION WITH THE ARCHITECT.
F. PROVIDE SUSPENSION SYSTEM AROUND ELECTRICAL FIXTURES, MECHANICAL GRILLES, DIFFUSERS, AND OTHER CEILING MOUNTED DEVICES. AT ACOUSTICAL PANEL CEILINGS.
G. ALL DIMENSIONS ON REFLECTED CEILING PLANS ARE ACTUAL AND ARE TO THE FOLLOWING UNLESS NOTED OTHERWISE:
   a. FACE OF FINISHED WALL
   b. FACE OF FINISHED BULKHEADS
   c. CENTERLINE OF COLUMNS
   d. CENTERLINE OF TEES
H. IN AREAS WITH EXPOSED STRUCTURE CEILINGS, COORDINATE EXACT LOCATIONS OF MECHANICAL GRILLES, DIFFUSERS, DUCTWORK AND ELECTRICAL FIXTURES WITH EACH REPRESENTATIVE SUBCONTRACTOR.
I. ALL WALLS EXTEND TO UNDERSIDE OF DECK EXCEPT THOSE SHOWN SHADED IN WHICH GYPSUM BOARD OR MASONRY EXTENDS MIN 4 INCHES ABOVE FINISHED CEILING. ALL METAL STUDS EXTEND TO UNDERSIDE OF FLOOR OR ROOF DECK.

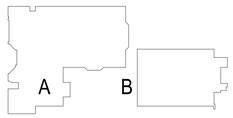
REFLECTED CEILING PLAN HATCH KEY

- AREA NOT IN SCOPE
- AREA OF NEW ACT-01 — SEE SHEET NOTE 1 FOR MORE INFORMATION
- AREA OF NEW SPLINE CEILING SYSTEM, SCS-01 — SEE SHEET NOTE 2 FOR MORE INFORMATION.
- AREA OF EXISTING SPLINE CEILING SYSTEM — SEE SHEET NOTE 8 FOR MORE INFORMATION.
- NEW CONSTRUCTION
- EXISTING CONSTRUCTION
- AREA OF EXISTING ACOUSTIC CEILING TILE — SEE SHEET NOTE 15 FOR MORE INFORMATION.
- (S) SPRINKLER HEAD TO BE RELOCATED — RELOCATE SPRINKLER HEAD TO CENTER OF TILE AT AREA OF NEW ACT-01 WITH FLEX LINE. PROVIDE NEW HEAD WITH WHITE COVER.

SHEET NOTES

#	
1	PROVIDE ACT-01, 2X2 TILE. SEE ELECTRICAL FOR LIGHTING. EXISTING DUCTWORK GRILLES AND SPRINKLES TO REMAIN AND BE RELOCATED TO CENTER OF TILES
2	BELOW IMMEDIATE AREA OF WORK, PROVIDE INDIVIDUAL 1X1 SPLINE CEILING SYSTEM, SCS-01 AND REINSTALL EXISTING LIGHTS AND DEVICES ALONG PATH. PAINT TILES WHITE TO MATCH ADJACENT TILES.
3	AT LOBBY B101, PROVIDE NEW GYPSUM CEILING AT AREA OF WORK. PAINT NEW CEILING & PROVIDE 1/2"X1/2" REGLET TO DELINEATE BETWEEN GYPSUM AND 1X1 TILE TO REMAIN. SEE FINISH SCHEDULE FOR COLOR. SEE ELECTRICAL AND MECHANICAL DRAWING FOR ADDITIONAL INFORMATION.
4	AT LOBBY A101, PROVIDE NEW GYPSUM CEILING AT AREAS REMOVED FOR DUCTWORK MODIFICATIONS AND EXPANDED LOBBY. CEILING SHALL TIE INTO EXISTING REMAINING CEILING. FINISH AT ENTIRE LOBBY CEILING SHALL BE PAINT GRADE 4. SEE FINISH SCHEDULE FOR COLOR. PATCH AND PAINT CEILING FOR SMOOTH TRANSITION FROM GYPSUM TO GYPSUM. SEE ELECTRICAL AND MECHANICAL DRAWING FOR ADDITIONAL INFORMATION.
5	AT VESTIBULE, PROVIDE MOLD AND MOISTUER RESISTANT GYPSUM, GWB-02. FINISH AT ENTIRE LOBBY CEILING SHALL BE PAINT GRADE 4. SEE FINISH SCHEDULE FOR COLOR. SEE ELECTRICAL AND MECHANICAL DRAWING FOR ADDITIONAL INFORMATION.
6	AT EXTERIOR, PATCH EXTERIOR CEILING TO NEAREST JOINT. FINISH SHALL MATCH ADJACENT CEILING. REFER TO DETAIL 18/A801.00
7	PHASE I WORK TO REMAIN. PATCH CEILING FROM PHASE II TO PHASE I
8	ALONG CONDUIT ROUTING, WHERE REMOVED, PROVIDE INDIVIDUAL 1X1 SPLINE CEILING SYSTEM AS NEEDED, SCS-01. PAINT TILES WHITE TO MATCH ADJACENT TILES.
9	RELOCATE SECURITY CAMERA. REMOVE WIREMOLD AND REPAINT. SEE SECURITY DRAWINGS FOR MORE INFORMATION
10	NEW SECURITY CAMERA. SEE SECURITY DRAWINGS FOR MORE INFORMATION. ALIGN TO SECURITY DESK. COORDINATE HEIGHT AND LOCATION IN FIELD WITH ARCHITECT
11	PATCH AND PAINT THE CEILING FOR A LEVEL AND SMOOTH TRANSITION BETWEEN THE EXISTING AND NEW CEILING
12	PROVIDE 2X2 WHITE ACCESS PANEL IN SAME LOCATION AS EXISTING ACCESS PANEL. SEE DETAIL #14 / A.801. COORDINATE LOCATION IN FIELD WITH ARCHITECT
13	PROVIDE 2X2 WHITE ACCESS PANEL FOR NEW MECH/ELEC/SECURITY DEVICE. SEE DETAIL #14 / A.801. COORDINATE LOCATION IN FIELD WITH ARCHITECT
14	EXISTING ELEMENTS TO REMAIN. CONTRACTOR TO IDENTIFY EXISTING CABLING FOR REINSTALLATION. CONTRACTOR TO TAKE DEVICE DOWN AND STORE FOR NEW CEILING WORK. CONTRACTOR TO REINSTALL DEVICE IN SAME LOCATION AND COORDINATE THE FINAL POSITION WITH THE ARCHITECT
15	ACOUSTIC CEILING TILES TO REMAIN. REMOVE AND REPLACE TILES AS NEEDED ALONG ROUTING.

KEY PLAN



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LEVEL 00 - REFLECTED CEILING PLAN - PHASE I

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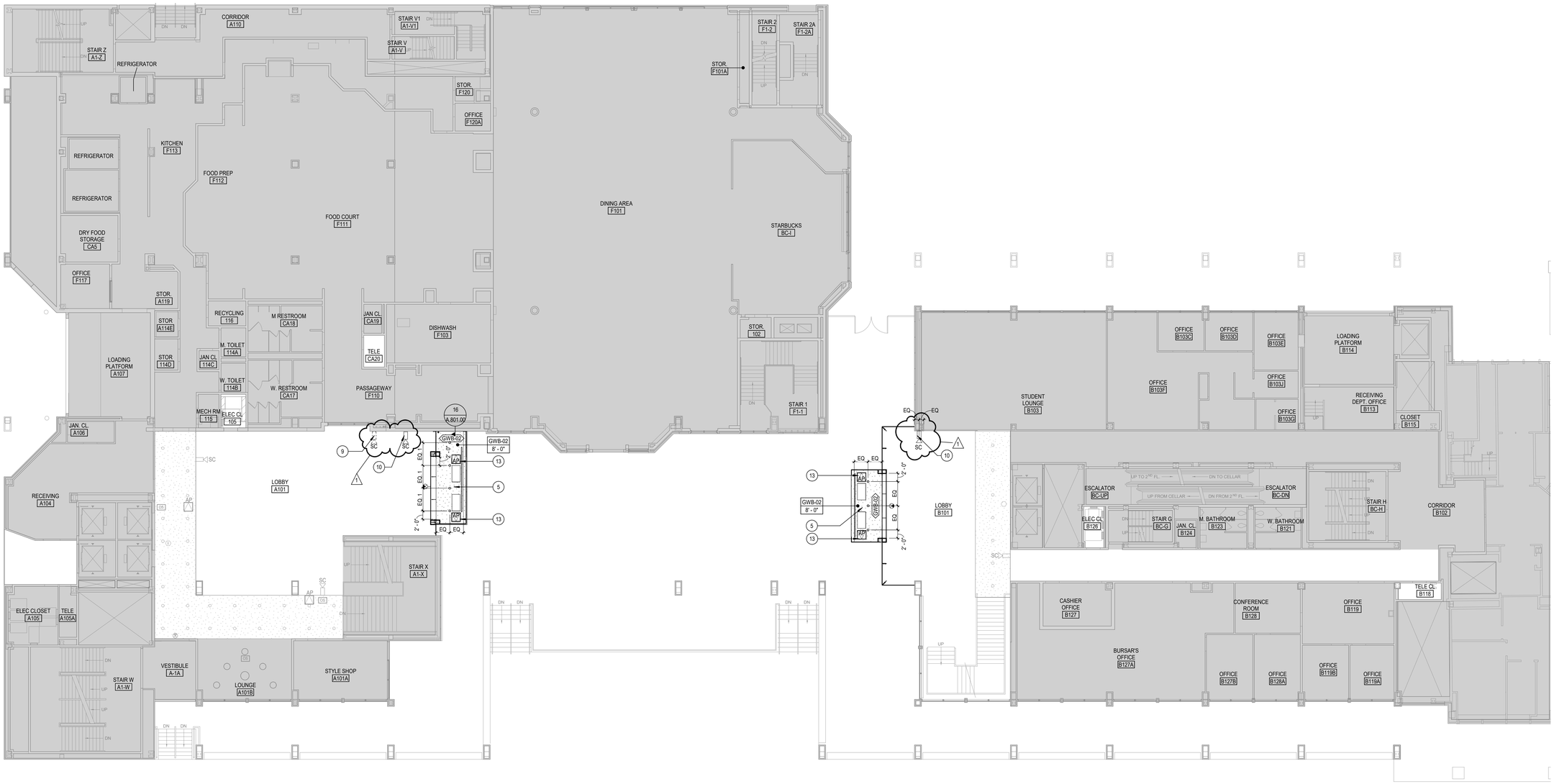

LEVEL 01 - REFLECTED CEILING PLAN - PHASE 1

SCALE: 3/32" = 1'-0"

REFLECTED CEILING PLAN GENERAL NOTES

A. REFLECTED CEILING PLAN GENERAL NOTES APPLY TO ALL REFLECTED CEILING PLAN SHEETS.
B. ALL CEILING GRIDS/PANELS SHALL BE CENTERED IN EACH ROOM UNLESS NOTED OTHERWISE.
C. CEILING HEIGHTS ARE NOTED ON THE REFLECTED CEILING PLANS ARE MEASURED FROM THE FINISH FLOOR OF THE ROOM.
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F. PROVIDE SUSPENSION SYSTEM AROUND ELECTRICAL FIXTURES, MECHANICAL GRILLES, DIFFUSERS, AND OTHER CEILING MOUNTED DEVICES. AT ACOUSTICAL PANEL CEILINGS.
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REFLECTED CEILING PLAN HATCH KEY

- AREA NOT IN SCOPE
- AREA OF NEW GWB-01/02/03 SEE RCP TAG FOR FININSH
- AREA OF EXISTING GWB
- AREA OF EXISTING SPLINE CEILING SYSTEM
- NEW CONSTRUCTION
- EXISTING CONSTRUCTION

SHEET NOTES

#	
1	PROVIDE ACT-01, 2X2 TILE. SEE ELECTRICAL FOR LIGHTING. EXISTING DUCTWORK GRILLES AND SPRINKLES TO REMAIN AND BE RELOCATED TO CENTER OF TILES
2	BELOW IMMEDIATE AREA OF WORK, PROVIDE INDIVIDUAL 1X1 SPLINE CEILING SYSTEM, SCS-01 AND REINSTALL EXISTING LIGHTS AND DEVICES ALONG PATH. PAINT TILES WHITE TO MATCH ADJACENT TILES.
3	AT LOBBY B101, PROVIDE NEW GYPSUM CEILING AT AREA OF WORK. PAINT NEW CEILING & PROVIDE 1/2"X1/2" REGLET TO DELINEATE BETWEEN GYPSUM AND 1X1 TILE TO REMAIN. SEE FINISH SCHEDULE FOR COLOR. SEE ELECTRICAL AND MECHANICAL DRAWING FOR ADDITIONAL INFORMATION.
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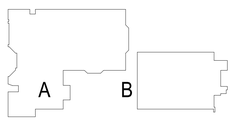
14	EXISTING ELEMENTS TO REMAIN. CONTRACTOR TO IDENTIFY EXISTING CABLING FOR REINSTALLATION. CONTRACTOR TO TAKE DEVICE DOWN AND STORE FOR NEW CEILING WORK. CONTRACTOR TO REINSTALL DEVICE IN SAME LOCATION AND COORDINATE THE FINAL POSITION WITH THE ARCHITECT
15	ACOUSTIC CEILING TILES TO REMAIN. REMOVE AND REPLACE TILES AS NEEDED ALONG ROUTING.

KEY PLAN



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LEVEL 01 - REFLECTED CEILING PLAN PHASE I

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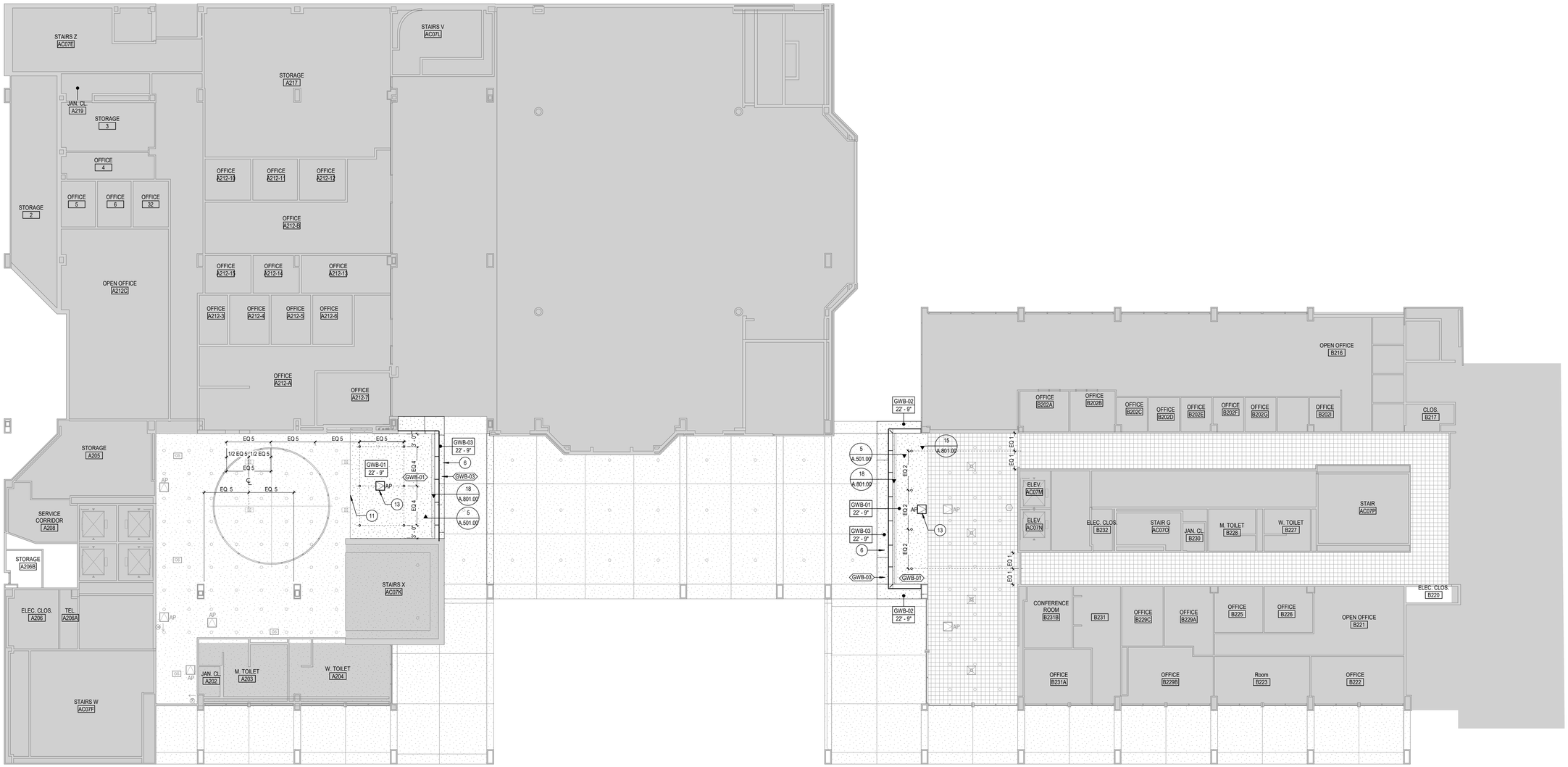

LEVEL 02 - REFLECTED CEILING PLAN - PHASE 1

SCALE: 3/32" = 1'-0"

REFLECTED CEILING PLAN GENERAL NOTES

A. REFLECTED CEILING PLAN GENERAL NOTES APPLY TO ALL REFLECTED CEILING PLAN SHEETS.
B. ALL CEILING GRIDS/PANELS SHALL BE CENTERED IN EACH ROOM UNLESS NOTED OTHERWISE.
C. CEILING HEIGHTS ARE NOTED ON THE REFLECTED CEILING PLANS ARE MEASURED FROM THE FINISH FLOOR OF THE ROOM.
D. ALL ELECTRICAL FIXTURES, SPEAKERS, SMOKE AND THERMAL DETECTORS, MECHANICAL GRILLES, SPRINKLER HEADS, AND OTHER CEILING MOUNTED DEVICES, SHALL BE CENTERED BETWEEN CEILING GRIDS UNLESS NOTED OTHERWISE. SPRINKLER HEADS SHALL BE WITHIN A 3-INCH RADIUS CENTERED BETWEEN CEILING GRIDS.
E. IN ACOUSTICAL CEILING PANELS WITH SCORE IN THE CENTER, CENTER DEVICES REFERENCE IN NOTE D IN ONE HALF OF THE TILE. DO NOT LOCATE ON THE SCORE. FOR ACP WITH MULTIPLE SCORED PATTERNS, COORDINATE LOCATION WITH THE ARCHITECT.
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   a. FACE OF FINISHED WALL
   b. FACE OF FINISHED BULKHEADS
   c. CENTERLINE OF COLUMNS
   d. CENTERLINE OF TEES
H. IN AREAS WITH EXPOSED STRUCTURE CEILINGS, COORDINATE EXACT LOCATIONS OF MECHANICAL GRILLES, DIFFUSERS, DUCTWORK AND ELECTRICAL FIXTURES WITH EACH REPRESENTATIVE SUBCONTRACTOR.
I. ALL WALLS EXTEND TO UNDERSIDE OF DECK EXCEPT THOSE SHOWN SHADED IN WHICH GYPSUM BOARD OR MASONRY EXTENDS MIN 4 INCHES ABOVE FINISHED CEILING. ALL METAL STUDS EXTEND TO UNDERSIDE OF FLOOR OR ROOF DECK.

REFLECTED CEILING PLAN HATCH KEY

- AREA NOT IN SCOPE
- AREA OF NEW GWB-01/02/03 SEE RCP TAG FOR FININSH
- AREA OF EXISTING GWB
- AREA OF EXISTING SPLINE CEILING SYSTEM
- NEW CONSTRUCTION
- EXISTING CONSTRUCTION

SHEET NOTES

#	
1	PROVIDE ACT-01, 2X2 TILE. SEE ELECTRICAL FOR LIGHTING. EXISTING DUCTWORK GRILLES AND SPRINKLES TO REMAIN AND BE RELOCATED TO CENTER OF TILES
2	BELOW IMMEDIATE AREA OF WORK, PROVIDE INDIVIDUAL 1X1 SPLINE CEILING SYSTEM, SCS-01 AND REINSTALL EXISTING LIGHTS AND DEVICES ALONG PATH. PAINT TILES WHITE TO MATCH ADJACENT TILES.
3	AT LOBBY B101, PROVIDE NEW GYPSUM CEILING AT AREA OF WORK. PAINT NEW CEILING & PROVIDE 1/2"X1/2" REGLET TO DELINEATE BETWEEN GYPSUM AND 1X1 TILE TO REMAIN. SEE FINISH SCHEDULE FOR COLOR. SEE ELECTRICAL AND MECHANICAL DRAWING FOR ADDITIONAL INFORMATION.
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5	AT VESTIBULE, PROVIDE MOLD AND MOISTUER RESISTANT GYPSUM, GWB-02. FINISH AT ENTIRE LOBBY CEILING SHALL BE PAINT GRADE 4. SEE FINISH SCHEDULE FOR COLOR. SEE ELECTRICAL AND MECHANICAL DRAWING FOR ADDITIONAL INFORMATION.
6	AT EXTERIOR, PATCH EXTERIOR CEILING TO NEAREST JOINT. FINISH SHALL MATCH ADJACENT CEILING. REFER TO DETAIL 18/A801.00
7	PHASE I WORK TO REMAIN. PATCH CEILING FROM PHASE II TO PHASE I
8	ALONG CONDUIT ROUTING, WHERE REMOVED, PROVIDE INDIVIDUAL 1X1 SPLINE CEILING SYSTEM AS NEEDED, SCS-01. PAINT TILES WHITE TO MATCH ADJACENT TILES.
9	RELOCATE SECURITY CAMERA. REMOVE WIREMOLD AND REPAINT. SEE SECURITY DRAWINGS FOR MORE INFORMATION
10	NEW SECURITY CAMERA. SEE SECURITY DRAWINGS FOR MORE INFORMATION. ALIGN TO SECURITY DESK. COORDINATE HEIGHT AND LOCATION IN FIELD WITH ARCHITECT
11	PATCH AND PAINT THE CEILING FOR A LEVEL AND SMOOTH TRANSITION BETWEEN THE EXISTING AND NEW CEILING
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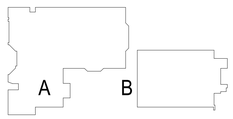
13	PROVIDE 2X2 WHITE ACCESS PANEL FOR NEW MECH/ELEC/SECURITY DEVICE. SEE DETAIL #14 / A.801. COORDINATE LOCATION IN FIELD WITH ARCHITECT
14	EXISTING ELEMENTS TO REMAIN. CONTRACTOR TO IDENTIFY EXISTING CABLING FOR REINSTALLATION. CONTRACTOR TO TAKE DEVICE DOWN AND STORE FOR NEW CEILING WORK. CONTRACTOR TO REINSTALL DEVICE IN SAME LOCATION AND COORDINATE THE FINAL POSITION WITH THE ARCHITECT
15	ACOUSTIC CEILING TILES TO REMAIN. REMOVE AND REPLACE TILES AS NEEDED ALONG ROUTING.

KEY PLAN



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LOT: 001

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REVISIONS

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LEVEL 02 - REFLECTED CEILING PLAN PHASE I

A.302.00

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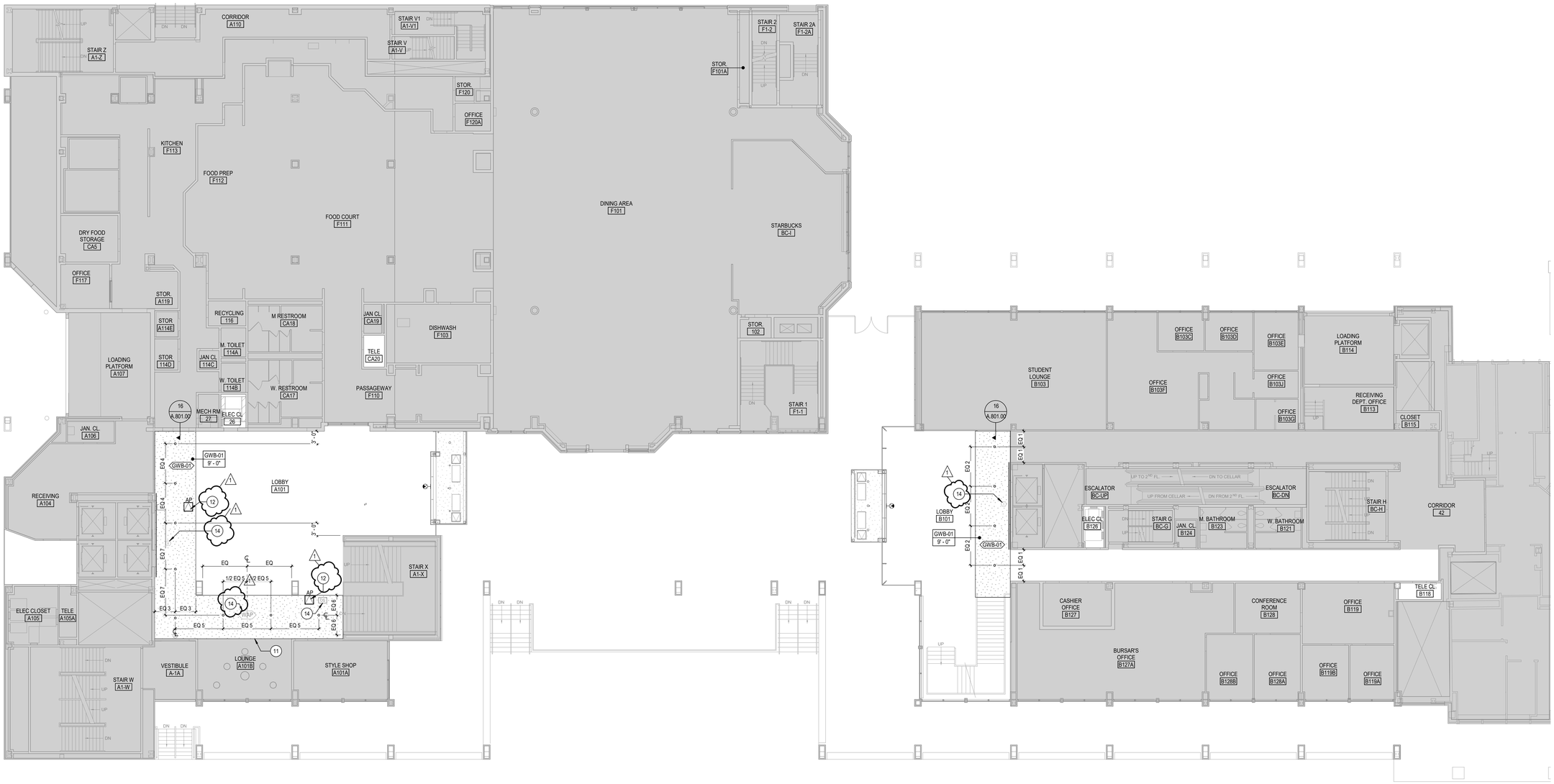


LEVEL 01 - REFLECTED CEILING PLAN - PHASE 2

SCALE: 3/32" = 1'-0"

REFLECTED CEILING PLAN GENERAL NOTES

A. REFLECTED CEILING PLAN GENERAL NOTES APPLY TO ALL REFLECTED CEILING PLAN SHEETS.
B. ALL CEILING GRIDS/PANELS SHALL BE CENTERED IN EACH ROOM UNLESS NOTED OTHERWISE.
C. CEILING HEIGHTS ARE NOTED ON THE REFLECTED CEILING PLANS ARE MEASURED FROM THE FINISH FLOOR OF THE ROOM.
D. ALL ELECTRICAL FIXTURES, SPEAKERS, SMOKE AND THERMAL DETECTORS, MECHANICAL GRILLES, SPRINKLER HEADS, AND OTHER CEILING MOUNTED DEVICES, SHALL BE CENTERED BETWEEN CEILING GRIDS UNLESS NOTED OTHERWISE. SPRINKLER HEADS SHALL BE WITHIN A 3-INCH RADIUS CENTERED BETWEEN CEILING GRIDS.
E. IN ACOUSTICAL CEILING PANELS WITH SCORE IN THE CENTER, CENTER DEVICES REFERENCE IN NOTE D IN ONE HALF OF THE TILE. DO NOT LOCATE ON THE SCORE. FOR ACP WITH MULTIPLE SCORED PATTERNS, COORDINATE LOCATION WITH THE ARCHITECT.
F. PROVIDE SUSPENSION SYSTEM AROUND ELECTRICAL FIXTURES, MECHANICAL GRILLES, DIFFUSERS, AND OTHER CEILING MOUNTED DEVICES. AT ACOUSTICAL PANEL CEILINGS.
G. ALL DIMENSIONS ON REFLECTED CEILING PLANS ARE ACTUAL AND ARE TO THE FOLLOWING UNLESS NOTED OTHERWISE:
   a. FACE OF FINISHED WALL
   b. FACE OF FINISHED BULKHEADS
   c. CENTERLINE OF COLUMNS
   d. CENTERLINE OF TEES
H. IN AREAS WITH EXPOSED STRUCTURE CEILINGS, COORDINATE EXACT LOCATIONS OF MECHANICAL GRILLES, DIFFUSERS, DUCTWORK AND ELECTRICAL FIXTURES WITH EACH REPRESENTATIVE SUBCONTRACTOR.
I. ALL WALLS EXTEND TO UNDERSIDE OF DECK EXCEPT THOSE SHOWN SHADED IN WHICH GYPSUM BOARD OR MASONRY EXTENDS MIN 4 INCHES ABOVE FINISHED CEILING. ALL METAL STUDS EXTEND TO UNDERSIDE OF FLOOR OR ROOF DECK.

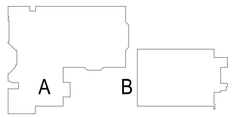
REFLECTED CEILING PLAN HATCH KEY

- AREA NOT IN SCOPE
- AREA OF NEW GWB-01/02/03 SEE RCP TAG FOR FININSH
- AREA OF EXISTING GWB
- AREA OF EXISTING SPLINE CEILING SYSTEM
- NEW CONSTRUCTION
- EXISTING CONSTRUCTION

SHEET NOTES

#	
1	PROVIDE ACT-01, 2X2 TILE. SEE ELECTRICAL FOR LIGHTING. EXISTING DUCTWORK GRILLES AND SPRINKLES TO REMAIN AND BE RELOCATED TO CENTER OF TILES
2	BELOW IMMEDIATE AREA OF WORK, PROVIDE INDIVIDUAL 1X1 SPLINE CEILING SYSTEM, SCS-01 AND REINSTALL EXISTING LIGHTS AND DEVICES ALONG PATH. PAINT TILES WHITE TO MATCH ADJACENT TILES.
3	AT LOBBY B101, PROVIDE NEW GYPSUM CEILING AT AREA OF WORK. PAINT NEW CEILING & PROVIDE 1/2"X1/2" REGLET TO DELINEATE BETWEEN GYPSUM AND 1X1 TILE TO REMAIN. SEE FINISH SCHEDULE FOR COLOR. SEE ELECTRICAL AND MECHANICAL DRAWING FOR ADDITIONAL INFORMATION.
4	AT LOBBY A101, PROVIDE NEW GYPSUM CEILING AT AREAS REMOVED FOR DUCTWORK MODIFICATIONS AND EXPANDED LOBBY. CEILING SHALL TIE INTO EXISTING REMAINING CEILING. FINISH AT ENTIRE LOBBY CEILING SHALL BE PAINT GRADE 4. SEE FINISH SCHEDULE FOR COLOR. PATCH AND PAINT CEILING FOR SMOOTH TRANSITION FROM GYPSUM TO GYPSUM. SEE ELECTRICAL AND MECHANICAL DRAWING FOR ADDITIONAL INFORMATION.
5	AT VESTIBULE, PROVIDE MOLD AND MOISTUER RESISTANT GYPSUM, GWB-02. FINISH AT ENTIRE LOBBY CEILING SHALL BE PAINT GRADE 4. SEE FINISH SCHEDULE FOR COLOR. SEE ELECTRICAL AND MECHANICAL DRAWING FOR ADDITIONAL INFORMATION.
6	AT EXTERIOR, PATCH EXTERIOR CEILING TO NEAREST JOINT. FINISH SHALL MATCH ADJACENT CEILING. REFER TO DETAIL 18/A801.00
7	PHASE I WORK TO REMAIN. PATCH CEILING FROM PHASE II TO PHASE I
8	ALONG CONDUIT ROUTING, WHERE REMOVED, PROVIDE INDIVIDUAL 1X1 SPLINE CEILING SYSTEM AS NEEDED, SCS-01. PAINT TILES WHITE TO MATCH ADJACENT TILES.
9	RELOCATE SECURITY CAMERA. REMOVE WIREMOLD AND REPAINT. SEE SECURITY DRAWINGS FOR MORE INFORMATION
10	NEW SECURITY CAMERA. SEE SECURITY DRAWINGS FOR MORE INFORMATION. ALIGN TO SECURITY DESK. COORDINATE HEIGHT AND LOCATION IN FIELD WITH ARCHITECT
11	PATCH AND PAINT THE CEILING FOR A LEVEL AND SMOOTH TRANSITION BETWEEN THE EXISTING AND NEW CEILING
12	PROVIDE 2X2 WHITE ACCESS PANEL IN SAME LOCATION AS EXISTING ACCESS PANEL. SEE DETAIL #14 / A.801. COORDINATE LOCATION IN FIELD WITH ARCHITECT
13	PROVIDE 2X2 WHITE ACCESS PANEL FOR NEW MECH/ELEC/SECURITY DEVICE. SEE DETAIL #14 / A.801. COORDINATE LOCATION IN FIELD WITH ARCHITECT
14	EXISTING ELEMENTS TO REMAIN. CONTRACTOR TO IDENTIFY EXISTING CABLING FOR REINSTALLATION. CONTRACTOR TO TAKE DEVICE DOWN AND STORE FOR NEW CEILING WORK. CONTRACTOR TO REINSTALL DEVICE IN SAME LOCATION AND COORDINATE THE FINAL POSITION WITH THE ARCHITECT
15	ACOUSTIC CEILING TILES TO REMAIN. REMOVE AND REPLACE TILES AS NEEDED ALONG ROUTING.

KEY PLAN



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LEVEL 01 - REFLECTED CEILING PLAN PHASE II

A.311.00

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LEVEL 02 - REFLECTED CEILING PLAN - PHASE 2

SCALE: 3/32" = 1'-0"

REFLECTED CEILING PLAN GENERAL NOTES

A. REFLECTED CEILING PLAN GENERAL NOTES APPLY TO ALL REFLECTED CEILING PLAN SHEETS.
B. ALL CEILING GRIDS/PANELS SHALL BE CENTERED IN EACH ROOM UNLESS NOTED OTHERWISE.
C. CEILING HEIGHTS ARE NOTED ON THE REFLECTED CEILING PLANS ARE MEASURED FROM THE FINISH FLOOR OF THE ROOM.
D. ALL ELECTRICAL FIXTURES, SPEAKERS, SMOKE AND THERMAL DETECTORS, MECHANICAL GRILLES, SPRINKLER HEADS, AND OTHER CEILING MOUNTED DEVICES, SHALL BE CENTERED BETWEEN CEILING GRIDS UNLESS NOTED OTHERWISE. SPRINKLER HEADS SHALL BE WITHIN A 3-INCH RADIUS CENTERED BETWEEN CEILING GRIDS.
E. IN ACOUSTICAL CEILING PANELS WITH SCORE IN THE CENTER, CENTER DEVICES REFERENCE IN NOTE D IN ONE HALF OF THE TILE. DO NOT LOCATE ON THE SCORE. FOR ACP WITH MULTIPLE SCORED PATTERNS, COORDINATE LOCATION WITH THE ARCHITECT.
F. PROVIDE SUSPENSION SYSTEM AROUND ELECTRICAL FIXTURES, MECHANICAL GRILLES, DIFFUSERS, AND OTHER CEILING MOUNTED DEVICES. AT ACOUSTICAL PANEL CEILINGS.
G. ALL DIMENSIONS ON REFLECTED CEILING PLANS ARE ACTUAL AND ARE TO THE FOLLOWING UNLESS NOTED OTHERWISE:
   a. FACE OF FINISHED WALL
   b. FACE OF FINISHED BULKHEADS
   c. CENTERLINE OF COLUMNS
   d. CENTERLINE OF TEES
H. IN AREAS WITH EXPOSED STRUCTURE CEILINGS, COORDINATE EXACT LOCATIONS OF MECHANICAL GRILLES, DIFFUSERS, DUCTWORK AND ELECTRICAL FIXTURES WITH EACH REPRESENTATIVE SUBCONTRACTOR.
I. ALL WALLS EXTEND TO UNDERSIDE OF DECK EXCEPT THOSE SHOWN SHADED IN WHICH GYPSUM BOARD OR MASONRY EXTENDS MIN 4 INCHES ABOVE FINISHED CEILING. ALL METAL STUDS EXTEND TO UNDERSIDE OF FLOOR OR ROOF DECK.

REFLECTED CEILING PLAN HATCH KEY

- AREA NOT IN SCOPE
- AREA OF NEW GWB-01/02/03 SEE RCP TAG FOR FININSH
- AREA OF EXISTING GWB
- AREA OF EXISTING SPLINE CEILING SYSTEM
- NEW CONSTRUCTION
- EXISTING CONSTRUCTION

SHEET NOTES

#	
1	PROVIDE ACT-01, 2X2 TILE. SEE ELECTRICAL FOR LIGHTING. EXISTING DUCTWORK GRILLES AND SPRINKLES TO REMAIN AND BE RELOCATED TO CENTER OF TILES
2	BELOW IMMEDIATE AREA OF WORK, PROVIDE INDIVIDUAL 1X1 SPLINE CEILING SYSTEM, SCS-01 AND REINSTALL EXISTING LIGHTS AND DEVICES ALONG PATH. PAINT TILES WHITE TO MATCH ADJACENT TILES.
3	AT LOBBY B101, PROVIDE NEW GYPSUM CEILING AT AREA OF WORK. PAINT NEW CEILING & PROVIDE 1/2"X1/2" REGLET TO DELINEATE BETWEEN GYPSUM AND 1X1 TILE TO REMAIN. SEE FINISH SCHEDULE FOR COLOR. SEE ELECTRICAL AND MECHANICAL DRAWING FOR ADDITIONAL INFORMATION.
4	AT LOBBY A101, PROVIDE NEW GYPSUM CEILING AT AREAS REMOVED FOR DUCTWORK MODIFICATIONS AND EXPANDED LOBBY. CEILING SHALL TIE INTO EXISTING REMAINING CEILING. FINISH AT ENTIRE LOBBY CEILING SHALL BE PAINT GRADE 4. SEE FINISH SCHEDULE FOR COLOR. PATCH AND PAINT CEILING FOR SMOOTH TRANSITION FROM GYPSUM TO GYPSUM. SEE ELECTRICAL AND MECHANICAL DRAWING FOR ADDITIONAL INFORMATION.
5	AT VESTIBULE, PROVIDE MOLD AND MOISTUER RESISTANT GYPSUM. GWB-02. FINISH AT ENTIRE LOBBY CEILING SHALL BE PAINT GRADE 4. SEE FINISH SCHEDULE FOR COLOR. SEE ELECTRICAL AND MECHANICAL DRAWING FOR ADDITIONAL INFORMATION.
6	AT EXTERIOR, PATCH EXTERIOR CEILING TO NEAREST JOINT. FINISH SHALL MATCH ADJACENT CEILING. REFER TO DETAIL 18/A801.00
7	PHASE I WORK TO REMAIN. PATCH CEILING FROM PHASE II TO PHASE I
8	ALONG CONDUIT ROUTING, WHERE REMOVED, PROVIDE INDIVIDUAL 1X1 SPLINE CEILING SYSTEM AS NEEDED, SCS-01. PAINT TILES WHITE TO MATCH ADJACENT TILES.
9	RELOCATE SECURITY CAMERA. REMOVE WIREMOLD AND REPAINT. SEE SECURITY DRAWINGS FOR MORE INFORMATION
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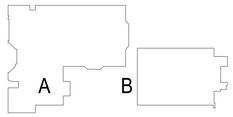
14	EXISTING ELEMENTS TO REMAIN. CONTRACTOR TO IDENTIFY EXISTING CABLING FOR REINSTALLATION. CONTRACTOR TO TAKE DEVICE DOWN AND STORE FOR NEW CEILING WORK. CONTRACTOR TO REINSTALL DEVICE IN SAME LOCATION AND COORDINATE THE FINAL POSITION WITH THE ARCHITECT
15	ACOUSTIC CEILING TILES TO REMAIN. REMOVE AND REPLACE TILES AS NEEDED ALONG ROUTING.

KEY PLAN



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LEVEL 02 - REFLECTED CEILING PLAN - PHASE II

A.312.00

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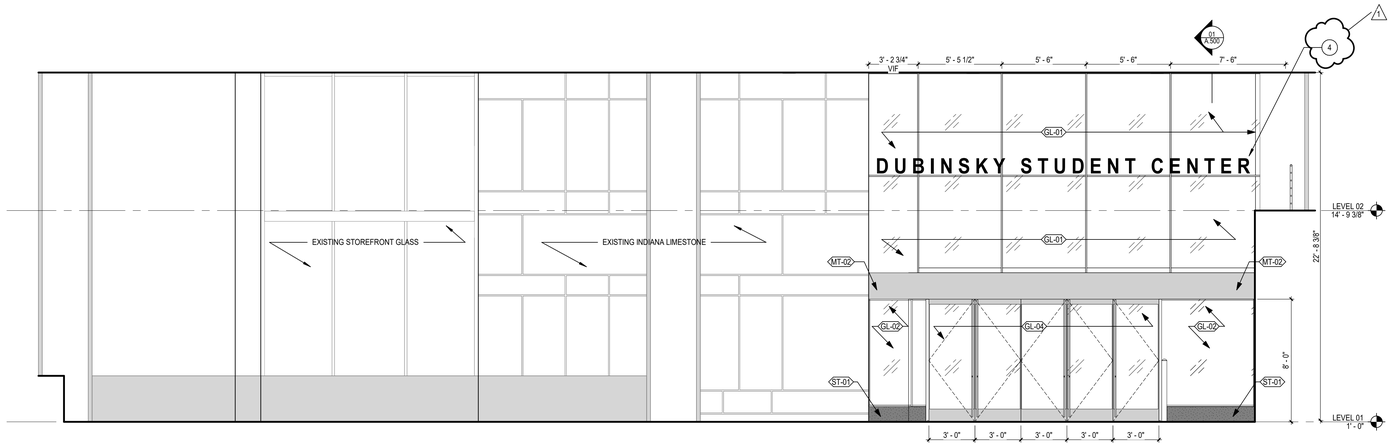
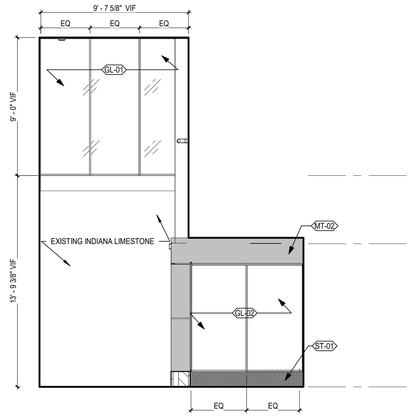


1 A.400.00 BUILDING A - DUBINSKY ELEVATION - MAIN FACADE
SCALE: 1/4" = 1'-0"



2 A.400.00 BUILDING A - DUBINSKY ELEVATION 2
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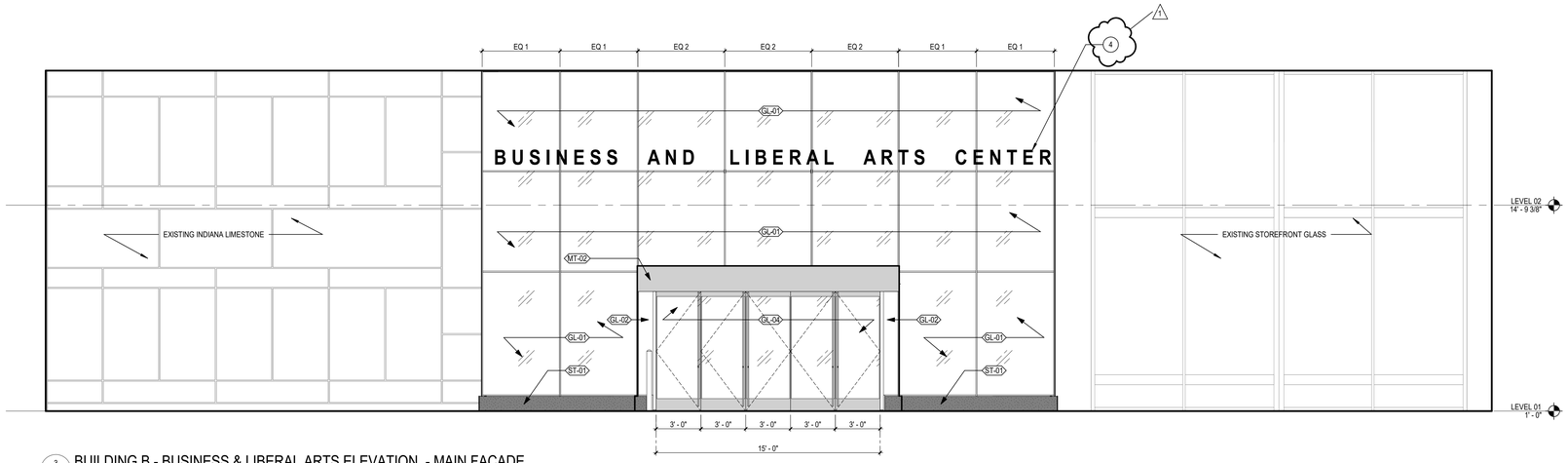
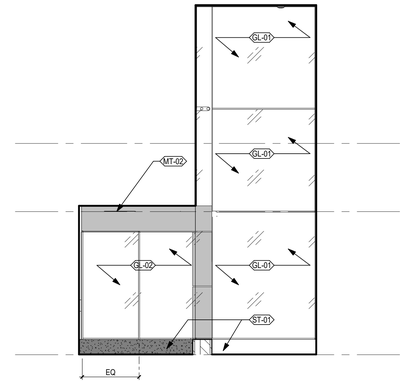


3 A.400.00 BUILDING B - BUSINESS & LIBERAL ARTS ELEVATION - MAIN FACADE
SCALE: 1/4" = 1'-0"



4 A.400.00 BUILDING B - BUSINESS & LIBERAL ARTS ELEVATION 2
SCALE: 1/4" = 1'-0"

SHEET NOTES

1. AREA OF WORK BELOW TURNSTILES. GC TO BLOCK OFF ACCESS TO ROOMS AC25, AC25A, & BC01A. WORK THAT OCCURS IN CORRIDOR AC07 & BC01 SHALL BE COORDINATED WITH OWNERSHIP AND ACCESS SHALL REMAIN THROUGH CORRIDORS DURING DURATION OF WORK.
2. AREA OF WORK AT GROUND FLOOR. ACCESS SHALL REMAIN THROUGH LOBBY FOR DURING DURATION OF WORK.
3. SEE A.101A.00 & A.101B.00 FOR ENLARGED PLANS AT GROUND FLOOR.
4. FURNISH AND INSTALL VINYL SIGNAGE ON CURTAIN WALL. SEE A.400 FOR MORE INFORMATION.
5. AREA OF WORK BELOW VESTIBULE FOR PLUMBING WORK. GC TO BLOCK OFF ACCESS TO ROOMS AC24 & AC07A. WORK THAT OCCURS IN CORRIDOR AC07 & BC01 SHALL BE COORDINATED WITH OWNERSHIP AND ACCESS SHALL REMAIN THROUGH CORRIDORS DURING DURATION OF WORK. SEE PLUMBING DRAWINGS FOR MORE INFORMATION.
6. AT EACH BIKE RACK, PROVIDE (2) CORE DRILLS 2" DEEP INTO EXTERIOR CONCRETE AND SET EPOXY AT EACH BIKE RAKE. SPACED OUT EACH RAKE EQUALLY TO THE SPACING AT THE EXISTING RACK.
7. REINSTALL FIN TUBE RADIATOR COVER, HYDRONIC PIPING. AND STOREFRONT INCLUSIVE OF MULLIONS & GLASS AFTER TEMPORARY EGRESS IS REMOVED. SEE MECHANICAL DRAWINGS FOR MORE INFORMATION.

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A.400.00

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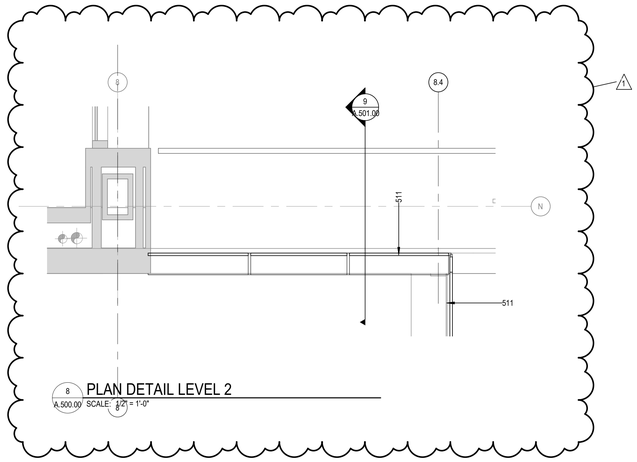
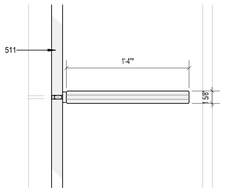


8 PLAN DETAIL LEVEL 2
A.500.00 SCALE: 1 1/2" = 1'-0"



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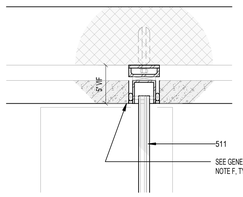

4 PLAN DETAIL
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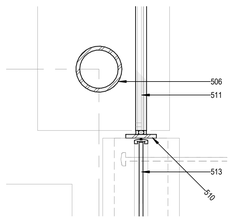

5 PLAN DETAIL
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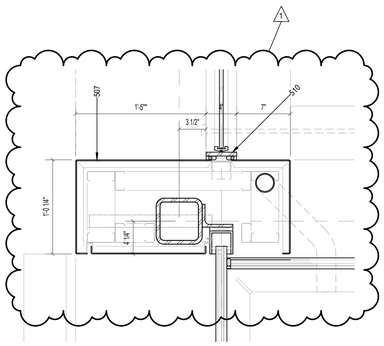

7 PLAN DETAIL
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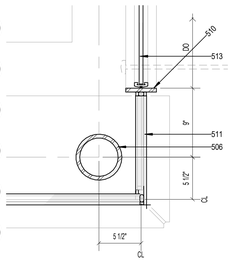
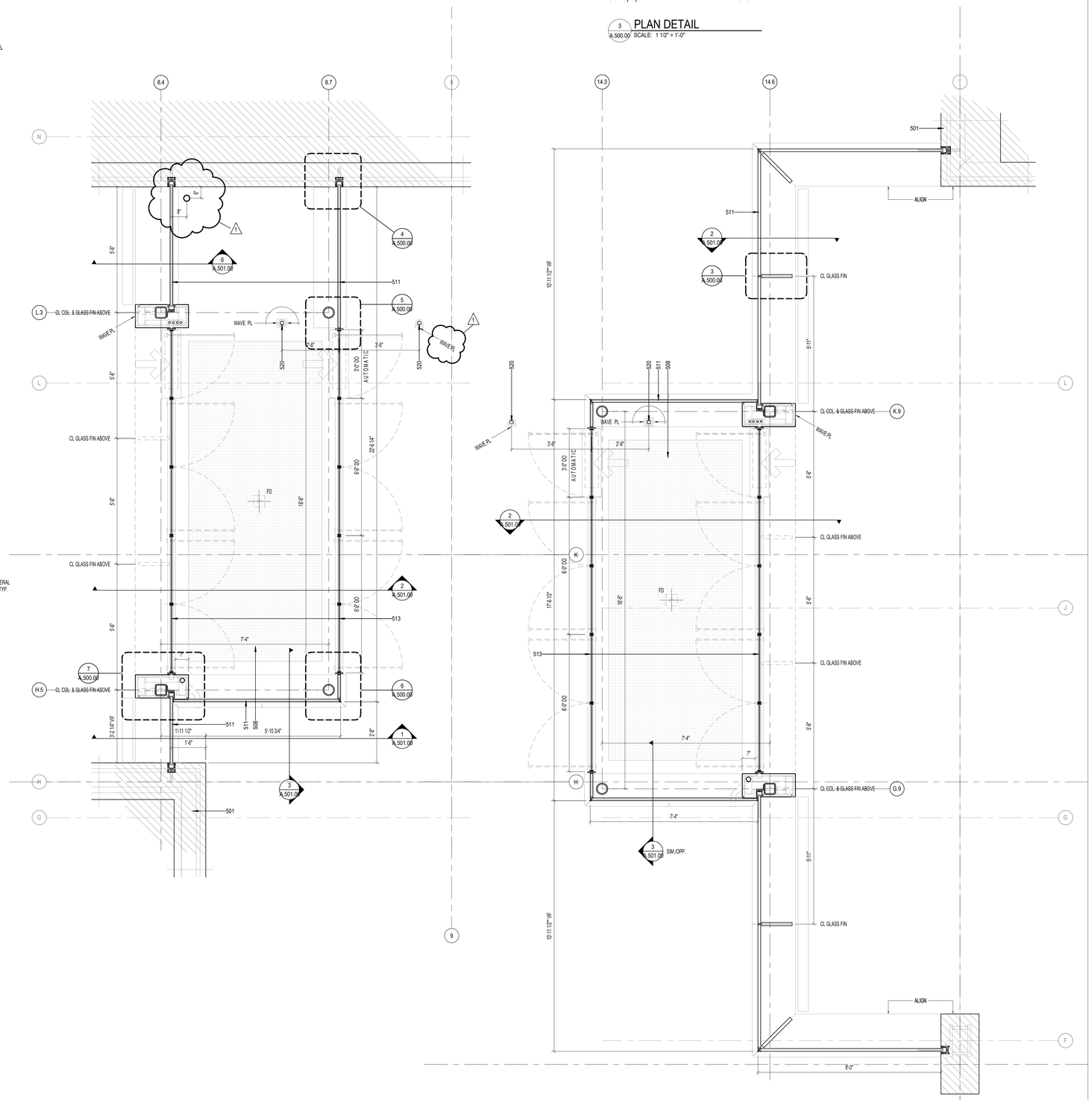


6 PLAN DETAIL
A.500.00 SCALE: 1 1/2" = 1'-0"



1 VESTIBULE PLAN (AREA A)
A.500.00 SCALE: 1/2" = 1'-0"

2 VESTIBLE PLAN (AREA B)
A.500.00 SCALE: 1/2" = 1'-0"

GENERAL NOTES

A. CLEAN, REPAIR, PATCH AND/OR REPLACE EXISTING WORK DAMAGED AS A RESULT OF CONSTRUCTION.
B. REPAIR FIREPROOFING DAMAGED AS A RESULT OF CONSTRUCTION WITH EQUIVALENT OR BETTER PROTECTION.
C. ALL EXPOSED STRUCTURAL STEEL SHALL BE SHOP PRIMED AND RECEIVE HIGH PERFORMANCE COATING.
D. ALL EXPOSED STAINLESS STEEL SHALL RECEIVE NO. 4 BRUSHED FINISH.
E. STRUCTURAL GLAZING SYSTEM:
   a. ALL GLAZING SHALL BE TYPE 'GL-1' UNO: 1 7/16" IGU' (3/8" TEMP GL. WITH EDGE FRIT ON NO. 2 SURFACE + PVB LAYER + 1/4" TEMP GL. WITH LOW-E COATING ON SURFACE NO. 4 + 1/2" AIR + 1/4" TEMP GL.) SUBJECT TO CONFIRMATION IN DELEGATED DESIGN.
   b. AL GLAZING SHALL BE LOW IRON AND TEMPERED.
   c. ALL FITTINGS SHALL BE STAINLESS STEEL.
   d. ALL EXPOSED GLAZING CHANNELS SHALL BE CLAD WITH STAINLESS STEEL.
F. WHERE NEW GLAZING INTESECTS EXISTING STONE, CLEANLY CUT EXISTING STONE TO ACCEPT NEW STRUC. GLAZING CHANNELS AS INDICATED AND PROVIDE NEW STEEL AND ANCHORAGE TO EXISTING WALL PER DELEGATED DESIGN TO SUPPORT GLAZING SYSTEM.
G. PROVIDE NEW FLOOR DRAIN CENTERED BELOW NEW WALK-OFF GRATING, SEE PLUMBING.
H. AN ASTERIKS INDICATES AN ITEM TO BE CONFIRMED DURING DELEGATED DESIGN.
I. SEAL ALL PENETRATIONS THRU AVB & FLASHINGS.

KEYNOTE LEGEND

501 EXISTING TO REMAIN
506 NEW STRUC. STEEL, SHOP PRIME AND ALL EXPOSED STEEL SHALL BE AESS-3 WITH HIGH PERFORMANCE COATING
507 NEW 1/8" THK. PREFIN. ALUM. MP CLADDING OR TRIM, CONCEALED FASTENER SYSTEM
508 NEW WALK-OFF GRATING
510 NEW 4" X 1/2" 304 SS BAR, TOP & BOTT. CONNECTIONS SHALL BE CONCEALED
511 NEW STRUCTURAL GLASS FACADE SYSTEM, SEE GENERAL NOTES E & F
513 NEW ALL GLASS ENTRANCE SYSTEM, BOD: THERMAGUARD BY ASSA ABLOY, U-VALUE OF 0.66, WITH 9/16" LAM. SAFETY GLAZING, WEATHER SEALS ALL SIDES, SS THRESHOLDS AND HEAVY DUTY OVERHEAD CONCEALED CLOSER OR IN-GROUND AUTOMATIC OPERATOR PER FLOOR PLAN, PROVIDE 304 SS THRESHOLDS, SEE SPEC FOR ADD'L. INFO.
520 2" DIA. 304 STAINLESS STEEL BOLLARD WITH AUTO DOOR PUSH PLATE, INSIDE VEST. PROVIDE A VESTIBULE SWITCH

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EXTERIOR DETAILS

A.500.00

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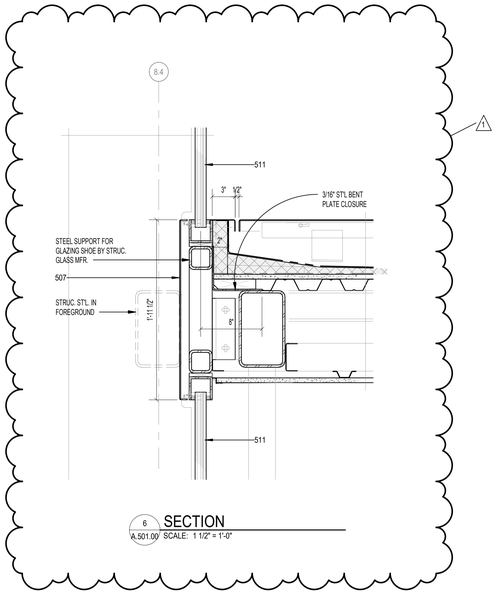

6 A.501.00 SECTION
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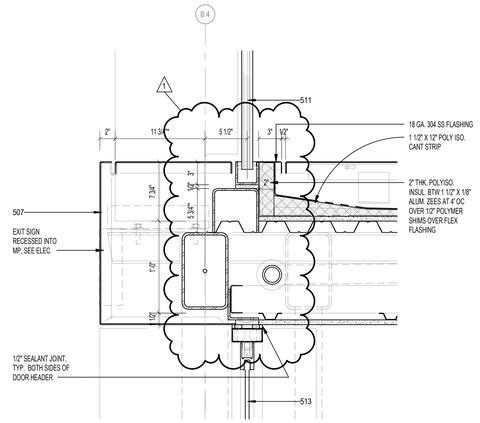

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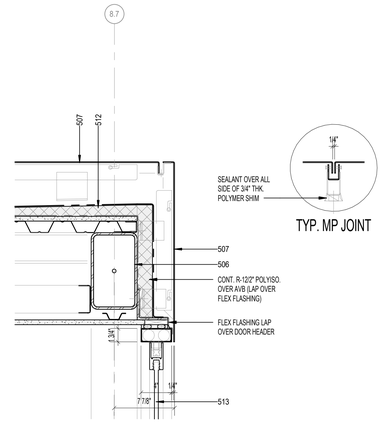
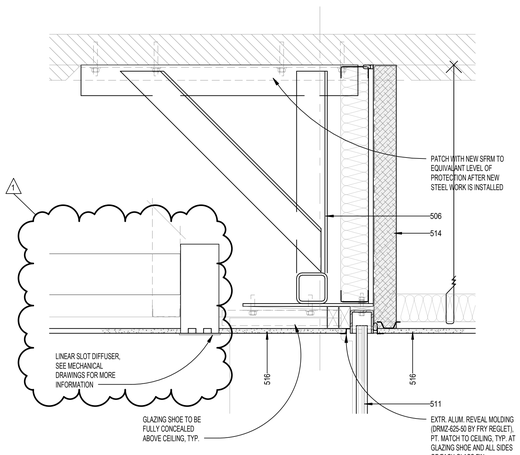


8 A.501.00 SECTION DETAILS
SCALE: 1 1/2" = 1'-0"



5 A.501.00 HEAD DETAIL
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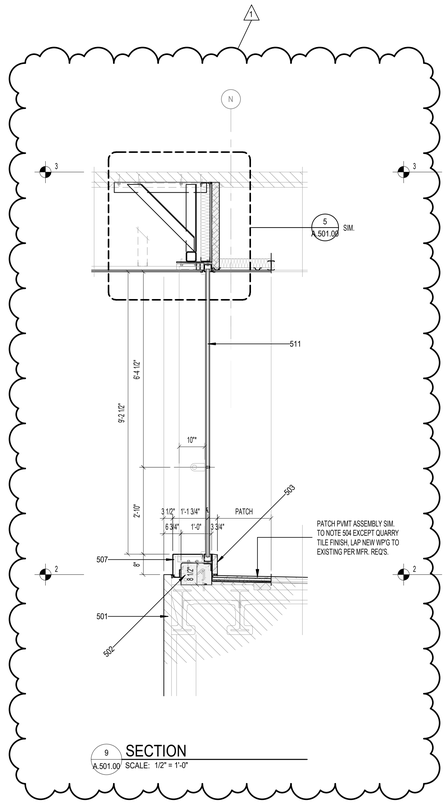

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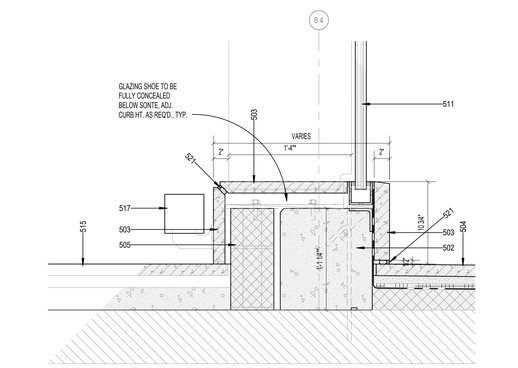

4 A.501.00 BASE DETAIL
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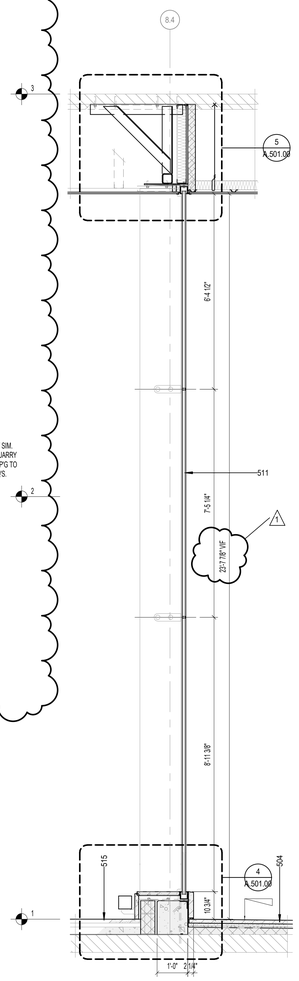

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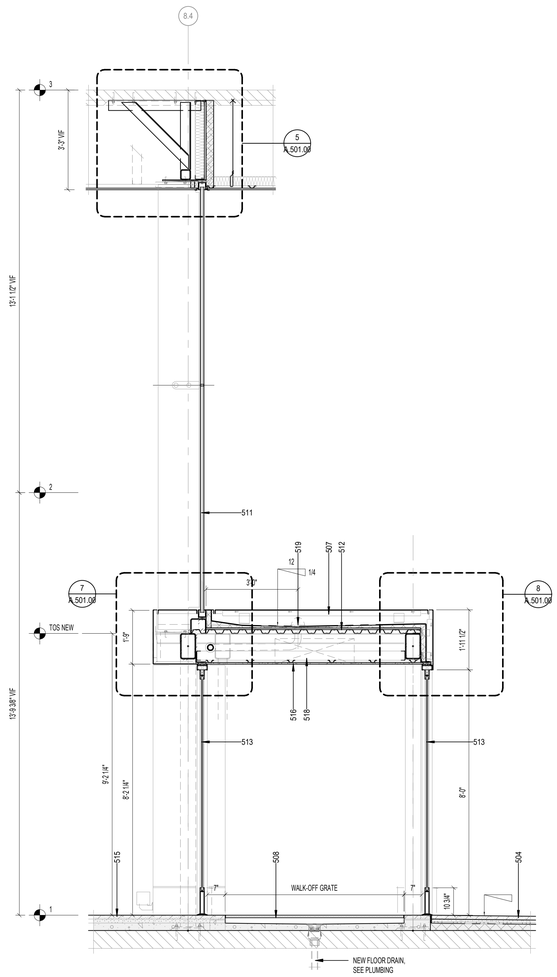

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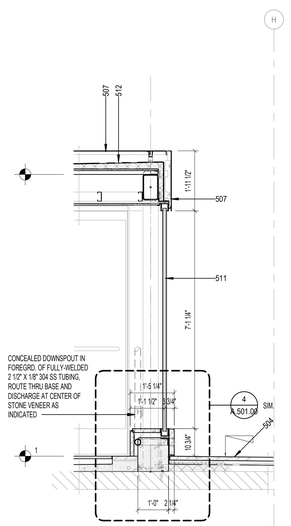

3 A.501.00 SECTION
SCALE: 1/2" = 1'-0"

GENERAL NOTES

A. CLEAN, REPAIR, PATCH AND/OR REPLACE EXISTING WORK DAMAGED AS A RESULT OF CONSTRUCTION.
B. REPAIR FIREPROOFING DAMAGED AS A RESULT OF CONSTRUCTION WITH EQUIVALENT OR BETTER PROTECTION.
C. ALL EXPOSED STRUCTURAL STEEL SHALL BE SHOP PRIMED AND RECEIVE HIGH PERFORMANCE COATING.
D. ALL EXPOSED STAINLESS STEEL SHALL RECEIVE NO. 4 BRUSHED FINISH.
E. STRUCTURAL GLAZING SYSTEM:
   a. ALL GLAZING SHALL BE TYPE 'GL-1' UNO: 1 7/16" IGU* (3/8" TEMP GL, WITH EDGE FRIT ON NO. 2 SURFACE + PVB LAYER + 1/4" TEMP GL, WITH LOW-E COATING ON SURFACE NO. 4 + 1/2" AIR + 1/4" TEMP GL.) SUBJECT TO CONFIRMATION IN DELEGATED DESIGN.
   b. AL GLAZING SHALL BE LOW IRON AND TEMPERED.
   c. ALL FITTINGS SHALL BE STAINLESS STEEL.
   d. ALL EXPOSED GLAZING CHANNELS SHALL BE CLAD WITH STAINLESS STEEL.
F. WHERE NEW GLAZING INTESECTS EXISTING STONE, CLEANLY CUT EXISTING STONE TO ACCEPT NEW STRUC. GLAZING CHANNELS AS INDICATED AND PROVIDE NEW STEEL AND ANCHORAGE TO EXISTING WALL PER DELEGATED DESIGN TO SUPPORT GLAZING SYSTEM.
G. PROVIDE NEW FLOOR DRAIN CENTERED BELOW NEW WALK-OFF GRATING, SEE PLUMBING.
H. AN ASTERIKS INDICATES AN ITEM TO BE CONFIRMED DURING DELEGATED DESIGN.
I. SEAL ALL PENETRATIONS THRU AVB & FLASHINGS.

KEYNOTE LEGEND

501	EXISTING TO REMAIN
502	NEW REINFORCED CONCRETE CURB
503	NEW GRANITE CLADDING (2" AT EXT. AND 1 1/2" AT INT. UNO.) WITH SS ANCHORS (NOT SHOWN) PER DELEGATED DESIGN
504	NEW OR REUSED 1 1/2" STONE PAVING OVER SETTING BED OVER PROTECTION BRD. OVER WATERPROOFING OVER INSULATING FILL. AT NEW CURBS EXTEND UP CURB AND TERMINATE 1" FROM TOP OF GLAZING CHANNEL TYP.
505	NEW CMU CURB AS REQ'D.
506	NEW STRUC. STEEL, SHOP PRIME AND ALL EXPOSED STEEL SHALL BE AESS-3 WITH HIGH PERFORMANCE COATING
507	NEW 1/8" THK. PREFIN. ALUM. MP CLADDING OR TRIM, CONCEALED FASTENER SYSTEM
508	NEW WALK-OFF GRATING
511	NEW STRUCTURAL GLASS FACADE SYSTEM, SEE GENERAL NOTES E & F
512	NEW PVC ROOFING FULLY ADHERED OVER TAPERED POLYISO. INSULATION OVER AVB OVER 5/8" ROOF BOARD SECURED TO METAL DECKING
513	NEW ALL GLASS ENTRANCE SYSTEM, BOD: THERMAGUARD BY ASSA ABLOY, U-VALUE OF 0.66, WITH 9/16" LAM. SAFETY GLAZING, WEATHER SEALS ALL SIDES, SS THRESHOLDS AND HEAVY DUTY OVERHEAD CONCEALED CLOSER OR IN-GROUND AUTOMATIC OPERATOR PER FLOOR PLAN, PROVIDE 304 SS THRESHOLDS, SEE SPEC FOR ADDT'L INFO.
514	NEW R-12.5/3" THK. SEMI-RIGID MINERAL WOOL INSUL. OVER AVB OVER 5/8" GLASS-MAT GYP. SHEATHING OVER 3 5/8" GALV. STL. FRAMING AT 16" OC.
515	NEW 1 1/2" STONE FLOORING OVER SETTING BED OVER LW CONC. FILL
516	NEW CEILING, SEE RCP (AT GWB PROVIDE STL SUPPORT FRAMING AS REQ'D.)
517	NEW RADS, SEE MECH.
518	NEW CUH MAY OCCUR RECESSED INTO CEILING, SEE MECH. AND RCP
519	NEW 2" CANOPY DRAIN, ROUTE LEADER THRU STRUC. STEEL AS INDICATED AND DISCHARGE TO PLAZA THRU STONE BASE OR CONNECT TO EXISTING STORM PIPING BELOW LEVEL 1, SEE PLUMBING
521	SEALANT OVER BACKER

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FIT LOBBY RENOVATION - BUILDING A & B

344 8TH AVENUE, NY, NY 10001 - BUILDING A
340-356 8TH AVENUE, NY, NY 10001 - BUILDING B

BIN: 1014250
BLK: 777
LOT: 1001

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#3 01/23/25

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EXTERIOR DETAILS

A.501.00

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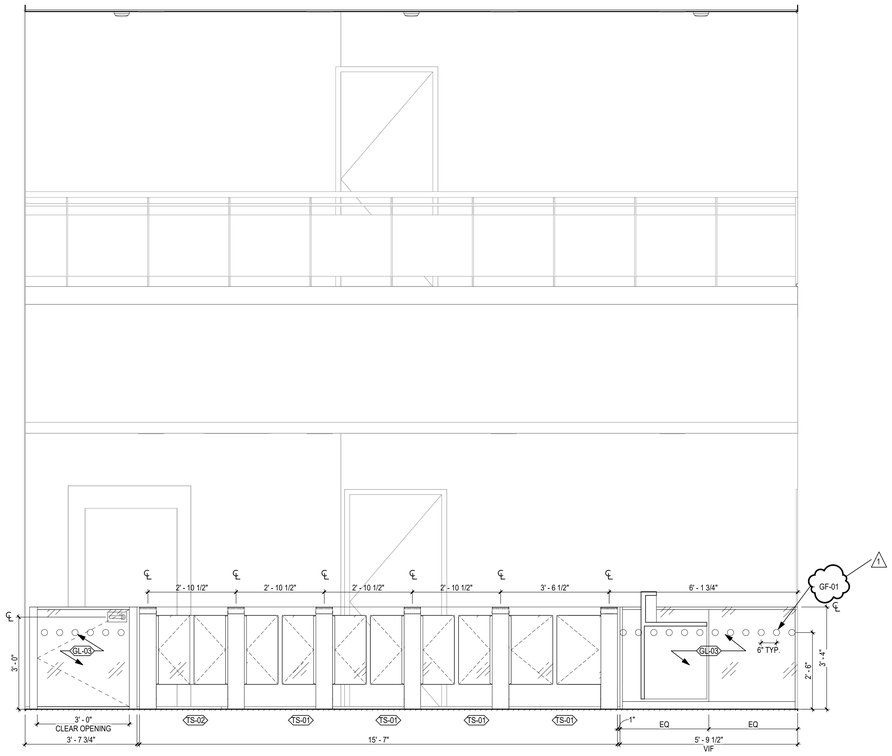
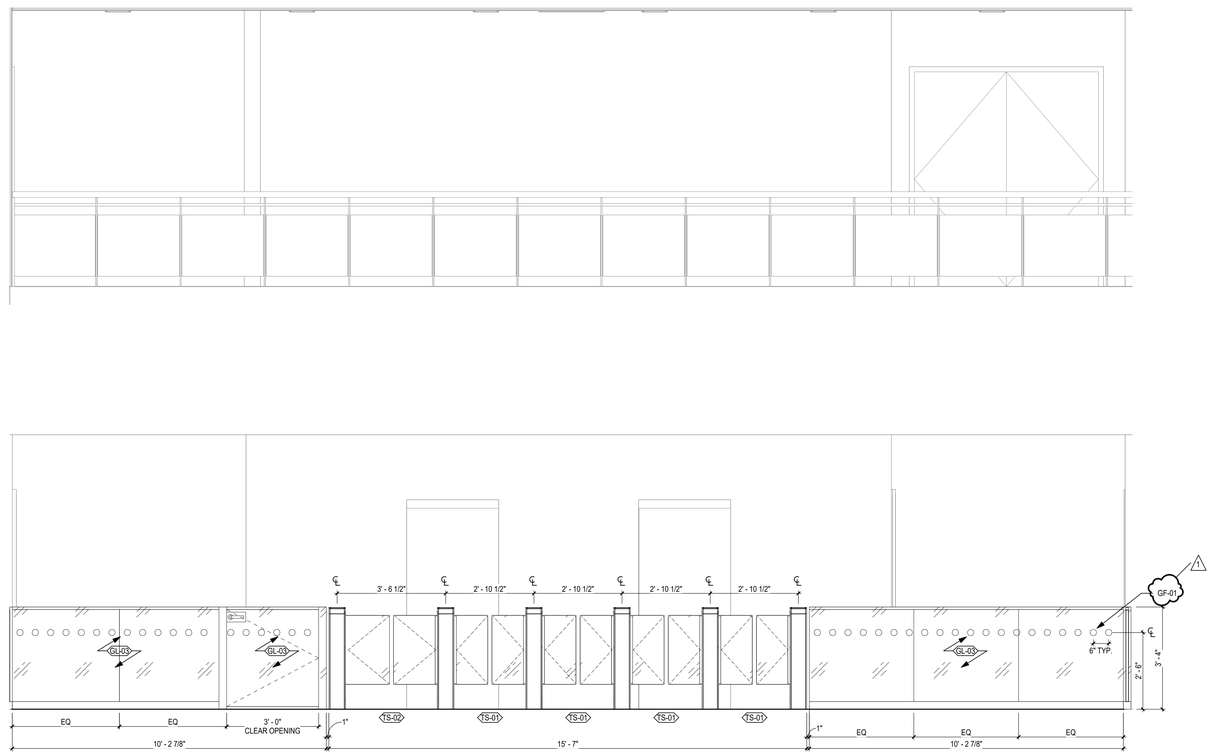


1 A.600.00 BUILDING A - DUBINSKY - TURNSTILE ELEVATION
SCALE: 1/2" = 1'-0"



3 A.600.00 BUILDING B - BUSINESS & LIBERAL ARTS - TURNSTILE ELEVATION
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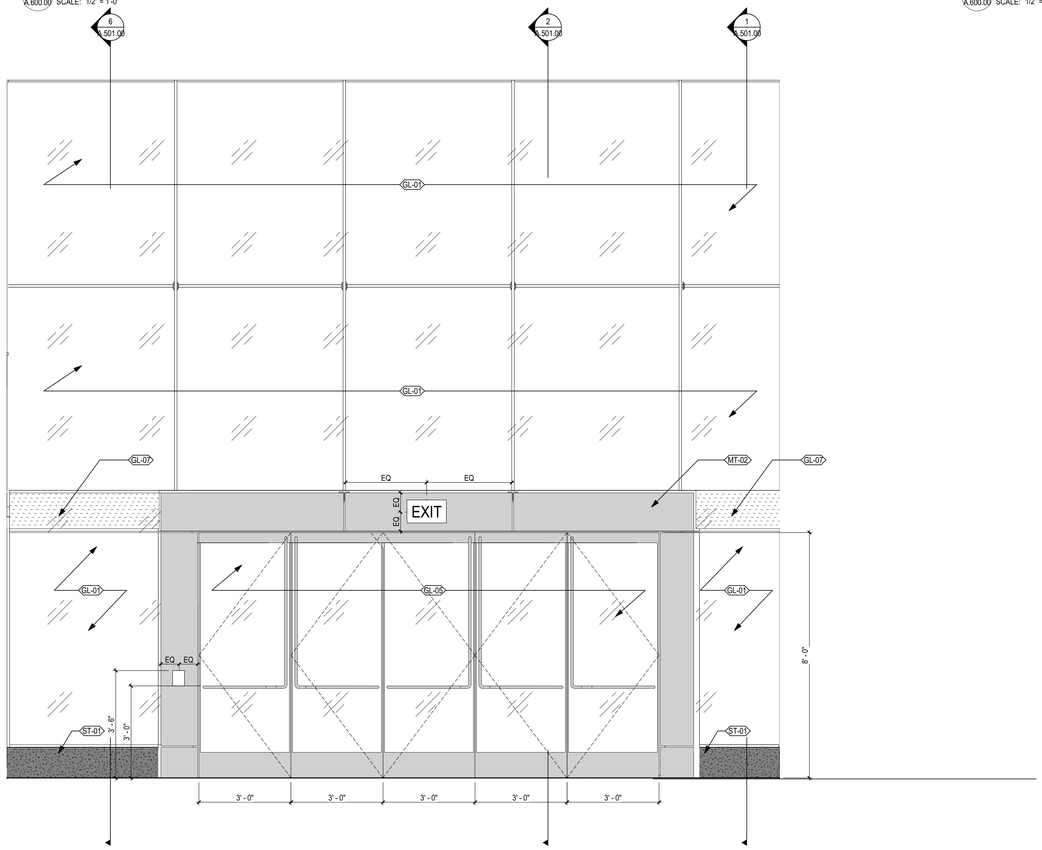

2 A.600.00 BUILDING A - DUBINSKY - VESTIBULE ELEVATION
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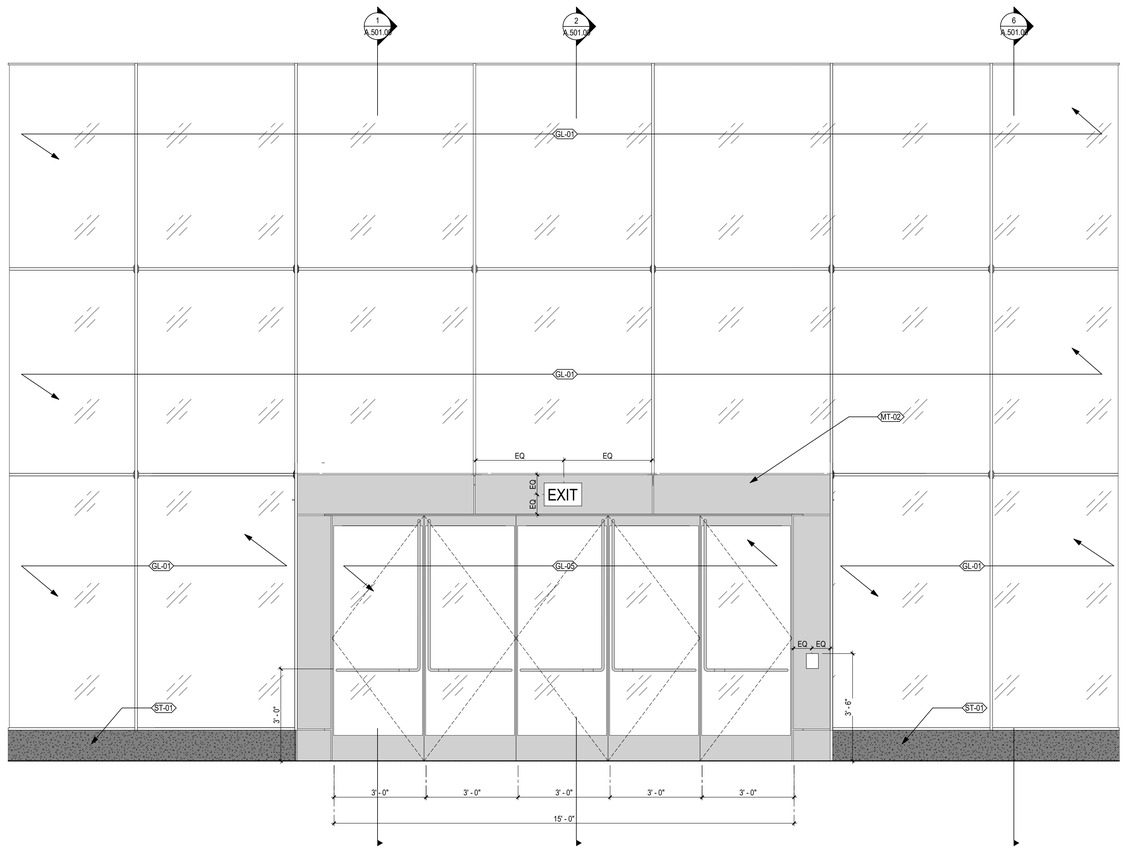

4 A.600.00 BUILDING B - BUSINESS & LIBERAL ARTS - VESTIBULE ELEVATION
SCALE: 1/2" = 1'-0"

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BIN: 1014250
BLK: 772
LOT: 001

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INTERIOR ELEVATIONS

A.600.00

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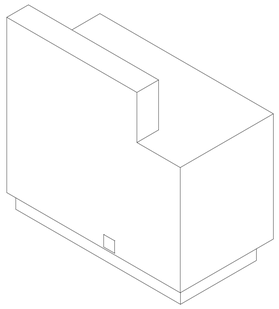

8 A.700.00 3D View Reception Desk
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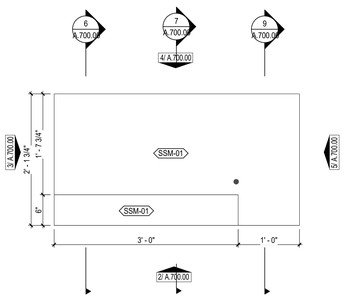

1 A.700.00 RECEPTION DESK ENLARGED PLAN
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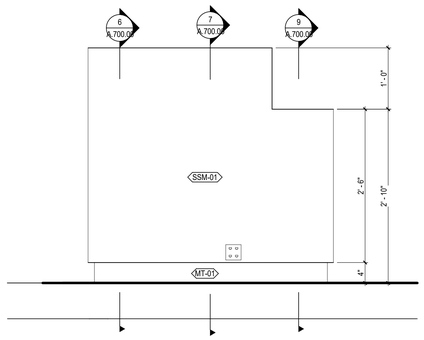

2 A.700.00 RECEPTION DESK FRONT ELEVATION
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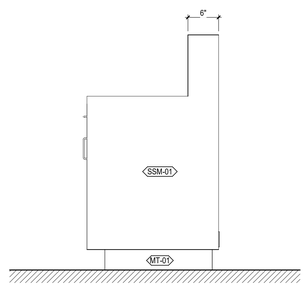

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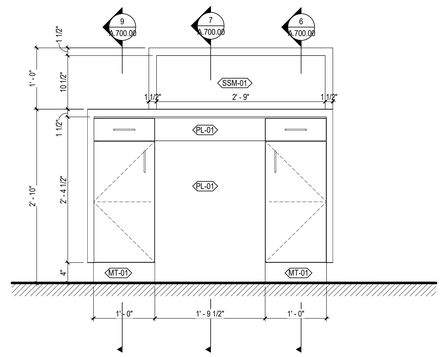

4 A.700.00 RECEPTION DESK REAR ELEVATION
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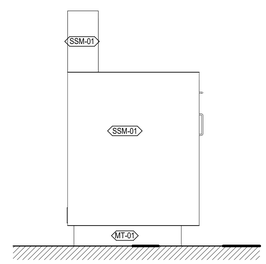

5 A.700.00 Elevation 5 - a1
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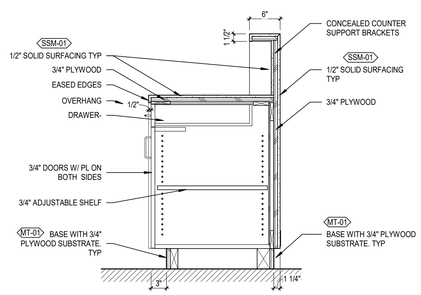

6 A.700.00 RECEPTION DESK SECTION 1
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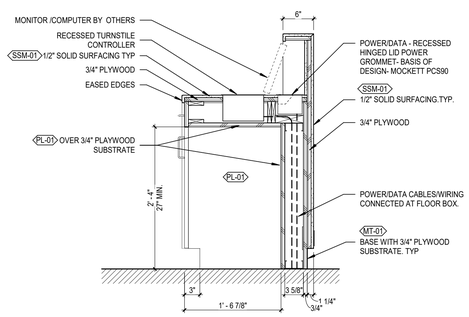

7 A.700.00 RECEPTION DESK SECTION 2
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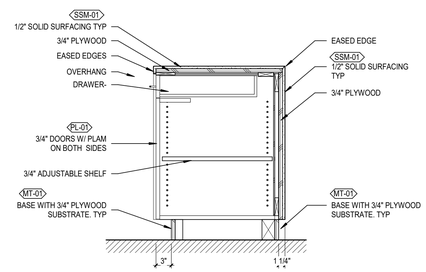

9 A.700.00 RECEPTION DESK SECTION 3
SCALE: 1" = 1'-0"

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MILLWORK DETAILS

A.700.00

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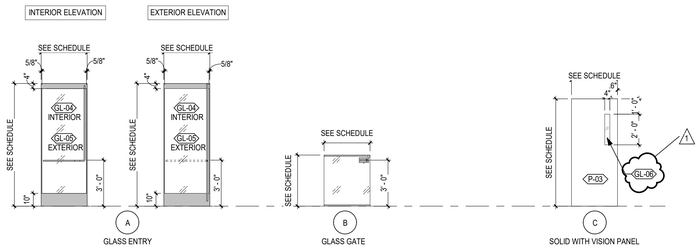
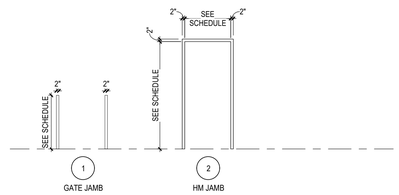


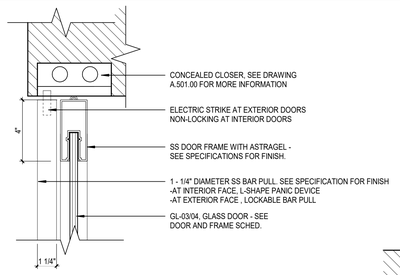
DOOR PANEL TYPES



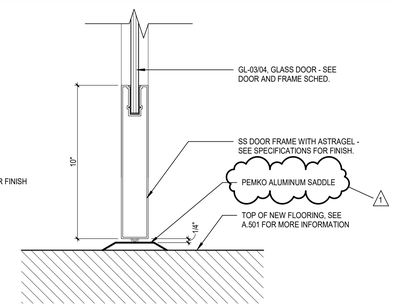
INTERIOR FRAME TYPES

DOOR AND FRAME SCHEDULE

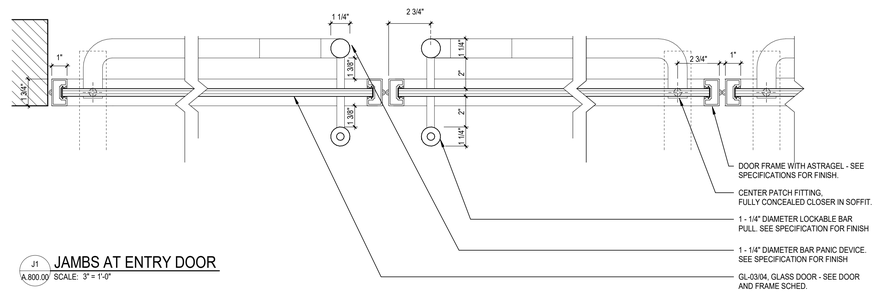
NUMBER	PANEL NO. OF PANELS	PANEL WIDTH	PANEL HEIGHT	PANEL THICKNESS	PANEL MATERIAL	PANEL GLASS	PANEL TYPE	FRAME MATERIAL	FRAME TYPE	FIRE RATING	HARDWARE SET	DETAILS HEAD	DETAILS JAMB LEFT	DETAILS JAMB RIGHT	DETAILS SILL	COMMENTS
A101-A	1	3' - 0"	8' - 0"	1/2"	SS	GL-04	A	SS		-	4.0	H1	J1	J1	S1	ADA ACTUATOR
A101-B	1	3' - 0"	8' - 0"	1/2"	SS	GL-04	A	SS		-	3.0	H1	J1	J1	S1	
A101-C	1	3' - 0"	8' - 0"	1/2"	SS	GL-04	A	SS		-	3.0	H1	J1	J1	S1	
A101-D	1	3' - 0"	8' - 0"	1/2"	SS	GL-04	A	SS		-	3.0	H1	J1	J1	S1	
A101-E	1	3' - 0"	8' - 0"	1/2"	SS	GL-04	A	SS		-	3.0	H1	J1	J1	S1	
A101-F	1	3' - 0"	8' - 0"	1/2"	SS	GL-05	A	SS		-	2.0	H1	J1	J1	S1	ADA ACTUATOR
A101-G	1	3' - 0"	8' - 0"	1/2"	SS	GL-05	A	SS		-	1.0	H1	J1	J1	S1	
A101-H	1	3' - 0"	8' - 0"	1/2"	SS	GL-05	A	SS		-	1.0	H1	J1	J1	S1	
A101-I	1	3' - 0"	8' - 0"	1/2"	SS	GL-05	A	SS		-	1.0	H1	J1	J1	S1	
A101-J	1	3' - 0"	8' - 0"	1/2"	SS		A	SS			1.0					
A101-K	1	3' - 0"	3' - 2"	3/8"	SS	GL-03	B	SS	1	-	9.0	-	J2	J2	-	GATE DOOR
B101-A	1	3' - 0"	8' - 0"	1/2"	SS	GL-04	A	SS		-	4.0	H1	J1	J1	S1	
B101-B	1	3' - 0"	8' - 0"	1/2"	SS	GL-04	A	SS		-	3.0	H1	J1	J1	S1	
B101-C	1	3' - 0"	8' - 0"	1/2"	SS	GL-04	A	SS		-	3.0	H1	J1	J1	S1	
B101-D	1	3' - 0"	8' - 0"	1/2"	SS	GL-04	A	SS		-	3.0	H1	J1	J1	S1	
B101-E	1	3' - 0"	8' - 0"	1/2"	SS	GL-04	A	SS		-	3.0	H1	J1	J1	S1	ADA ACTUATOR
B101-F	1	3' - 0"	8' - 0"	1/2"	SS	GL-05	A	SS		-	2.0	H1	J1	J1	S1	
B101-G	1	3' - 0"	8' - 0"	1/2"	SS	GL-05	A	SS		-	1.0	H1	J1	J1	S1	
B101-H	1	3' - 0"	8' - 0"	1/2"	SS	GL-05	A	SS		-	1.0	H1	J1	J1	S1	
B101-I	1	3' - 0"	8' - 0"	1/2"	SS	GL-05	A	SS		-	1.0	H1	J1	J1	S1	
B101-J	1	3' - 0"	8' - 0"	1/2"	SS	GL-05	A	SS		-	1.0	H1	J1	J1	S1	ADA ACTUATOR
B101-K	1	3' - 0"	3' - 2"	3/8"	SS	GL-03	B	SS	1	-	9.0	-	J2	J2	-	GATE DOOR
B101-L	2	3' - 0"	7' - 0"	1 3/4"	HM	GL-06	C	WD	2	-	5.0	H4	J4	J4	S2	TEMPORARY DOOR - SEE CP.201.00
B101-M	1	3' - 0"	7' - 0"	1 3/4"	HM	GL-06	C	HM	2	-	6.0	H4	J4	J4	S2	TEMPORARY DOOR - SEE CP.201.00
F101-A	2	3' - 0"	7' - 0"	1 3/4"	HM	GL-06	C	WD	2	90 MIN	8.0	H4	J3	J3	-	TEMPORARY DOOR - SEE CP.201.00
F101-B	2	3' - 0"	7' - 0"	1 3/4"	HM	GL-06	C	WD	2	-	7.0	H4	J4	J4	-	TEMPORARY DOOR - SEE CP.201.00



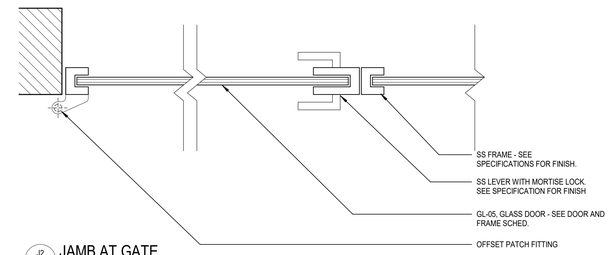
H1 A.800.00 HEAD AT ENTRY DOOR
SCALE: 3" = 1'-0"



S1 A.800.00 SILL AT ENTRY DOOR
SCALE: 3" = 1'-0"



J1 A.800.00 JAMBS AT ENTRY DOOR
SCALE: 3" = 1'-0"



J2 A.800.00 JAMB AT GATE
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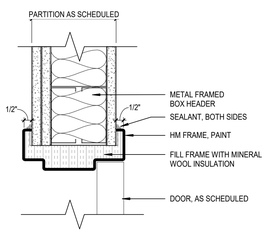
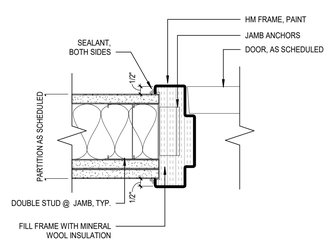
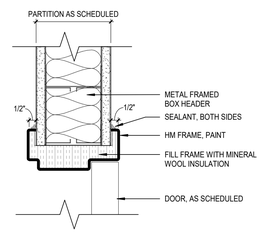


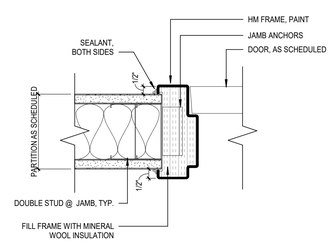
H3 A.800.00 HEAD AT 90 MIN INTERIOR HM DOOR
SCALE: 3" = 1'-0"



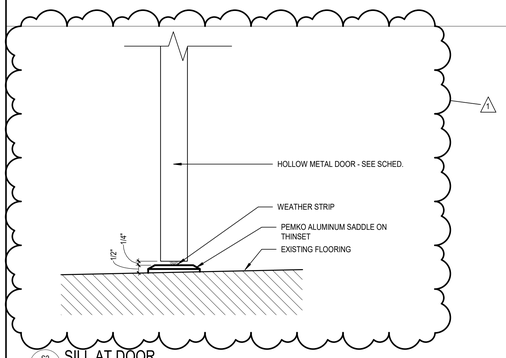
J3 A.800.00 JAMB AT 90 MIN INTERIOR HM DOOR
SCALE: 3" = 1'-0"



H4 A.800.00 HEAD AT NON-RATED HM DOOR
SCALE: 3" = 1'-0"



J4 A.800.00 JAMB AT NON-RATED HM DOOR
SCALE: 3" = 1'-0"



S2 A.800.00 SILL AT DOOR
SCALE: 3" = 1'-0"

DOOR AND FRAME SCHEDULE GENERAL NOTES

A. ALL EXTERIOR HOLLOW METAL FRAMES SHALL BE FILLED WITH INSULATION.
B. ALL INTERIOR HOLLOW METAL FRAMES SET IN MASONRY AND CONCRETE WALLS SHALL BE GROUTED SOLID.
C. ALL HOLLOW METAL FRAMES SET IN METAL STUD WALLS SHALL BE FILLED WITH MINERAL WOOL BLANKET INSULATION.
D. ALL EXTERIOR FRAMES SHALL BE INSTALLED WITH 1/4" SHIM AND SEALANT AROUND PERIMETER OF FRAME.
E. MASONRY LINTELS AND STEEL LINTELS ARE SHOWN ON STRUCTURAL DRAWINGS.
F. GLASS TYPES FOR DOORS ARE INDICATED IN THE DOOR GLAZING COLUMN OF THE DOOR AND FRAME SCHEDULE. GLASS TYPES FOR FRAMES ARE INDICATED ON THE FRAME ELEVATIONS.
G. FOR COILING DOORS, GRILLES AND SECTIONAL DOORS, WIDTH AND HEIGHT DIMENSIONS SHOWN IN DOOR AND FRAME SCHEDULE REPRESENT FINISHED OPENING SIZE. CONTRACTOR TO COORDINATE EXACT SIZE OF DOOR WITH MANUFACTURER.
H. FRAME MANUFACTURER SHALL COORDINATE LOCATIONS OF ALL CONCEALED CONDUIT AND J-BOXES REQUIRED FOR SECURITY SYSTEM HARDWARE PRIOR TO MANUFACTURING OF HOLLOW METAL FRAMES AND COORDINATE WITH SECURITY HARDWARE AND DEVICES.
I. PROVIDE HEAD RECEIVERS AT ALUMINUM STOREFRONTS AND CURTAIN WALLS AS REQUIRED FOR STRUCTURAL DEFLECTION ALLOWANCE.
J. SEE SPECIFICATIONS HARDWARE SECTION FOR HARDWARE SETS NOTED IN DOOR AND FRAME SCHEDULE.

DOOR PANEL TYPE DESCRIPTIONS

A	GLASS ENTRY DOOR
B	GLASS GATE
C	SOLID DOOR WITH VISION PANEL

GLAZING TYPE DESCRIPTIONS

GL-01	DOUBLE HEIGHT CLEAR INSULATED GLAZING UNIT GLASS
GL-02	SINGLE HEIGHT CLEAR INSULATED GLAZING UNIT GLASS
GL-03	LAMINATED GLASS
GL-04	CLEAR TEMPERED INSULATING GLASS DOOR
GL-05	CLEAR TEMPERED GLASS DOOR
GL-06	VISION GLASS IN DOOR

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STATE OF NEW YORK REGISTERED ARCHITECT

FIT LOBBY RENOVATION - BUILDING A & B
344 8TH AVENUE, NY, NY 10001 - BUILDING A
340-356 8TH AVENUE, NY, NY 10001 - BUILDING B
BIN: 1014250
BLK: 777
LOT: 001

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#3 01/23/25

57-24140-02

DOOR TYPES & SCHEDULE

A.800.00

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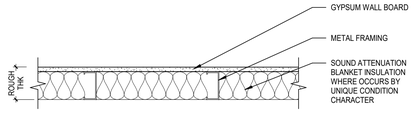
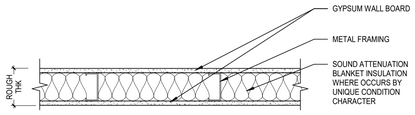
PARTITION TYPES



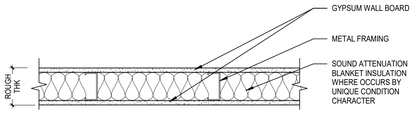
S_-_-1_ NON-RATED STUD PARTITION

MARK			ROUGH THICKNESS	FIRE/SMOKE RATING	FIRE/SMOKE TESTED ASSEMBLIES	SOUND STC RATING	SOUND TESTED ASSEMBLIES	T.O. WALL DETAIL	B.O. WALL DETAIL	COMMENTS
SA	3	10	4 1/4"	NR	NA	-	-	1 / A.801.00	1 / A.801.00	



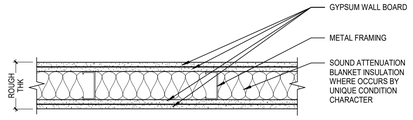
S_-_-2_ NON-RATED STUD PARTITION

MARK			ROUGH THICKNESS	FIRE/SMOKE RATING	FIRE/SMOKE TESTED ASSEMBLIES	SOUND STC RATING	SOUND TESTED ASSEMBLIES	T.O. WALL DETAIL	B.O. WALL DETAIL	COMMENTS
SA	3	20	4 7/8"	NR	NA	-	-	1 / A.801.00	1 / A.801.00	
SA	6	20	7 1/4"	NR	NA	-	-	1 / A.801.00	1 / A.801.00	



S1-_-2_ 1-HOUR RATED STUD PARTITION

MARK			ROUGH THICKNESS	FIRE/SMOKE RATING	FIRE/SMOKE TESTED ASSEMBLIES	SOUND STC RATING	SOUND TESTED ASSEMBLIES	T.O. WALL DETAIL	B.O. WALL DETAIL	COMMENTS
S1	3	20	4 7/8"	1	UL U419	-	-	1 / A.801.00	1 / A.801.00	



S2-_-4_ 2-HOUR RATED STUD PARTITION

MARK			ROUGH THICKNESS	FIRE/SMOKE RATING	FIRE/SMOKE TESTED ASSEMBLIES	SOUND STC RATING	SOUND TESTED ASSEMBLIES	T.O. WALL DETAIL	B.O. WALL DETAIL	COMMENTS
S2	3	40	6 1/8"	2	UL U419	-	-	1 / A.801.00	1 / A.801.00	
S2	6	40	8 1/2"	2	UL U419	-	-	1 / A.801.00	1 / A.801.00	

PARTITION TYPES DESCRIPTIONS

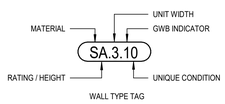
MATERIAL DESCRIPTION
- S = STEEL (METAL STUDS)
- W = WOOD STUDS
- H = SHAFT WALLS
- M = MASONRY
- C = CONCRETE

UNIT WIDTH / CONFIGURATION
- F = FURRING STRIPS / CHANNELS
- 1 = 1 5/8" METAL
- 2 = 2 1/2" METAL / 1 1/2" WOOD
- 3 = 3 5/8" METAL
- 4 = 4" METAL / 3 1/2 WOOD / 3 5/8" CMU
- 6 = 6" METAL / 5 1/2" WOOD / 5 5/8" CMU / 6" CONC
- 8 = 8" METAL / 7 1/4" WOOD / 7 5/8" CMU / 8" CONC
- 10 = 10" CONC
- 12 = 11 5/8" CMU / 12" CONC

RATING / PARTITION HEIGHT
- A = FULL HEIGHT
- B = 6" ABOVE CEILING (NOT RATED)
- C = UNDERSIDE OF CEILING (NOT RATED)
- D = PARTIAL HEIGHT (NOT RATED)
- X = VARIABLE HEIGHT (NOT RATED)
- S = SMOKE PARTITON (NOT RATED)
- 1 = 1 HOUR RATED
- 2 = 2 HOUR RATED
- 3 = 3 HOUR RATED
- 4 = 4 HOUR RATED

GYPSUM WALLBOARD INDICATOR (NOT INCLUDING SHAFT LINER)
- 0 = NO GWB
- 1 = ONE LAYER, TAG SIDE
- 2 = ONE LAYER, EACH SIDE
- 3 = TWO LAYERS TAG SIDE, ONE LAYER OTHER
- 4 = TWO LAYERS, EACH SIDE
- 5 = TWO LAYERS TAG SIDE, NO GWB OTHER
- 6 = THREE LAYERS, EACH SIDE

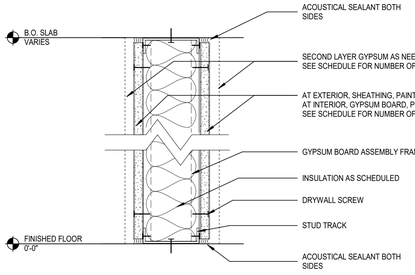
SYMBOL KEY



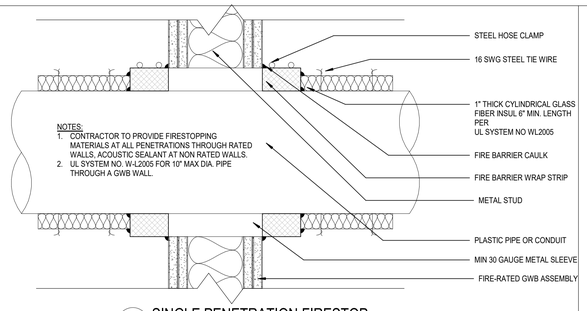
FINISH SCHEDULE

TAG	DESCRIPTION	MANUFACTURER	PRODUCT	COLOR/FINISH	SIZE	COMMENTS	Provided By
044000 NATURAL STONE							
ST-01	ABSOLUTE BLACK GRANITE	STONE SOURCE OR SIMILIAR	GRANITE SLAB	HONED	3/4" THICK AT INTERIOR & 2" THICK AT EXTERIOR		CFCI
ST-02	DANBY MARBLE	STONE SOURCE OR SIMILIAR	MARBLE SLAB	HONED	3/4" THICK SLAB	SIZE = 3'-1"X2'-7" TO MATCH FLOORING	CFCI
050000 METALS							
MT-01	DECORATIVE METAL SHEET	-	-	DARK BRONZE	SEE MILLWORK DRAWINGS	MATCH VESTIBULE ANODIZED ALUMINUM FINISH	CFCI
MT-02	ALUMINUM WALK OFF MAT	MATTER SURFACE	DESIGN TRACK	ALUMINUM MILL	VARIES AT EACH LOBBY		CFCI
066400 CUSTOM CASEWORK							
PL-01	PLASTIC LAMINATE	FORMICA OR SIMILIAR	HIGH PRESSURE LAMINATE	TO MATCH SSM-01	SEE MILLWORK ELEVATIONS		CFCI
088000 GLAZING							
GF-01	GLAZING FILM	3M OR SIMILIAR	FASARA 7725SE-314	DUSTED CRYSTAL FILM - WHITE	2" DIAMETER PER DECAL	CUSTOM "FIT" VINYL PROVIDED BY OWNER	CFCI
GL-01	STRUCTURAL GLAZING - SINGLE STORY	SEE 084426 - STRUCTURAL GLASS FACADE	IGU	LOW-E	1 7/16" IGU (3/8" TEMP GL. WITH EDGE FRIT ON NO. 2 SURFACE + PVB LAYER + 1/4" TEMP GL. WITH LOW-E COATING ON SURFACE NO. 4 + 1/2" AIR + 1/4" TEMP GL.)	SUBJECT TO CONFIRMATION IN DELEGATED DESIGN. SEE A.500.00 FOR MORE INFORMATION.	CFCI
GL-02	STRUCTURAL GLAZING - DOUBLE STORY	SEE 084426 - STRUCTURAL GLASS FACADE	IGU	LOW-E	1 7/16" IGU (3/8" TEMP GL. WITH EDGE FRIT ON NO. 2 SURFACE + PVB LAYER + 1/4" TEMP GL. WITH LOW-E COATING ON SURFACE NO. 4 + 1/2" AIR + 1/4" TEMP GL.)	SUBJECT TO CONFIRMATION IN DELEGATED DESIGN. SEE A.500.00 FOR MORE INFORMATION.	CFCI
GL-03	TEMPERED GLAZING	SEE 088000 - GLAZING	TEMPERED	CLEAR	3/8"	SEE GF-01 FOR GLAZING FILM	CFCI
GL-04	ENTRANCE DOOR GLAZING - EXTERIOR	ASSA ABLOY OR SIMILIAR	LAMINANTED	CLEAR	9/16"	U-VALUE < 0.66	CFCI
GL-05	ENTRANCE DOOR GLAZING - INTERIOR	ASSA ABLOY OR SIMILIAR	LAMINANTED	CLEAR	9/16"	U-VALUE < 0.66	CFCI
GL-07	SPANDRAL WITH WHITE PANEL BEHIND	SEE 084426 - STRUCTURAL GLASS FACADE	IGU	WHITE	TO MATCH GL-01 / 02	SUBJECT TO CONFIRMATION IN DELEGATED DESIGN. SEE A.500.00 FOR MORE INFORMATION.	CFCI
095000 GYPSUM BOARD							
GWB-01	INTERIOR GYPSUM BOARD	USG OR SIMILIAR	TYPE X GYPSUM	SEE 099000 - PAINTING	5/8" THICK (WALL) & 1/2" THICK (CEILING)		CFCI
GWB-02	MOISTURE & MOLD RESISTANCE GYPSUM BOARD	USG OR SIMILIAR	TYPE X GYPSUM	SEE 099000 - PAINTING	5/8" THICK (WALL) & 1/2" THICK (CEILING)		CFCI
GWB-03	CEMENT BOARD	USG OR SIMILIAR	EXTERIOR GRADE	PARGE CEILING TO MATCH ADJACENT. SEE DETAIL #18/A.801.00	1/2" THICK (CEILING)		CFCI
095100 ACOUSTIC CEILING TILE							
ACT-01	STANDARD ACOUSTIC CEILING TILE	ARMSTRONG OR SIMILAR	ULTIMA	WHITE	24" X 24"	NRC 0.75 MIN. 9/16" TEGULAR EDGE	CFCI
CSC-01	TONGUE AND GROOVE CEILING TILE	TO MATCH EXISTING	TO MATCH EXISTING	WHITE	12" X 12"		CFCI
099000 PAINTING							
P-01	CEILING PAINT	SHERWIN WILLIAMS OR SIMILAR	LOW VOC, PREMIUM PAINT	WHITE; FLAT FINISH	-		CFCI
P-02	WALL PAINT	SHERWIN WILLIAMS OR SIMILIAR	LOW VOC, PREMIUM PAINT	WHITE; EGGSHELL FINISH (OR SATIN)	-		CFCI
P-03	HM DOORS AND TRIM	SHERWIN WILLIAMS OR SIMILIAR	LOW VOC, PREMIUM PAINT	WHITE; SEMI-GLOSS FINISH	-		CFCI
111400 AUTOMATED SECURITY							
TS-01	STANDARD TURNSTILE	GUNEBOO	OPTISTILE 720	STAINLESS STEEL, SATIN & GLASS	I	SEE TELECOMMUNICATION SPECIFCIATION FOR MORE INFORMATION	CFCI
TS-02	ADA TURNSTILE	GUNEBOO	OPTISTILE 720	STAINLESS STEEL, SATIN & GLASS	-	SEE TELECOMMUNICATION SPECIFCIATION FOR MORE INFORMATION	CFCI
123661 SOLID SURFACING							
SSM-01	COMPOSITE SOLID SURFACE	CORIAN	COMPOSITE	TO BE DETERMINED	1/2" THICK		CFCI

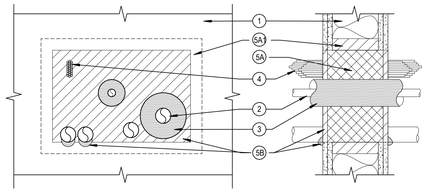
PARTITION DETAILS



1 A.801.00 TYPICAL WALL SECTION
SCALE: 3" = 1'-0"



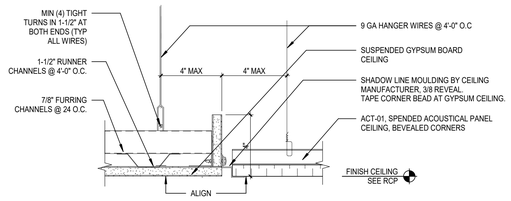
2 A.801.00 SINGLE PENETRATION FIRESTOP
SCALE: 3" = 1'-0"



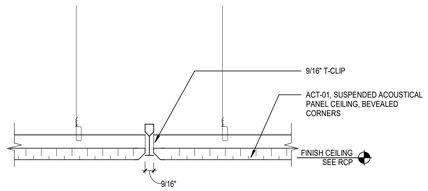
1. WALL TYPE PER PLAN
2. ONE OR MORE PIPES, CONDUIT, OR TUBES MAY BE INSTALLED WITHIN THE OPENING. THE TOTAL NUMBER OF THROUGH-PENETRATIONS IS DEPENDENT ON THE SIZE OF THE OPENING AND THE TYPES AND SIZES OF THE PENETRATIONS. REFER TO UL W-L-8079 FOR ADDITIONAL RESTRICTIONS
3. ONE OF MORE METALLIC PENETRATIONS MAY BE INSULATED, REFER TO UL W-L-8079 FOR ADDITIONAL RESTRICTIONS
4. ONE MAX 3 IN. DIAM BUNDLE OF CABLES INSTALLED WITHIN THE OPENING, REFER TO UL W-L-8079 FOR ADDITIONAL RESTRICTIONS
5A. MIN 4-3/4" THICKNESS OF MIN 4 PCF MINERAL WOOL BATT INSULATION FIRMLY PACKED INTO OPENING AS A PERMANENT FORM. PACKING MATERIAL RECESSED FROM BOTH SURFACES OF THE WALL TO ACCOMMODATE THE REQUIRED THICKNESS OF FILL MATERIAL
5A1. PACKING MATERIAL MIN 1-1/4" THICKNESS OF MIN 4 PCF MINERAL WOOL BATT INSULATION FIRMLY PACKED AS A BACKER AROUND THE PERIMETER OF OPENING AS A PERMANENT FORM.
5B. SEALANT 5/8" MIN THICKNESS OF FILL MATERIAL APPLIED WITHIN ANNULUS, FLUSH WITH BOTH SURFACES OF WALL. AT THE POINT CONTACT LOCATION BETWEEN THROUGH PENETRANTS AND GYPSUM BOARD, A MIN 1/2" DIAM BEAN OF FILL MATERIAL SHALL BE APPLIED AT THE GYPSUM BOARD / THROUGH PENETRANT INTERFACE ON BOTH SURFACES OF WALL

3 A.801.00 MULTIPULE PENETRATION FIRESTOP
SCALE: 1 1/2" = 1'-0"

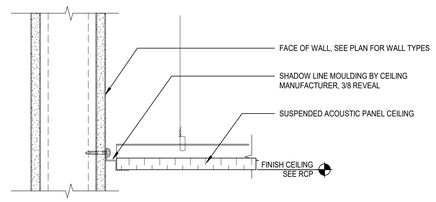
CEILING DETAILS



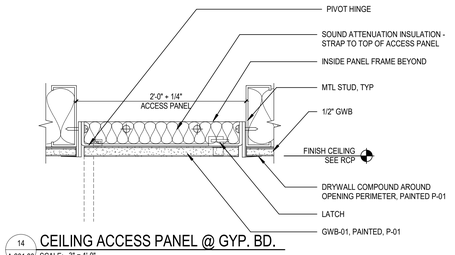
11 A.801.00 FLUSH GYP. CEILING TO ACOUSTIC PANEL CEILING
SCALE: 3" = 1'-0"



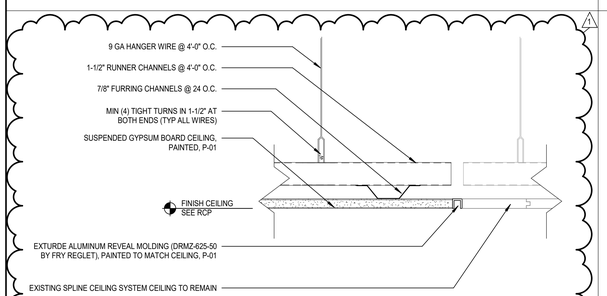
12 A.801.00 ACOUSTIC PANEL CEILING TYPICAL T-CLIP
SCALE: 3" = 1'-0"



13 A.801.00 ACOUSTIC PANEL AT END WALL
SCALE: 3" = 1'-0"



14 A.801.00 CEILING ACCESS PANEL @ GYP. BD.
SCALE: 3" = 1'-0"



15 A.801.00 CEILING TRANSITION AT BLD. B
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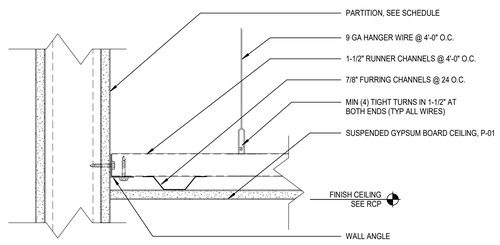
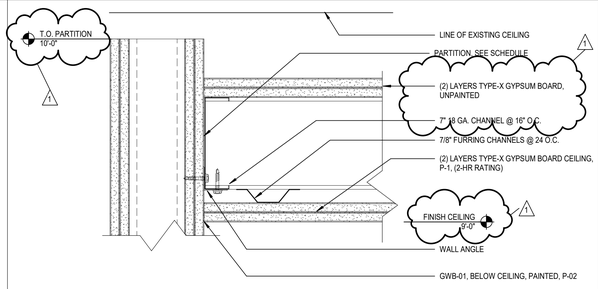
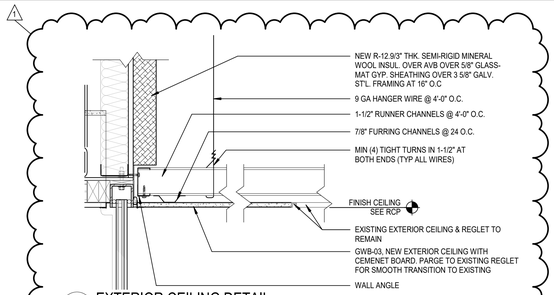


16 A.801.00 SUSP GYP CEILING, MAIN RUNNER @ FIXED END - NON-RATED
SCALE: 3" = 1'-0"



17 A.801.00 SUSP GYP CEILING, MAIN RUNNER @ FIXED END - 2 HR RATED
SCALE: 3" = 1'-0"



18 A.801.00 EXTERIOR CEILING DETAIL
SCALE: 1 1/2" = 1'-0"

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344 8TH AVENUE, NY, NY 10001 - BUILDING A
340-356 8TH AVENUE, NY, NY 10001 - BUILDING B
BIN: 1014260
BLK: 777
LOT: 001

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01.23.25
REVISIONS
#3 01/23/25

57-24140-02

FINISH SCHEDULE & INTERIOR DETAILS

A.801.00

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GENERAL

1. THE DRAWINGS REPRESENT THE FINISHED STRUCTURE, NOT THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY GUYING AND BRACING REQUIRED TO ERECT AND HOLD THE STRUCTURE IN PROPER ALIGNMENT UNTIL ALL STRUCTURAL WORK AND CONNECTIONS HAVE BEEN COMPLETED. THE RESEARCH, DESIGN, SAFETY, ADEQUACY, AND INSPECTION OF ERECTION BRACING, SHORING, GUYING, TEMPORARY SUPPORTS, ETC, IS THE RESPONSIBILITY OF THE CONTRACTOR.
2. THE ENGINEER SHALL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S MEANS AND METHODS, SEQUENCES OF CONSTRUCTION, OR CONSTRUCTION TECHNIQUES USED TO PERFORM THE WORK. OBSERVATION VISITS TO THE SITE WILL NOT INVOLVE REVIEW OF THESE ITEMS.
3. THE ENGINEER SHALL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S SAFETY PROGRAM. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH ALL SAFETY PRECAUTIONS AND REGULATIONS DURING THE WORK. THE ENGINEER WILL NOT ADVISE ON, NOR ISSUE DIRECTION, AS TO SAFETY PRECAUTIONS AND PROGRAMS. OBSERVATION VISITS TO THE SITE WILL NOT INVOLVE REVIEW OF THESE ITEMS.
4. CONTRACTOR IS TO ESTABLISH AND VERIFY OPENINGS AND INSERTS FOR ITEMS TO BE INSTALLED BY OTHER TRADES PRIOR TO SUBMITTAL OF SHOP DRAWINGS AND CONSTRUCTION.
5. CONSTRUCTION MATERIAL AND EQUIPMENT LOADS PLACED ON THE STRUCTURE DURING THE CONSTRUCTION PROCESS SHALL NOT EXCEED THE DESIGN LIVE LOAD OF THE STRUCTURE. THE ENGINEER SHALL NOT BE RESPONSIBLE TO INVESTIGATE, NOR APPROVE, THE STRUCTURE FOR CONSTRUCTION MATERIAL OR EQUIPMENT LOADING. ERECTION OR CONSTRUCTION LOADS ARE NOT TO BE APPLIED UNTIL PROPER STRUCTURAL FRAMING CONNECTIONS ARE MADE, AND ALL TEMPORARY BRACING IS IN PLACE. THE CONTRACTOR SHALL DESIGN AND PROVIDE TEMPORARY BRACING OF THE STRUCTURE WHERE NECESSARY FOR CONSTRUCTION LOADS.
6. DETAILS THAT ARE NOTED AS "TYPICAL" OR "TYP" ON DETAIL TITLES ARE TO BE APPLIED TO THE PROJECT CONSTRUCTION AS GENERAL CONSTRUCTION METHODS UNLESS NOTED OTHERWISE. THESE DETAILS ARE NOT CUT AT ALL LOCATIONS WHERE THEY OCCUR, AND THEY MAY NOT BE CUT AT ALL. WHERE NO SPECIFIC DETAILS ARE SHOWN, CONSTRUCTION SHALL CONFORM TO SIMILAR CONDITIONS ELSEWHERE ON THE PROJECT, SUBJECT TO APPROVAL OF THE ENGINEER.
7. DO NOT SCALE DRAWINGS. CONTRACTOR IS TO VERIFY ALL DIMENSIONS RELATIVE TO ARCHITECTURAL OR OTHER DISCIPLINE DRAWINGS PRIOR TO CONSTRUCTION. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER PRIOR TO CONSTRUCTION.
8. WHERE DISCREPANCIES OCCUR BETWEEN GENERAL NOTES, PLANS, DETAILS, AND SPECIFICATIONS, THE MOST STRINGENT REQUIREMENTS SHALL GOVERN, UNLESS APPROVED OTHERWISE BY THE ENGINEER IN WRITING PRIOR TO CONSTRUCTION.
9. THE STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH THE DRAWINGS OF ALL OTHER DISCIPLINES AND SPECIFICATIONS. THE CONTRACTOR SHALL ESTABLISH AND VERIFY THE REQUIREMENTS OF OTHER TRADES AS TO SLEEVES, CHASES, HANGERS, INSERT ANCHORS, HOLES, AND OTHER ITEMS TO BE PLACED OR SET IN THE STRUCTURAL WORK. DO NOT PENETRATE ANY STRUCTURAL ELEMENTS (BEAMS, COLUMNS, WALLS, SLABS, STEEL DECKS, ETC) WITHOUT PRIOR WRITTEN APPROVAL OF THE ENGINEER.
10. IF THE ENGINEER'S SEAL AND SIGNATURE IS NOT AFFIXED TO THESE DRAWINGS, THESE DRAWINGS ARE INTENDED FOR PRELIMINARY PURPOSES ONLY AND SHALL NOT BE USED FOR CONSTRUCTION.

DESIGN CRITERIA

1. ALL CONSTRUCTION, MATERIALS, AND WORKMANSHIP SHALL CONFORM TO THE REQUIREMENTS OF THESE DRAWINGS, SPECIFICATIONS, AND THE CODES, RULES AND REGULATIONS OF THE 2022 NEW YORK CITY BUILDING CODE (2015 INTERNATIONAL BUILDING CODE), AS ADOPTED AND AMENDED BY THE CITY OF NEW YORK HEREAFTER REFERRED TO AS THE BUILDING CODE.
2. MATERIAL SPECIFIC DESIGN STANDARDS LISTED IN THESE GENERAL NOTES ARE THE VERSION REFERENCED BY THE BUILDING CODE. IF NOT REFERENCED BY THE BUILDING CODE, USE THE LATEST EDITION APPROVED BY THE AUTHORITY HAVING JURISDICTION ON THE DATE OF THE PERMIT ISSUANCE.
3. RISK CATEGORY — III
4. DESIGN LIVE LOADS
   - LOBBIES — 100 PSF
5. SNOW LOADS
   - GROUND SNOW LOAD, P_g — 20 PSF
6. WIND LOADS
   - BASIC WIND SPEED (3 SECOND GUST), V — 122 MPH
   - EXPOSURE CATEGORY — B
   - TOPOGRAPHIC FACTOR, Kzt — 1.0
   - AIR DENSITY FACTOR, Ke — 1.0
   - INTERNAL PRESSURE COEFFICIENT, GC_{pi} — +/- 0.18
   - COMPONENTS AND CLADDING: — DESIGNED BY REGISTERED DESIGN PROFESSIONAL IN ACCORDANCE WITH ASCE 7-10
7. SEISMIC LOADS
   - SITE CLASS — D (ASSUMED)
   - MAPPED SPECTRAL RESPONSE ACCELERATIONS — S_S = 0.279, S_1 = 0.072
   - DESIGN SPECTRAL RESPONSE ACCELERATIONS — S_{DS} = 0.294, S_{D1} = 0.115
   - SEISMIC DESIGN CATEGORY — B
   - IMPORTANCE FACTOR, I_e — 1.25

SUBMITTALS

1. THE FOLLOWING ITEMS ARE REQUIRED STRUCTURAL SUBMITTALS.
   a. STRUCTURAL STEEL FRAMING
   b. STEEL DECKING
2. THE FOLLOWING ITEMS ARE DELEGATED DESIGN (DEFERRED SUBMITTALS PER THE BUILDING CODE).
   a. STRUCTURAL STEEL CONNECTIONS
   b. CURTAIN WALL
   c. SHORING
3. DELEGATED DESIGN SUBMITTAL CALCULATIONS AND/OR SHOP DRAWINGS SHALL BE SIGNED AND SEALED BY THE ENGINEER RESPONSIBLE FOR THEIR PREPARATION AND SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW WITH THE SHOP DRAWING SUBMITTAL. ONCE REVIEWED, CONTRACTOR SHALL FORWARD TO THE AHJ FOR APPROVAL. FABRICATION AND INSTALLATION OF THE DELEGATED DESIGN SUBMITTAL ITEMS SHALL NOT OCCUR UNTIL APPROVAL OF THE AHJ IS RECEIVED.

EXISTING CONDITIONS

1. CONTRACTOR IS TO FIELD VERIFY EXISTING CONDITIONS PRIOR TO BIDDING. ALL WORK AND MATERIALS NECESSARY TO INSTALL NEW WORK IN EXISTING BUILDING(S) SHALL BE INCLUDED.
2. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS AND SHALL CONTACT THE ENGINEER IF ANY DISCREPANCIES ARE FOUND BEFORE PROCEEDING. NOTIFY ENGINEER IMMEDIATELY IF EXISTING CONDITIONS DO NOT MATCH, OR SEEM IN CONFLICT WITH, INFORMATION SHOWN ON DRAWINGS.
3. DIMENSIONS INDICATED ON PLAN AS FIELD VERIFY, OR "FV", ARE DIMENSIONS THAT MAY BE REQUIRED FOR FABRICATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF DIMENSIONS IN THE FIELD NECESSARY FOR FABRICATION OF MEMBERS AND PRIOR TO SUBMISSION OF SHOP DRAWINGS.
4. CONTRACTOR TO PROVIDE PROTECTION FOR ALL EXISTING BUILDING MATERIALS AND EQUIPMENT TO REMAIN FROM DAMAGE DUE TO DEMOLITION OR CONSTRUCTION OPERATIONS PERFORMED UNDER THIS CONTRACT.
5. THE SEQUENCE OF CONSTRUCTION SHALL BE THE RESPONSIBILITY THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL TEMPORARY GUYS, BRACING, AND OTHER SUPPORTS AS NEEDED TO SAFELY RESIST ALL GRAVITY AND LATERAL LOADS TO WHICH THE EXISTING OR PROPOSED STRUCTURE MAY BE SUBJECTED, INCLUDING LOADS FROM ERECTION EQUIPMENT AND ERECTION OPERATIONS, AND WIND OR SEISMIC FORCES COMPARABLE IN INTENSITY FOR WHICH THE STRUCTURE IS DESIGNED. LOAD VERIFICATION OF EXISTING MEMBERS TO RECEIVE TEMPORARY SHORING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR'S ENGINEER.
6. ALL ERECTION AND CONSTRUCTION PROCEDURES SHALL MEET THE REQUIREMENTS OF ALL APPLICABLE CODES AND ORDINANCES.
7. ALL FRAMING CONNECTIONS TO EXISTING STRUCTURE SHALL BE FIELD VERIFIED PRIOR TO SHOP DRAWING PRODUCTION AND FABRICATION. FIELD VERIFIED DIMENSIONS SHALL BE INCLUDED ON FIRST SHOP DRAWING SUBMITTAL AND NOTED AS SUCH.
8. CONTRACTOR SHALL LOCATE REBAR IN EXIST. CONSTRUCTION PRIOR TO DRILLING OF HOLES AND SHALL TAKE CARE NOT TO DAMAGE EXIST. BARS. IF DAMAGE TO EXIST. REBAR OCCURS DURING CONSTRUCTION, THE CONTRACTOR IS RESPONSIBLE FOR REPAIRING THE DAMAGE. REPAIR PROCEDURES NOT DETAILED IN THE CONTRACT DOCUMENTS WILL REQUIRE PREPARATION BY A QUALIFIED PROFESSIONAL ENGINEER REGISTERED IN THE STATE IN WHICH THE PROJECT IS LOCATED AND MUST BE APPROVED BY THE ENGINEER.

EXISTING DOCUMENTATION

1. THE FOLLOWING DOCUMENTS WERE USED TO REPRESENT EXISTING STRUCTURE IN THE CONSTRUCTION DOCUMENTS. NOT ALL ELEMENTS AND INFORMATION HAS BEEN PROVIDED. COPIES OF THE EXISTING DRAWINGS MAY BE AVAILABLE AT THE CONTRACTOR'S REQUEST.
   - DRAWINGS DATED SEPTEMBER, 1969 BY de YOUNG & MOSCOWITZ ARCHITECTS

DEMOLITION

1. DEMOLITION OF EXISTING STRUCTURE TO BE REMOVED SHALL BE PERFORMED BY THE CONTRACTOR USING MEANS NECESSARY TO PREVENT DAMAGE TO THE EXISTING STRUCTURE TO REMAIN. DAMAGE TO THE EXISTING STRUCTURE TO REMAIN SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE USING METHODS REVIEWED BY THE STRUCTURAL ENGINEER. IF EXISTING CONDITIONS DIFFER FROM THOSE SHOWN IN THE CONTRACT DOCUMENTS CONTACT THE ARCHITECT PRIOR TO PROCEEDING WITH WORK.
2. SHORING OF THE EXISTING STRUCTURE SHALL BE PROVIDED BY THE CONTRACTOR AND DESIGNED BY A QUALIFIED PROFESSIONAL ENGINEER REGISTERED IN THE STATE IN WHICH THE PROJECT IS LOCATED.

STRUCTURAL STEEL

1. FABRICATOR QUALIFICATIONS: FABRICATOR SHALL BE AISC CERTIFIED OR AN "APPROVED FABRICATOR" IN ACCORDANCE WITH THE BUILDING CODE AND APPROVED BY THE AHJ. IN LIEU OF THE PREVIOUS, FABRICATOR SHALL INCLUDE IN THEIR BID THE SERVICES OF A SPECIAL INSPECTOR TO PROVIDE IN-PLANT INSPECTION/TESTING SERVICES FOR WORK COMPLETED ON THE FABRICATOR'S PREMISES TO MEET BUILDING CODE REQUIREMENTS. AT THE COMPLETION OF WORK, FABRICATOR SHALL SUBMIT A "CERTIFICATE OF COMPLIANCE" TO THE ARCHITECT AND AHJ STATING THAT THE WORK WAS PERFORMED IN ACCORDANCE WITH APPROVED CONSTRUCTION DOCUMENTS.
2. STRUCTURAL STEEL SHAPES AND CONNECTING COMPONENTS SHALL CONFORM TO THE FOLLOWING MATERIAL SPECIFICATIONS UNO:
   FOLLOWING MATERIAL SPECIFICATIONS:
   - WIDE FLANGE SHAPES — ASTM A992, Fy = 50 KSI
   - HOLLOW STRUCTURAL SECTIONS (HSS)
     - RECTANGULAR & SQUARE — ASTM A500, GRADE C, Fy = 50 KSI
     - ROUND — ASTM A500, GRADE C, Fy = 46 KSI
   - OTHER STEEL SHAPES AND PLATES — ASTM A36, Fy = 36 KSI
   - HIGH STRENGTH STRUCTURAL BOLTS — ASTM F3125, GRADE A325N
   - WELDING ELECTRODES — E70XX
3. COLUMNS AND BEAMS WITH BASE, CAP OR END PLATES SHALL HAVE SQUARE CUT OR MILLED ENDS.
4. NON-METALLIC, NON-SHRINK, CHLORIDE FREE GROUT UNDER ALL COLUMN BASE PLATES AND BEAM BEARING PLATES SHALL CONSIST OF A PRE-MIXED PRODUCT COMPLYING WITH ALL REQUIREMENTS OF ASTM C1107. THE 28-DAY COMPRESSIVE STRENGTH OF THE GROUT SHALL BE TWICE THE FOUNDATION REQUIRED CONCRETE COMPRESSIVE STRENGTH, 5,000 PSI MINIMUM.
5. ALL ARCHITECTURALLY EXPOSED STRUCTURAL STEEL (AESS) SHALL COMPLY WITH AISC CODE OF STANDARD PRACTICE, SECTION 10. REFER TO DRAWINGS FOR LOCATIONS OF AESS.
6. WHERE CONNECTIONS ARE NOTED TO BE SLIP CRITICAL (EXAMPLE: A325-SC), BOLTS SHALL BE TIGHTENED TO THE MINIMUM PRETENSION FOR FULLY TIGHTENED BOLTS BY ONE OF THE AISC APPROVED METHODS. SLIP-CRITICAL BOLTS SHALL HAVE CLASS "A" FAYING SURFACES.
7. ALL BOLTS (HIGH STRENGTH, ANCHOR BOLTS, EXPANSION BOLTS, ADHESIVE ANCHORS, ETC.) SHALL BE INSTALLED WITH STEEL NUTS AND WASHERS. NUTS AND WASHERS FOR HIGH STRENGTH BOLTS SHALL CONFORM TO ASTM A563 AND TO ASTM F436, RESPECTIVELY.
8. WELDING PROCEDURES, ELECTRODES, AND WELDER QUALIFICATIONS SHALL CONFORM TO THE AMERICAN WELDING SOCIETY CODE D1.1, AISC STANDARDS, AND LOCAL CODE REQUIREMENTS.
9. ALL WELDS SHOWN ON THE DRAWINGS SHALL BE SHOP WELDS, UNO. WHERE SHOWN, FIELD WELDING SHALL BE USED. CONTRACTOR MAY SUBSTITUTE FIELD WELDS FOR SHOP WELDS AT THEIR DISCRETION. SHOP DRAWINGS SHALL CLEARLY NOTE ALL WELDING USING AWS A2.4 SYMBOLS.
10. WHERE CONTINUOUS ANGLES OR BENT PLATES ARE INDICATED, PROVIDE A CONTINUOUS BUTT WELD OR FULL PENETRATION WELD AT THE SPLICE POINTS, UNO. THE STEEL FABRICATOR MAY SUBMIT AN ALTERNATE BOLTED CONNECTION DETAIL FOR APPROVAL.

STRUCTURAL STEEL DELEGATED CONNECTION DESIGN

1. THE CONTRACTOR SHALL RETAIN A PROFESSIONAL ENGINEER LICENSED IN THE STATE WHICH THE PROJECT IS LOCATED TO DESIGN ALL STEEL CONNECTIONS NOT FULLY DETAILED IN THE DRAWINGS. CONNECTION DESIGN CALCULATIONS BEARING THE SEAL AND SIGNATURE OF THE ENGINEER RESPONSIBLE FOR THEIR PREPARATION SHALL BE SUBMITTED WITH THE SHOP DRAWING SUBMITTAL.
2. CONNECTIONS SHOWN ON CONSTRUCTION DOCUMENTS ARE FOR CONCEPTUAL PURPOSES ONLY. CONNECTIONS SHALL BE DESIGNED TO SUSTAIN THE FACTORED REACTIONS SHOWN IN ACCORDANCE WITH AISC LRFD SPECIFICATIONS. WHERE NO REACTION HAS BEEN PROVIDED, THE CONNECTION CAPACITY SHALL NOT BE LESS THAN ONE-HALF THE MAXIMUM FACTORED UNIFORM LOAD LISTED IN THE AISC CONSTRUCTION MANUAL FOR THE GIVEN BEAM, SPAN, AND GRADE OF STEEL SPECIFIED.
3. CONTRACTOR IS RESPONSIBLE FOR DESIGNING ALL MOMENT CONNECTIONS FOR THE FACTORED FORCES SHOWN IN ACCORDANCE WITH AISC LRFD SPECIFICATIONS. IF A MEMBER FORCE IS NOT SHOWN, THE CONNECTION SHALL BE DESIGNED FOR THE FULL PLASTIC MOMENT CAPACITY OF THE MEMBER. CONNECTIONS SHALL BE DESIGNED TO TRANSFER THE MAXIMUM COMBINATION OF THE FORCES OF ALL MEMBERS, FRAMING INTO THE JOINT.
4. THE MEMBER SIZES SHOWN ON THE DRAWINGS DO NOT ACCOUNT FOR NET AREA REDUCTION DUE TO BOLT HOLES. PROVIDE SHOP WELDED MEMBER END SUPPLEMENT PLATES WHERE REQUIRED FOR BOLT HOLE NET-AREA REDUCTION. ALL MEMBER END SUPPLEMENT PLATES, SPLICE PLATES, FILLER PLATES AND GUSSET PLATES OF TRUSS CONNECTIONS SHALL BE ASTM A572, GRADE 50.

STEEL DECK

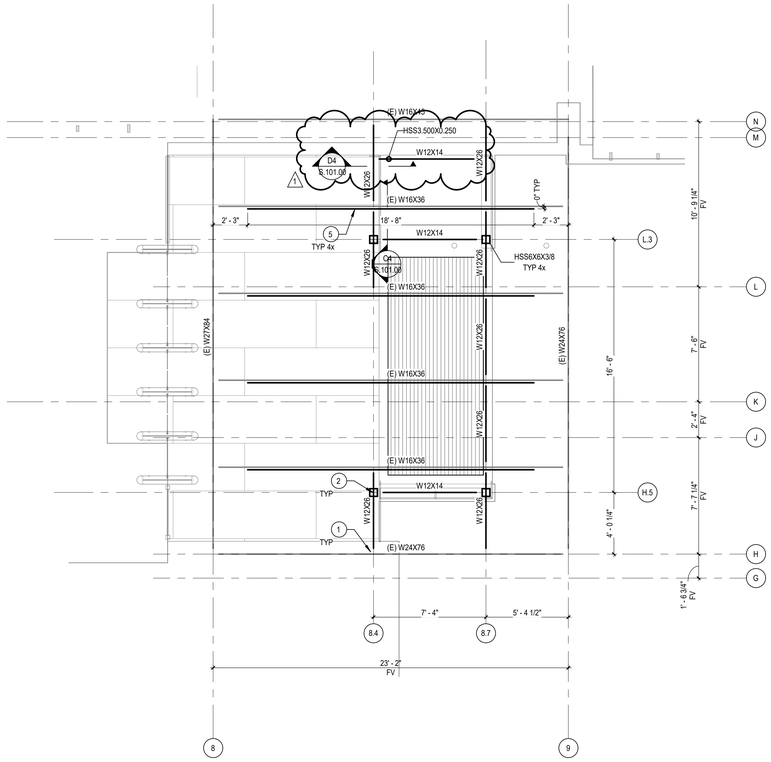
1. ALL STEEL DECK SHALL BE MANUFACTURED, DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST EDITION OF THE "DESIGN MANUAL FOR COMPOSITE DECKS, FORM DECKS, AND ROOF DECKS" BY THE STEEL DECK INSTITUTE (SDI).
2. STEEL DECK & ACCESSORIES SHALL BE FABRICATED FROM STEEL PER ASTM A1008 OR A653.
3. DECK SHALL HAVE THE FOLLOWING MINIMUM PROPERTIES:
   A. ROOF DECK (TYPE 1.5B):
      a. MINIMUM YIELD STRENGTH — Fy = 50 KSI
      b. DEPTH/GAGE: — 1 1/2" / 20
      c. MOMENT OF INERTIA (Ip): — 0.197 IN⁴ / FT MIN
      d. SECTION MODULUS (Sp): — 0.1229 IN³ / FT MIN
      e. GALVANIZED-SHEET STEEL, GRADE 33, G90 ZINC COATING
4. ROOF DECK SHALL BE ATTACHED TO SUPPORTING STRUCTURAL MEMBERS BY 5/8" EFFECTIVE DIAMETER PUDDLE WELDS. WELD EDGE AND INTERIOR RIBS OF DECK UNITS WITH A MINIMUM OF TWO WELDS PER DECK UNIT AT EACH SUPPORT. SPACE WELDS 12 INCHES APART IN THE FIELD OF ROOF AND 6 INCHES APART IN ROOF CORNERS AND PERIMETER, BASED ON ROOF-AREA DEFINITIONS IN FM LOSS PREVENTION DATA SHEET 1-28. SIDE LAPS BETWEEN ADJACENT UNITS ARE TO BE ATTACHED WITH #10 TEK SCREWS, CRIMP OR BUTTON PUNCH OR 5/8" EFFECTIVE ARCH SPOT WELDS AT 36 INCHES MAXIMUM (MINIMUM 2 SCREWS PER SPAN).
5. MECHANICAL FASTERNERS MAY BE USED IN LIEU OF WELDING TO FASTEN DECK. LOCATE MECHANICAL FASTENERS AND INSTALL ACCORDING TO DECK MANUFACTURER'S WRITTEN INSTRUCTIONS TO PROVIDE EQUIVALENT LOAD CAPACITY AS SPECIFIED WELDS.
6. MINIMUM DECK BEARING SHALL BE 1-1/2" AT EXTERIOR SUPPORTS & 3" FOR INTERIOR SUPPORTS, UNO.
7. NO DIRECT ATTACHMENT TO UNDERSIDE OF METAL ROOF DECK IS ALLOWED UNLESS INDICATED ON THE STRUCTURAL DRAWINGS. ALL SUSPENDED LOADS, INCLUDING BUT NOT LIMITED TO, CEILINGS, LIGHT FIXTURES, DUCTWORK, PIPING, AND OTHER UTILITIES TO BE SUPPORTED FROM THE PRIMARY STRUCTURAL MEMBERS OR SECONDARY SUPPORTS BETWEEN STRUCTURAL FRAMING. COORDINATE HANGER AND/OR WIRE SUPPORTS WITH ASSOCIATED SPECIFICATIONS AND TRADES.

POST-INSTALLED ANCHORS

1. UNO, THE FOLLOWING APPLIES TO ALL POST-INSTALLED ANCHORAGE INTO HARDENED CONCRETE OR MASONRY WHICH INCLUDES TYPES SUCH AS EXPANSION, WEDGE, SLEEVE, ADHESIVE / EPOXY, SHOT-PIN, SCREW AND UNDERCUT.
2. POST-INSTALLED ANCHORS SHALL ONLY BE USED WHERE SPECIFIED.
3. CARE SHALL BE GIVEN TO AVOID CONFLICTS WITH EXISTING REBAR OR EMBEDDED CONDUIT WHEN DRILLING HOLES. HOLES SHALL BE DRILLED AND CLEANED PER THE MANUFACTURER'S INSTRUCTIONS.
4. MAINTAIN A MINIMUM OF 2 INCHES FROM EXISTING REINFORCEMENT, CONDUIT, POST-TENSIONING (WHERE OCCURS), ETC. USE NON-DESTRUCTIVE TESTING TO LOCATE PRIOR TO DRILLING, CORING OR SHOOTING PINS INTO THE EXISTING CONCRETE OR MASONRY. FOR INSTALLATION DEEPER THAN 3 INCHES USE GROUND PENETRATING RADAR OR X-RAY METHODS.
5. ALL ANCHORS SHALL BE INSTALLED IN ACCORDANCE WITH THE BUILDING CODE REQUIREMENTS, MANUFACTURER'S RECOMMENDATIONS AND ALL APPLICABLE ICC-ES REPORTS, INCLUDING, BUT NOT LIMITED TO, ALL ANCHOR SPACINGS, EMBEDMENTS AND EDGE DISTANCES.
6. SUBSTITUTION REQUESTS FOR ALTERNATE PRODUCTS MUST BE APPROVED IN WRITING BY THE ENGINEER PRIOR TO USE. CONTRACTOR SHALL PROVIDE CALCULATIONS DEMONSTRATING THAT THE SUBSTITUTED PRODUCT IS CAPABLE OF ACHIEVING THE PERFORMANCE VALUES OF THE SPECIFIED PRODUCT. SUBSTITUTIONS WILL BE EVALUATED BY HAVING AN ICC ESR SHOWING COMPLIANCE WITH THE BUILDING CODE FOR SEISMIC USES, LOAD RESISTANCE, INSTALLATION CATEGORY, AND AVAILABILITY OF COMPREHENSIVE INSTALLATION INSTRUCTIONS. ADHESIVE ANCHOR EVALUATION WILL ALSO CONSIDER CREEP, IN-SERVICE AND INSTALLATION TEMPERATURES.
7. EMBEDMENT REFERS TO THE FINAL INSTALLED EFFECTIVE DEPTH 'Hef'. ALL ANCHORS SHALL HAVE EMBEDMENT NOTED OR EMBEDMENT AS RECOMMENDED BY MANUFACTURER WHERE NO EMBEDMENT IS SHOWN. REQUIRED ANCHOR HOLE DEPTH FOR INSTALLATION MAY BE DEEPER.
8. IF THE FULL ANCHOR EMBEDMENT DEPTH, SPACING OR EDGE DISTANCE CANNOT BE ACHIEVED, NOTIFY THE ENGINEER.
9. STEEL ANCHORING ELEMENTS SHALL BE THE SIZE AND GRADE SHOWN ON THE DRAWINGS AND MUST BE CLEAN, DRY AND FREE OF ANY OIL CONTAMINANTS. DO NOT INCREASE OR DECREASE SIZE OF ANCHOR WITHOUT APPROVAL OF ENGINEER.
10. ALL PERSONNEL INSTALLING POST-INSTALLED ANCHORS SHALL BE TRAINED BY THE MANUFACTURER ON PROPER INSTALLATION TECHNIQUE. TRAINING DOCUMENTATION FROM THE MANUFACTURER SHALL BE AVAILABLE UPON REQUEST.
11. EXPANSION BOLTS IN CONCRETE SHALL BE HILTI KWIK BOLT TZ2 CONCRETE ANCHORS (ICC ESR-4266)
12. SCREW ANCHORS IN CONCRETE SHALL BE HILTI HUS-EZ SCREW ANCHORS (ICC ESR-3027)
13. ADHESIVE ANCHORS IN CONCRETE SHALL BE HILTI HIT-HY 200 V3 ADHESIVE ANCHORING SYSTEM WITH SAFESET (ESR-4868) (FAST CURE APPLICATIONS)
14. USE INSTALLATION PROCEDURES FOR CRACKED CONCRETE CONDITIONS. DO NOT CORE DRILL FOR ANCHOR HOLES WITHOUT ENGINEER APPROVAL.
15. PROVIDE GALVANIZED CARBON STEEL ANCHORS AT DRY INTERIOR LOCATIONS AND STAINLESS-STEEL TYPE 304 OR 316 AT EXTERIOR / DAMP INTERIOR LOCATIONS. ANCHORS SHALL BE CLEAN AND FREE OF DEBONDING SUBSTANCES.
16. PATCH ABANDONED HOLES AND SPALLS USING NON-SHRINK GROUT AND REPAIR FINISHES AS REQUIRED. ANCHORS PENETRATING THROUGH WATERPROOFING OR VAPOR MEMBRANES SHALL BE SEALED OR PATCHED.

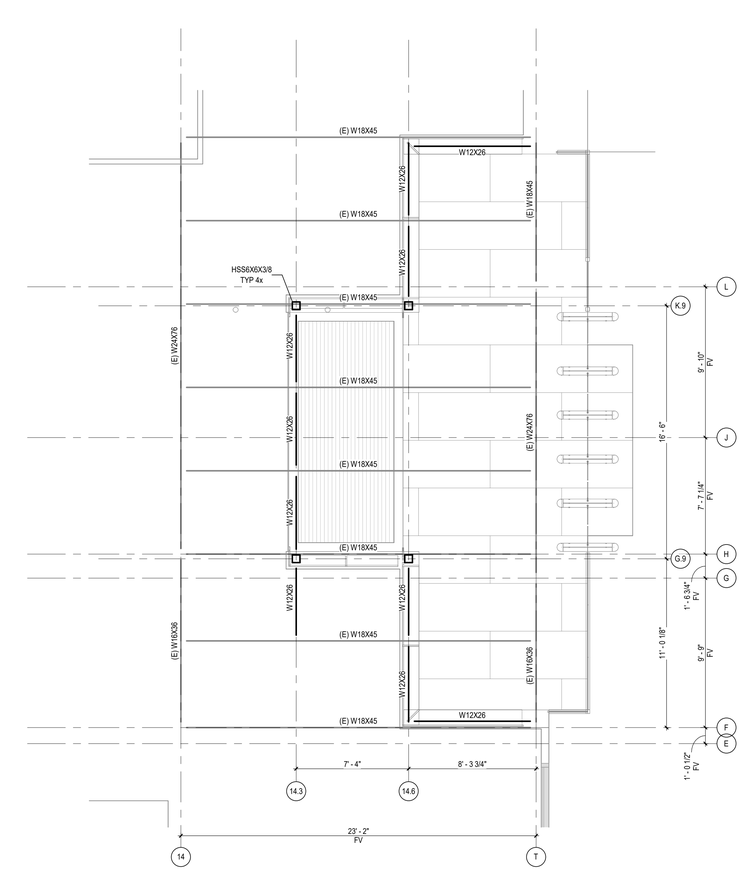
FIREPROOFING

1. PER G.000.00 AND THE 1968 BUILDING CODE. THE CONSTRUCTION IS TYPE IB.
2. INTERIOR COLUMNS SUPPORTING ONE STORY SHALL RECEIVE SPRAY-ON MATERIAL FOR 2-HOUR RATING IN ACCORDANCE WITH TABLE 3-4.
3. EXPOSED VESTIBULE COLUMNS SHALL RECEIVE 2-HOUR INTUMESCENT PAINT, PT-04.
4. BEAMS AND GIRDERS SHALL RECEIVE SPRAY-ON-MATERIAL FOR 2-HOUR RATING IN ACCORDANCE WITH TABLE 3-4.



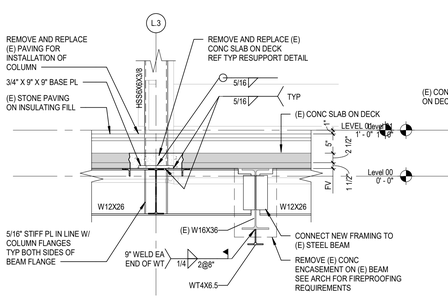
LEVEL 01 - AREA A

SCALE: 1/4" = 1'-0"



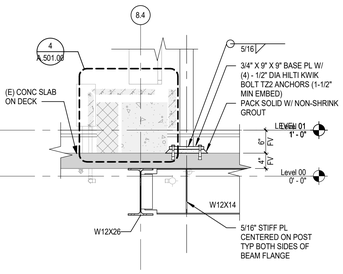
LEVEL 01 - AREA B

SCALE: 1/4" = 1'-0"



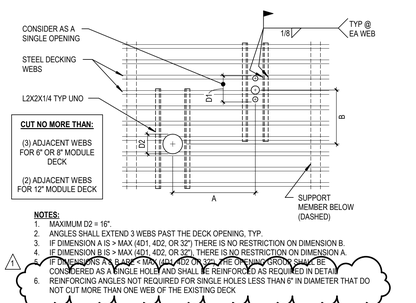
C4 S.101.00 SECTION

SCALE: 3/4" = 1'-0"



D4 S.101.00 SECTION

SCALE: 3/4" = 1'-0"



CUT NO MORE THAN:

(3) ADJACENT WEBS FOR 6" OR 8" MODULE DECK

(2) ADJACENT WEBS FOR 12" MODULE DECK

NOTES:

1. MAXIMUM D2 = 16".
2. ANGLES SHALL EXTEND 3 WEBS PAST THE DECK OPENING, TYP.
3. IF DIMENSION A IS > MAX (4D1, 4D2, OR 32"), THERE IS NO RESTRICTION ON DIMENSION B.
4. IF DIMENSION B IS > MAX (4D1, 4D2, OR 32"), THERE IS NO RESTRICTION ON DIMENSION A.
5. IF DIMENSIONS A & B ARE < MAX (4D1, 4D2 OR 32"), THE OPENING GROUP SHALL BE CONSIDERED AS A SINGLE HOLE AND SHALL BE REINFORCED AS REQUIRED IN DETAIL
6. REINFORCING ANGLES NOT REQUIRED FOR SINGLE HOLES LESS THAN 6" IN DIAMETER THAT DO NOT CUT MORE THAN ONE WEB OF THE EXISTING DECK

E4 S.101.00 TYP CORED HOLE IN (E) SOD

NO SCALE

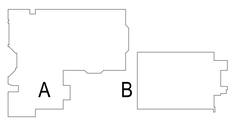
GENERAL STRUCTURAL NOTES

A. STRUCTURAL GENERAL NOTES APPLY TO ALL SHEETS.
B. SEE ARCHITECTURAL DRAWINGS FOR LAYOUT AND DIMENSIONS NOT SHOWN.
C. SEE CIVIL, LANDSCAPE, AND ARCHITECTURAL DRAWINGS FOR SIDEWALKS, PAVING AND SITE DETAILS NOT SHOWN ON STRUCTURAL DRAWINGS.
D. SEE ARCHITECTURAL DRAWINGS FOR FIREPROOFING & AESS REQUIREMENTS.
E. SEE ARCHITECTURAL DRAWINGS FOR MISCELLANEOUS STEEL NOT SHOWN ON STRUCTURAL DRAWINGS, INCLUDING BUT NOT LIMITED TO STEEL AT ROOF DRAINS, INSERTS, EMBEDDED ITEMS AND STEEL ASSOCIATED WITH ARCHITECTURAL DETAILS.
F. SR1.5 = 1-1/2" X 20 GAGE WIDE RIB ROOF DECK (GALV)

SHEET NOTES

1. NEW BEAM TO BE CONNECTED TO EXISTING CONCRETE ENCASED BEAM. REMOVE EXISTING CONCRETE ENCASEMENT AND ATTACH DIRECTLY TO EXISTING STEEL BEAM. SEE ARCH FOR FIREPROOFING REQUIREMENTS.
2. NEW POST TO BE CONNECTED TO NEW STEEL BEAM. REMOVE AND REPLACE EXISTING CONCRETE SLAB ON DECK. EXISTING SLAB ON DECK TO BE RESUPPORTED PER PROVIDED DETAIL.
3. BEAM TO BE CONTINUOUS OVER TOP OF POST.
4. MOMENT CONNECTION TO BE DESIGNED FOR PROVIDED LRFD MOMENT (DELEGATED DESIGN)
   - INDICATES BEAM TO COL MOMENT CONNECTION
   - INDICATES BEAM TO BEAM MOMENT CONNECTION
5. REINFORCE EXISTING BEAM WITH NEW WT4X6.5

KEY PLAN



DLRGROUP
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STATE OF NEW YORK
SHAWN P. CARR
087522-1
LICENSED PROFESSIONAL ENGINEER
01/23/25

Warning: It is a violation of the law for any person, unless acting under the direction of a licensed Design Professional, to alter an item in any way.

FIT LOBBY RENOVATION - BUILDING A & B

344 8TH AVENUE, NY, NY 10001 - BUILDING A
340-356 8TH AVENUE, NY, NY 10001 - BUILDING B

BIN: 1014250
BLK: 772
LOT: 001

ISSUE FOR ADDENDUM #3 - C1667

01.23.25

REVISIONS

#3 01/23/25

57-24140-02

LEVEL 01 STRUCTURAL PLANS

S.101.00

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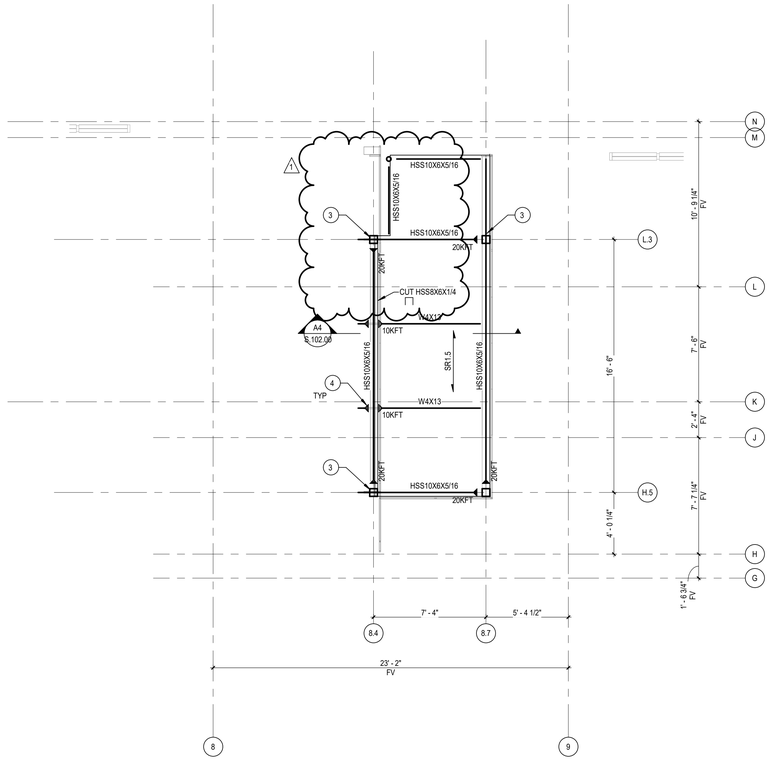
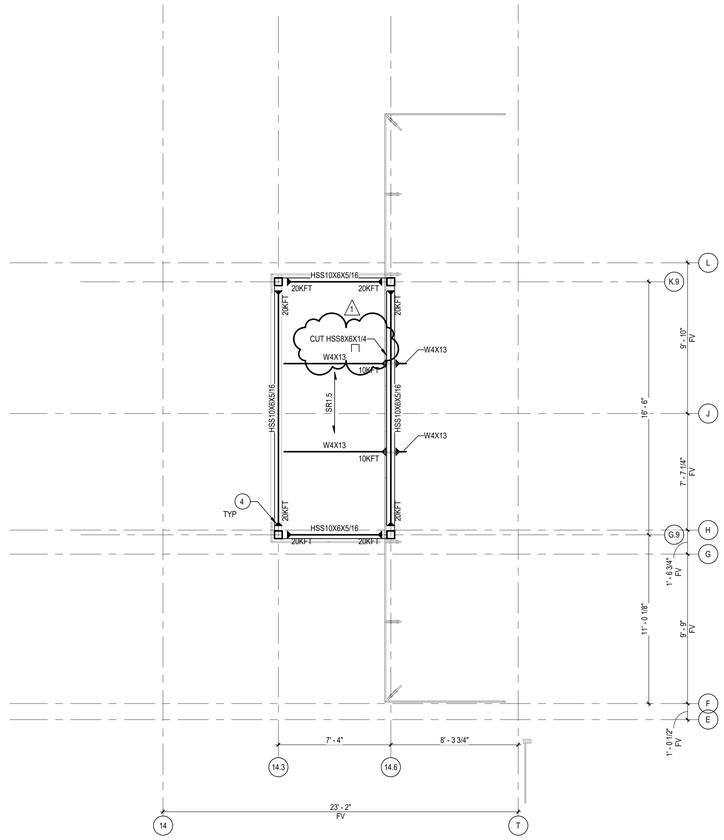


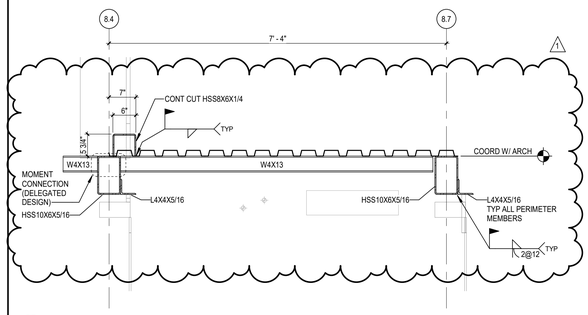
LEVEL 02 - AREA A

SCALE: 1/4" = 1'-0"



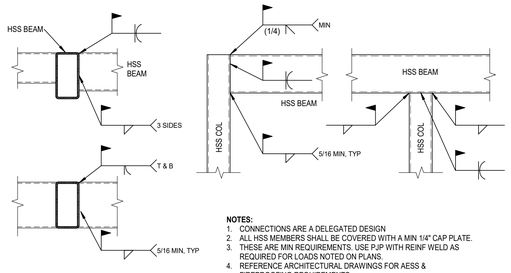
LEVEL 02 - AREA B

SCALE: 1/4" = 1'-0"



A4 S.102.00 SECTION

SCALE: 3/4" = 1'-0"



NOTES:

1. CONNECTIONS ARE A DELEGATED DESIGN
2. ALL HSS MEMBERS SHALL BE COVERED WITH A MIN 1/4" CAP PLATE.
3. THESE ARE MIN REQUIREMENTS. USE PJP WITH REINF WELD AS REQUIRED FOR LOADS NOTED ON PLANS.
4. REFERENCE ARCHITECTURAL DRAWINGS FOR AESS & FIREPROOFING REQUIREMENTS.

B4 S.102.00 TYP HSS CONNECTIONS

NO SCALE

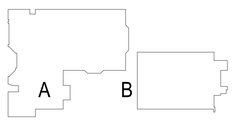
GENERAL STRUCTURAL NOTES

A. STRUCTURAL GENERAL NOTES APPLY TO ALL SHEETS.
B. SEE ARCHITECTURAL DRAWINGS FOR LAYOUT AND DIMENSIONS NOT SHOWN.
C. SEE CIVIL, LANDSCAPE, AND ARCHITECTURAL DRAWINGS FOR SIDEWALKS, PAVING AND SITE DETAILS NOT SHOWN ON STRUCTURAL DRAWINGS.
D. SEE ARCHITECTURAL DRAWINGS FOR FIREPROOFING & AESS REQUIREMENTS.
E. SEE ARCHITECTURAL DRAWINGS FOR MISCELLANEOUS STEEL NOT SHOWN ON STRUCTURAL DRAWINGS, INCLUDING BUT NOT LIMITED TO STEEL AT ROOF DRAINS, INSERTS, EMBEDDED ITEMS AND STEEL ASSOCIATED WITH ARCHITECTURAL DETAILS.
F. SR1.5 = 1-1/2" X 20 GAGE WIDE RIB ROOF DECK (GALV)

SHEET NOTES

1. NEW BEAM TO BE CONNECTED TO EXISTING CONCRETE ENCASED BEAM. REMOVE EXISTING CONCRETE ENCASEMENT AND ATTACH DIRECTLY TO EXISTING STEEL BEAM. SEE ARCH FOR FIREPROOFING REQUIREMENTS.
2. NEW POST TO BE CONNECTED TO NEW STEEL BEAM. REMOVE AND REPLACE EXISTING CONCRETE SLAB ON DECK. EXISTING SLAB ON DECK TO BE RESUPPORTED PER PROVIDED DETAIL.
3. BEAM TO BE CONTINUOUS OVER TOP OF POST.
4. MOMENT CONNECTION TO BE DESIGNED FOR PROVIDED LRFD MOMENT (DELEGATED DESIGN)
   - INDICATES BEAM TO COL MOMENT CONNECTION
   - INDICATES BEAM TO BEAM MOMENT CONNECTION
5. REINFORCE EXISTING BEAM WITH NEW WT4X6.5

KEY PLAN



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04.01.25

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FIT LOBBY RENOVATION - BUILDING A & B

344 8TH AVENUE, NY, NY 10001 - BUILDING A
340-356 8TH AVENUE, NY, NY 10001 - BUILDING B

BIN: 1014250
BK: 1772
LOT: 001

ISSUE FOR ADDENDUM #3 - C1667

01.23.25

REVISIONS

#3 01/23/25

57-24140-02

LEVEL 02 STRUCTURAL PLANS

S.102.00

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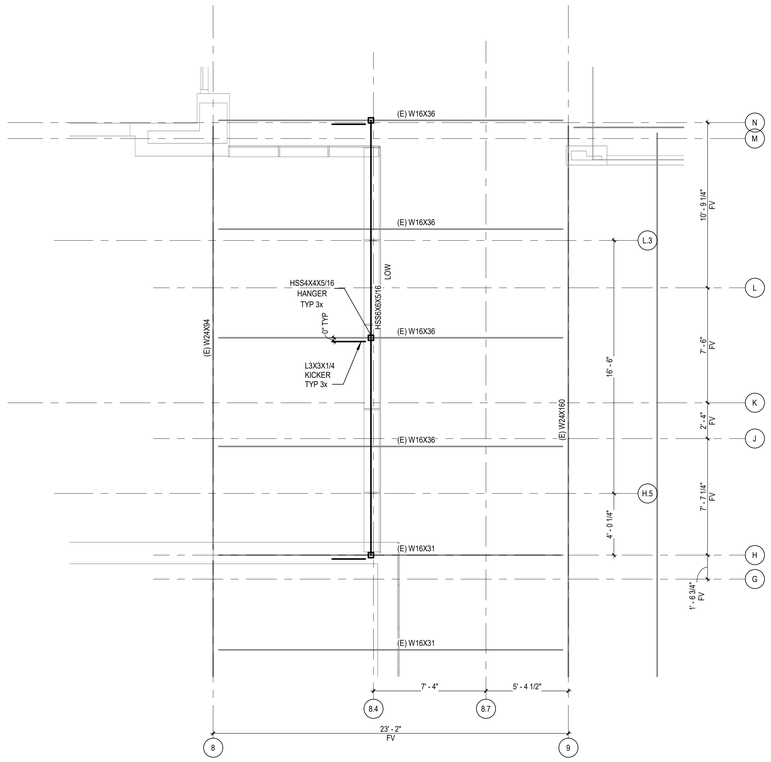
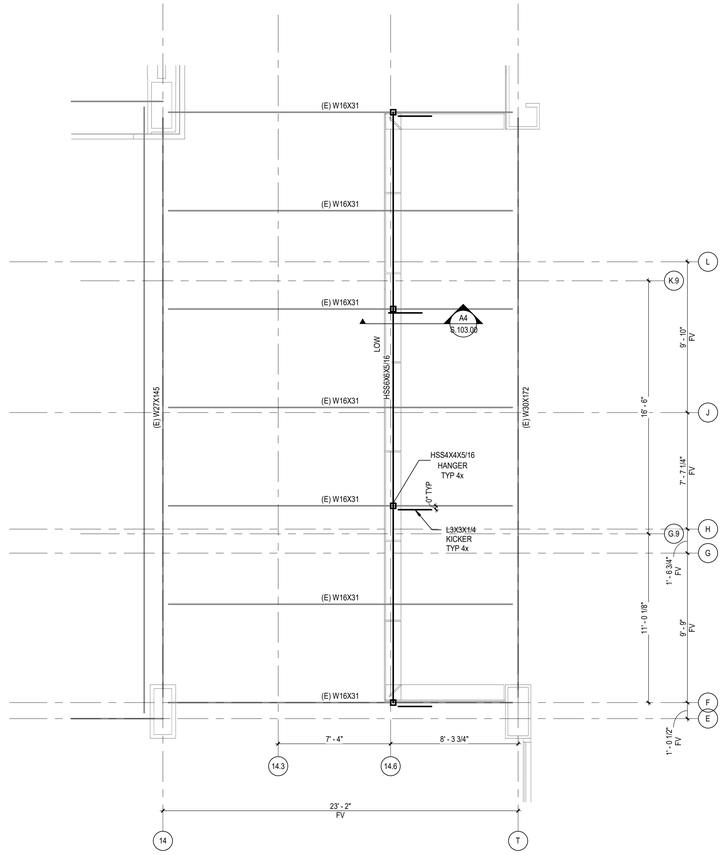


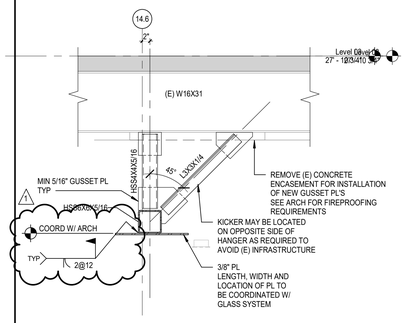
LEVEL 03 - AREA A

SCALE: 1/4" = 1'-0"



LEVEL 03 - AREA B

SCALE: 1/4" = 1'-0"



A4 S.103.00 SECTION

SCALE: 3/4" = 1'-0"

GENERAL STRUCTURAL NOTES

A. STRUCTURAL GENERAL NOTES APPLY TO ALL SHEETS.
B. SEE ARCHITECTURAL DRAWINGS FOR LAYOUT AND DIMENSIONS NOT SHOWN.
C. SEE CIVIL, LANDSCAPE, AND ARCHITECTURAL DRAWINGS FOR SIDEWALKS, PAVING AND SITE DETAILS NOT SHOWN ON STRUCTURAL DRAWINGS.
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F. SR1.5 = 1-1/2" X 20 GAGE WIDE RIB ROOF DECK (GALV)

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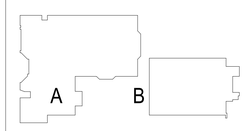

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340-356 8TH AVENUE, NY, NY 10001 - BUILDING B

BIN: 1014250
BLK: 777
LOT: 001

ISSUE FOR ADDENDUM #3 - C1667

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REVISIONS

#3 01/23/25

57-24140-02

LEVEL 03 STRUCTURAL PLANS

S.103.00

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GENERAL NOTES

1. REMOVE ALL UNUSED PIPING, DUCTWORK AND ACCESSORIES.
2. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING, PRIOR TO FINAL BID, ALL EXISTING CONDITIONS FOR PLUMBING AND MECHANICAL SYSTEMS WITHIN TENANT SPACE AND WITHIN CLOSE PROXIMITY OF TENANT SPACE.
3. THE MECHANICAL CONTRACTOR SHALL PERFORM SERVICE AND REPAIR ON THE EXISTING EQUIPMENT AND ITS ACCESSORIES AS FOLLOWS: CLEAN ALL COILS, REPLACE THE FILTERS AND BELTS, INSPECT, REPAIR, OR REPLACE THE ECONOMIZERS, DRIVES AND FAN BEARINGS, MOTORS, CONTROL COMPONENTS, VALVES AND ANY OTHER ITEM NECESSARY FOR A COMPLETE AND PROPER OPERATING SYSTEM. THIS CONTRACTOR SHALL ALSO VISIT THE SITE, PRIOR TO FINAL BIDDING, AND VERIFY ALL EXISTING SITE CONDITIONS. PROVIDE ALL MATERIAL AND COMPONENTS AS NEEDED TO BRING THE UNITS TO FULL COMPLIANCE OF THE LANDLORD'S CRITERIA AND LOCAL AUTHORITY HAVING JURISDICTION.
4. WHERE FLOOR DRAINS OCCUR WITHIN THE LIMITS OF CONSTRUCTION, PREVENT CONSTRUCTION DEBRIS FROM ENTERING DRAIN BODY BY SEALING DRAIN OPENING PRIOR TO START OF WORK. UNSEAL DRAINS AT COMPLETION OF CONSTRUCTION.
5. COORDINATE INSTALLATION OF PIPING, DUCTWORK, CONDUIT, LIGHTS, CABLE TRAY, STRUCTURE, AND EQUIPMENT TO PREVENT CONFLICTS.
6. THE CONTRACTOR SHALL BE FAMILIAR WITH ALL THE CONDITIONS BOTH EXISTING AND THOSE ILLUSTRATED BY THESE DOCUMENTS AS WELL AS THOSE WHICH CAN BE REASONABLY ANTICIPATED INCLUDING, BUT NOT LIMITED TO ARCHITECTURAL, ELECTRICAL, VENTILATION, PLUMBING, AND OTHER SYSTEMS INVOLVED ON THIS PROJECT.
7. FINAL PRODUCT SHALL BE A COMPLETE AND FUNCTIONING SYSTEM, AND SHALL CONFORM TO ALL REQUIREMENTS OF APPLICABLE FEDERAL, STATE, AND LOCAL CODES, INCLUDING BUT NOT LIMITED TO THE INTERNATIONAL BUILDING CODE AND INTERNATIONAL MECHANICAL CODE.
8. LOCATE EQUIPMENT REQUIRING ACCESS 2'-0" MAXIMUM ABOVE CEILING.
9. ALL ROOF MOUNTED EQUIPMENT SHALL BE A MINIMUM 10'-0" FROM EDGE OF ROOF.
10. LOCATE DUCTWORK, PIPING AND MECHANICAL EQUIPMENT AWAY FROM THE SPACE ABOVE ELECTRICAL PANELS. TRANSFORMERS AND OTHER ELECTRICAL EQUIPMENT.
11. FIRE SEAL AROUND DUCT AND PIPING PENETRATIONS OF FIRE RATED WALLS. REFER TO SPECIFICATION.
12. PROVIDE SLEEVES AND/OR OPENINGS TO RUN PIPES AND DUCTS THROUGH FOUNDATIONS, FLOORS, WALLS, AND ROOF.
13. ADJUST PIPING AND DUCTWORK SIZES TO PROPERLY CONNECT TO MECHANICAL EQUIPMENT.
14. REFER TO PLUMBING SERIES DRAWINGS FOR GAS AND A.C. CONDENSATE DRAIN PIPING.
15. PIPE SIZES SHOWN SHALL BE CONTINUED IN THE DIRECTION OF FLOW UNTIL ANOTHER SIZE IS SHOWN.
16. FOR DETAILS, EQUIPMENT CONNECTIONS, AND PIPE SIZES NOT SHOWN ON THE SEGMENTS, REFER TO DETAILS, SCHEDULES, AND SPECIFICATIONS.
17. INSTALL ALL EQUIPMENT IN ACCORDANCE WITH THE RESPECTIVE MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS, AT A LEVEL OF QUALITY AND WORKMANSHIP CONSISTENT WITH THE SPECIFICATIONS.
18. LOCATIONS OF PIPING, DUCTWORK AND EQUIPMENT AS INDICATED ON THE DRAWING, ARE APPROXIMATE AND SUBJECT TO MINOR ADJUSTMENTS IN THE FIELD. WORK SHALL BE COORDINATED WITH ALL OTHER TRADES TO AVOID INTERFERENCE IN THE FIELD.
19. INSTALL EXPOSED PIPING AND DUCTWORK AS HIGH AS PRACTICAL IN ROOMS WITHOUT CEILINGS.

GENERAL HVAC NOTES

1. SUPPLY AND RETURN PIPING TO COILS ARE THE SAME SIZE.
2. CONTRACTOR SHALL LOCATE THERMOSTATS AND TEMPERATURE SENSORS AT 48" AFF MAX, A MINIMUM OF 8" FROM LIGHT SWITCH.
3. REFER TO PIPING DRAWINGS FOR THERMOSTAT AND TEMPERATURE SENSOR LOCATIONS.
4. CONDENSATE DRAINS SHALL BE SUPPLIED FOR ALL COOLING EQUIPMENT. CONTRACTOR SHALL ENSURE PROPER INSTALLATION AND DRAINAGE AS REQUIRED BY FEDERAL, STATE, AND LOCAL CODES. CONDENSATE PIPING SHALL BE TYPE "L" COPPER.
5. PROVIDE A 4" HOUSEKEEPING PAD FOR EACH PIECE OF MECHANICAL EQUIPMENT. COORDINATE SIZES WITH MECHANICAL EQUIPMENT SELECTED.
6. ALL SUPPLY, RETURN, AND EXHAUST DUCTWORK SHALL BE RATED FOR PRESSURE CLASS OF 2" W.G. UNLESS NOTED OTHERWISE.
7. THIS CONTRACTOR SHALL BE REQUIRED TO REPLACE FILTERS ON HVAC EQUIPMENT AFTER ALL DUST PRODUCING CONSTRUCTION HAS BEEN COMPLETED AND PRIOR TO THE FINAL PUNCH.

SHEET INDEX

M.000.10 MECHANICAL GENERAL NOTES & SYMBOLS
M.000.20 MECHANICAL ABBREVIATIONS

MD.100.00 LEVEL 00 - HVAC DEMOLITION PLAN - PHASE I
MD.101.00 LEVEL 01 - HVAC DEMOLITION PLAN - PHASE I
MD.102.00 LEVEL 02 - HVAC DEMOLITION PLAN - PHASE I
MD.102.01 LEVEL 02 - HVAC DEMOLITION PLAN - PHASE II

M.100.00 LEVEL 00 - OVERALL HVAC PLAN - PHASE I
M.101.00 LEVEL 01 - OVERALL HVAC PLAN - PHASE I
M.101.10 LEVEL 01 - AREA A/B - HVAC PLAN - PHASE I
M.102.21 LEVEL 02 - OVERALL HVAC PLAN - PHASE I
M.102.22 LEVEL 02 - AREA A/B - HVAC PLAN - PHASE I
M.102.23 LEVEL 02 - OVERALL HVAC PLAN - PHASE II
M.102.24 LEVEL 02 - AREA A/B - HVAC PLAN - PHASE II

M.700.00 MECHANICAL DETAILS AND SCHEDULES

GENERAL SYMBOLS

	POINT OF DISCONNECT - DEMOLITION REMOVED FROM EXISTING
	POINT OF CONNECTION - NEW CONNECTS TO EXISTING
	AREA NOT IN CONTRACT

PIPING ANNOTATIONS

SCHEMATIC	3D	DESCRIPTION
		EXISTING TO REMAIN - (E) or EXIST
		ITEM TO BE DEMOLISHED - (D) or DEMO
18" CHWS	18" CHWS	PIPE SIZE TAG (DIAMETER WITH SYSTEM NAME)
		ABOVE GROUND PIPING
		BELOW GROUND PIPING
1/8" / 12" SLOPE	1/8" / 12" SLOPE	PIPE SLOPE
IE: -93' - 1"	IE: -93' - 8"	PIPE INVERT ELEVATION
DDC-xx		MECHANICAL EQUIPMENT TAG
		MECHANICAL EQUIPMENT CLEARANCE

PIPING VALVES AND FITTINGS

SCHEMATIC	3D	DESCRIPTION
		PIPE DROP
		PIPE RISE
		PIPE TEE DOWN
		PIPE TEE UP
		CONCENTRIC REDUCER
		ECCENTRIC REDUCER
		PIPE CAP
		PIPE ALIGNMENT GUIDE
		PIPE ANCHOR
		FLOW DIRECTION
		EXPANSION JOINT
		FLEXIBLE CONNECTION
		UNION
		DIRECTION OF PIPE PITCH
		AQUASTAT
		EXPANSION LOOP
		BALANCING VALVE
		BALANCING VALVE W/ METERING POINTS
		BALL VALVE
		BUTTERFLY VALVE
		CHECK VALVE
		STEAM TRAP
		GATE VALVE
		CIRCUIT SETTER
		MANUAL AIR VENT
		AUTOMATIC AIR VENT
		PLUG VALVE
		PRESSURE GAUGE
		SOLENOID VALVE
		ANGLE VALVE
		AUTOMATIC CONTROL VALVE 2-WAY
		AUTOMATIC CONTROL VALVE 3-WAY
		AUTOMATIC FLOW CONTROL VALVE
		STRAINER
		PRESSURE AND TEMPERATURE TEST PORT
		THERMOMETER
		PRESSURE REDUCING VALVE (WATER SYSTEMS) PRESSURE REGULATING VALVE (GAS SYSTEMS)
		RELIEF VALVE
		FLOW MEASURING DEVICE
		BACKFLOW PREVENTER
		UNION

*** 3D VALVE REPRESENTATION IS AN EXAMPLE. VALVE IN MODEL MAY VARY DEPENDING ON APPLICATIONS. SEE SPECIFICATIONS.

HVAC SYMBOLS

SCHEMATIC	3D	DESCRIPTION
		DIFFUSER (SUPPLY)
		GRILLE (RETURN)
		GRILLE (EXHAUST)
		WALL REGISTER
		LINEAR DIFFUSER (SLOT)
AFMS	AFMS	AIR FLOW MEASURING STATION
D	D	DUCT DETECTOR
H	H	DUCT MOUNTED HUMIDISTAT
BDD	BDD	BACKDRAFT DAMPER
SB	SB	SECURITY BARS
VD	VD	VOLUME DAMPER
FS	FS	COMBINATION FIRE / SMOKE DAMPER
F	F	FIRE DAMPER
S	S	SMOKE DAMPER
MBD	MBD	MOTORIZED BACKDRAFT DAMPER
M	M	MOTORIZED DAMPER
		ROUND DUCT UP
		RECTANGULAR DUCT UP
		OVAL DUCT UP
		ROUND DUCT DOWN
		RECTANGULAR DUCT DOWN
		OVAL DUCT DOWN
		MITERED ELBOW WITH VANES
		MITERED ELBOW WITHOUT VANES
		RADIUSED ELBOW
		TEE WITH VANES
		RADIUSED TEE
		DUCT WITH INSULATION
		DUCT WITH LINING
		DUCT IS FABRIC
		FLEXIBLE DUCT
		TRANSFER DUCT
2		DUCT SMOKE DETECTOR
		SUPPLY ARROW RETURN ARROW EXHAUST ARROW
DC 100		DOOR UNDERCUT ARROW WITH CFM
D-1 12"x12" 200 CFM		DIFFUSER, REGISTER OR GRILLE TAG NECK SIZE (00"x00" - SQ / RECT) (0"ø ROUND) AIR FLOW (CUBIC FEET PER MINUTE)
24"x12"		TYPICAL DUCT - SIZE AS INDICATED (WIDTH x DEPTH) SIZE INDICATED FREE AREA
	DDC-xx	MECHANICAL EQUIPMENT TAG MECHANICAL EQUIPMENT CLEARANCE
CO2		CARBON DIOXIDE SENSOR - WALL MOUNTED
CO		CARBON MONOXIDE SENSOR - WALL MOUNTED
SP		STATIC PRESSURE SENSOR - WALL MOUNTED
SP		STATIC PRESSURE SENSOR - CEILING MOUNTED
H		HUMIDISTAT - WALL MOUNTED
H		HUMIDISTAT - CEILING MOUNTED
NO2		NITROGEN DIOXIDE SENSOR - WALL MOUNTED
P		PRESSURE SENSOR - WALL MOUNTED
P		PRESSURE SENSOR - CEILING MOUNTED
T		TEMPERATURE SENSOR - WALL MOUNTED
T		TEMPERATURE SENSOR - CEILING MOUNTED
T		THERMOSTAT - WALL MOUNTED

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STATE OF NEW YORK
DAVID STEPHEN TEGAY
106719
LICENSED PROFESSIONAL ENGINEER

FIT TURNSTILES - BUILDING A & B
344 8TH AVENUE, NY, NY 10001 - BUILDING A 340-356 8TH AVENUE, NY, NY 10001 - BUILDING B

BIN: 1014250
BLK: 777
LOT: 001

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MECHANICAL GENERAL NOTES & SYMBOLS

M.000.10

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ABBREVIATIONS

#	NUMBER
&	AND
(D)	DEMOLISHED
(E)	EXISTING
(R)	RELOCATED
@	AT
°C	DEGREES CELSIUS
°F	DEGREES FAHRENHEIT
Ø	PHASE
Ø	DIAMETER
A	COMPRESSED AIR
A	AMPERE
A	AMP
A/C	AIR CONDITIONING(ER)
A/E	ARCHITECT/ENGINEER
AABC	ASSOCIATED AIR BALANCE COUNCIL
AAP	ALARM ANNUNCIATOR PANEL
AAP	AREA ALARM PANEL
AAV	AUTOMATIC AIR VENT
AAV	AIR ADMITTANCE VALVE
AB	ANCHOR BOLT
ABS	ACRYLONITRILE-BUTADIENE-STYRENE
AC	ALTERNATING CURRENT
AC	ACOUSTIC CEILING
ACC	AIR COOLED CONDENSER
ACC	ACCESSIBLE
ACCU	AIR COOLED CONDENSING UNIT
ACM	ALUMINUM COMPOSITE MATERIAL
ACST	ACOUSTIC
AD	AREA DRAIN
AD	ACCESS DOOR
ADDN	ADDITION OR ADDITIONAL
ADJ	ADJUSTABLE
ADJT	ADJACENT, ADJOINING
ADMIN	ADMINISTRATION
ADO	AUTOMATIC DOOR OPENER
AF	AIR FILTER
AFC	ABOVE FINISHED COUNTER
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AGF	AIR GAP FITTING
AHJ	AUTHORITY HAVING JURISDICTION
AHRI	AIR-CONDITIONING HEATING AND REFRIGERATION INSTITUTE
AHU	AIR HANDLING UNIT
AI	AREA INLET
AI	ANALOG INPUT
ALT	ALTERNATE
ALUM	ALUMINUM
AMB	AMBIENT
AMBA	AMERICAN BOILER MANUFACTURERS ASSOCIATION
AMP	AMPERE
ANCH	ANCHOR
AP	ACCESS PANEL
APC	ACOUSTIC PANEL CEILING
APPROX	APPROXIMATE
AR	ACID RESISTING
AR	ARGON
ARCH	ARCHITECTURAL
AS	AIR SEPARATOR
ASB	ASBESTOS
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASHRAE	AMERICAN SOCIETY OF HEATING REFRIGERATION AND AIR CONDITIONING ENGINEERS
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASPH	ASPHALT
AUTO	AUTOMATIC
AV	AUDIO-VIDEO, AUDIO-VISUAL
AV	ACID VENT
AV	AIR VENT
AVG	AVERAGE
AW	ACID WASTE
AWG	AMERICAN WIRE GAUGE
AWP	ACOUSTIC WALL PANEL
B	BOILER
B to B	BACK TO BACK
BAS	BUILDING AUTOMATION SYSTEM
BAT	BATTERY
BBO	BOILER BLOW OFF
BC	BALANCING COCK
BC	BARE COPPER
BCMU	BURNISHED CONCRETE MASONRY UNIT
BD	BOARD
BDD	BACK DRAFT DAMPER
BET	BETWEEN
BF	BOILER FEED
BFF	BELOW FINISH FLOOR
BFP	BACKFLOW PREVENTER
BFR	BELOW FLOOR
BFV	BUTTERFLY VALVE
BHP	BREAK HORSEPOWER
BI	BACKWARD INCLINED (FAN IMPELLER/WHEEL)
BKR	BREAKER
BL	BUILDING LINE
BLDG	BUILDING
BLK	BLOCK
BLKG	BLOCKING
BLKHD	BULKHEAD
BM	BENCH MARK
BM(S)	BEAM(S)
BMS	BUILDING MANAGEMENT SYSTEM
BOD	BOTTOM OF DUCT
BOF	BOTTOM OF FOOTING
BOP	BOTTOM OF PIPE
BOT	BOTTOM
BPIP	BOILER PLANT INSTRUMENTATION PANEL
BRDG	BRIDGING
BRG	BEARING
BRKT	BRACKET
BSMT	BASEMENT
BT	BATHTUB
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
BUR	BUILT UP ROOFING
BV	BALL VALVE
C	CONDUIT
C	CONDENSER WATER
CA	COMBUSTION AIR
CANT	CANTILEVER
CAP	CAPACITY
CAS	CASING
CBD	COUNTER-BALANCED DAMPER
CBD	CHALKBOARD
CC	COOLING COIL
CCR	CONTROL CONTRACTOR
CCTV	CLOSED CIRCUIT TELEVISION
CD	CONDENSATE DRAIN
CD	CEILING DIFFUSER
CD	CONSTRUCTION DOCUMENTS
CDA	CLEAN DRY AIR (COMPRESSED AIR)
CDF	COMBINATION DRINKING FOUNTAIN & BOTTLE FILLING STATION
CE	COVER ELEVATION
CEM	CEMENT
CENT	CENTRIFUGAL
CER	CERAMIC
CF	CUBIC FEET
CFCI	CONTRACTOR FURNISHED CONTRACTOR INSTALLED
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CG	CORNER GUARD
CH	CHILLER
CH	CHANNEL
CHWP	CHILLED WATER PUMP
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CI	CAST IRON
CI	CURB INLET
CIP	CAST IN PLACE
CIP	CAST IRON PIPE
CIRC	CIRCULATING
CJ	CONTROL JOINT
CJ	CONSTRUCTION JOINT
CJA	CONTROL JOINT ABOVE
CKT	CIRCUIT
CKT BK	CIRCUIT BREAKER
CL	CENTER LINE
CL	CIRCUIT LINE
CLG	CEILING
CLOS	CLOSET
CLR	CLEAR
CM	CEILING MOUNTED
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CO	CLEAN OUT
CO	CARBON MONOXIDE
CO	CONDUIT ONLY
CO2	CARBON DIOXIDE
COL	COLUMN
COMB	COMBINATION
COMM	COMMUNICATIONS
COMP	COMPRESSOR UNIT
COMP	COMPOSITE
COMPR	COMPRESSIBLE
CONC	CONCRETE
COND	CONDENSATE
CONF	CONFERENCE
CONFIG	CONFIGURATION
CONN(S)	CONNECTION(S)
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACT(OR)
CONV	CONVECTOR
COOR	COORDINATE
COORD	COORDINATE
CP	CONDENSATE PUMP
CP	COVER PLATE
CPS	CYCLES PER SECOND
CPT	CARPET
CPVC	CHLORINATED POLYVINYL CHLORIDE
CR	CORROSION RESISTANT
CRAC	COMPUTER ROOM AIR CONDITIONING UNIT
CS	COUNTERSINK
CS	COMBINATION SEWER
CS	CARBON STEEL
CSK	COUNTERSUNK
CSMU	CALCIUM SILICATE MASONRY UNIT
CSP	COMBINATION STANDPIPE
CSWK	CASEWORK
CT	COOLING TOWER
CT	CERAMIC TILE
CT	CURRENT TRANSFORMER
CTL	CONTROL
CTR	CENTER
CU	COPPER
CU	CONDENSING UNIT
CU	CUBIC
CU	COMBINATION UNIT
CUH	CABINET UNIT HEATER
CW	COLD WATER
CWP	CONDENSER WATER PUMP
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY
CWV	COMBINATION WASTE AND VENT
CY	CUBIC YARD
CYL	CYLINDER
D	DRAIN
D	DIFFUSER
D	DEPTH
D	DATA
d	PENNY (NAIL 10D)
DB	DECIBEL
DB	DRY BULB
DBA	DECIBELS A
DBL	DOUBLE
DC	DIRECT CURRENT
DC	DUST COLLECTOR
DCJ	DUMMY CONTROL JOINT
DDC	DIRECT DIGITAL CONTROL
DEG	DEGREE
DEMO	DEMOLISH OR DEMOLITION
DEPR	DEPRESS(ION)(ED)
DEPT	DEPARTMENT
DET	DETAIL
DET	DETENTION
DF	DRINKING FOUNTAIN
DFR	DIESEL FUEL RETURN
DFS	DIESEL FUEL SUPPLY
DFU	DRAINAGE FIXTURE UNIT
DFV	DIESEL FUEL VENT
DG	DOOR GRILLE
DH	DUCT HEATER
DHU	DEHUMIDIFICATION UNIT
DI	DEIONIZED WATER
DI	DUCTILE IRON
DIA	DIAMETER
DIAG	DIAGONAL
DIC	DISCHARGE
DIFF	DIFFUSER
DIM	DIMENSION
DISC	DISCONNECT
DISC SW	DISCONNECT SWITCH
DISCH	DISCHARGE
DISTR	DISTRIBUTION
DIV	SPECIFICATION DIVISION
DL	DRUM LOUVER
DL	DEAD LOAD
DM	DAMPER MOTOR
DMPR	DAMPER
DN	DOWN
DO or "	DITTO
DOAS	DEDICATED OUTDOOR AIR SYSTEM UNIT
DOE	DEPARTMENT OF ENERGY
DP	DIFFERENTIAL PRESSURE
DPFG	DAMPROFFING
DPI	DIFFERENTIAL PRESSURE INDICATOR
DPS	DIFFERENTIAL PRESSURE SWITCH
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
DR	DOOR
DR	DRAIN
DS	DISTILLED WATER
DS	DOWNSPOUT
DSN	DOWNSPOUT NOZZLE
DSP	DRY STANDPIPE
DSPR	DRY SPRINKLER PIPING
DSPR	DRY SPRINKLER PIPE
DSTB	DISTRIBUTED
DTL	DETAIL
DTR	DUCT THRU ROOF
DW	DISHWASHER
DWBP	DOMESTIC WATER BOOSTER PUMP
DWDI	DOUBLE WIDTH DOUBLE INLET
DWG(S)	DRAWING(S)
DWL(S)	DOWEL(S)
DWR	DRAWER
DWRP	DOMESTIC WATER RECIRCULATING PUMP
DX	DIRECT EXPANSION
DXS	DOUBLE EXTRA STRONG
E	EAST
EA	EACH
EA	EXHAUST AIR
EA	EACH FACE
EAT	ENTERING AIR TEMPERATURE
EB	ELECTRIC BASEBOARD RADIATION
EB	EXPANSION BOLT
EBH	ELECTRIC BASIN HEATER
EC	ELECTRICAL CONTRACTOR
ECON	ECONOMIZER
ECS	EMERGENCY COMMUNICATION SYSTEM
EDH	ELECTRIC DUCT HEATER
EE	EACH END
EER	ENERGY EFFICIENCY RATIO
EEW	EMERGENCY EYE WASH
EEWS	EMERGENCY EYE WASH SHOWER
EF	EXHAUST FAN
EF	EACH FACE
EFF	EFFICIENCY
EG	EXHAUST AIR GRILLE
EH	ELECTRICAL HEATER
EIFS	EXTEROR INSULATION AND FINISH SYSTEM
EJ	EXPANSION JOINT
EL	ELEVATION
ELAS	ELASTOMERIC
ELEC	ELECTRICAL(AL)
ELEV	ELEVATOR
EMCS	ENERGY MANAGEMENT CONTROL SYSTEM
EMD	ESTIMATED MAXIMUM DEMAND
EMER	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
EMV	EMERGENCY MIXING VALVE
ENCL	ENCLOSURE
ENT	ENTERING
ENTR	ENTRANCE
EOMD	END OF MAIN DRIP
EP	ELECTRO-PNEUMATIC
EP	EXPLOSION PROOF
EPO	EMERGENCY POWER OFF
EQ	EQUAL
EQUIP	EQUIPMENT
EQUIV	EQUIVALENT
ER	EXISTING (TO BE) RELOCATED
ER	EXHAUST REGISTER
ERA	ENERGY RECOVERY AIR
ERF	EPOXY RESIN FLOORING
ES	EMERGENCY SHOWER
ES	EXTRA STRONG
ESP	EXTERNAL STATIC PRESSURE
EST	ESTIMATE
ET	EXPANSION TANK
EW	EACH WAY
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EWT	ENTERING WATER TEMPERATURE
EXC	EXCAVATE
EXH	EXHAUST
EXIST	EXISTING
EXP	EXPANSION
EXP	EXPOSED
EXPL	EXPLOSION
EXT	EXTERIOR
F	FAHRENHEIT
F	FIRELINE
F	FURNACE
F	FACE
F	FIRE SERVICE
FA	FIRE ALARM
FA	FACE
FA	FRESH AIR
FAA	FIRE ALARM ANNUNCIATOR
FAB	FABRICATE(D)
FACP	FIRE ALARM CONTROL PANEL
FB	FACE BRICK
FC	FLUID COOLER
FCMU	FLUTED CONCRETE MASONRY UNIT
FCO	FLOOR CLEAN OUT
FCU	FAN COIL UNIT
FCV	FLOW CONTROL VALVE
FCW	FILTERED COLD WATER
FD	FLOOR DRAIN
FD	FIRE DAMPER
FDC	FIRE DEPARTMENT CONNECTION
FDN	FOUNDATION
FDNDR	FOUNDATION DRAIN
FDR	FEEDER
FDV	FIRE DEPARTMENT VALVE
FDVC	FIRE DEPARTMENT VALVE CABINET
FE	FIRE EXTINGUISHER
FEA	FUME HOOD EXHAUST AIR
FEC	FIRE EXTINGUISHER CABINET
FF	FINISH FLOOR
FH	FIRE HYDRANT
FH	FILTER HOUSING
FHC	FIRE HOSE CABINET
FIG	FIGURE
FIN	FINISHED
FIX	FIXTURE
FL	FLOOR
FLA	FULL LOAD AMPS
FLASH	FLASHING
FLEX	FLEXIBLE
FLG	FLANGE
FLG	FLOORING
FLM	FULL LENGTH MIRROR
FLUOR	FLUORESCENT
FM	FIRE MAIN
FM	FORCE MAIN
FM	FACTORY MUTUAL
FMCS	FACILITIES MANAGMENT CONTROL SYSTEM
FME	FLOW MEASURING EQUIPMENT
FNPT	FEMALE NPT
FO	FINISH OPENING
FO	FACE OF
FOC	FACE OF CONCRETE
FOF	FUEL OIL FILL
FOF	FACE OF FINISH
FOM	FACE OF MASONRY
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FOS	FACE OF STUD
FOV	FUEL OIL VENT
FOW	FACE OF WALL
FP	FIRE PUMP
FP	FIREPROOFING
FPB	FAN POWERED VAV TERMINAL
FPD	FIRE PUMP DISCHARGE
FPI	FINS PER INCH
FPM	FEET PER MINUTE
FR	FIRE RESISTANT
FR	FIRE RESISTIVE
FR	FRAME
FRP	FIBERGLASS REINFORCED PANEL
FS	FLOW SWITCH
FS	FLOOR SINK
FSD	FIRE SMOKE DAMPER
FSEC	FOOD SERVICE EQUIPMENT CONTRACTOR
FT	FEET
FT	FIN TUBE
FT	FLOW TRANSMITTER
FTG	FOOTING
FURN	FURNISH(ED)
FUT	FUTURE
FV	FIELD VERIFY
FV	FACE VELOCITY
FVC	FIRE VALVE CABINET
FWC	FABRIC WALL COVERING
G	GRILLE
G	NATURAL GAS
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GB	GRAD BAR
GC	GENERAL CONTRACTOR
GCMU	GLAZED CONCRETE MASONRY UNIT
GCO	GRADE CLEAN OUT
GD	GARBAGE DISPOSAL
GEA	GREASE EXHAUST AIR
GEN	GENERATOR
GEN	GENERAL
GFA	GROSS FLOOR AREA
GFCMU	GROUND-FACE CONCRETE MASONRY UNIT
GFI, GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFRC	GLASS FIBER REINFORCED CONCRETE
GHR	GLYCOL-WATER HEATING RETURN
GHS	GLYCOL-WATER HEATING SUPPLY
GI	GALVANIZED IRON
GL	GLUE LAMINATED
GL	GLASS
GMU	GLASS MASONRY UNIT
GND	GROUND
GOVT	GOVERNMENT
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GR	GUARD RAIL
GR	GRADE
GR	GRILLE
GRC	GLASS REINFORCED CONCRETE
GRC	GALVANIZED RIGID CONDUIT
GRC	GLASS REINFORCED CONCRETE
GRD	GRILLES, REGISTERS AND DIFFUSERS
GRGP	GLASS REINFORCED GYPSUM PLASTER
GRS	GALVANIZED RIGID STEEL
GRV	GRAVITY VENTILATOR
GS	GASOLINE
GV	GATE VALVE
GV	GREASE VENT
GVBF	GREASE VENT BELOW FLOOR
GW	GREASE WASTE
GWB	GYPSUM WALL BOARD
GWR	GEOTHERMAL WATER RETURN
GWS	GEOTHERMAL WATER SUPPLY
GYP	GYPSUM
H	HEIGHT
H1E	HOOK ONE END
H2	HYDROGEN
HB	HOSE BIB
HC	HEATING COIL
HC	HOLLOW CORE
HC	HANDICAP
HCB	HANDICAP BENCH
HCR	HOT/CHILLED WATER RETURN
HCS	HOT/CHILLED WATER SUPPLY
HCW	HARD COLD WATER
HD	HAND DRYER
HDBD	HARDBOARD
HDCP	HANDICAP
HDR	HEADER
HDWD	HARDWOOD
HDWR	HARDWARE
HE	HELIUM
HEV	HOSE END VALVE
HGR	HANGER
HID	HIGH INTENSITY DISCHARGE
HM	HOLLOW METAL
HOA	HAND-OFF-AUTOMATIC
HORIZ	HORIZONTAL
HP	HORSE POWER
HP	HEAT PUMP
HP	HIGH PRESSURE
HPC	HIGH PRESSURE STEAM CONDENSATE
HPNG	HIGH PRESSURE NATURAL GAS
HPR	HIGH PRESSURE STEAM RETURN
HPS	HIGH PRESSURE STEAM SUPPLY
HPS	HIGH PRESSURE SODIUM
HR	HOUR
HRO	HOT REVERSE OSMOSIS
HROC	HOT REVERSE OSMOSIS RECIRCULATION
HRWR	HEAT RECOVERY WATER RETURN
HRWS	HEAT RECOVERY WATER SUPPLY
HS	HEADSTUD
HSPF	HEAT SEASONAL PERFORMANCE FACTOR
HSTR	HIGH STRENGTH
HT	HEIGHT
HTG	HEATING
HTR	HEATER
HTWR	HIGH TEMPERATURE HOT WATER RETURN
HTWS	HIGH TEMPERATURE HOT WATER SUPPLY
HUM	HUMIDIFIER
HV	HEATING VENTILATING UNIT
HVAC	HEATING VENTILATING AND AIR CONDITIONING
HW	DOMESTIC HOT WATER
HWC	DOMESTIC HOT WATER RECIRCULATING
HWR	HEATING WATER RETURN
HWS	HEATING WATER SUPPLY
HX	HEAT EXCHANGER
HZ	HERTZ (FREQUENCY)
i.e.	THAT IS
IAQ	INDOOR AIR QUALITY
IAW	IN ACCORDANCE WITH
IB	INFRARED BURNER
IBC	INTERNATIONAL BUILDING CODE
IC	INTERCOM
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IECC	INTERNATIONAL ENERGY CONSERVATION CODE
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
IES	ILLUMINATING ENGINEERING SOCIETY
IF	INSIDE FACE
IG	ISOLATED GROUND
IH	INTAKE HOOD
IJ	ISOLATION JOINT
IJS	IN JOIST SPACE
IMC	INTERNATIONAL MECHANICAL CODE
IMC	INTERMEDIATE METAL CONDUIT
IN	INCH
IN HG	INCHES OF MERCURY (PRESSURE)
IN WC	INCHES OF WATER COLUMN (PRESSURE)
INC	INCLUDE(ING)
INSUL	INSULATION
INT	INTERIOR
IP	IRON PIPE
IPC	INTERNATIONAL PLUMBING CODE
IPS	IRON PIPE SIZE
IW	INDIRECT WASTE
JAN	JANITOR
JB	JUNCTION BOX
JCT	JUNCTION
JFB	JOINT FILLER BOARD
JST	JOIST
JT	JOINT
KCJ	KEYED CONSTRUCTION JOINT
KCP	KEENE'S CEMENT PLASTER
KD	KNOCKDOWN
KH	KITCHEN HOOD
KHE	KITCHEN HOOD EXHAUST FAN
KHS	KITCHEN HOOD SUPPLY FAN
KIT	KITCHEN
KO	KNOCKOUT
KS	KITCHEN SINK
KV	KILOVOLT
KVA	KILOVOLT AMPERES
KVAR	KILOVOLT AMPERES REACTIVE
KW	KILOWATT
KWH	KILOWATT HOUR
L	ANGLE
LA	LABRATORY COMPRESSED AIR
LAB	LABORATORY
LAM	LAMINATED
LAT	LEAVING AIR TEMPERATURE
LAV	LAVATORY
LB(S)	POUND(S)
LBR	LUMBER
LDG	LOADING
LF	LINEAR FOOT
LG	LENGTH (LONG)
LIN	LINEAR
LINO	LINOLEUM
LKR	LOCKER
LL	LIVE LOAD
LLH	LONG LENGTH HORIZONTAL
LLV	LONG LENGTH VERTICAL
LN2	LIQUID NITROGEN
LO2	LIQUID OXYGEN
LOC	LOCATION
LONG	LONGITUDINAL
LPG	LIQUIFIED PETROLEUM GAS (PROPANE)
LPR	LOW PRESSURE STEAM RETURN
LPS	LOW PRESSURE STEAM SUPPLY
LR	LIVING ROOM
LS	LAWN SPRINKLER
LSC	LIFE SAFETY CODE
LT	LIGHT
LTD	LINED TRANSFER DUCT
LTG	LIGHTING
LV	LOUVER
LV	LABORATORY VACUUM
LVG	LEAVING
LW	LONG WAY
LWT	LEAVING WATER TEMPERATURE
M	THOUSAND
MA	MIXED AIR
MA	MAKE-UP AIR
MA	MEDICAL COMPRESSED AIR
MAC	MACHINE
MAG	MAGNETIC
MAINT	MAINTENANCE
MAN	MANUAL
MAS	MASONRY
MATL	MATERIAL
MAU	MAKEUP AIR UNIT
MAV	MANUAL AIR VENT
MAX	MAXIMUM
MB	MACHINE BOLT
MBD	MARKER BOARD
MBH	THOUSAND BTU PER HOUR
MC	MECHANICAL CONTRACTOR
MC	MEDICINE CABINET
MCA	MINIMUM CIRCUIT AMPACITY
MCB	MAIN CIRCUIT BREAKER
MCM	METAL COMPOSITE MATERIAL
MD	MOTORIZED DAMPER
MDF	MEDIUM DENSITY FIBERBOARD
MDO	MEDIUM DENSITY OVERLAY
MECH	MECHANICAL
MEMB	MEMBRANE
MET	METAL
MEZZ	MEZZANINE
MFR	MANUFACTURER
MFRG	MANUFACTURING
MG	MOTOR GENERATOR
MH	MANHOLE
MH	METAL HALIDE
MH	MOP HOLDER
MIN	MINIMUM
MISC	MISCELLANEOUS
MISC	MISCELLANEOUS
ML	MOTORIZED LOUVER
MLDG	MOLDING
MLO	MAIN LUGS ONLY
MLWK	MILLWORK
MO	MASONRY OPENING
MOCP	MAXIMUM OVERCURRENT PROTECTION
MPG	MEDIUM PRESSURE GAS
MPR	MEDIUM PRESSURE STEAM RETURN
MPS	MEDIUM PRESSURE STEAM SUPPLY
MR	MIRROR
MR/S	MIRROR WITH SHELF
MS	MAGNETIC STARTER
MS	MOP SINK
MTD	MOUNTED
MTG	MOUNTING
MTL	METAL
MTWR	MEDIUM TEMP HOT WATER RETURN
MTWS	MEDIUM TEMP HOT WATER SUPPLY
MUL	MULLION
MV	MEDICAL VACUUM
MV	MERCURY VAPOR
MW	MARKER WALL
N	NITROGEN
N	NORTH
N2	LABORATORY NITROGEN
N2O	NITROUS OXIDE
N20	NITROUS OXIDE
N/A	NOT APPLICABLE
NA	NOT APPLICABLE
NAT	NATURAL
NC	NORMALLY CLOSED
NC	NOISE CRITERIA
NC	NURSE CALL
NEC	NATIONAL ELECTRIC CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSN.
NEUT	NEUTRAL
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NO	NUMBER
NO2	NITROGEN DIOXIDE
NOM	NOMINAL
NRS	NON RISING STEM
NS	NEUTRAL SENSOR
NTS	NOT TO SCALE
NV	NITROGEN VENT
O2	OXYGEN
O to O	OUT TO OUT
O&M	OPERATION AND MAINTENANCE
OA	OUTSIDE AIR
OBSC	OBSCURE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OD	OVERFLOW DRAIN
OF	OUTSIDE FACE
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
OFF	OWNER FURNISHED OWNER INSTALLED
OFOI	OWNER FURNISHED OWNER INSTALLED
OHP	OVERHEAD POWER
OHT	OVERHEAD TELEPHONE
OPNG	OPENING
OPP	OPPOSITE
ORD	OVERFLOW ROOF DRAIN
OS&Y	OUTSIDE SCREW AND YOKE
OSD	OVERFLOW STORM DRAIN
OTCS	OPEN TO CEILING SPACE
OV	OIL VENT
OVFL	OVERFLOW
OVHD	OVERHEAD
OW	OIL WASTE
P	POLE(S)
P	PUMP
P/T	PRESSURE/TEMPERATURE TEST PORT
PA	PUBLIC ADDRESS
PAN B	PANIC BOLT
PAR	PARALLEL
PB	PULL BOX
PB	PUSH BUTTON
PB	PARTICLE BOARD
PBS	PUSH BUTTON STATION
PC	PRECAST CONCRETE
PC	PUMPED CONDENSATE
PCD	PAPER CUP DISPENSER
PCF	POUNDS PER CUBIC FOOT
PCT	PORCELAIN CERAMIC TILE
PCV	PRESSURE CONTROL VALVE
PCWP	PROCESS COOLING WATER PUMP
PCWR	PROCESS COOLING WATER RETURN
PCWS	PROCESS COOLING WATER SUPPLY
PD	PRESSURE DROP
PD	PUMP DISCHARGE
PDI	PLUMBING & DRAINAGE INSTITUTE
PENT	PENTHOUSE
PERF	PERFORATED
PERP	PERPENDICULAR
PF	POWER FACTOR
PG	PRESSURE GAUGE
PG	PROPANE GAS
PH	PHASE
PHC	PRE-HEAT COIL
PI	POINT OF INTERSECTION
PI	PRESSURE INDICATOR
PIC	PORTABLE INSTRUMENT CONNECTION
PIV	POST INDICATOR VALVE
PL	PLATE
PL	PLACE(S)
PLAM	PLASTIC LAMINATE
PLAS	PLASTER
PLBG	PLUMBING
PLYWD	PLYWOOD
PNEU	PNEUMATIC
PNL	PANEL
POC	POINT OF CONNECTION
PORC	PORCELAIN
PPM	PARTS PER MILLION
PR	PAIR
PREFAB	PREFABRICATED
PROJ	PROJECT(OR) (ION)
PRV	PRESSURE REGULATING VALVE
PS	PIPE SUPPORT
PS	PROJECTION SCREEN
PSF	POUNDS PER SQUARE FOOT
PSFA	POUNDS PER SQUARE FOOT, ABSOLUTE
PSFG	POUNDS PER SQUARE FOOT, GAUGE
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH, ABSOLUTE
PSID	POUNDS PER SQUARE INCH, DIFFERENTIAL
PSIG	POUNDS PER SQUARE INCH, GAUGE
PSV	PRESSURE SAFETY (RELIEF) VALVE
PT	PLASTER TRAP
PT	POINT
PT	POTENTIAL TRANSFORMER
PTD	PAPER TOWEL DISPENSER
PTD/R	COMBINATION TOWEL DISPENSER/RECEPTACLE
PTN	PARTITION
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
PWL	SOUND POWER LEVEL
PWR	POWER
QT	QUARRY TILE
QTR RND	QUARTER ROUND
QTY	QUANTITY
R	RISER
R	RADIUS
R	REGISTER
RA	RETURN AIR
RAD	RADIUS
RAD	RADIATOR
RAD	RADIATED
RAT	RETURN AIR TEMPERATURE
RB	RUBBER BASE
RC	REMOTE CHILLER
RC	REMOTE CONTROL
RCP	REFLECTED CEILING PLAN
RCP	REINFORCED CONCRETE PIPE
RCP	RADIANT CEILING PANEL
RCU	RECIPROCATING CHILLER UNIT
RCW	RECLAIMED WATER
RD	ROOF DRAIN
RD	REFRIGERANT DISCHARGE
RE	REFER TO
RE	REFERENCE
RECIRC	RECIRCULATING
RECP	RECEPTACLE
RECPT	RECEPTACLE
RECT	RECTANGLE(AR)
REF	REFERENCE
REFL	REFLECTED
REFR	REFRIGERANT
REG	REGISTER
REINF	REINFORCEMENT
RELA	RELIEF AIR
REM	REMOVABLE
REQ(D)	REQUIRE(D)
RESIL	RESILIENT
RESP	RESPONSIVE
RET	RETAINING
REV	REVISION(S)
RF	RETURN FAN
RF	RUBBER FLOOR
RFM	RECESSED FLOOR MAT
RH	RELATIVE HUMIDITY
RH	REFLIEF HOOD
RH	ROBE HOOK
RHC	REHEAT COIL
RHG	REFRIGERANT HOT GAS
RI&C	ROUGH IN AND CONNECT
RIJS	RISE IN JOIST SPACE
RL	REFRIGERANT LIQUID
RM	ROOM
RND	ROUND
RO	REVERSE OSMOSIS WATER
RO	ROUGH OPENING
ROC	REVERSE OSMOSIS RECIRCULATING
RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
RPM	REVOLUTIONS PER MINUTE
RS	REFRIGERANT SUCTION
RTU	ROOF TOP UNIT
RV	REFRIGERANT VENT
RWL	RAIN WATER LEADER
S	SMOKE DAMPER
S	SOUTH
S	SANITARY SEWER
S	SPRINKLER LINE
S	SINK
S	SOAP DISH
SA	SUPPLY AIR
SA	SHOCK ABSORBER
SAN	SANITARY WASTE
SC	SECURITY
SC	SOLID CORE
SC	SHOWER CURTAIN
SC	SPECIAL COATING
SCCR	SHORT CIRCUIT CURRENT RATING
SCD	SEAT COVER DISPENSER
SCD	SECONDARY CONDENSATE DRAIN
SCH	SHOWER CURTAIN HOOK
SCHED	SCHEDULE
SCR	SILICON CONTROLED RECTIFIER
SCT	STRUCTURAL CLAY TILE
SCUT	SCUTTLE
SCW	SOFT COLD WATER
SD	SMOKE DAMPER
SD	STORM DRAIN
SD	SMOKE DETECTOR
SD	SOAP DISPENSER
SE	STEAM EXHAUST VENT
SEA	SMOKE EXHAUST AIR
SEC	SECONDARY
SEC	SECOND
SECT	SECTION
SECY	SECRETARY
SENS	SENSIBLE
SF	SUPPLY FAN
SF	SQUARE FOOT
SFA	SPRINKLER FLOW ALARM
SFCMU	SPLIT-FACE CONCRETE MASONRY UNIT
SFU	STRUCTURE FACING UNIT
SGL	SINGLE
SH	SHOWER
SHM	SECURITY HOLLOW METAL
SHT	SHEET
SHW	SOFT HOT WATER
SHWC	SOFT HOT WATER RECIRCULATING
SHWR	SOLAR HOT WATER RETURN
SHWS	SOLAR HOT WATER SUPPLY
SIM	SIMILAR
SK	SINK
SL	SHORT LEG
SLNT	SEALANT
SM	SPRINKLER MAIN
SM	SHEET METAL
SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION
SND	SANITARY NAPKIN DISPOSAL
SNV	SANITARY NAPKIN VENDOR
SP	STATIC PRESSURE (H2O)
SP	STAND PIPE
SPD	SURGE PROTECTION DEVICE
SPEC	SPECIFICATION(S)
SPK	SPRINKLER
SPL	SOUND PRESSURE LEVEL
SPL	SPECIAL
SPL BLK	SPLASH BLOCK
SQ	SQUARE
SQ FT	SQUARE FEET
SQ IN	SQUARE INCHES
SS	STAINLESS STEEL
SS	SERVICE SINK
SS	SOLID SURFACE
SS	SOLID SEPARATOR
SSA	STORM SHELTER AREA
SST	SECONDARY STORM DRAINAGE
ST	STAIR
ST	STORM DRAINAGE
STAG'D	STAGGERED
STC	SOUND TRANSMISSION CLASS
STD	STANDARD
STE	SINGLE TAPERED END
STGR	STRINGER
STL	STEEL
STOR	STORAGE
STR	STRUCTURE(AL)
STRUCT	STRUCTURAL
SUB	SUBSTATION
SURF	SURFACE
SUSP	SUSPENDED
SV	SOLENOID VALVE
SV	STEAM VENT
SW	SHORT WAY
SW	SWITCH
SWBD	SWITCHBOARD
SWP	STEAM WORKING PRESSURE
SYM	SYMETRICAL
T	TEMPERED
T	THERMOSTAT
T	TREAD
T&B	TOP AND BOTTOM
T&G	TONGUE AND GROOVE
TA	TRANSFER AIR
TAB	TEST(ING) ADJUST(ING) BALANCE(ING)
TAN	TANGENT
TB	TERMINAL BOX
TB	TOWEL BAR
TBD	TACK BOARD
TC	TIME CLOCK
TC	TEMPERATURE CONTROL
TCC	TEMPERATURE CONTOLS CONTRACTOR
TD	TRANSFER DUCT
TD	TRENCH DRAIN
TDH	TOTAL DYNAMIC HEAD
TDS	TOTAL DISOLVED SOLIDS
TEL	TELEPHONE
TEMP	TERMPORARY
TEMP	TEMPERATURE
TEMP	TEMPERED
TEMP	TEMPORARY
TERR	TERRAZZO
TEXT	TEXTURED
TGL	TOGGLE
TH	THRESHOLD
TH	TOWEL HOOK
THK	THICK(NESS)
TMR	TILT MIRROR UNIT
TMV	THERMOSTATIC MIXING VALVE
TOB	TOP OF BEAM
TOC	TOP OF CONCRETE
TOD	TOP OF DUCT
TOF	TOP OF FOOTING
TOIL	TOILET
TOM	TOP OF MASONRY
TOP	TOP OF PAVING
TOP	TOP OF PIPE
TOS	TOP OF STEEL
TOW	TOP OF WALL
TPV	TRAP PRIMER
TPV	TRAP PRIMER VALVE
TR	TRIP
TRANS	TRANSVERSE
TRD	TREAD
TS	TEMPERATURE SENSOR
TSP	TOTAL STATIC PRESSURE
TT	TEMPERATURE TRANSMITTER
TT	TERRAZZO TILE
TTD	TOILET TISSUE DISPENSER
TV	TELEVISION
TW	TACK WALL
TYP	TYPICAL
UC	UNIT COOLER
UC	UNDERCUT DOOR
UG	UNDERGROUND
UGE	UNDERGROUND ELECTRICAL
UGT	UNDERGROUND TELEPHONE
UH	UNIT HEATER
UL	UNDERWRITERS LABORATORIES
UNEX	UNEXCAVATED
UNFIN	UNFINISHED
UNO	UNLESS NOTED OTHERWISE
UR	URINAL
URD	UNDERGROUND RESIDENTIAL DISTRIBUTION
US	UTILITY SHELF
UTIL	UTILITY
UV	UNIT VENTILATOR
V	VOLT
V	SANITARY VENT
V	VACUUM
VA	VOLT-AMPERE
VA	VALVE
VAC	VACUUM
VAV	VARIABLE AIR VOLUME
VB	VAPOR BARRIER
VB	VINYL BASE
VBF	VENT BELOW FLOOR
VCB	VENTED COVE BASE
VCP	VITRIFIED CLAY PIPE
VCT	VINYL COMPOSITION TILE
VD	VOLUME DAMPER
VEL	VELOCITY
VENT	VENTALATOR(TION)
VERT	VERTICAL
VEST	VESTIBULE
VF	VINYL FLOOR
VFD	VARIABLE FREQUENCY DRIVE
VIF	VERIFY IN FIELD
VM	VOLTMETER
VOL	VOLUME
VP	VACUUM PUMP
VP	VENEER PLASTER
VSMP	VARIABLE SPEED MOTOR CONTROLLER
VT	VINYL TILE
VTR	VENT THROUGH ROOF
VWC	VINYL WALL COVERING
W	WIRE
W	WIDE FLANGE
W	WEST
W	WATER SERVICE
W	WIDE(TH)
W	WASTE (PLUG)
W	WATT
W/	WITH
W/O	WITHOUT
WAGD	WASTE ANESTHETIC GAS DISPOSAL
WB	WET BULB
WC	WATER COLUMN
WC	WATER CLOSET
WC	WALL COVERING
WCC	WATER COOLED CONDENSER
WCL	WATER CLOSET/LAVATORY COMBINATION
WCO	WALL CLEAN OUT
WD	WOOD
WDW	WINDOW
WF	WASH FOUNTAIN
WFMD	WATER FLOW MEASURING DEVICE
WFU	WASTE FIXTURE UNIT
WG	WIRE GUARD
WG	WATER GAUGE
WH	WALL HYDRANT
WH	WATER HEATER
WHA	WATER HAMMER ARRESTOR
WHM	WATT HOUR METER
WI	WROUGHT IRON
WLR	WATER LOOP RETURN
WLS	WATER LOOP SUPPLY
WMG	WATER MOTOR GOING
WNSCT	WAINSCOT
WP	WEATHER-PROOF (NEMA 3R)
WP	WEATHERPROOF
WPB	WHIRLPOOL BATH
WPF	WATERPROOF
WPFG	WATERPROOFING
WR	WASTE RECEPTACLE
WR	WATER RESISTANT
WSHP	WATER SOURCE HEAT PUMP
WSP	WET STAND PIPE
WT	WEIGHT
WW	WARM WHITE
WWF	WELDED WIRE FABRIC
XFMR	TRANSFORMER
XMTR	TRANSMITTER
YD	YARD
YH	YARD HYDRANT
Z	IMPEDANCE
ZCB	ZONE CONTROL BOX
ZCV	ZONE CONTROL VALVE
ZVB	ZONE VALVE BOX

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MECHANICAL ABBREVIATIONS

M.000.20

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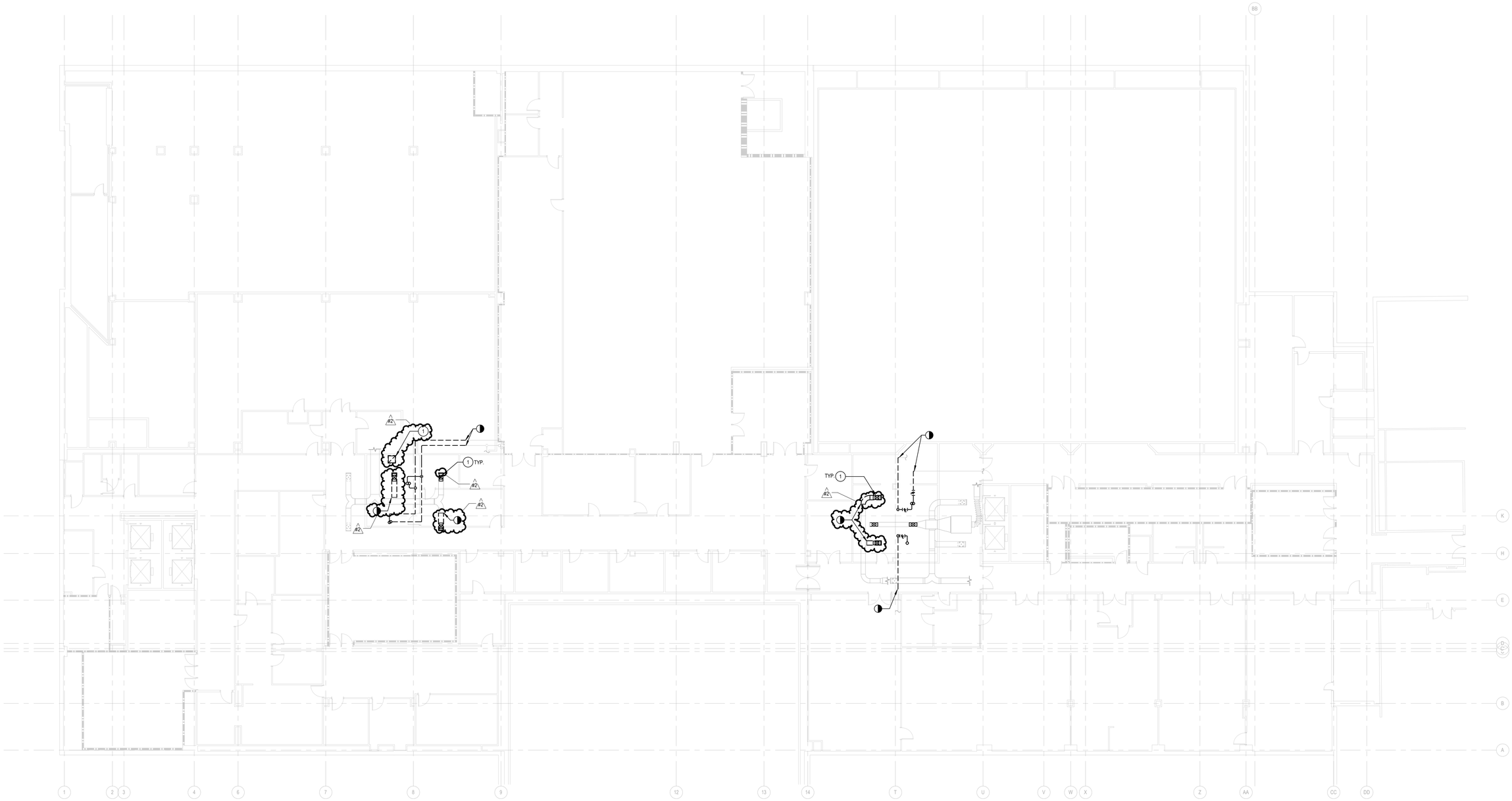

LEVEL 00 - HVAC DEMOLITION PLAN - PHASE I

SCALE: 3/32" = 1'-0"

SHEET NOTES

1 REMOVE EXISTING DIFFUSERS AND CLEAN FOR RE-USE AFTER CEILING REPLACEMENT. SEE M.100.00 FOR NEW WORK.

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LEVEL 00 - HVAC DEMOLITION PLAN - PHASE I

MD.100.00

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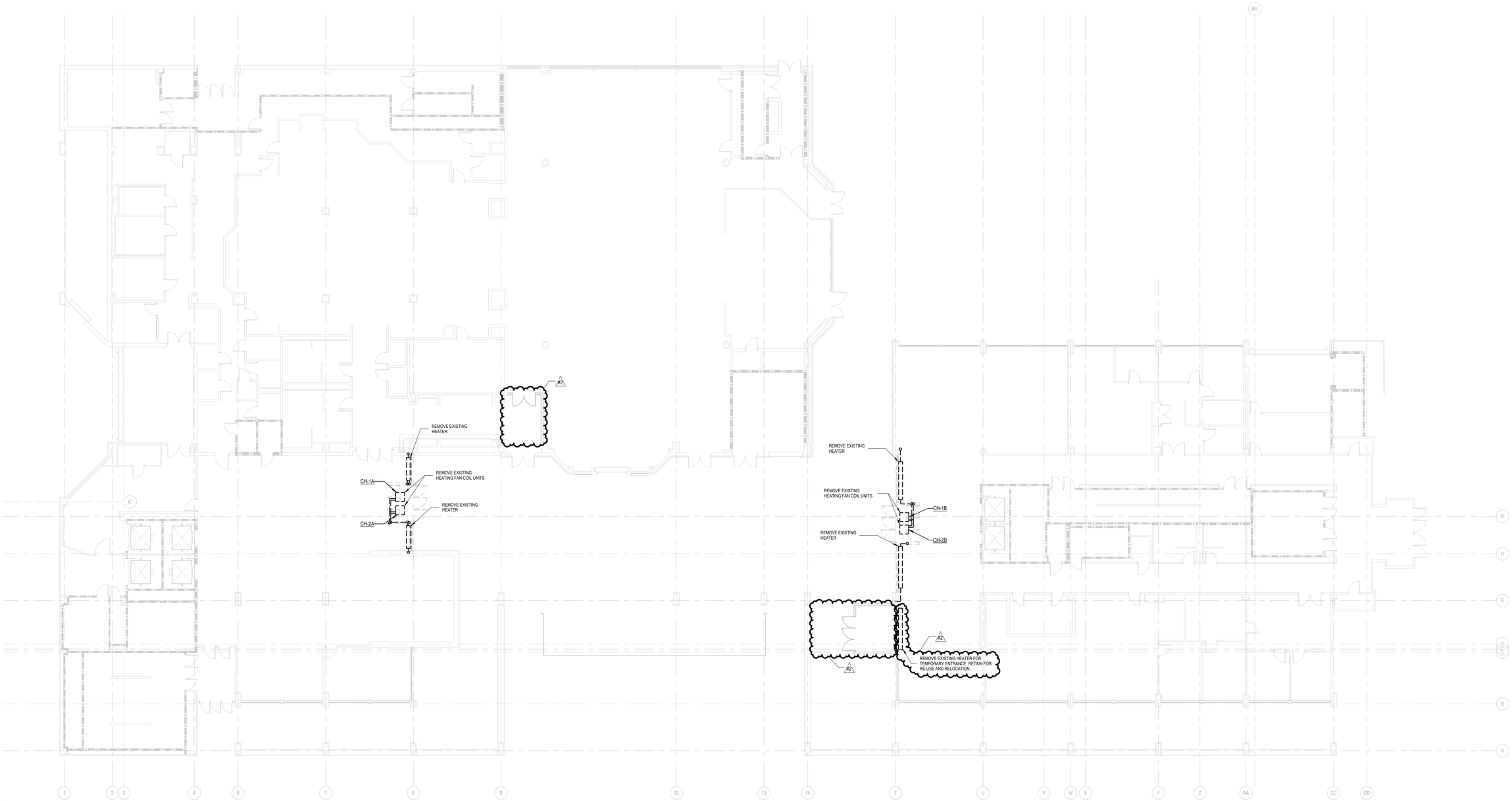

N

LEVEL 01 - HVAC DEMOLITION PLAN - PHASE I

SCALE: 3/32" = 1'-0"

SHEET NOTES

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LEVEL 01 - HVAC DEMOLITION PLAN - PHASE I

MD.101.00

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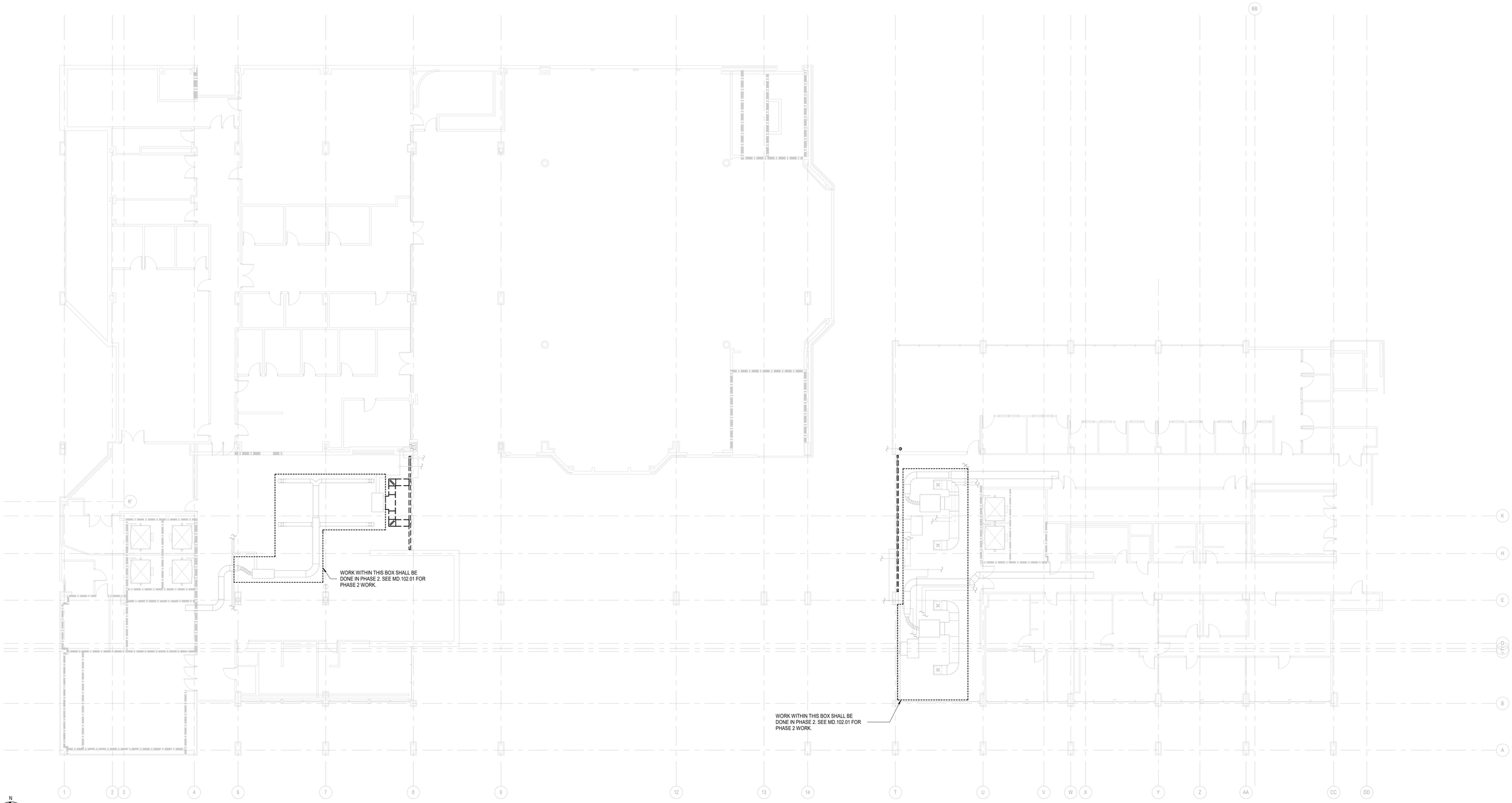

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LEVEL 02 - HVAC DEMOLITION PLAN - PHASE I

SCALE: 3/32" = 1'-0"

SHEET NOTES

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LEVEL 02 - HVAC DEMOLITION PLAN - PHASE I

MD.102.00

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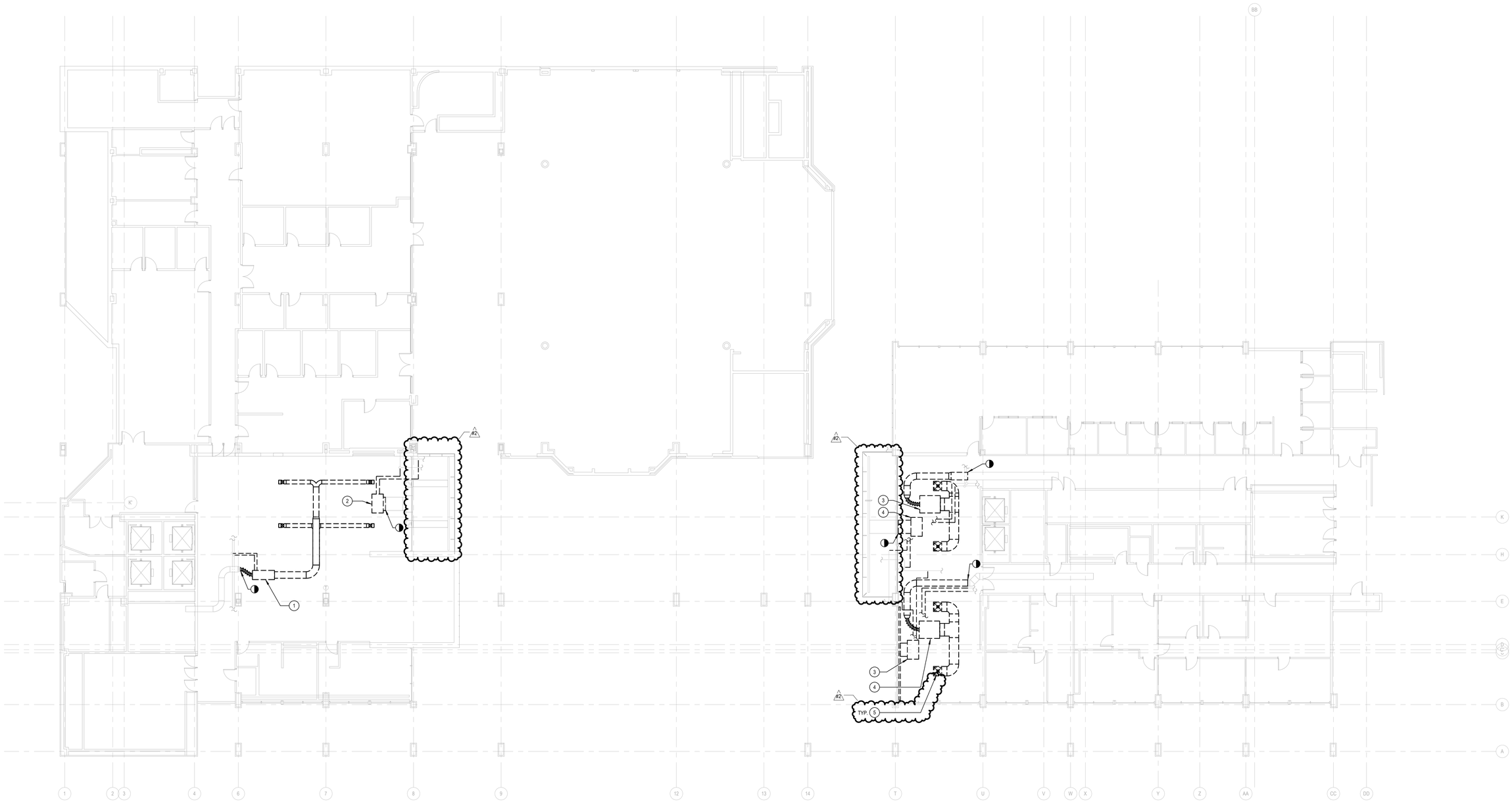

N

LEVEL 02 - HVAC DEMOLITION PLAN - PHASE II

SCALE: 3/32" = 1'-0"

SHEET NOTES

1 REMOVE CAV NO. 9, AND ALL OF THE LOW PRESSURE DUCTWORK AND DIFFUSERS DOWNSTREAM OF THE UNIT. REMOVE THE UNITS CONNECTION TO THE HEATING HOT WATER SYSTEM AND PREPARE DUCTWORK AND PIPING CONNECTIONS TO NEW WORK.

2 REMOVE CH-13A, AND ALL OF THE LOW PRESSURE DUCTWORK AND DIFFUSERS DOWNSTREAM OF THE UNIT. REMOVE THE UNITS CONNECTION TO THE HEATING HOT WATER SYSTEM AND PREPARE FOR CONNECTIONS TO THE NEW WORK.

3 REMOVE CAV NO. 16, AND ALL OF THE LOW PRESSURE DUCTWORK AND DIFFUSERS DOWNSTREAM OF THE UNIT. REMOVE THE UNITS CONNECTION TO THE HEATING HOT WATER SYSTEM AND PREPARE DUCTWORK AND PIPING CONNECTIONS TO NEW WORK.

4 REMOVE CH-3B/4B, AND ALL OF THE LOW PRESSURE DUCTWORK AND DIFFUSERS DOWNSTREAM OF THE UNIT. REMOVE THE UNITS CONNECTION TO THE HEATING HOT WATER SYSTEM AND PREPARE DUCTWORK AND PIPING CONNECTIONS TO NEW WORK.

5 REMOVE EXISTING DIFFUSERS AND CLEAN FOR RE-USE AFTER CEILING REPLACEMENT. SEE M.101.24 FOR NEW WORK. #2

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LEVEL 02 - HVAC DEMOLITION PLAN - PHASE II

MD.102.01

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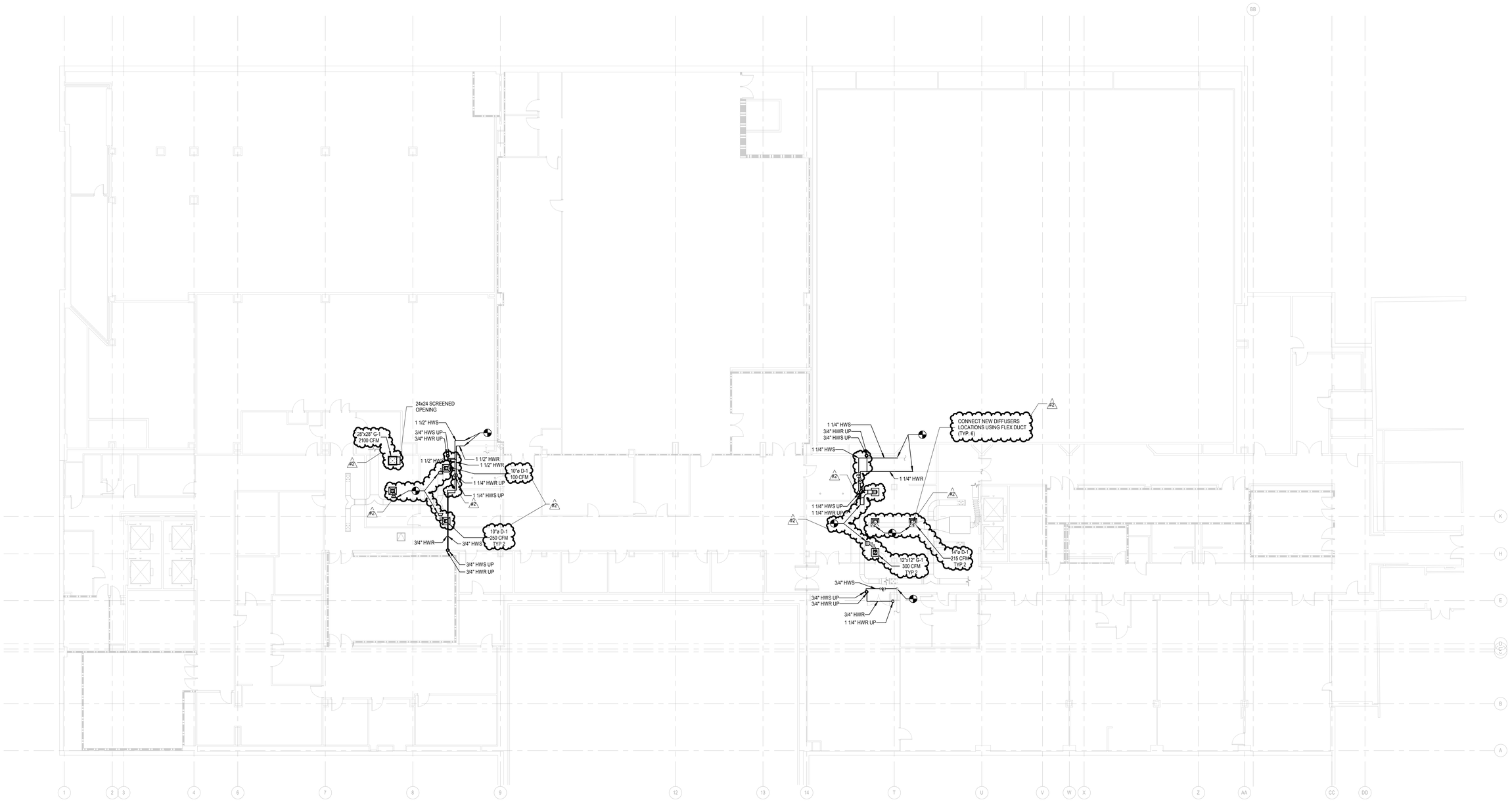

LEVEL 00 - OVERALL HVAC PLAN - PHASE I

SCALE: 3/32" = 1'-0"

SHEET NOTES

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LEVEL 00 - OVERALL HVAC PLAN - PHASE I

M.100.00

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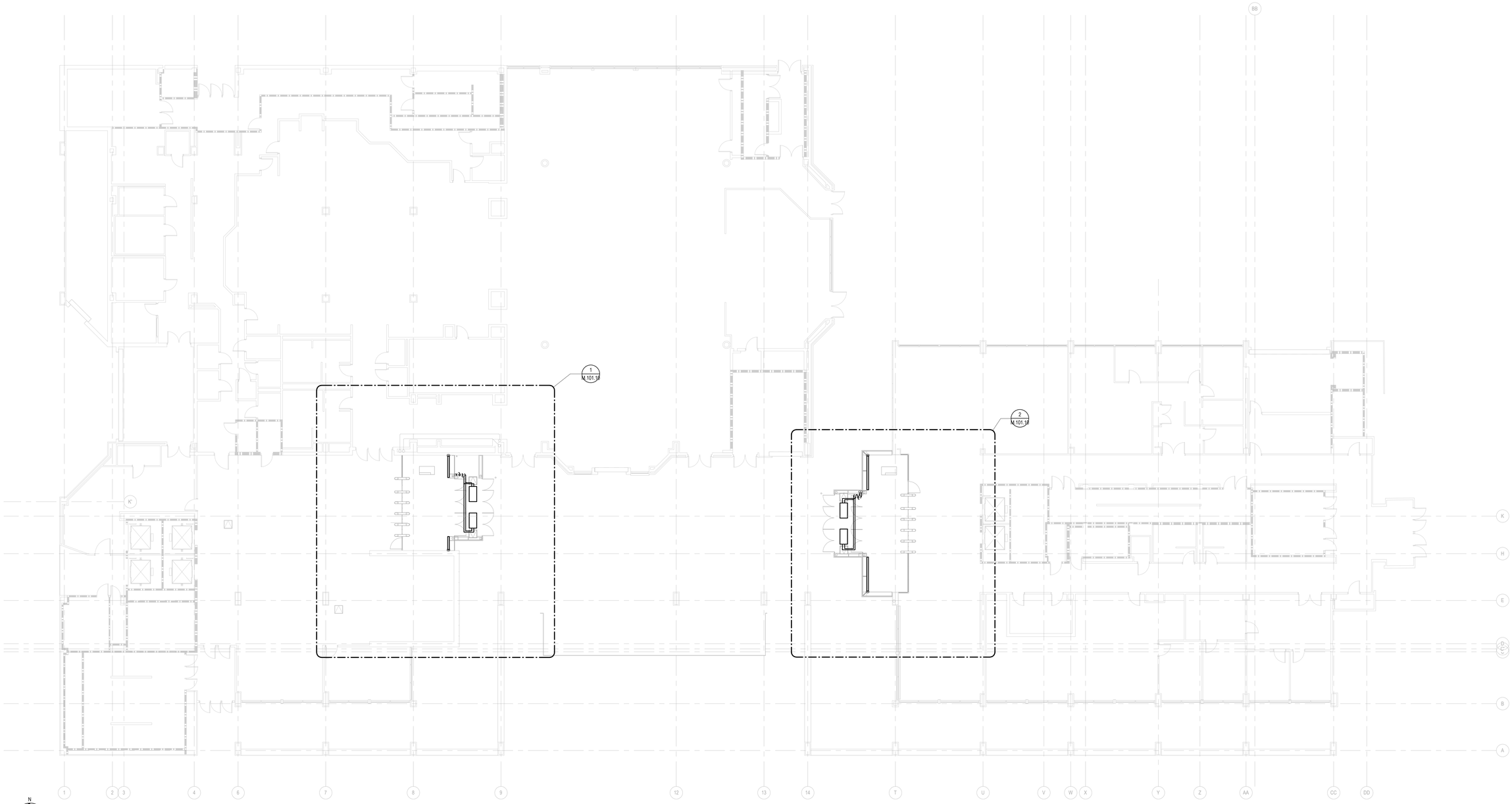

LEVEL 01 - OVERALL HVAC PLAN - PHASE 1

SCALE: 3/32" = 1'-0"

SHEET NOTES

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LEVEL 01 - OVERALL HVAC PLAN - PHASE I

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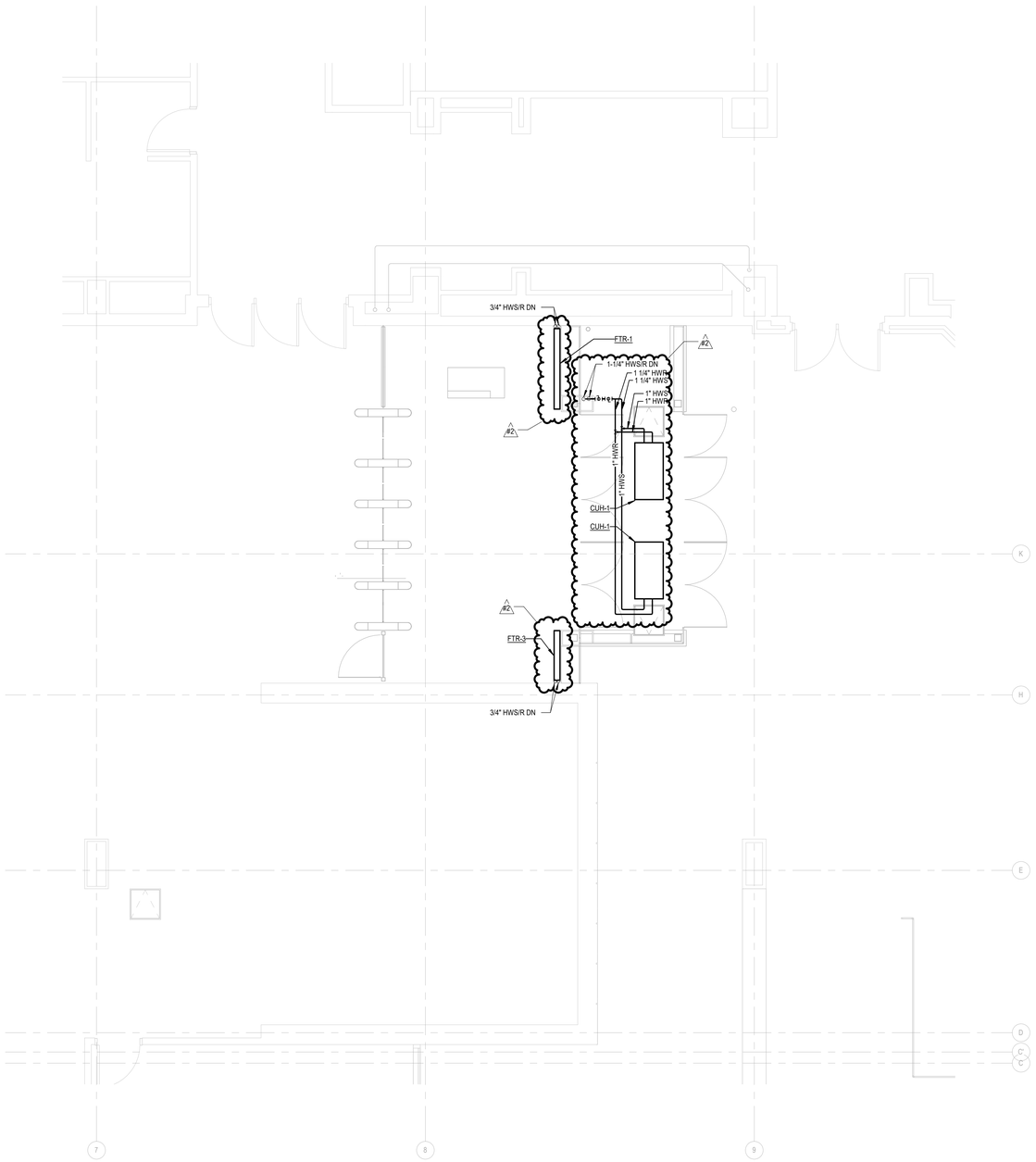
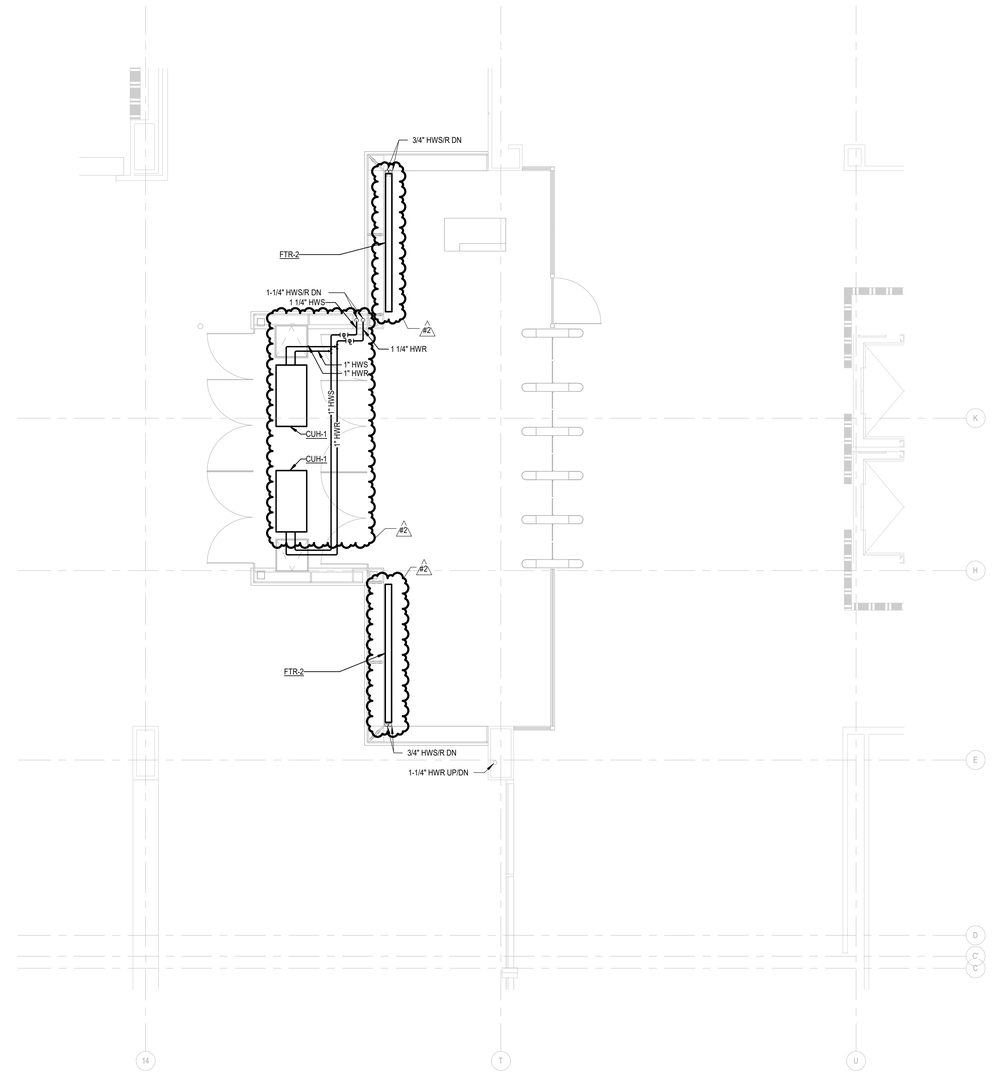


1 LEVEL 01 - WEST - HVAC PLAN - PHASE I
M.101.10 SCALE: 1/4" = 1'-0"



2 LEVEL 01 - EAST - HVAC PLAN - PHASE I
M.101.10 SCALE: 1/4" = 1'-0"

SHEET NOTES

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LEVEL 01 - AREA A/B - HVAC PLAN - PHASE I

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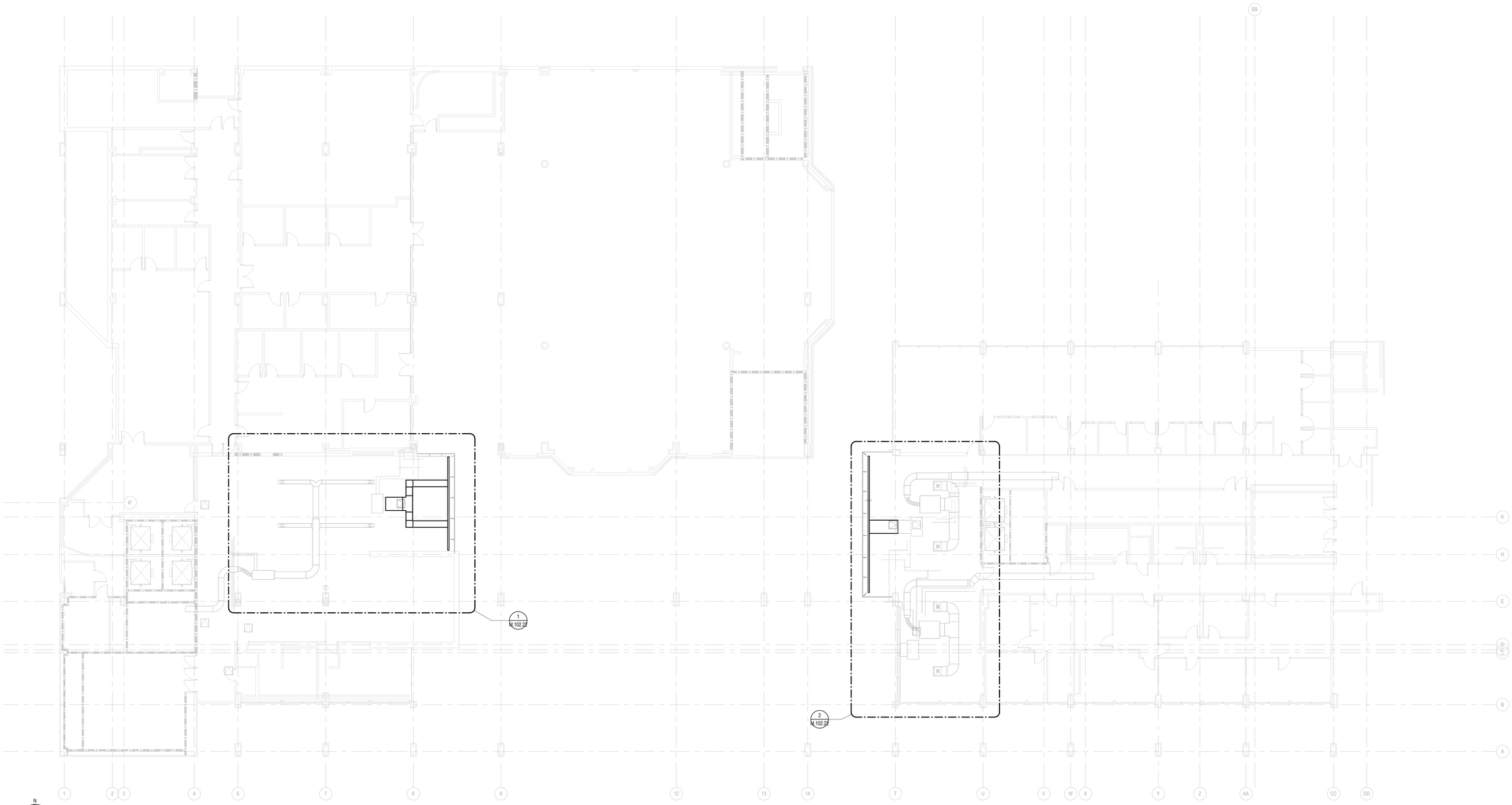

LEVEL 02 - OVERALL HVAC PLAN - PHASE I

SCALE: 3/32" = 1'-0"

SHEET NOTES

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LEVEL 02 - OVERALL HVAC PLAN - PHASE I

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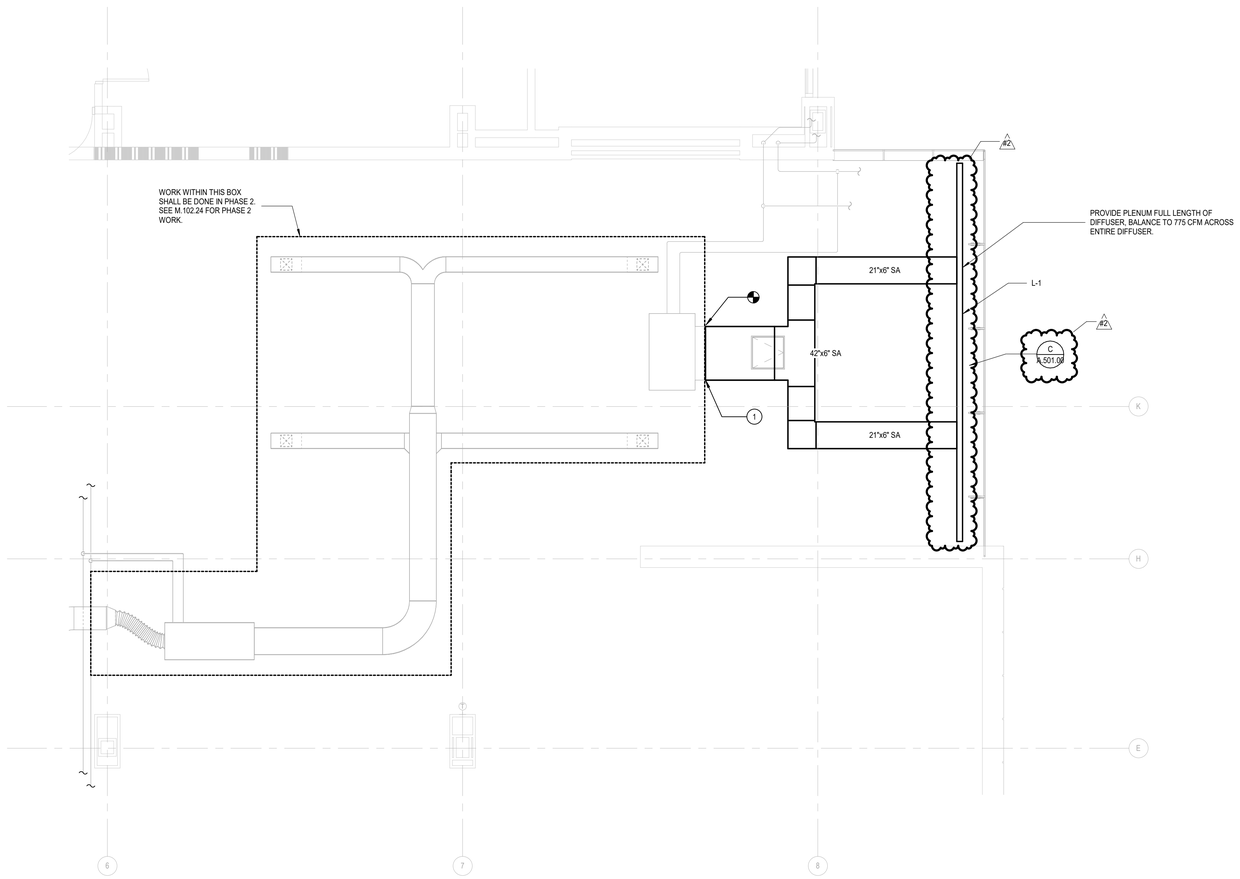
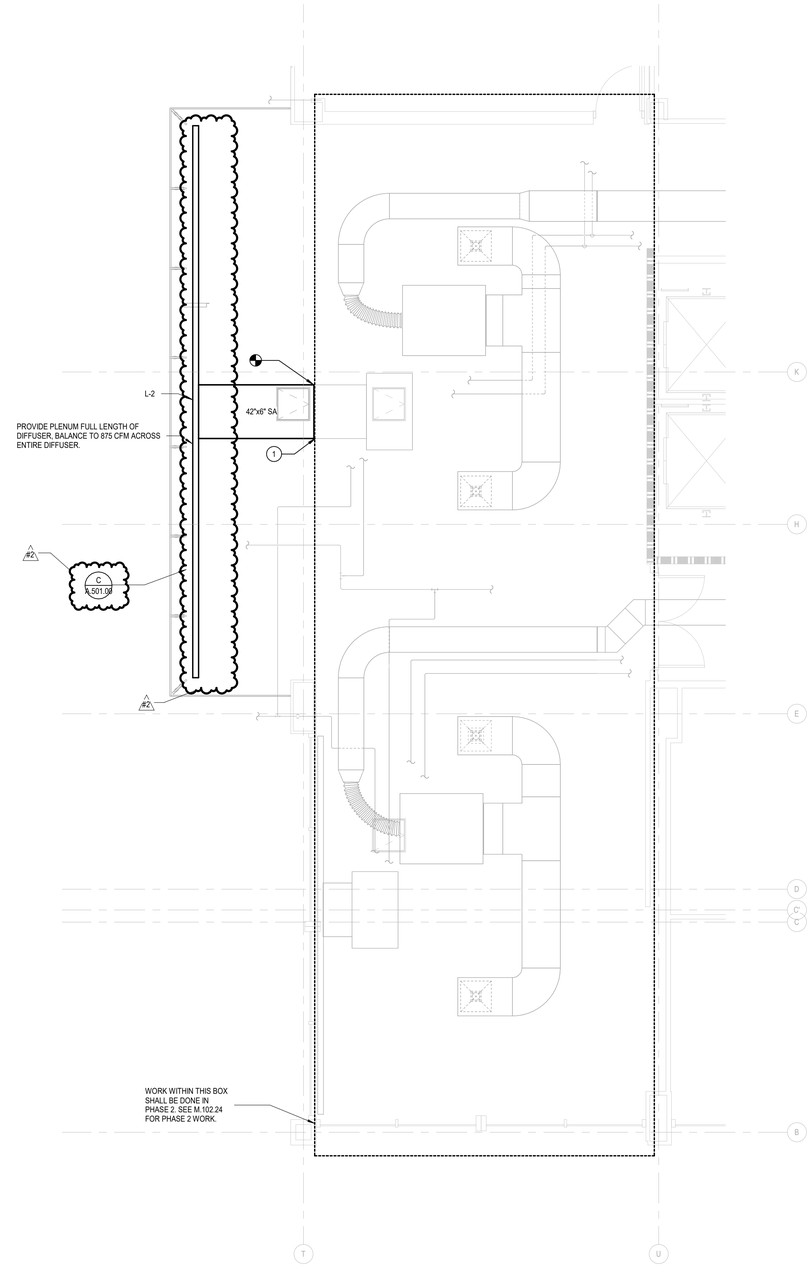


1 LEVEL 02 - WEST - HVAC PLAN - PHASE I
M.102.22 SCALE: 1/4" = 1'-0"



2 LEVEL 02 - EAST - HVAC PLAN - PHASE I
M.102.22 SCALE: 1/4" = 1'-0"

SHEET NOTES

1 PHASE I WORK TO INCLUDE REPLACEMENT OF DUCT AND DIFFUSER IN NEWLY ADDED VESTIBULE SPACE. CONNECT NEW DUCT TO EXISTING DUCT, SEE PHASE II WORK FOR COMPLETION OF EQUIPMENT REPLACEMENT.

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LEVEL 02 - AREA A/B - HVAC PLAN - PHASE I

M.102.22

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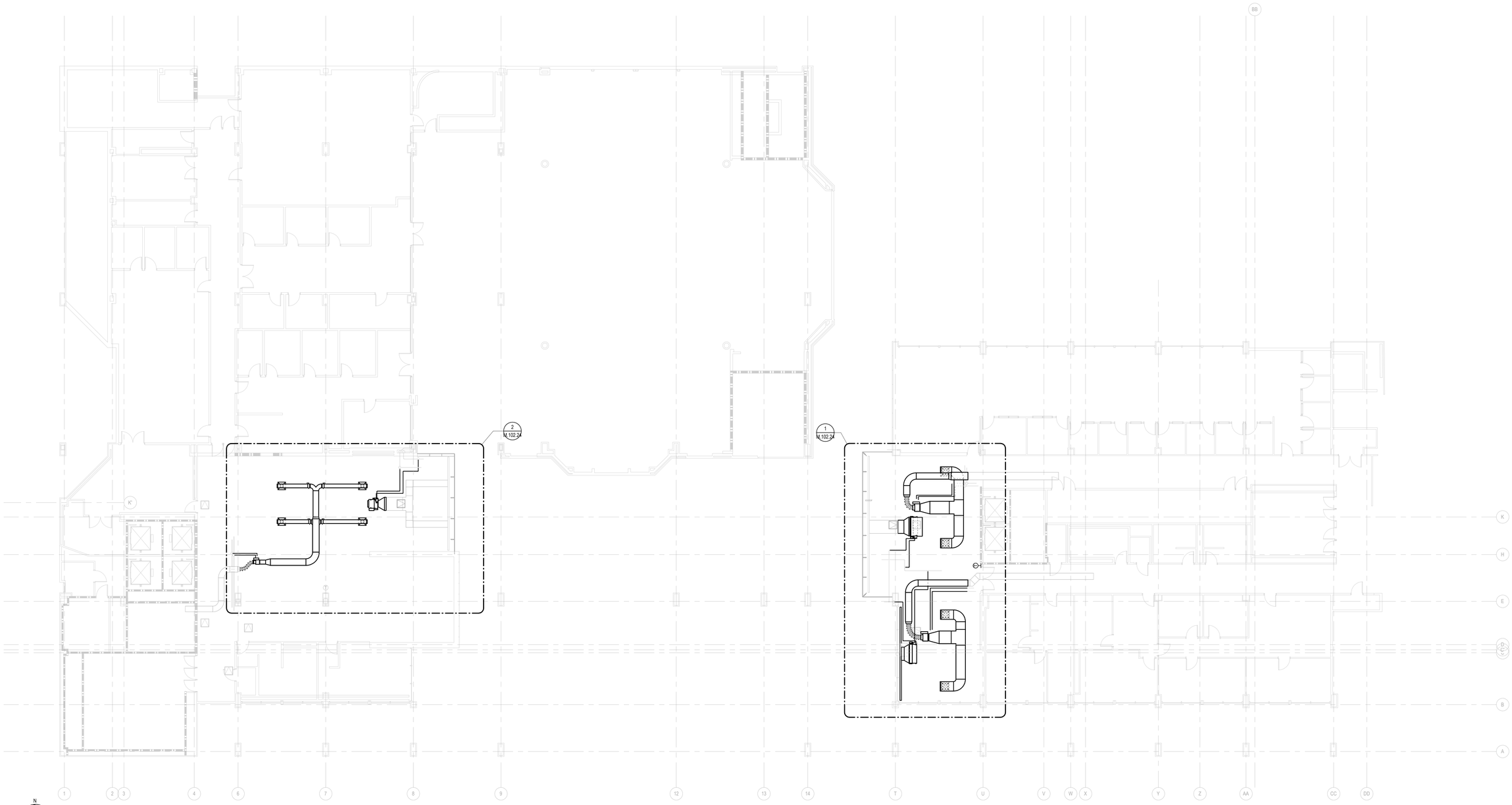

LEVEL 02 - AREA A/B HVAC PLAN - PHASE II

SCALE: 3/32" = 1'-0"

SHEET NOTES

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LEVEL 02 - OVERALL HVAC PLAN - PHASE II

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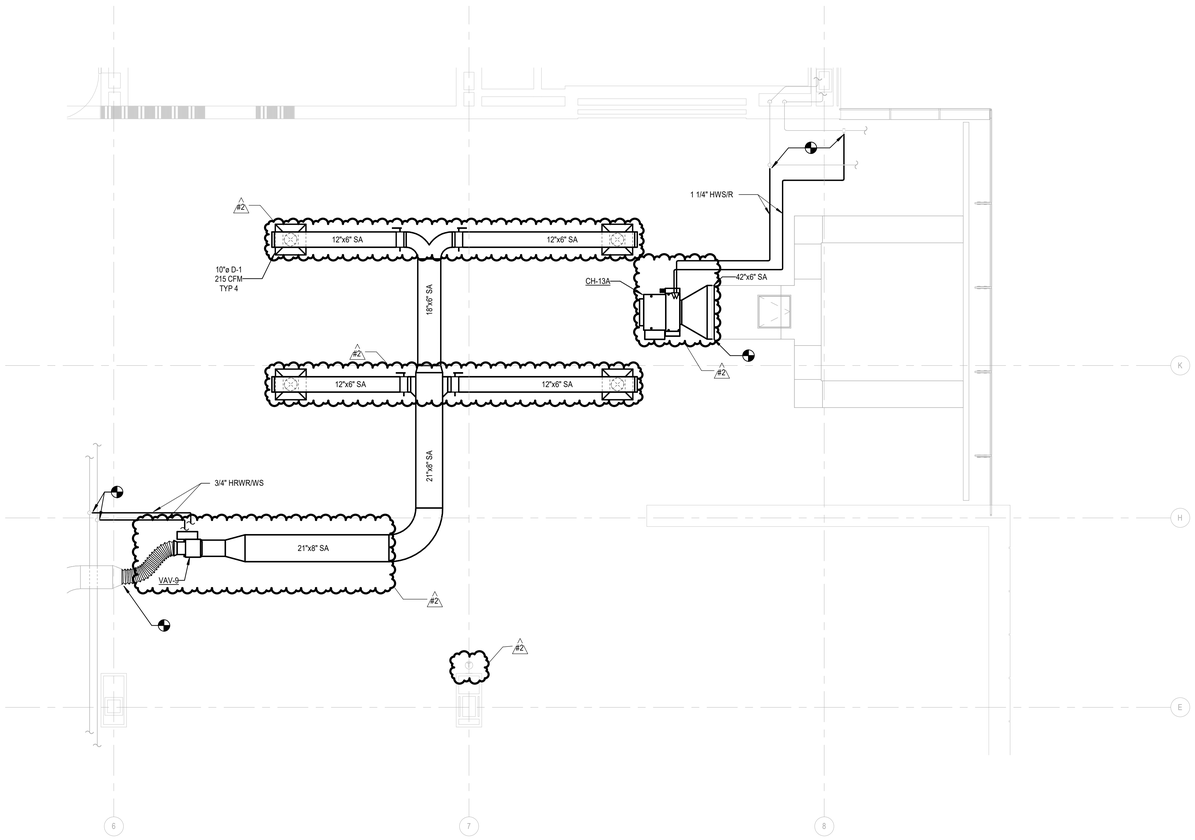
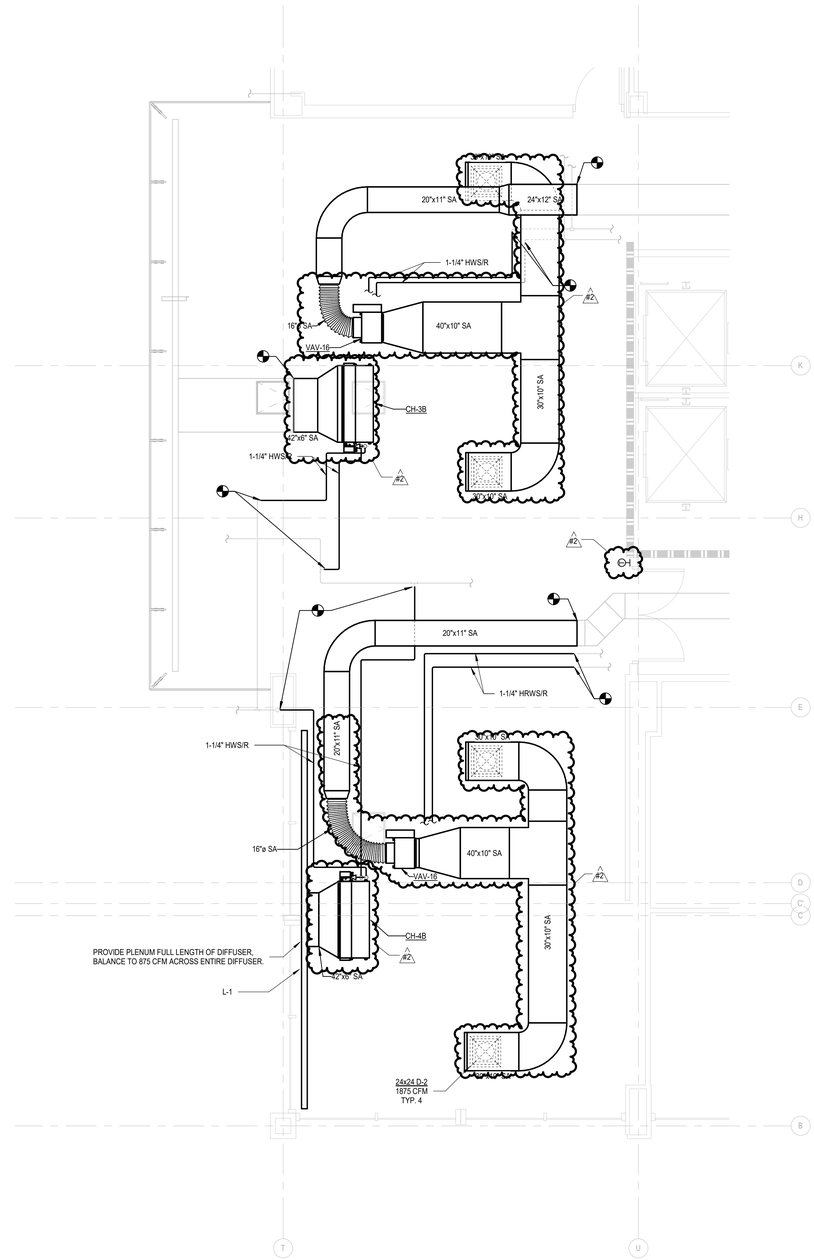


LEVEL 02 - WEST - HVAC PLAN - PHASE II

SCALE: 1/4" = 1'-0"



LEVEL 02 - EAST - HVAC PLAN - PHASE II

SCALE: 1/4" = 1'-0"

SHEET NOTES

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LEVEL 02 - AREA A/B - HVAC PLAN - PHASE II

M.102.24

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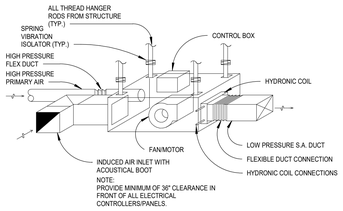
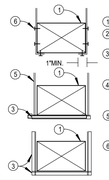


1 FAN POWERED VAV BOX WITH HYDRONIC HEAT
M.700.00 NO SCALE

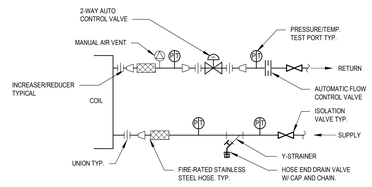


KEY NOTES:

1. DUCT
2. SHEET METAL STRAP 1" (25.4mm) WIDE, OF SAME METAL GAUGE AS DUCT.
3. STEEL ANGLE, NOT LESS THAN 1"x 1"x 1/8" (25.4 x 25.4 x 3 mm), SIZED TO MATCH DUCT.
4. SHEET METAL BAND, 1" (25.4mm) WIDE OF SAME METAL GAUGE AS DUCT.
5. ALL THREAD HANGER ROD WITH ACCESSORIES AS USED FOR LIGHT PIPE HANGER.
6. SELF TAPPING CADMIUM PLATED HEX HEADED SHEET METAL SCREW STRAPS TO BE TIGHT AGAINST DUCT.

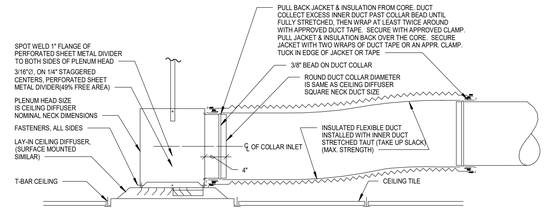
HANGER SIZES FOR RECTANGULAR DUCT			
MAX. LENGTH ANY SIDE	HANGER	HORIZONTAL SUPPORT ANGLE	MAXIMUM SPACING
30"	1"x 18 GAUGE STRAP	NONE REQUIRED	10'-0"
36"	1/4" ROUND ROD	1-1/2" x 1-1/2" x 1/8"	8'-0"
48"	1/4" ROUND ROD	2" x 2" x 1/8"	8'-0"
60"	5/16" ROUND ROD	2" x 2" x 1/8"	8'-0"
84"	3/8" ROUND ROD	2" x 2" x 1/8"	8'-0"

2 DUCT HANGING DETAIL
M.700.00 NO SCALE



NOTE: HOSE KITS, STRAINER, AUTOFLOW VALVES AND BALL VALVES TO BE FULL SIZE OF BRANCH PIPING.

3 2-WAY COIL DETAIL
M.700.00 NO SCALE



NOTE: USE WHERE CLEAR HEIGHT IN CEILING SPACE DOES NOT ALLOW STRAIGHT VERTICAL DUCT.

4 RESTRICTED CEILING SUPPLY DIFFUSER PLENUM HEAD CONNECTION
M.700.00 NO SCALE

LINEAR SLOT DIFFUSER SCHEDULE

ID	ROOM SERVICED	DESCRIPTION	STATIC PRESSURE (IN-WG)	NC MAXIMUM	FRAME BORDER TYPE	DIFFUSER LENGTH	DIFFUSER SLOT WIDTH	DIFFUSER SLOT QTY	MATERIAL DESCRIPTION	FINISH DESCRIPTION	MANUFACTURER	MODEL	NOTES
L-1	LOBBY - EAST	LINEAR SLOT DIFFUSER	0.1	N/A	SURFACE	24' - 8"	1"	2	ALUMINUM	WHITE ENAMEL	TITUS	ML-38	
L-2	LOBBY - WEST	LINEAR SLOT DIFFUSER	0.1	N/A	SURFACE	36' - 0"	1"	2	ALUMINUM	WHITE ENAMEL	TITUS	ML-38	

#2

#2

DIFFUSER AND GRILLE SCHEDULE

ID	ROOM SERVICED	DESCRIPTION	STATIC PRESSURE	NC MAXIMUM	DAMPER INCLUDED (Y/N)	FRAME BORDER TYPE	NECK DIMENSION SIZE	SIZE (W" x H")	MATERIAL DESCRIPTION	FINISH DESCRIPTION	MANUFACTURER	MODEL	NOTES
D-1	LOBBY - WEST	PLAQUE FACE DIFFUSER	0.1 IN-WG	N/A	N	SURFACE	24 x 24	24 x 24	STEEL	WHITE ENAMEL	PRICE	SPD	1,2
D-2	LOBBY - EAST	MODULAR LOUVER FACED DIFFUSER	0.1 IN-WG	N/A	N	SURFACE	24 x 24	24 x 24	STEEL	WHITE ENAMEL	PRICE	SMDA	1,2
G-1	BASEMENT	RETURN GRILLE	0.1 IN-WG	N/A	N	SURFACE	24 x 24	24 x 24	STEEL	WHITE ENAMEL	PRICE	530	1,2

NOTES:
1. CONTRACTOR SHALL COORDINATE MOUNTING AND SURFACE CONSTRUCTION PRIOR TO FURNISHING MATERIAL.
2. SEE PLANS FOR LOCATION, NECK SIZE, FRAME TYPE, COLOR AND CFM.

#2

VAV TERMINAL UNIT SCHEDULE

ID	ROOM SERVICED	MAX	COOLING MIN.	HEATING CFM	MAX PD @ MAX FULL CFM (IN W.C.)	INLET SIZE (IN)	OUTLET DIMENSIONS (INxIN)	OVERALL DIMENSIONS (LxWxH) (INxINxIN)	STATIC PRESSURE INLET MAX (IN W.C.)	DOWN STREAM (IN W.C.)	SOUND MAX DISCHARGE NC	MAX RADIATED NC	HOT WATER COIL DATA: FACTORY SOUND ATTENUATOR	EAT (°F)	LAT (°F)	CAPACITY (MBH)	GPM	MANUFACTURER	MODEL	NOTES
VAV-9	LOBBY - WEST	950	260	350	0.5	10	14x12	22.5x14x12.5	1	0.25	<20	<20	Y	58	82.81	9.43	0.89	ETI	SDR	1,2,3,4,5
VAV-16	LOBBY - EAST	3800	1140	1500	0.5	16	24X17	26.5x24x17.5	1	0.25	<20	<20	Y	58	84.05	42.41	4.48	ETI	SDR	1,2,3,4,5

NOTES:
1. FACTORY INSTALL CONTROLS FURNISHED AS PART OF SPECIFICATION 230900.
2. WIDTH DIMENSION INCLUDES CONTROL ENCLOSURE.
3. NC RATINGS BASED ON INDICATED INLET/OUTLET PRESSURES.
4. MINIMUM CFM BASED ON MFGR'S DATA FOR MODEL INDICATED AT 0.30" WC MIN TRANSDUCER DIFFERENTIAL PRESSURE. ACTUAL MINIMUM CFM TO BE BASED ON EQUIPMENT PROVIDED.
5. HEATING COIL SHALL BE SIZED AT 30°F DELTA T ON AIR SIDE AND 20°F ON WATER SIDE. FLUID SHALL BE WATER.

HYDRONIC UNIT HEATER SCHEDULE

TAG	ROOM SERVICED	CFM LOW/HIGH	GPM	HEATING COIL: CAPACITY (MBH)	HEATING COIL: LAT (°F)	ELECTRICAL: MOTOR SIZE (HP)	ELECTRICAL: FLA LOW/HIGH	ELECTRICAL: VOLT/PHASE	DIM (LxWxH) (INxINxIN)	WEIGHT (LBS)	BASIS OF DESIGN	NOTES
CH-3B	LOBBY - EAST	776	2.6	26.3	98.7	(2) 1/4	0.3/0.6	115/1	70x25x10	126	ENVIROTEC - HLP-D12	
CH-4B	LOBBY - EAST	776	2.6	26.3	98.7	(2) 1/4	0.3/0.6	115/1	70x25x10	126	ENVIROTEC - HLP-D12	
CH-13A	LOBBY - WEST	815	3	30.8	95.3	(1) 1/3	0.3/0.6	115/1	40x33x17	122	PENVIROTEC - HPP08	
CUH-1	LOBBY - EAST/WEST	210	0.86	8.5	103	-	-	115/1	47x24x6.4	61	KAMPMAN - KADECK - 8VDC	

#2

FIN TUBE RADIATIOR SCHEDULE - HOT WATER

ID	ROOM SERVICED	CAPACITY (MBH)	ACTIVE LENGTH (FEET)	CAPACITY/LF (BTUH/LF)	TOTAL GPM	MAX WPD (FT)	BRANCH CONNECTION SIZE (IN)	CONTROL VALVE	EWT (°F)	HEIGHT (IN)	DEPTH (IN)	MTG TYPE	MTG HEIGHT AFF (IN)	FINISH	FINISHED END CONDITION	BASIS OF DESIGN	NOTES
FTR-1	LOBBY - WEST	8,645	5'-0"	1690	0.65	3	3/4"	2-WAY	160	11.5"	5"	FLOOR	3	EXPOSED	FINISHED END	RUNTAL R3F-4	1-4
FTR-2	LOBBY - EAST	12,675	7'-6"	1690	0.85	3	3/4"	2-WAY	160	11.5"	5"	FLOOR	3	EXPOSED	FINISHED END	RUNTAL R3F-4	1-4
FTR-3	LOBBY - WEST	4,250	2'-6"	1690	0.5	3	3/4"	2-WAY	160	11.5"	5"	FLOOR	3	EXPOSED	FINISHED END	RUNTAL R3F-4	1-4

#2

NOTES:
1. COLOR AS SELECTED BY ARCHITECT.
2. MOUNTING HEIGHTS ARE TO BE COORDINATED WITH ARCHITECTURE. TOP OF HEATERS SHALL BE FLUSH WITH ADJACENT BASE.
3. SELECTED FTR'S SHALL INCLUDE CORRECTION FACTORS FOR 65°F EAT, 160°F ENTERING WATER TEMP, FLUID AS WATER, AND SHALL BE CAPABLE OF MEETING MINIMUM HEATING REQUIREMENTS WITH CORRECTION FACTOR APPLIED.
4. PROVIDE PIPING OPTIONS A FOR BOTTOM CONNECTION OF UNITS. PROVIDE WITH COIL CONNECTION PER DETAIL 3/M.700.00.

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MECHANICAL DETAILS AND SCHEDULES

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GENERAL PLUMBING NOTES

1.1 GENERAL PLUMBING NOTES

A. THESE NOTES SHALL BE GENERALLY APPLIED TO ALL PLUMBING DRAWINGS. AS THEY ARE GENERAL IN NATURE, THEY MAY NOT BE SPECIFICALLY CALLED OUT ON THE PLANS. REFERENCE THE INDIVIDUAL DRAWINGS AS WELL AS DIVISION 22 SPECIFICATIONS FOR ADDITIONAL CONTRACTUAL REQUIREMENTS.

B. SHOULD ANY CONFLICT OCCUR BETWEEN ANY PORTIONS OF THE CONTRACT DOCUMENTS (DRAWINGS AND SPECIFICATIONS), THE CONTRACTOR IS DEEMED TO HAVE BASED THEIR BID/PRICE ON THE MORE EXPENSIVE MATERIAL, EQUIPMENT, PRODUCT OR WORK, UNLESS THEY HAVE REQUESTED AND OBTAINED A WRITTEN CLARIFICATION OR DECISION IN REGARD TO THE CONFLICT FROM THE ARCHITECT/ENGINEER.

C. DRAWINGS AND MEASUREMENTS:
1. THE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL SCOPE OF THE WORK I.E., ARRANGEMENT OF SYSTEMS AND EQUIPMENT, EXCEPT WHEN THEY HAVE BEEN SPECIFICALLY DIMENSIONED OR DETAILED.
2. PLUMBING PLANS ARE INTENDED TO SHOW SIZE, CAPACITY, APPROXIMATE LOCATION, DIRECTION, AND GENERAL RELATIONSHIP OF ONE WORK TRADE TO ANOTHER.
3. COORDINATION: THE PLUMBING DESIGN SHALL BE COORDINATED WITH ALL OTHER ASPECTS OF THE BUILDING. TO THAT END, THE PLUMBING CONTRACTOR IS RESPONSIBLE FOR REVIEWING THE ARCHITECTURAL, STRUCTURAL, MECHANICAL, ELECTRICAL AND CIVIL DRAWINGS WHERE AVAILABLE, AS WELL AS PHYSICALLY OBSERVING FIELD CONDITIONS BEFORE PERFORMING ANY WORK. EXTRAS WILL NOT BE PAID TO MOVE PIPING DUE TO CONFLICTS ARISING FROM LACK OF COORDINATION.
   a. REFER TO THE ARCHITECTURAL DRAWINGS FOR BUILDING ELEVATIONS, CEILING DETAILS, PARTITIONS, AND OCCUPANCIES.
   b. REFER TO STRUCTURAL DRAWINGS TO COORDINATE PIPING LAYOUT WITH STRUCTURAL ELEMENTS OF THE BUILDING.
   c. REFER TO THE FIRE PROTECTION DRAWINGS (WHEN AVAILABLE) AND MECHANICAL DRAWINGS TO ASSESS THE CONGESTION ABOVE CEILINGS. THE PLUMBING CONTRACTOR SHALL SPECIFICALLY BE CONSCIOUS OF ANY HORIZONTAL MECHANICAL EQUIPMENT LOCATIONS AS WELL AS THEIR CLEAR SERVICE SPACE REQUIREMENTS IN ADDITION TO ANY DUCTWORK OR HYDRONIC PIPING.
   d. CONTRACT DRAWINGS SHALL ONLY SERVE TO SHOW THE GENERAL ARRANGEMENT OF EQUIPMENT AND STRUCTURE. SUCH DRAWINGS SHALL NOT BE CONSIDERED A SUBSTITUTE FOR FIELD VERIFICATION OF CONDITIONS. COORDINATION SHALL OCCUR PRIOR TO FABRICATION, PURCHASE, AND/OR INSTALLATION OF ALL WORK. DISCUSS, COORDINATE AND COOPERATE WITH OTHER TRADES AND COORDINATE THE WORK WITH THEIRS. COORDINATE CEILING CAVITY SPACE CAREFULLY WITH OTHER TRADES. BRING ANY CONFLICTS TO THE ATTENTION OF THE ARCHITECT/ENGINEER.
   e. AS THE DRAWINGS ARE OF SMALL SCALE, IT IS NOT POSSIBLE TO SHOW ALL NECESSARY OFFSETS, FITTINGS, AND ACCESSORIES. OBTAIN EXACT LOCATIONS, FIELD MEASUREMENTS, ETC., AT THE SITE PRIOR TO THE FABRICATION OF ANY MATERIAL OR ORDERING OF EQUIPMENT.
4. THE DESIGN (DRAWINGS AND SPECIFICATIONS) ARE BASED ON THE CHARACTERISTICS OF THE EQUIPMENT SCHEDULED / SPECIFIED. ALL CHANGES REQUIRED BY THE USE OF OTHER MANUFACTURERS (INCLUDING MANUFACTURERS THAT ARE LISTED IN THE SPECIFICATIONS) SHALL BE MADE BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
   a. THESE CHANGES SHALL INCLUDE, BUT NOT BE LIMITED TO REVISIONS TO FOUNDATIONS, ELECTRICAL CHANGES, SPACE REQUIRED FOR PLACEMENT OF EQUIPMENT, EQUIPMENT BASES, PIPING, CONTROLS, WIRING, WALL OR BUILDING OPENINGS, SERVICE ACCESS REQUIREMENTS, PIPING AND STRUCTURAL MODIFICATIONS.

D. WORK SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH THE NEW YORK CITY PLUMBING CODE 2022, LOCAL AMENDMENTS, LAWS AND GOVERNING BODIES. WHERE THE PLANS AND/OR SPECIFICATIONS EXCEED THE GOVERNING CODE REQUIREMENTS, THE PLANS AND SPECIFICATIONS WILL GOVERN.

E. PROVIDE COORDINATION DRAWINGS WHERE REQUIRED BY THE SPECIFICATIONS. RFIs RELATED TO COORDINATION ITEMS WILL NOT BE REVIEWED UNLESS COORDINATION DRAWINGS HAVE BEEN SUBMITTED.

F. ALL MATERIALS EXPOSED WITHIN AN AIR PLENUM SHALL BE NONCOMBUSTIBLE OR HAVE A FLAME SPREAD INDEX OF NOT MORE THAN 25 AND A SMOKE-DEVELOPMENT INDEX OF NOT MORE THAN 50.

G. WHERE LOCATIONS OF ANY EXISTING UTILITY SERVICES ARE SHOWN, THEY SHALL BE CONSIDERED AS "APPROXIMATE". EXACT LOCATIONS OF ANY EXISTING UTILITY SERVICES SHALL BE CONFIRMED BY THE CONTRACTOR PRIOR TO BEGINNING ANY CONSTRUCTION OR EXCAVATION. COORDINATE UTILITY SERVICE CONNECTION POINTS WITH EXTERIOR UNDERGROUND AND OVERHEAD UTILITIES AND SERVICES. COMPLY WITH REQUIREMENTS OF GOVERNING REGULATIONS, FRANCHISED SERVICE COMPANIES, AND CONTROLLING AGENCIES. THE CONTRACTOR IS RESPONSIBLE FOR AND SHALL BEAR ALL COSTS ASSOCIATED WITH DAMAGE TO ANY EXISTING UTILITIES DURING CONSTRUCTION.

H. PIPE RUNS SHALL BE INSTALLED TO AVOID INTERFERENCE WITH OTHER WORK/TRADES. INSTALL PIPING AT RIGHT ANGLES TO OR PARALLEL WITH BUILDING WALLS OR COLUMN CENTER LINES. DIAGONAL PIPING RUNS ARE PROHIBITED UNLESS SPECIFICALLY INDICATED OTHERWISE. LOCATE GROUPS OF PIPES PARALLEL TO EACH OTHER. SPACE PIPING INCLUDING ANY INSULATION TO PROVIDE A 1-INCH MINIMUM CLEARANCE BETWEEN ADJACENT PIPING OR OTHER SURFACES. SPACE PIPING TO PERMIT VALVE SERVICING OR REPLACEMENT.

I. IN AREAS WHERE PIPING IS INSTALLED ABOVE A CEILING AND THERE IS CONGESTED CEILING SPACE, INSTALL THE PIPING AS HIGH AS POSSIBLE WHILE GIVING CONSIDERATION OF OTHER TRADES AND THE SERVICEABILITY OF THE SYSTEMS. WHERE VALVES ARE SHOWN, THEY SHALL BE INSTALLED NO MORE THAN 18-INCHES ABOVE THE CEILINGS. IF IT IS NECESSARY TO INSTALL OFFSET(S) IN THE PIPING SO THE VALVES ARE INSTALLED NO MORE THAN 18-INCHES ABOVE THE CEILINGS, INSTALL A DRAIN VALVE WITH HOSE END CONNECTION FOR EACH SYSTEM ADJACENT TO THE ISOLATION VALVE(S). IF THERE IS AN OFFSET UP ON THE OUTLET SIDE OF THE ISOLATION VALVE(S), THEN PROVIDE A SECOND DRAIN VALVE AT THAT LOCATION.

J. PLUMBING EQUIPMENT, PIPING, OR ACCESSORIES SHOULD NOT BE LOCATED WITHIN ELECTRICAL EQUIPMENT ROOMS UNLESS INDICATED ON THE DRAWINGS. WHERE PIPING AND EQUIPMENT ARE INDICATED TO BE INSTALLED WITHIN ELECTRICAL EQUIPMENT ROOMS, MAINTAIN THE ELECTRICAL CODE REQUIRED WORKING AND DEDICATED SPACES.

K. PLUMBING EQUIPMENT, PIPING, OR ACCESSORIES SHALL NOT PASS THRU OR OVER ANY SERVER (COMM / IT) ROOMS.

L. INSTALL HANGERS FOR METALLIC PIPE AND TUBING NOT TO EXCEED THE MAXIMUM HORIZONTAL AND VERTICAL SPACING AND MINIMUM HANGER ROD DIAMETERS TO COMPLY WITH THE 2022 NEW YORK CITY PLUMBING CODE, MSS SP-58 STANDARD PRACTICE FOR PIPE HANGERS AND SUPPORTS, LOCALLY ENFORCED CODES AND AHJ REQUIREMENTS, WHICHEVER ARE MOST STRINGENT. WHERE CONFLICTS ARISE BETWEEN THE PLUMBING CODE REQUIREMENTS, MSS SP-58 AND THE PROJECT SPECIFICATIONS, THE MOST RESTRICTIVE OR THE REQUIREMENT THAT SPECIFIES SUPPORTS WITH HIGHEST LOAD RATING OR SHORTEST HANGER SPACING SHALL APPLY.
1. WHERE HANGER SPACING DOES NOT CORRESPOND WITH JOIST OR RIB SPACING, USE STRUCTURAL STEEL CHANNELS SECURED DIRECTLY TO JOIST AND RIB STRUCTURE TO MEET THE REQUIRED HANGER SPACING. THEN, SUSPEND THE EQUIPMENT AND PIPING FROM THE CHANNELS. HOLES WILL NOT BE DRILLED OR BURNED IN STRUCTURAL STEEL WITHOUT PRIOR WRITTEN APPROVAL OF THE STRUCTURAL ENGINEER OF RECORD.
2. PROVIDE ADDITIONAL SUPPORTS AT VALVES, STRAINERS, INLINE PUMPS AND OTHER HEAVY COMPONENTS. PROVIDE SUPPORT WITHIN ONE FOOT OF EACH PIPE ELBOW.

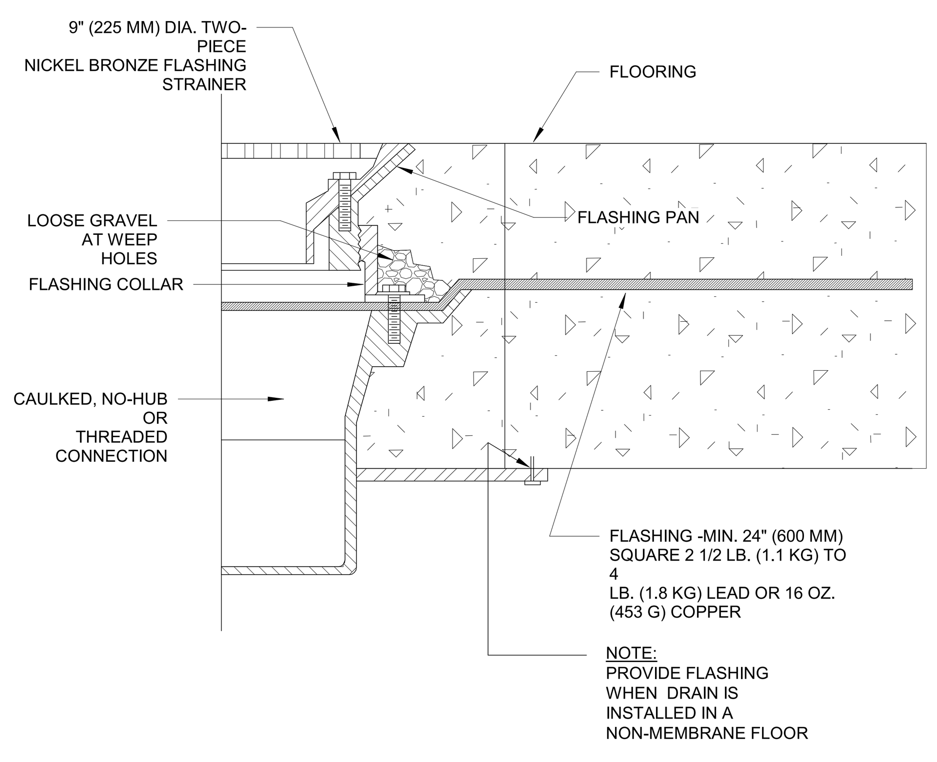
M. CONDENSATE SHALL NOT DISCHARGE INTO A STREET, ALLEY OR ONTO GRADE. CONDENSATE DRAINS FROM ALL COOLING COILS AND EVAPORATORS SHALL BE CONVEYED FROM THE DRAIN PAN OUTLET TO A DRYWELL AS SHOWN ON THE PLANS.

N. PROVIDE CLEANOUTS (FLOOR OR WALL AS REQUIRED) EVERY 100', AT AGGREGATE CHANGES IN DIRECTION IN EXCESS OF 45°, AT THE END OF ALL SANITARY AND STORM DRAIN RUNS, AND AT THE BASE OF ALL SEWER AND STORM DRAIN STACKS. PROVIDE WHETHER INDICATED ON PLANS OR NOT BASED ON ACTUAL FIELD ROUTING.

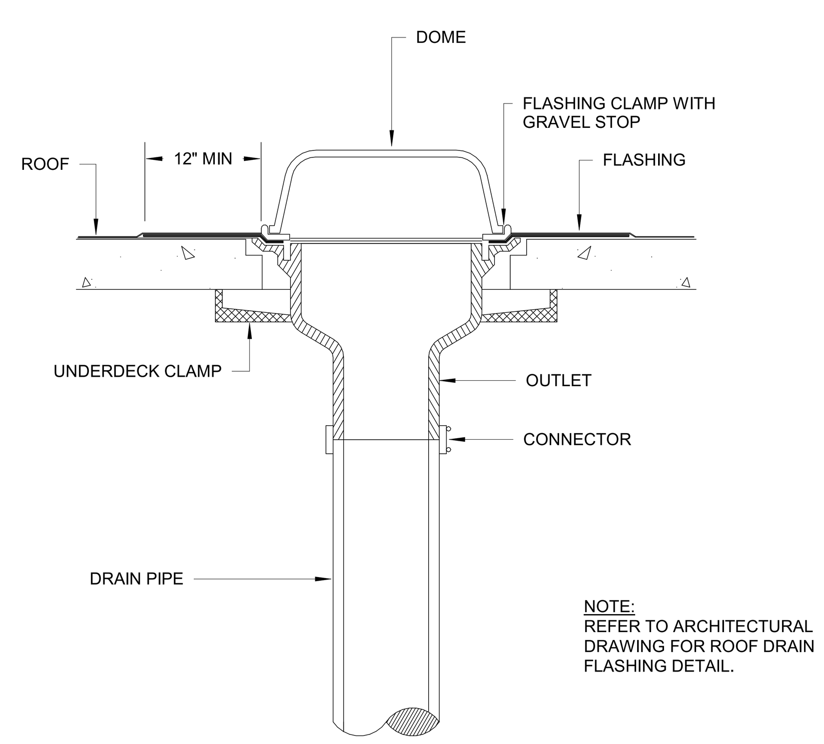
O. THE DETAILS SHOWN ON THE DETAIL SHEETS APPLY TO ALL PLUMBING PLAN SHEETS. THE DETAILS ARE TO BE FOLLOWED FOR THE INSTALLATION OF ALL COMPONENTS AND EQUIPMENT SHOWN.

PLUMBING FIXTURE SCHEDULE

ID	FIXTURE	LOCAL CONNECTIONS (IN) W	V	CW	HW	TW	STORM	BASIS OF DESIGN	REMARKS	NOTES
AD-1	AREA DRAIN						SEE PLANS	JAY R SMITH 2110	DUCO CAST IRON BODY, 8" ROUND TOP, NICKEL BRONZE STRAINER, VANDAL RESISTANT SCREWS.	
DSN-1	DOWNSPOUT NOZZLE						SEE PLANS	JAY R SMITH 1770Y	NO-HUB OUTLET, BIRD SCREEN, SEE PLANS FOR SIZING	
RD-1	ROOF DRAIN						SEE PLANS	JOSAM 21500 ROOF DRAIN	SEE PLANS FOR ROOF DRAIN SIZING	



5 / P.000.10 FLOOR DRAIN DETAIL
NO SCALE



6 / P.000.10 ROOF DRAIN DETAIL
NO SCALE

GENERAL SYMBOLS

SYMBOL	DESCRIPTION
	POINT OF DISCONNECT - DEMOLITION REMOVED FROM EXISTING
	POINT OF CONNECTION - NEW CONNECTS TO EXISTING
	AREA NOT IN CONTRACT

PIPING ANNOTATIONS

SCHEMATIC	3D	DESCRIPTION
		EXISTING TO REMAIN - (E) or EXIST
		ITEM TO BE DEMOLISHED - (D) or DEMO
18" CHWS	18" CHWS	PIPE SIZE TAG (DIAMETER WITH SYSTEM NAME)
		ABOVE GROUND PIPING
		BELOW GROUND PIPING
1/8" / 12" SLOPE	1/8" / 12" SLOPE	PIPE SLOPE
IE: -93' - 1"	IE: -93' - 8"	PIPE INVERT ELEVATION
DDC-xx		MECHANICAL EQUIPMENT TAG
		MECHANICAL EQUIPMENT CLEARANCE

PLUMBING SYMBOLS

SCHEMATIC	3D	DESCRIPTION
		DOMESTIC COLD WATER (LINETYPE)
		DOMESTIC HOT WATER (LINETYPE)
		DOMESTIC HOT WATER RECIRC (LINETYPE)
NV	NV	LAB NITROGEN VENT
AV	AV	ACID VENT
GV	GV	GREASE VENT
OV	OV	OIL VENT
IW	IW	INDIRECT WASTE
V	V	SANITARY VENT
CO	CO	CLEAN OUT
WCO	WCO	WALL CLEAN OUT
FCO	FCO	FLOOR CLEAN OUT
GCO	GCO	GRADE CLEAN OUT (DOUBLE CLEAN OUT)
		FLOOR DRAIN / FLOOR SINK
		ROOF DRAIN / OVERFLOW DRAIN
		DOWNSPOUT NOZZLE
		WALL HYDRANT
		HOSE BIBB
X		WATER HAMMER ARRESTER
AE		ANESTHESIA EVACUATOR
A		MEDICAL COMPRESSED AIR OUTLET
D		DEIONIZED WATER OUTLET
DS		DISTILLED WATER OUTLET
G		NATURAL GAS OUTLET
N		NITROGEN OUTLET
NO		NITROUS OXIDE OUTLET
		OXYGEN OUTLET
V		VACUUM INLET
XX		RISER TAG
8" ORD- 1,500 SF		ROOF DRAIN TAG
3" FS-		PLUMBING FIXTURE TAG

PIPING VALVES AND FITTINGS

SCHEMATIC	3D	DESCRIPTION
		PIPE DROP
		PIPE RISE
		PIPE TEE DOWN
		PIPE TEE UP
		CONCENTRIC REDUCER
		ECCENTRIC REDUCER
		PIPE CAP
		PIPE ALIGNMENT GUIDE
		PIPE ANCHOR
		FLOW DIRECTION
		EXPANSION JOINT
		FLEXIBLE CONNECTION
		UNION
		DIRECTION OF PIPE PITCH
		AQUASTAT
		EXPANSION LOOP
		BALANCING VALVE
		BALANCING VALVE W/ METERING POINTS
		BALL VALVE
		BUTTERFLY VALVE
		CHECK VALVE
		STEAM TRAP
		GATE VALVE
		CIRCUIT SETTER
		MANUAL AIR VENT
		AUTOMATIC AIR VENT
		PLUG VALVE
		PRESSURE GAUGE
		SOLENOID VALVE
		ANGLE VALVE
		AUTOMATIC CONTROL VALVE 2-WAY
		AUTOMATIC CONTROL VALVE 3-WAY
		AUTOMATIC FLOW CONTROL VALVE
		STRAINER
PT		PRESSURE AND TEMPERATURE TEST PORT
		THERMOMETER
		PRESSURE REDUCING VALVE (WATER SYSTEMS) PRESSURE REGULATING VALVE (GAS SYSTEMS)
		RELIEF VALVE
		FLOW MEASURING DEVICE
		BACKFLOW PREVENTER
		UNION

*** 3D VALVE REPRESENTATION IS AN EXAMPLE. VALVE IN MODEL MAY VARY DEPENDING ON APPLICATIONS. SEE SPECIFICATIONS.

SHEET INDEX

P.000.10 PLUMBING GENERAL NOTES, SYMBOLS, SCHEDULES & DETAILS

PD.100.00 LEVEL 00 - PLUMBING DEMOLITION PLAN

P.100.00 LEVEL 00 - PLUMBING PLAN
P.101.00 LEVEL 01 - PLUMBING PLAN

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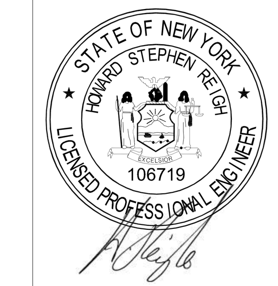

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PLUMBING GENERAL NOTES, SYMBOLS, SCHEDULES & DETAILS

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LEVEL 00 - PLUMBING DEMOLITION PLAN

SCALE: 3/32" = 1'-0"

SHEET NOTES	
Key Value	Keynote Text

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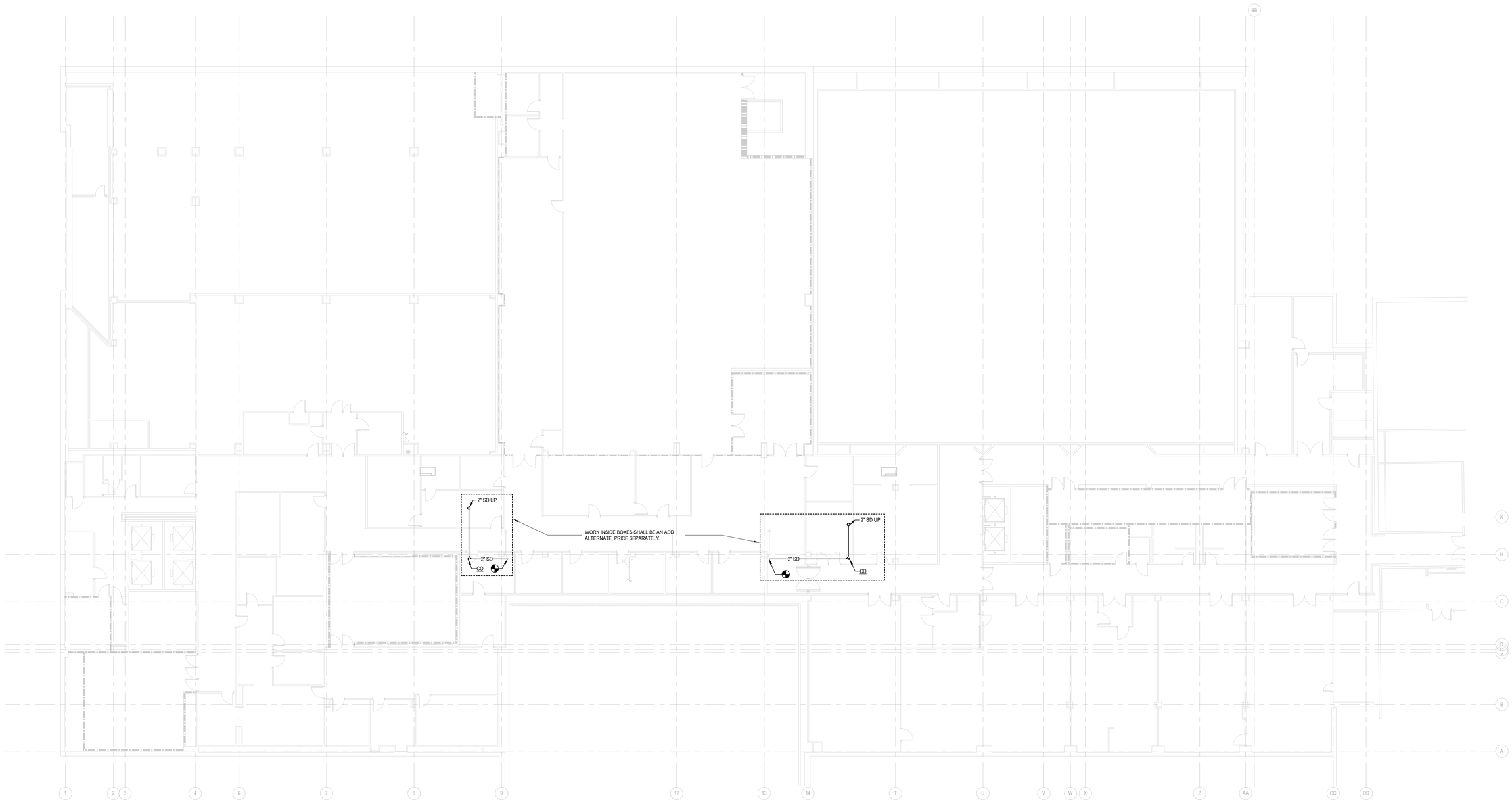

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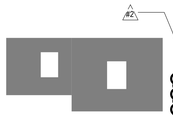
LEVEL 00 - PLUMBING PLAN

SCALE: 3/32" = 1'-0"

SHEET NOTES



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LEVEL 00 - PLUMBING PLAN

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LEVEL 01 - PLUMBING PLAN

SCALE: 3/32" = 1'-0"

SHEET NOTES

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LEVEL 01 - PLUMBING PLAN

#2

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ABBREVIATIONS

(R)	RELOCATED
Ø	PHASE
A	AMPERE
AC	ABOVE COUNTER
AF	AMP FRAME (CIRCUIT BREAKER)
AIC	AMPERE INTERRUPTING CAPACITY
AL	ALUMINUM
AMP	AMPERE
AP	WIRELESS ACCESS POINT
AT	AMP TRIP (CIRCUIT BREAKER OR FUSE)
ATS	AUTOMATIC TRANSFER SWITCH
AV	AUDIO-VIDEO, AUDIO-VISUAL
AWG	AMERICAN WIRE GAUGE
BAS	BUILDING AUTOMATION SYSTEM
BJ	BONDING JUMPER
BKR	BREAKER
BMS	BUILDING MANAGEMENT SYSTEM
C	CONDUIT
CAS	CASING
CATV	CABLE TELEVISION
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CE	COVER ELEVATION
CEM	CEMENT
CFCI	CONTRACTOR FURNISHED CONTRACTOR INSTALLED
CG	CORNER GUARD
CH	CHANNEL
CJ	CONSTRUCTION JOINT
CKT	CIRCUIT
CKT BK	CIRCUIT BREAKER
CL	CIRCUIT LINE
CM	CEILING MOUNTED
CMP	CORRUGATED METAL PIPE
CO	CONDUIT ONLY
COMP	COMPOSITE
COOR	COORDINATE
COORD	COORDINATE
CSK	COUNTERSUNK
CT	CURRENT TRANSFORMER
CTL	CONTROL
CU	COPPER
CWV	COMBINATION WASTE AND VENT
DB	DECIBEL
DC	DIRECT CURRENT
DISC	DISCONNECT
DP	DISTRIBUTION PANELBOARD
DW	DISHWASHER
ECS	EMERGENCY COMMUNICATION SYSTEM
EGB	ELECTRICAL GROUNDING BUSBAR
EMD	ESTIMATED MAXIMUM DEMAND
EMGB	ELECTRICAL MAIN GROUNDING BUSBAR
EP	EXPLOSION PROOF
ERMS	ENERGY REDUCTION MAINTENANCE SWITCH
EWC	ELECTRIC WATER COOLER
FA	FIRE ALARM
FAA	FIRE ALARM ANNUNCIATOR
FACP	FIRE ALARM CONTROL PANEL
FC	FOOT CANDLE
FLA	FULL LOAD AMPS
FS	FLOW SWITCH
FSD	FIRE SMOKE DAMPER
G	EQUIPMENT GROUNDING CONDUCTOR
GEN	GENERATOR
GFI, GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFPE	GROUND FAULT PROTECTION OF EQUIPMENT
GND	EQUIPMENT GROUNDING CONDUCTOR
HH	HANDHOLE
HOA	HAND-OFF-AUTOMATIC
HP	HORSE POWER
IC	INTERCOM
IG	ISOLATED GROUND
JB	JUNCTION BOX
KAIC	THOUSAND AMPERE INTERRUPTING CIRCUIT
KV	KILOVOLT
KVA	KILOVOLT AMPERES
KW	KILOWATT
LT	LIGHT
LTG	LIGHTING
MCA	MINIMUM CIRCUIT AMPACITY
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MH	MANHOLE
MLO	MAIN LUGS ONLY
MOCP	MAXIMUM OVERCURRENT PROTECTION
MRTS	MOTOR RATED TOGGLE SWITCH
MSB	MAIN SWITCHBOARD
MTD	MOUNTED
MTG	MOUNTING
MTS	MAIN TRANSFER SWITCH
N	NEUTRAL
NC	NORMALLY CLOSED
NF	NON-FUSED
NL	NIGHT LIGHT
NO	NORMALLY OPEN
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
OS&Y	OUTSIDE SCREW AND YOKE
P	POLE(S)
PA	PUBLIC ADDRESS
PB	PULL BOX
PH	PHASE
PIV	POST INDICATOR VALVE
PNL	PANEL
PWR	POWER
RCP	REFLECTED CEILING PLAN
RECPT	RECEPTACLE
REF	REFERENCE
RESP	RESPONSIVE
SCCR	SHORT CIRCUIT CURRENT RATING
SD	SMOKE DAMPER
SEC	SECONDARY
SPD	SURGE PROTECTION DEVICE
SWBD	SWITCHBOARD
TBB	TELECOMMUNICATIONS BONDING BACKBONE
TC	TIME CLOCK
TGB	TELECOMMUNICATIONS GRONDING BUSBAR
TMGB	TELECOMMUNICATIONS MAIN GRONDING BUSBAR
TO	TELECOMMUNICATIONS OUTLET
TR	TELECOMMUNICATIONS ROOM
TS	TAMPER SWITCH
TV	TELEVISION
UG	UNDERGROUND
UPS	UNINTERRUPTABLE POWER SUPPLY
V	VOLT
VA	VOLT-AMPERE
VFD	VARIABLE FREQUENCY DRIVE
W	WIRE
WA	TELECOMMUNICATIONS WORK AREA
WG	WIRE GUARD
WP	WEATHER-PROOF (NEMA 3R)
XFMR	TRANSFORMER

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* NOTE *

ALL NOTES ON THIS SHEET ARE APPLICABLE TO ALL OTHER SHEETS IN THIS SET.

THE SYMBOLS AND ABBREVIATIONS SHOWN ON THIS SHEET MAY OR MAY NOT BE APPLICABLE IN THIS SET OF DRAWINGS.

NOTES

GENERAL NOTES

1. MODIFICATIONS TO EXISTING POWER DISTRIBUTION EQUIPMENT: MATCH EXISTING MANUFACTURER, SWITCH TYPE, FUSE TYPE, BREAKER TYPE AND KAIC RATING FOR ALL INSTALLED DEVICES.
2. EXISTING PANEL DIRECTORIES AT PANELS AFFECTED BY WORK: PROVIDE UPDATED TYPED PANEL DIRECTORY. CONSULT OWNER FOR INPUT ON LABELING OF ALL EXISTING CIRCUITS.
3. DEVICES AND LIGHT FIXTURES DENOTED 'ER' ARE EXISTING TO BE RELOCATED. NOTIFY A/E IF DEVICES OR FIXTURES ARE DAMAGED.

GENERAL DEMOLITION NOTES

1. ITEMS INDICATED ON DEMOLITION PLANS ARE BASED ON AS-BUILT DRAWINGS AND FIELD OBSERVATIONS AND ARE INTENDED TO GIVE THE BIDDER A GENERAL REPRESENTATION OF EXISTING CONDITIONS.
2. REMOVE ALL ITEMS SHOWN FULL-TONE OR NOTED ELSEWHERE IN THE DOCUMENTS TO BE REMOVED OR DEMOLISHED. DEMOLISH ADDITIONAL ITEMS NOT SHOWN ON DRAWINGS, BUT WHICH MUST BE REMOVED TO COMPLETE THE PROJECT.
3. ITEMS SHOWN HALF-TONE ARE EXISTING TO REMAIN.
4. RELOCATE ITEMS DENOTED 'ER'. SEE LIGHTING, POWER AND/OR SPECIAL SYSTEM SHEETS FOR NEW LOCATIONS. 'ER' IS DEFINED AS EXISTING (TO BE) RELOCATED.
5. EXISTING CONDUIT MAY REMAIN IF ALL THE FOLLOWING ARE TRUE:
   A. IT CAN BE REUSED TO FEED DEVICES INSTALLED UNDER THIS CONTRACT.
   B. IT DOES NOT INTERFERE WITH OTHER TRADES.
   C. IT WAS ORIGINALLY INSTALLED MEETING SPECIFICATIONS RELATED TO THIS PROJECT.
   D. IT WILL NOT BE EXPOSED IN A FINISHED AREA (UNLESS NOTED OTHERWISE).
6. PROVIDE ELECTRICAL DEMOLITION ASSOCIATED WITH MECHANICAL EQUIPMENT TO BE REMOVED. IN ADDITION TO DEVICES SHOWN, REFER TO MECHANICAL AND ARCHITECTURAL DEMOLITION SHEETS TO DETERMINE EQUIPMENT TO BE REMOVED.
7. MAINTAIN FUNCTIONALITY OF ALL EXISTING LOW VOLTAGE SYSTEMS INCLUDING, BUT NOT LIMITED TO, TELECOM CABLING NETWORKS, INTERCOM, CLOCKS, FIRE ALARM, SAFETY AND SECURITY DURING ALL PHASES OF CONSTRUCTION. PROVIDE TEMPORARY INTERCONNECTIONS AS REQUIRED TO ACCOMMODATE CONSTRUCTION SCHEDULE.

GENERAL POWER NOTES

1. VERIFY ANY NEUTRAL WIRES REQUIRED ON 1Ø OR 3Ø MECHANICAL UNITS FURNISHED UNDER DIVISION 23. IF REQUIRED, PROVIDE NEUTRAL.
2. PROVIDE DEDICATED 120-VOLT CIRCUITS TO ALL HVAC BAS CONTROL DEVICES AND PANELS. COORDINATE QUANTITY WITH DIVISION 23. UTILIZE NEAREST SPARE 120-VOLT, 20/1 BREAKER. LABEL TYPED PANEL DIRECTORY ACCORDING TO LOAD BEING SERVED.
3. IN ADDITION TO DEVICES SHOWN, SEE SCHEDULE SHEETS FOR CONNECTIONS TO ALL MECHANICAL EQUIPMENT.
4. LOCATE SWITCHES FOR CONTROL OF FANS IN TWO-GANG BOX WITH LIGHT SWITCH WHERE APPLICABLE.
5. PROVIDE #10AWG CONDUCTORS FOR ALL WARM AIR DRYER CIRCUITS. PROVIDE LOCKOUT DEVICE AT ALL BREAKERS SERVING WARM AIR DRYERS.

GENERAL LIGHTING NOTES

1. SEE LIGHT FIXTURE SCHEDULE AND SYMBOLS LEGEND FOR MOUNTING HEIGHTS, UNLESS NOTED OTHERWISE.
2. PROVIDE #10AWG MINIMUM CONDUCTORS FOR ALL EXTERIOR LIGHTING CIRCUITS.
3. SEE ARCHITECTURAL BUILDING ELEVATIONS FOR LOCATION OF BUILDING MOUNTED EXTERIOR LIGHT FIXTURES.
4. PROVIDE BEAD OF SILICONE SEALANT AROUND RECESSED BACK BOX PERIMETER AT ALL BUILDING MOUNTED EXTERIOR LIGHT FIXTURE LOCATIONS.
5. CIRCUIT FIXTURES DENOTED WITH 'NL' AS UNSWITCHED NIGHT LIGHTS.
6. FIXTURES DENOTED WITH LOWER CASE LETTERS SHALL BE CONTROLLED BY SWITCHES DENOTED WITH THE SAME LOWER CASE LETTER IN EACH ROOM.

GENERAL DEVICE BOX NOTES

1. SEE SYMBOLS LEGEND THIS SHEET FOR MOUNTING HEIGHTS UNLESS NOTED OTHERWISE ON DRAWINGS.
2. ALL MOUNTING HEIGHTS ARE TO CENTERLINE OF BOXES UNLESS NOTES OTHERWISE.
3. PROVIDE BOX EXTENDER FOR FLUSH INSTALLATION OF DEVICES LOCATED IN ARCHITECTURAL CASEWORK THAT IS FLUSH WITH ADJACENT WALL (SUCH AS RECEPTACLES FOR GARBAGE DISPOSERS).
4. FLOOR BOXES: OBTAIN OWNER APPROVAL OF ALL BOX LOCATIONS PRIOR TO ROUGH IN. PROVIDE DEVICE PLATES AT DEVICES AND BLANK PLATES AT ALL UNUSED COMPARTMENTS.
5. COORDINATE LOCATION OF DEVICE BOXES FOR SWITCHES, RECEPTACLES, AND SYSTEMS DEVICES WITH MARKERBOARDS. ADJUST BOX LOCATIONS TO AVOID MARKERBOARDS.
6. COORDINATE LOCATION OF DEVICE BOXES FOR SWITCHES, RECEPTACLES, AND SYSTEMS DEVICES WITH TACKBOARDS. ADJUST BOX LOCATIONS TO AVOID TACKBOARDS. PROVIDE BOX EXTENDER FOR A FLUSH INSTALLATION WHERE DEVICES MUST BE MOUNTED AT TACKBOARD/TACKWALL.
7. CEILING MOUNTED RECEPTACLES: AT SUSPENDED CEILINGS, ROUTE POWER TO RECEPTACLE VIA FLEXIBLE METALLIC CONDUIT WITH 6-FOOT SERVICE LOOP. FEED FMC FROM A J-BOX RIGIDLY SUPPORTED A MAXIMUM OF 24-INCHES ABOVE SUSPENDED CEILING OR AT BOTTOM OF STRUCTURE ABOVE, WHICHEVER IS LOWER. LOCATE J-BOX DIRECTLY ABOVE RECEPTACLE AND SUPPORT VIA STRUCTURE, OR VIA THREAD ROD AND UNISTRUT HUNG FROM STRUCTURE ABOVE IN HIGH STRUCTURE APPLICATIONS.
8. DEVICES RECESSED IN MULLIONS: BACK BOXES TO BE RECESSED FOR FLUSH INSTALLATION OF DEVICE AND WALLPLATE. EXTEND CONCEALED CONDUIT IN MULLION UP TO WALL ABOVE AND STUB OUT ABOVE ACCESSIBLE CEILING. IN AREAS WITH NO CEILING, EXTEND CONDUIT TOWARDS CABLING SOURCE TO ABOVE NEAREST ACCESSIBLE CEILING.

GENERAL SYSTEMS NOTES

DIVISION 26

1. TELECOMMUNICATIONS OUTLETS: PROVIDE TWO-GANG BOX (2.25-INCH DEEP MINIMUM) WITH SINGLE-GANG STRAP MOUNT PLASTER RING AND 1-INCH CONDUIT STUBBED INTO ACCESSIBLE SPACE ABOVE FINISHED CEILING (EXCEPTION: VOICE-ONLY OR VIDEO-ONLY OUTLETS PER NOTE BELOW).
2. TELECOMMUNICATIONS OUTLET INDICATED AS ROUGH IN ONLY (NO SUBSCRIPTS): INSTALL PER NOTE ABOVE, WITH BLANK 302SS SINGLE-GANG WALLPLATE.
3. VOICE-ONLY OR VIDEO-ONLY TELECOMMUNICATIONS OUTLET: PROVIDE SINGLE-GANG BOX WITH 1-INCH CONDUIT STUBBED INTO ACCESSIBLE SPACE ABOVE FINISHED CEILING.
4. MISCELLANEOUS LOW VOLTAGE OUTLETS (CALL STATIONS, HANDSETS, VOLUME CONTROL, MICROPHONE OUTLETS, SURFACE-MOUNT WALL SPEAKERS AND FIRE ALARM DEVICES): PROVIDE SINGLE-GANG BOX WITH 3/4-INCH CONDUIT STUBBED INTO ACCESSIBLE SPACE ABOVE FINISHED CEILING.
5. INSULATED BUSHINGS: PROVIDE BUSHINGS ON ALL CONDUIT STUB UPS, INCLUDING BUT NOT LIMITED TO, OUTLETS FOR TELECOMMUNICATIONS, FIRE ALARM, SECURITY, ACCESS CONTROL, MASS NOTIFICATION, PUBLIC ADDRESS, ALL OTHER LOW VOLTAGE INTERCOMMUNICATIONS AND UNUSED STUB-UPS OR STUB-UPS INDICATED FOR FUTURE USE.
6. FLOOR BOXES CONTAINING TELECOMMUNICATIONS OUTLETS: FOR EACH LOW-VOLTAGE COMPARTMENT, ROUTE 1-INCH CONDUIT WITH PULL STRING UNDERFLOOR, UP NEAREST WALL, AND STUB INTO ACCESSIBLE SPACE ABOVE FINISHED CEILING. LABEL CONDUIT END 'FLOOR BOX'
7. SLEEVES FOR LOW VOLTAGE CABLES: PROVIDE 2-INCH SLEEVES UNLESS NOTED OTHERWISE. COORDINATE WITH PATH OF DUCTWORK AND GWB CEILING TO ENSURE ACCESSIBILITY, EXTEND SLEEVES AS REQUIRED. INSTALL ALL SLEEVES 4-INCHES ABOVE HIGHER CEILING OF TWO ADJACENT SPACES. REFER TO ROOM FINISH SCHEDULES AND REFLECTED CEILING PLANS FOR CEILING HEIGHTS. STUB SLEEVES INTO JOIST SPACE OF FINISHED ROOMS WITH EXPOSED STRUCTURE. PROVIDE INSULATED BUSHINGS ON BOTH ENDS OF ALL SLEEVES, INCLUDING UNUSED SLEEVES. PROVIDE GROUT OR ESCUTCHEONS TO SECURE SLEEVES TO WALL. PROVIDE FIRE-RATED SLEEVES AT ALL FIRE-RATED WALLS.
8. PROVIDE ADDITIONAL CONDUIT, BOXES, CONDUCTORS AND OVERCURRENT PROTECTION FOR 120-VOLT BRANCH CIRCUITS NOT SPECIFICALLY COVERED UNDER DIVISION 26 WORK, BUT REQUIRED TO COMPLETE DIVISION 08 AND 28 WORK. DEVICES SHALL INCLUDE, BUT NOT BE LIMITED TO, POWER SUPPLIES FOR DOOR HARDWARE, ACCESS CONTROL, FIRE ALARM AND VIDEO SURVEILLANCE.
9. CARD READERS: PROVIDE RECESSED SINGLE-GANG BOX WITH GASKETED BLANK COVERPLATE AND EMPTY 1-INCH CONDUIT STUBBED INTO NEAREST ACCESSIBLE SPACE ABOVE FINISHED CEILING OR JOIST SPACE OF ADJACENT EXPOSED STRUCTURE. LABEL CONDUIT END 'CARD READER'.
10. PROVIDE WATERFALL DROPOUTS AT ALL CABLE TRAY LOCATIONS ABOVE RUNWAYS, WALL/FLOOR MOUNTED RACKS, AND EQUIPMENT ENCLOSURES.
11. AUDIO VISUAL (AV) SYSTEMS: PROVIDE RECESSED BOXES, CONDUIT AND PULL STRINGS FOR ALL SYSTEM COMPONENTS.

GENERAL SYSTEMS NOTES

DIVISION 27

1. ALL SPEAKERS AND HORN-TYPE SPEAKERS ARE PART OF THE INTERCOM SYSTEM, UNLESS NOTED OTHERWISE.
2. PROVIDE SURFACE MOUNT ENCLOSURE AND BAFFLE FOR ALL SPEAKERS IN FINISHED SPACES WITH NO CEILINGS (EXPOSED STRUCTURE).
3. PROVIDE WIREGUARDS ON ALL CLOCKS IN GYMNASIUMS.
4. UTILIZE SLEEVES AND FIRE RATED SLEEVES AT RATED WALLS PROVIDED UNDER DIVISION 26 FOR INSTALLATION OF ALL LOW VOLTAGE CABLING. FOLLOW INDUSTRY STANDARDS TO MAINTAIN 40% FILL REQUIREMENTS IN ALL SLEEVES (SUPERSEDES NEC - DO NOT FILL SLEEVES TO CAPACITY). PROVIDE ADDITIONAL SLEEVES MEETING DIVISION 26 REQUIREMENTS AS REQUIRED.
5. SYSTEM PANEL LOCATIONS: AUXILIARY SYSTEM PANELS, POWER SUPPLIES OR OTHER EQUIPMENT ENCLOSURES SHALL NOT BE LOCATED IN TELECOM ROOMS UNLESS NOTED OTHERWISE. IF DRAWINGS DO NOT DEPICT LOCATIONS FOR AUXILIARY COMPONENTS, CONSULT OWNER OR A/E FOR APPROVED LOCATIONS PRIOR TO EQUIPMENT INSTALL.

GENERAL SYSTEMS NOTES

DIVISION 28

1. PROVIDE MINIMUM CANDELA RATINGS FOR ROOMS WITH WALL MOUNTED VISUAL NOTIFICATION APPLIANCES AS FOLLOWS:
   - <20'x20' = 15cd
   - <28'x28' = 30cd
   - <40'x40' = 60cd
   - >40'x40' = 110cd
2. PROVIDE MINIMUM CANDELA RATINGS FOR ROOMS WITH CEILING MOUNTED VISUAL NOTIFICATION APPLIANCES ON MAXIMUM 10' HIGH CEILING AS FOLLOWS:
   - <20'x20' = 15cd
   - <30'x30' = 30cd
   - <40'x40' = 60cd
   - >40'x40' = 110cd
3. INCREASE DEVICE RATINGS/SETTINGS WHEN LOCATED OFF-CENTER IN ROOMS TO MAINTAIN NFPA COVERAGE.
4. VISUAL DEVICES IN CORRIDORS SHALL BE 15cd. VISUAL DEVICES LOCATED IN OTHER AREAS SHALL BE 110cd UNLESS NOTED OTHERWISE.
5. IN ADDITION TO DEVICES SHOWN, SEE SCHEDULE SHEETS FOR FIRE ALARM SYSTEM DEVICES CONNECTIONS TO MECHANICAL EQUIPMENT.
6. PROVIDE FIRE ALARM MONITORING OF ALL FLOW AND TAMPER SWITCHES. CONFIRM QUANTITIES AND LOCATION WITH DIVISION 21.
7. UTILIZE SLEEVES AND FIRE RATED SLEEVES AT RATED WALLS PROVIDED UNDER DIVISION 26 FOR INSTALLATION OF ALL LOW VOLTAGE CABLING. FOLLOW INDUSTRY STANDARDS TO MAINTAIN 40% FILL REQUIREMENTS IN ALL SLEEVES (SUPERSEDES NEC - DO NOT FILL SLEEVES TO CAPACITY). PROVIDE ADDITIONAL SLEEVES MEETING DIVISION 26 REQUIREMENTS AS REQUIRED.
8. SYSTEM PANEL LOCATIONS: AUXILIARY SYSTEM PANELS, POWER SUPPLIES OR OTHER EQUIPMENT ENCLOSURES SHALL NOT BE LOCATED IN TELECOM ROOMS UNLESS NOTED OTHERWISE. IF DRAWINGS DO NOT DEPICT LOCATIONS FOR AUXILIARY COMPONENTS, CONSULT OWNER OR A/E PRIOR TO EQUIPMENT INSTALLATION.
9. DUCT SMOKE DETECTION: DETERMINE QUANTITY AND PLACEMENT OF DETECTORS REQUIRED FOR COVERAGE OF DUCTWORK BASED ON NFPA REQUIREMENTS. PROVIDE MECHANICAL EQUIPMENT FAN SHUTDOWN RELAY AT ALL DUCT DETECTORS. SEE HVAC PLANS FOR EQUIPMENT LOCATIONS. COORDINATE SHUTDOWN CONTROL WITH DIVISION 23.
10. SMOKE DAMPERS AND FIRE-SMOKE DAMPERS: PROVIDE FIRE ALARM CONNECTION AND 120-VOLT POWER TO EACH FIRE/SMOKE DAMPER SHOWN ON HVAC PLANS. PROVIDE DEDICATED CIRCUIT TO DAMPERS, ROUTED THROUGH NORMALLY CLOSED FIRE ALARM RELAY, MOUNTED ON WALL IN NEAREST ELECTRICAL ROOM. COORDINATE WITH DAMPER MANUFACTURER FOR SPECIFIC DAMPER LOAD REQUIREMENTS. RELAY SHALL BE CONTROLLED BY FACP, SUCH THAT, ON GENERAL ALARM DAMPERS CLOSE. FIRE ALARM CONNECTION TO DAMPER SHALL BE A SUPERVISORY CIRCUIT MONITORING STATUS OF INTEGRAL SMOKE DETECTOR, AND SHALL PROVIDE REMOTE FIRE/SMOKE DAMPER RESET. FACP SHALL INITIATE A SUPERVISORY SIGNAL WHEN INTEGRAL DETECTOR GOES INTO ALARM. FIRE/SMOKE DAMPERS MAY BE GROUPED TOGETHER ON SUPERVISORY CIRCUITS TO SIMPLIFY WIRING. COORDINATE REQUIREMENTS WITH FIRE/SMOKE DAMPER MANUFACTURER. UTILIZE SPARE 20/1 BREAKERS. LABEL TYPED PANEL DIRECTORY 'FIRE/SMOKE DAMPERS - (INDICATE AREA SERVED)'.
11. PROVIDE WIREGUARDS ON ALL FIRE ALARM STROBES AND HORN/STROBES IN GYMNASIUMS.

ELECTRICAL SYMBOLS

LIGHTING

LIGHTING FIXTURE TAG

XXX / XXX-X / XXX-X — FIXTURE TYPE; CKT DESIGNATION (PNL - CKT NO.); RELAY PANEL - RELAY NO. OR LOCAL SWITCH DESIGNATION

LIGHTING FIXTURES

- LIGHTING FIXTURE
- LIGHTING FIXTURE ON EMERGENCY SYSTEM
- CEILING FIXTURE, SURFACE, RECESSED OR PENDANT
- LIGHTING FIXTURE ON EMERGENCY SYSTEM
- LIGHTING TRACK, TRACK MOUNTED LIGHT FIXTURES
- LIGHTING FIXTURE
- WALL MOUNTED LIGHTING FIXTURE
- WALL WASHER
- HIGH BAY LIGHTING FIXTURE
- WALL MOUNTED LIGHTING FIXTURE
- SELF CONTAINED EMERGENCY LIGHTING UNIT MOUNT 94-INCHES AFF, UNO
- EXIT SIGN, CEILING MOUNTED, DIRECTIONAL ARROW(S) AS INDICATED
- EXIT SIGN, WALL MOUNTED, DIRECTIONAL ARROW(S) AS INDICATED. MOUNT 94-INCHES AFF, UNO

AREA LIGHTING

- SITE LIGHTING - POLE
- POLE MOUNTED AREA LIGHTING FIXTURE
- POLE WITH POLE MOUNTED AREA LIGHTING FIXTURE
- WALL MOUNTED AREA LIGHTING FIXTURE
- IN GRADE LIGHT FIXTURE
- BOLLARD LIGHT FIXTURE

LIGHTING CONTROL DEVICES

- RPx LIGHTING CONTROL PANEL
- CVx CENTRAL INVERTER
- R LOW VOLTAGE RELAY
- PC PHOTOELECTRIC CELL
- LC LIGHTING CONTACTOR
- BAT REMOTE EMERGENCY BATTERY PACK

SWITCHES AND WALL-BOX CONTROLS

SWITCHES: MOUNT 42-INCHES AFF UNO

- SUPERSCRIPT, SWITCH SHALL CONTROL FIXTURE DENOTED WITH SAME LOWER CASE LETTER
- SWITCH SYMBOL
- SUBSCRIPT, SWITCH TYPE - SEE BELOW
- LINE THRU SWITCH INDICATES A KEY OPERATED SWITCH

- S SWITCH, SINGLE POLE
- S_2 SWITCH, DOUBLE POLE
- S_3 SWITCH, 3-WAY
- S_4 SWITCH, 4-WAY
- S_D SWITCH, DIMMER
- S_E SWITCH, EMERGENCY
- S_{LV} SWITCH, LOW VOLTAGE
- S_{MC} SWITCH, MOMENTARY CONTACT
- S_{OS} SWITCH, WALL-BOX OCCUPANCY SENSOR
- S_{OS2} SWITCH, WALL-BOX OCCUPANCY SENSOR, 2-POLE
- S_{VS} SWITCH, WALL-BOX VACANCY SENSOR
- S_P SWITCH WITH PILOT LIGHT
- S_R SWITCH, LOW VOLTAGE, ASSOCIATED WITH RELAY PANEL
- S_T SWITCH, TIMER
- S_{ES} SWITCH, ECO-SYSTEM
- S_{EP} SWITCH, EXPLOSION-PROOF

CEILING MOUNTED LIGHTING CONTROL DEVICES
MAXIMUM MOUNTING HEIGHT OF 10-FEET AFF

- OS OCCUPANCY SENSOR
- VS VACANCY SENSOR

WALL MOUNTED LIGHTING CONTROL DEVICES:
MOUNT 94-INCHES AFF, UNO

- OS OCCUPANCY SENSOR
- VS VACANCY SENSOR

THEATRICAL LIGHTING DEVICES:

- LCD THEATRICAL LIGHTING LCD STATION MOUNT 50-INCHES AFF, UNO
- E THEATRICAL LIGHTING ENTRY STATION MOUNT 42-INCHES AFF, UNO
- TO THEATRICAL OUTLET BOX MOUNT 18-INCHES AFF, UNO
- TN THEATRICAL NETWORK OUTLET MOUNT 18-INCHES AFF, UNO
- TC THEATRICAL CONTROL CONSOLE OUTLET MOUNT 18-INCHES AFF, UNO

POWER

- CIRCUIT HOME RUN
- CONDUIT TURNING UP
- CONDUIT TURNING DOWN
- CONDUIT STUB-UP
- CONDUIT SLEEVE
- CONDUIT SEAL
- CONDUIT CONCEALED IN CEILING OR WALLS, POWER
- CONDUIT CONCEALED IN CEILING OR WALLS, OTHER (* = SEE ABBREVIATIONS)
- CONDUIT CONCEALED IN FLOOR OR UNDERGROUND, POWER
- CONDUIT CONCEALED IN FLOOR OR UNDERGROUND, OTHER (* = SEE ABBREVIATIONS)
- EXPOSED CONDUIT, POWER
- EXPOSED CONDUIT, OTHER (* = SEE ABBREVIATIONS)
- FRS FIRE RATED SLEEVE
- T TRANSFORMER
- XXX BRANCH CIRCUIT PANELBOARD MOUNT 72-INCHES TO TOP
- XXX DISTRIBUTION PANELBOARD MOUNT 72-INCHES TO TOP
- EQUIPMENT CABINET, AS NOTED
- XXX SWITCHBOARD
- MOTOR STARTER OR DRIVE
- DISCONNECT SWITCH
- COMBINATION STARTER / DISCONNECT SWITCH
- CT CURRENT TRANSFORMER ENCLOSURE
- M METER
- GEN GENERATOR
- ATS AUTOMATIC TRANSFER SWITCH
- SYSTEM GROUND ELECTRODE
- THERMOSTAT
- MUSHROOM SWITCH
- MH ELECTRICAL MANHOLE
- HH ELECTRICAL HAND HOLE
- MOTOR CONNECTION, HORSEPOWER AS INDICATED
- S_F FUSE AND SWITCH ASSEMBLY
- S_T MANUAL CONTROLLER WITH THERMAL OVERLOAD
- S_M MANUAL CONTROLLER W/O THERMAL OVERLOAD
- B ENCLOSED CIRCUIT BREAKER
- PB PULL BOX
- EQUIPMENT CONNECTION
- CABLE TRAY, LADDER TYPE OR RUNWAY
- CABLE TRAY
- MULTI-OUTLET ASSEMBLIES MOUNT 18-INCHES AFF, UNO WHERE DENOTED 'AC', MOUNT ABOVE COUNTER
- DIVIDED SURFACE RACEWAY MOUNT 18-INCHES AFF, UNO WHERE DENOTED 'AC', MOUNT ABOVE COUNTER

PUSHBUTTON STATION: MOUNT 42-INCHES AFF UNO

- SWITCH, PUSH BUTTON, SINGLE
- SWITCH, PUSH BUTTON, DOUBLE
- SWITCH, PUSH BUTTON, TRIPLE

RECEPTACLES: MOUNT 18-INCHES AFF, UNO

DIAGONAL LINE THROUGH SYMBOL OR DENOTED 'AC' INDICATES MOUNT DEVICE ABOVE COUNTER.
WHERE INDICATED AS 'MOUNT ABOVE COUNTER' MOUNT BOTTOM OF BOX 2-INCHES ABOVE TOP OF BACKSPLASH OR 6-INCHES ABOVE COUNTERTOP IF NO BACKSPLASH EXISTS.

LABELS SHALL BE MACHINE PRINTED, UNO

- SIMPLEX RECEPTACLE
- DUPLEX RECEPTACLE
- DUPLEX RECEPTACLE, GFI TYPE
- DUPLEX RECEPTACLE, MOUNT ABOVE COUNTER
- DUPLEX RECEPTACLE, GFI TYPE, MOUNT ABOVE COUNTER
- FOURPLEX RECEPTACLE
- FOURPLEX RECEPTACLE, GFI TYPE
- FOURPLEX RECEPTACLE, MOUNT ABOVE COUNTER
- FOURPLEX RECEPTACLE, GFI TYPE, MOUNT ABOVE COUNTER
- DUPLEX RECEPTACLE, FLUSH IN CEILING
- FOURPLEX RECEPTACLE, FLUSH IN CEILING
- DUPLEX RECEPTACLE, HORIZONTALLY MOUNTED
- DUPLEX RECEPTACLE, HORIZ. MTD, GFI TYPE
- DUPLEX RECEPTACLE, HORIZ. MTD, ABOVE COUNTER
- DUPLEX RECEPTACLE, HORIZ. MTD, GFI TYPE, MOUNT ABOVE COUNTER
- R WEATHER RESISTANT GFI DUPLEX RECEPTACLE, ROOF MOUNT 18-INCHES ABOVE ADJACENT STRUCTURE WITH A WEATHERPROOF, IN-USE COVER
- WP WEATHER RESISTANT GFI DUPLEX RECEPTACLE, MOUNT 18-INCHES AFF WITH A WEATHERPROOF, IN-USE COVER
- EWC STD DUPLEX RECEPTACLE TO SERVE ELECTRIC WATER COOLER, MOUNT AT HEIGHT PER EQUIPMENT MANUFACTURER'S INSTALLATION GUIDELINES. WIRE TO GFCI BKR IN PANELBOARD.
- TV DUPLEX RECEPTACLE TO SERVE TELEVISION, MOUNT AT SAME HEIGHT AND WITHIN 8-INCHES OF ADJACENT TV OUTLET
- DUPLEX RECEPTACLE, EMERGENCY
- FOURPLEX RECEPTACLE, EMERGENCY
- DUPLEX RECEPTACLE, LOWER SWITCH
- DUPLEX RECEPTACLE, SWITCHED
- RANGE RECEPTACLE, MOUNT 8-INCHES AFF
- SPECIAL RECEPTACLE, DEEP WELL BOX
- FLUSH FLOOR OUTLET BOX UNO
- FLUSH FLOOR BOX WITH DUPLEX RECEPTACLE UNO
- MULTI-DEVICE FLOOR BOX WITH DUPLEX RECEPTACLE AND TELECOMMUNICATIONS OUTLETS
- USB ONLY RECEPTACLE
- RECEPTACLE WITH USB PORTS
- FLUSH JUNCTION BOX, CEILING MOUNTED
- P JUNCTION BOX FOR FUTURE PROJECTOR POWER MOUNT 24-INCHES ABOVE SUSPENDED CEILING MOUNT TIGHT TO CEILING AT EXPOSED STRUCTURE LABEL BOX COVER 'PROJECTOR POWER'
- JUNCTION BOX ABOVE SUSPENDED CEILING WITH FLEX CONNECTION
- FLUSH JUNCTION BOX, WALL MOUNTED
- SURFACE JUNCTION BOX, WALL MOUNTED
- SURFACE JUNCTION BOX, FLOOR MOUNTED
- HAND DRYER, INSTALL HAND DRYER SPECIFIED IN DIV. 11

COMMUNICATIONS

TELECOMMUNICATIONS OUTLETS: MOUNT 18-INCHES AFF, UNO, AND WITHIN 8-INCHES OF ADJACENT RECEPTACLE WHERE DENOTED 'AC', MOUNT ABOVE COUNTER WHERE DENOTED 'C', MOUNT FLUSH IN CEILING

- X,Y,Z TELECOMMUNICATIONS OUTLET PROVIDE JACKS UNDER A COMMON FACEPLATE: X = QTY OF VOICE JACKS, Y = QTY OF DATA JACKS, Z = QTY OF VIDEO JACKS
- TELECOMMUNICATIONS OUTLET MOUNTED IN FLOOR BOX
- AP WIRELESS ACCESS POINT
- AP WIRELESS ACCESS POINT, WALL MOUNTED
- ANALOG VOICE ONLY TELECOM OUTLET (TELEPHONE OUTLET) MOUNT 18-INCHES AFF, UNO. EQUIVALENT TO 1,0,0 WHERE DENOTED 'W' MOUNT 50-INCHES AFF
- TV VIDEO ONLY TELECOM OUTLET (TELEVISION OUTLET) MOUNT 94-INCHES AFF, UNO. EQUIVALENT TO 0,0,1
- TV TELEVISION OUTLET, FLUSH IN CEILING
- AV AV OUTLET.
- FLOOR MOUNTED TELECOMMUNICATIONS RACK

CLOCKS: MOUNT 94-INCHES AFF, UNO

- CLOCK - WALL MOUNT
- DS CLOCK - DOUBLE FACE
- C CLOCK - OUTLET
- M CLOCK - MASTER
- DS CLOCK - CEILING MOUNT, DOUBLE FACE

BELLS, BUZZERS, CHIMES AND WALL SPEAKERS: MOUNT 94-INCHES AFF, UNO

- CLASS PROGRAM BELL
- BUZZER
- C CHIME
- S SPEAKER, WALL
- S SPEAKER, FLUSH IN CEILING, ENCLOSED IN BACKBOX WHERE EXPOSED
- S PA PUBLIC ADDRESS (A/V) SYSTEM SPEAKER, FLUSH IN CEILING
- H SPEAKER/HORN, WALL
- IC INTERCOM CALLBACK STATION MOUNT 42-INCHES AFF
- IC 2 TWO-WAY INTERCOM/CALL STATION COMBINATION UNIT MOUNT 42-INCHES AFF
- IC M INTERCOM MASTER STATION OUTLET MOUNT 18-INCHES AFF
- H INTERCOM HANDSET MOUNT 50-INCHES AFF
- V VOLUME CONTROL, WALL MOUNT 42-INCHES AFF
- M MICROPHONE OUTLET, WALL MOUNT 18-INCHES AFF
- FLUSH FLOOR BOX WITH MICROPHONE OUTLET
- D DIRECTORS HEADSET

SAFETY

- FACP FIRE ALARM CONTROL PANEL MOUNT CENTER OF DISPLAY 54-INCHES AFF
- FAA FIRE ALARM ANNUNCIATOR PANEL MOUNT CENTER OF DISPLAY 54-INCHES AFF
- LOC LOCAL OPERATOR'S CONSOLE MOUNT CENTER OF DISPLAY 54-INCHES AFF
- NAC NOTIFICATION APPLIANCE CIRCUIT CABINET MOUNT CENTER OF DISPLAY 54-INCHES AFF
- F MANUAL FIRE ALARM PULL STATION MOUNT 42-INCHES AFF

FIRE ALARM A/V DEVICES: MOUNT 94-INCHES AFF, OR 6-INCHES BELOW CEILING, WHICHEVER IS LOWER UNO

- FIRE ALARM BELL
- FIRE ALARM HORN
- FIRE ALARM VISUAL WARNING SIGNAL
- FIRE ALARM BELL WITH VISUAL WARNING SIGNAL
- FIRE ALARM HORN WITH VISUAL WARNING SIGNAL
- MINI FIRE ALARM HORN WITH VISUAL WARNING SIGNAL
- FIRE ALARM SPEAKER WITH VISUAL WARNING SIGNAL
- FIRE ALARM SPEAKER, FLUSH IN CEILING
- FIRE ALARM SPEAKER WITH VISUAL WARNING SIGNAL, CEILING
- FIRE ALARM VISUAL WARNING SIGNAL, CEILING
- ECS SPEAKER, FLUSH IN CEILING
- ECS SPEAKER WITH VISUAL WARNING SIGNAL, CEILING
- ECS VISUAL WARNING SIGNAL, CEILING
- SPRINKLER SYSTEMS ELECTRIC BELL ALARM
- D FIRE ALARM MAGNETIC DOOR HOLDER MOUNT 74-INCHES AFF
- L REMOTE INDICATOR LAMP
- OSY OS&Y VALVE
- FS WATER FLOW ALARM SWITCH
- TS TAMPER SWITCH
- T BEAM TRANSMITTER
- R BEAM RECEIVER
- FF FIRE FIGHTERS TELEPHONE MOUNT 54-INCHES AFF
- DAS ANTENNA
- D SMOKE DETECTOR - IONIZATION TYPE (D = DUCT)
- P D SMOKE DETECTOR - PHOTOELECTRIC TYPE (D = DUCT)
- SMOKE DETECTOR - IONIZATION TYPE
- SMOKE DETECTOR - PHOTOELECTRIC TYPE
- HEAT DETECTOR RATE-OF-RISE AND FIXED TEMPERATURE, 135 F
- HEAT DETECTOR, RATE-OF-RISE AND FIXED TEMPERATURE, 200 F
- HEAT DETECTOR, FIXED TEMPERATURE ONLY, 135 F
- HEAT DETECTOR, FIXED TEMPERATURE ONLY, 200 F

SECURITY

INTRUSION DETECTION

- INTRUSION DETECTOR, CEILING
- INTRUSION DETECTOR, WALL
- MD LR MOTION DETECTOR - LONG RANGE
- MD BR MOTION DETECTOR - BROAD RANGE
- MD 360 MOTION DETECTOR - 360 DEGREES
- GB GLASS BREAK DETECTOR
- K SECURITY KEYPAD MOUNT 48-INCHES AFF

VIDEO SURVEILLANCE

- XXX VIDEO CAMERA - CEILING
- XXX VIDEO CAMERA - WALL

ACCESS CONTROL

- XXX DOOR TAG
- ACP ACCESS CONTROL SYSTEM CONTROL PANEL
- P DOOR POSITION SWITCH
- PS POWER SUPPLY, 120V INPUT
- CR CARD READER MOUNT 36-INCHES AFF
- EL DOOR WITH ELECTRIFIED DOOR HARDWARE. REFER TO DOOR HARDWARE SPECIFICATIONS.

ONE-LINE DIAGRAM

- X — ENCLOSED CONTROLLER (ACROSS-THE-LINE UNO) MOUNT 60-INCHES AFF TO TOP
  X = STARTER NEMA SIZE
- XX/X XXAF XX — ENCLOSED SWITCH; MOUNT 60-INCHES AFF TO TOP
  XX/X = AMP RATING / NO. OF POLES
  XXAF = FUSE SIZE; AF=AMP FUSE; NF=NO FUSE
  X = STARTER NEMA SIZE
- XX/X XXAF XX — COMBINATION CONTROLLER \ DISCONNECT; MOUNT 60-INCHES AFF TO TOP
  XX/X = AMP RATING / NO. OF POLES
  XXAF = FUSE SIZE; AF=AMP FUSE; NF=NO FUSE
  XX = ENCLOSURE NEMA RATING; BLANK=NEMA 1; WP=NEMA 3R
- M — METER SOCKET/METER
- SPD — SURGE PROTECTION DEVICE
- T XX — TRANSFORMER
  T = TRANSFORMER ID
  XX = SIZE
- XXX/X LSIG — BREAKER
  XXX/X = AMP RATING / POLES
  LSIG = ADJUSTABLE SETTINGS (WHERE NOTED)
  L = LONG TIME
  S = SHORT TIME
  I = INSTANTANEOUS
  G = GROUND FAULT PROTECTION OF EQUIPMENT
  GFPE = GROUND FAULT PROTECTION OF EQUIPMENT
  ERMS = ENERGY REDUCTION MAINTENANCE SWITCH
- XXX/3 XXX — FUSIBLE SWITCH
  XXX/X = SWITCH AMP RATING / POLES
  XXX = FUSE SIZE
- GROUNDING ELECTRODE SYSTEM

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ELECTRICAL SYMBOLS, ABBREVIATIONS & NOTES

E001.00

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SWITCHBOARD SES-A
277/480V, 3Ø, 4W

480/277 VOLT COLORS:

PHASE A: BROWN

PHASE B: ORANGE

PHASE C: YELLOW

NEUTRAL: GRAY

GROUND: GREEN

SWITCHBOARD LABEL EXAMPLE:
CONTENT AND CONFIGURATION REQUIRED

PANEL L1A1
120/208V, 3Ø, 4W
FED FROM T1A1

208/120 VOLT COLORS:

PHASE A: BLACK

PHASE B: RED

PHASE C: BLUE

NEUTRAL: WHITE

GROUND: GREEN

DISTRIBUTION PANELBOARD, PANELBOARD LABEL EXAMPLE: CONTENT AND CONFIGURATION REQUIRED

XFMR T1A1
480V DELTA - 208Y/120V
FED FROM SES

TRANFORMER LABEL EXAMPLE:
CONTENT AND CONFIGURATION REQUIRED

208V, 3Ø, 4W
FED FROM XFMR T1A1
FEEDS PANEL L1A1

SAFETY SWITCH OR CIRCUIT BREAKER ENCLOSURE EXAMPLE:
CONTENT AND CONFIGURATION REQUIRED

ROOFTOP UNIT RTU-1

SWITCHBOARD AND DISTRIBUTION PANEL EXAMPLE:
CONTENT AND CONFIGURATION REQUIRED

PANEL L1A1

SUB-FEED BREAKERS LOCATED IN BRANCH PANELS EXAMPLE:
CONTENT AND CONFIGURATION REQUIRED

EQUIPMENT LABELING DETAIL GENERAL NOTES:

A. LABEL SHALL BE BLACK OR WHITE LAMINATED ACRYLIC OR MELAMINE WITH ENGRAVED LETTERING AND SELF-ADHESIVE BACK.

B. LETTERING SHALL BE WHITE ON BLACK OR BLACK ON WHITE BACKGROUND AND 3/8-INCH HIGH MINIMUM.

C. PROVIDE THE FOLLOWING INFORMATION ON SWITCHBOARD LABELS:
SWITCHBOARD TAG
SYSTEM VOLTAGE, PHASE, WIRE
SHORT CIRCUIT RATING, DATE
CONDUCTOR COLORS

D. PROVIDE THE FOLLOWING INFORMATION ON DISTRIBUTION PANELBOARD AND PANELBOARD LABELS:
DISTRIBUTION PANELBOARD OR PANELBOARD TAG
SYSTEM VOLTAGE, PHASE, WIRE
FED FROM
SHORT CIRCUIT RATING, DATE
CONDUCTOR COLORS

E. PROVIDE THE FOLLOWING INFORMATION ON TRANSFORMER LABELS:
TRANSFORMER TAG
SYSTEM PRIMARY AND SECONDARY VOLTAGE, WYE, DELTA, OR SINGLE PHASE
FED FROM

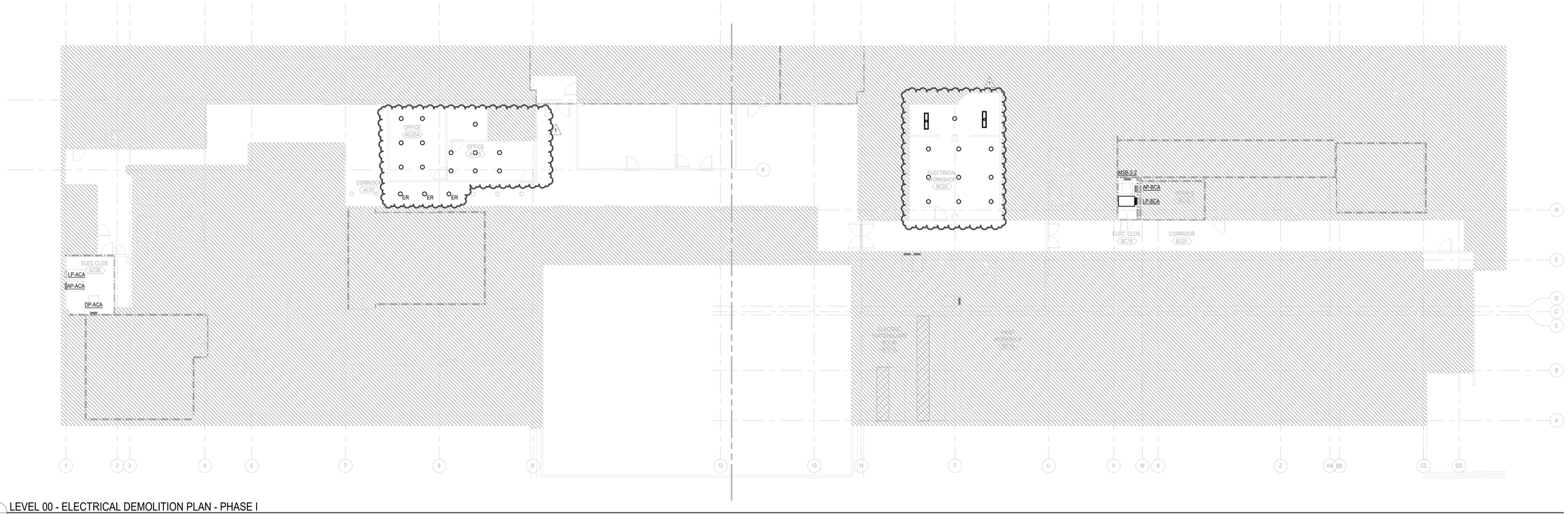
F. PROVIDE THE FOLLOWING INFORMATION ON SAFETY SWITCH OR CIRCUIT BREAKER ENCLOSURE LABELS:
SYSTEM VOLTAGE, PHASE, WIRE
FED FROM
FEEDS (LOAD BEING SERVED)

G. PROVIDE THE FOLLOWING INFORMATION AT INDIVIDUAL SWITCHBOARD AND DISTRIBUTION PANELBOARD BRANCH SWITCHES:
BRANCH SWITCH TAG (LOAD BEING SERVED)

H. PROVIDE THE FOLLOWING INFORMATION AT INDIVIDUAL SUB-FEED BREAKERS LOCATED IN BRANCH PANELS:
BRANCH SWITCH TAG (LOAD BEING SERVED)

I. CONDUCTOR COLORS SHALL ALSO FOLLOW REQUIREMENTS LISTED IN SPECIFICATIONS SECTION 260553.

2E
ED100.00 EQUIPMENT LABELING
SCALE: 12" = 1'-0"

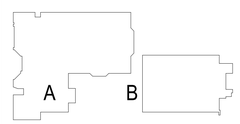


4A
ED100.00 LEVEL 00 - ELECTRICAL DEMOLITION PLAN - PHASE I
SCALE: 3/32" = 1'-0"

SHEET NOTES

1

KEY PLAN



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LEVEL 00 - ELECTRICAL DEMOLITION PLAN - PHASE I

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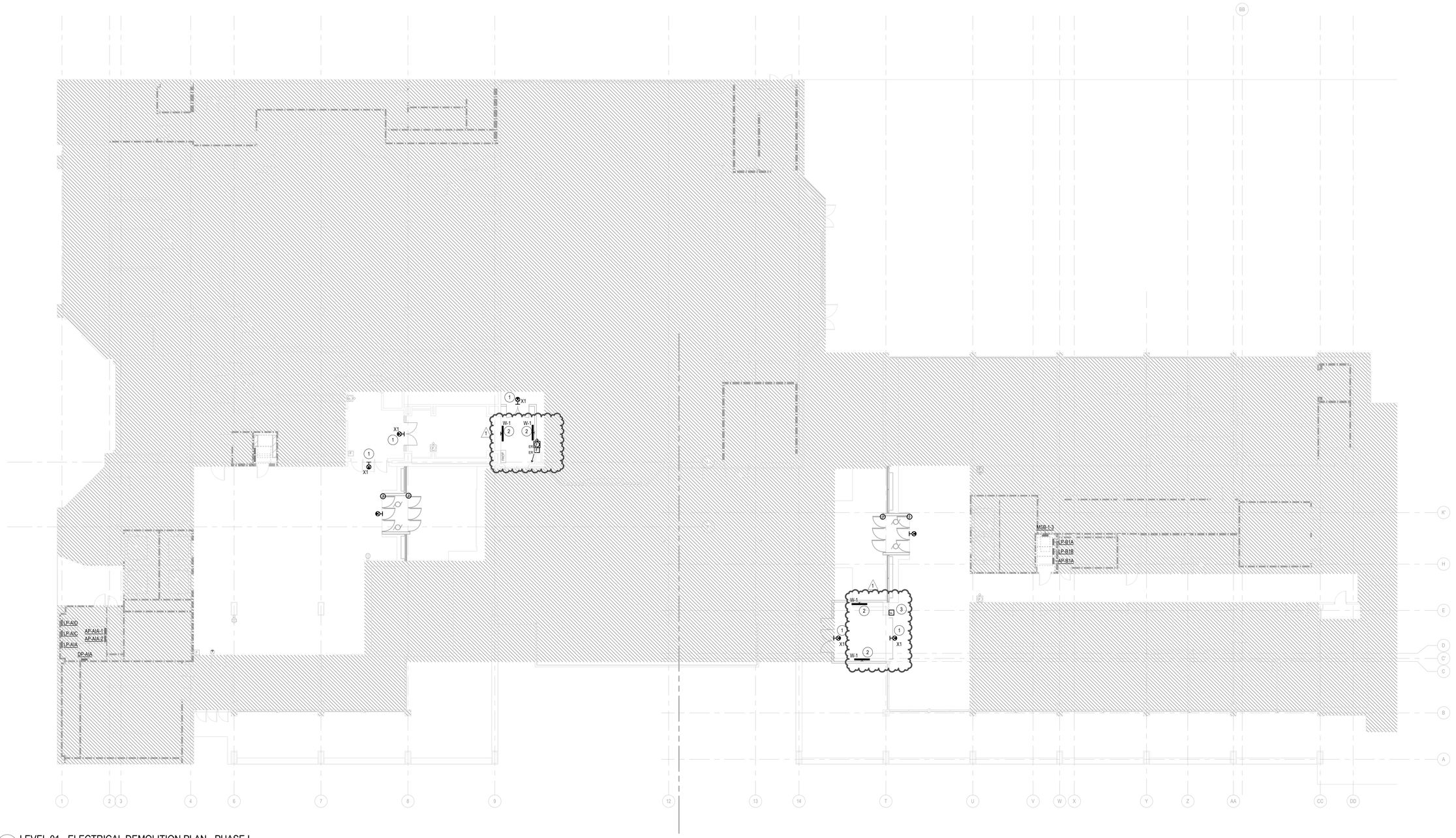
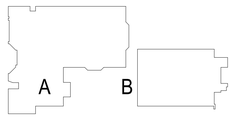


1 LEVEL 01 - ELECTRICAL DEMOLITION PLAN - PHASE I
ED101.00 SCALE: 3/32" = 1'-0"

SHEET NOTES

1. INSTALL TEMPORARY EXIT SIGNS DURING PHASE I RENOVATIONS AND REMOVE WHEN NORMAL EGRESS POINT IS RESTORED AND FULLY OPERATIONAL.
2. WALL MOUNT NEW LUMINAIRE FOR TEMPORARY EGRESS. DEMOLISH LUMINAIRE WHEN TEMPORARY EGRESS WALLS ARE REMOVED. EXTEND EXISTING EMERGENCY CIRCUIT FROM ADJACENT CORRIDOR LOBBY TO NEW LUMINAIRE (NEW LUMINAIRE TO OPERATE ON EXISTING CORRIDOR LOBBY CONTROLS).
3. INSTALL TEMPORARY PULL STATION DURING PHASE I RENOVATIONS AND REMOVE WHEN NORMAL EGRESS POINT IS RESTORED AND FULLY OPERATIONAL.

KEY PLAN



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LEVEL 01 - ELECTRICAL DEMOLITION AND TEMPORARY EGRESS PLAN - PHASE I

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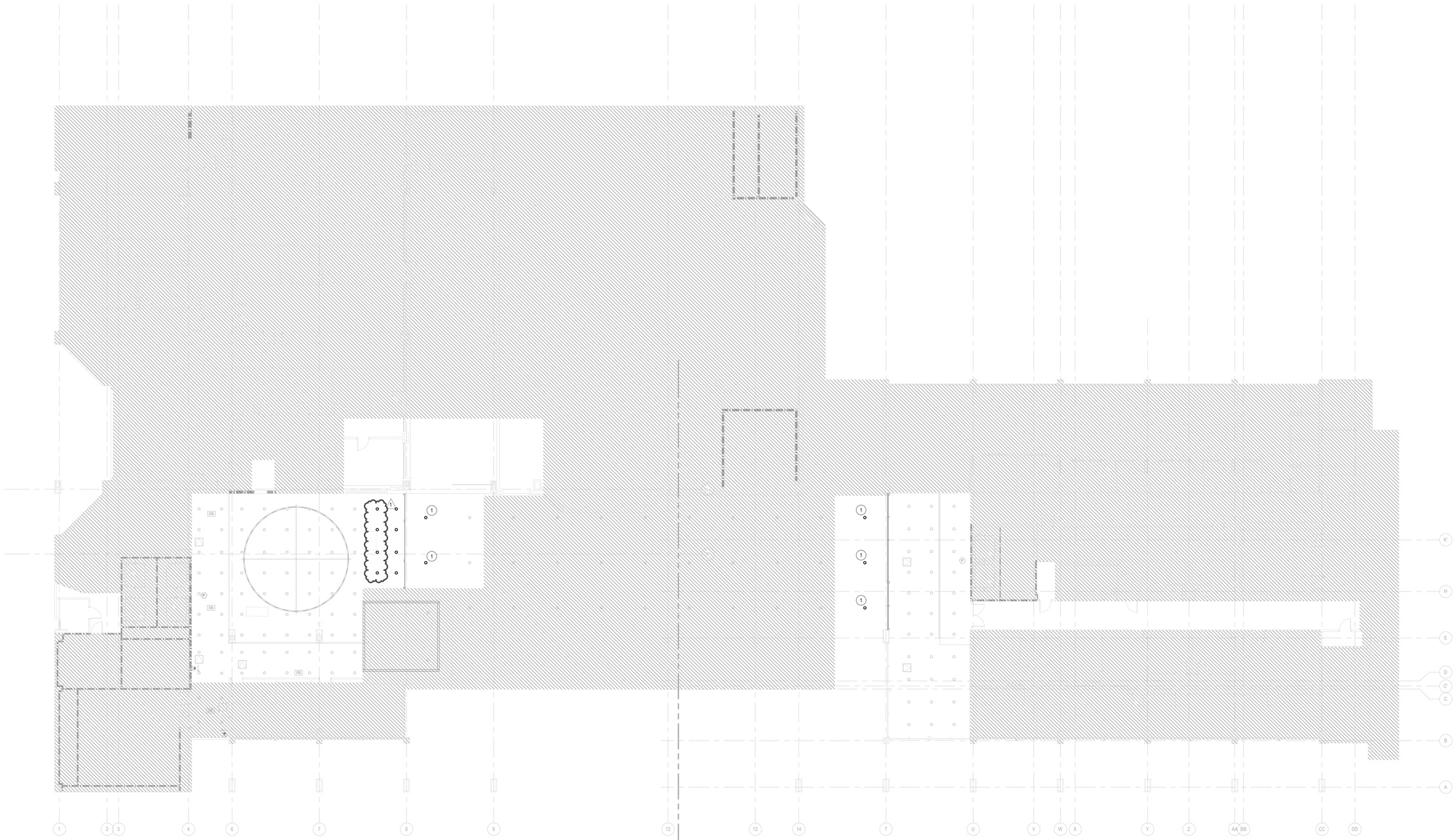
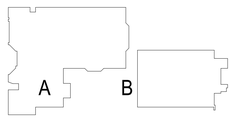


1 LEVEL 02 - ELECTRICAL DEMOLITION PLAN - PHASE I
ED102.00 SCALE: 3/32" = 1'-0"

SHEET NOTES

1 REMOVE EXTERIOR LAMPS FROM FIXTURES AND REMOVE CONDUCTORS BACK TO PREVIOUS FIXTURE.

KEY PLAN



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LEVEL 02 - ELECTRICAL DEMOLITION PLAN - PHASE I

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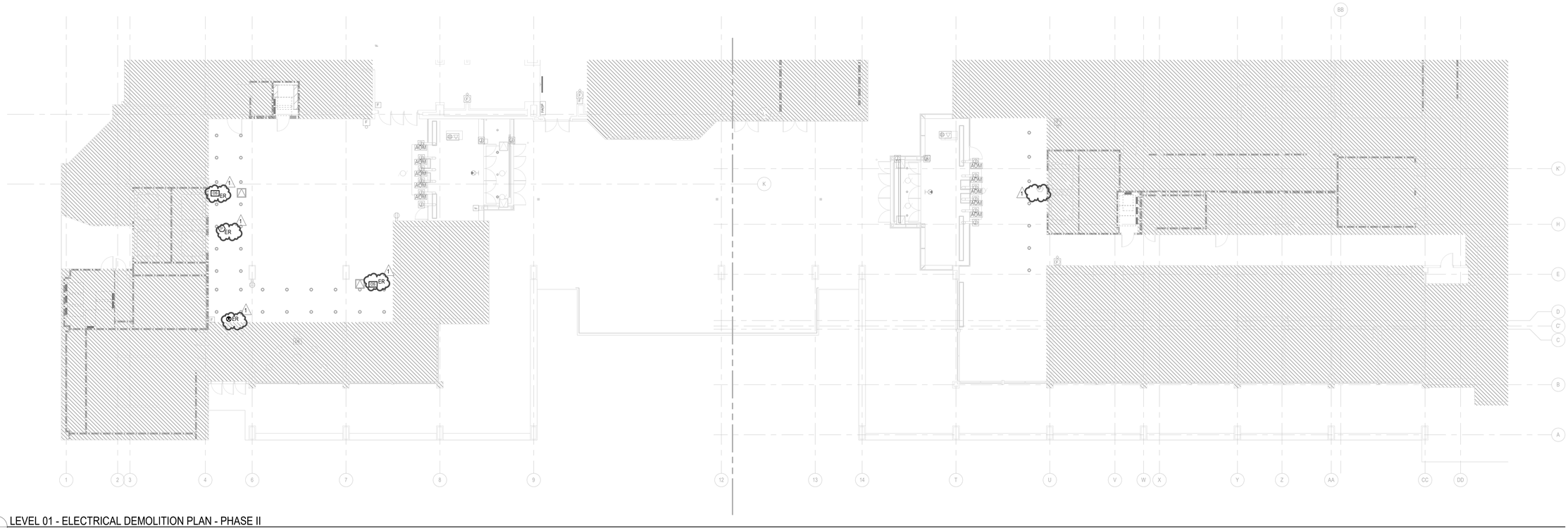

1 LEVEL 01 - ELECTRICAL DEMOLITION PLAN - PHASE II
ED111.00 SCALE: 3/32" = 1'-0"

SHEET NOTES

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LEVEL 01 - ELECTRICAL DEMOLITION PLAN - PHASE II

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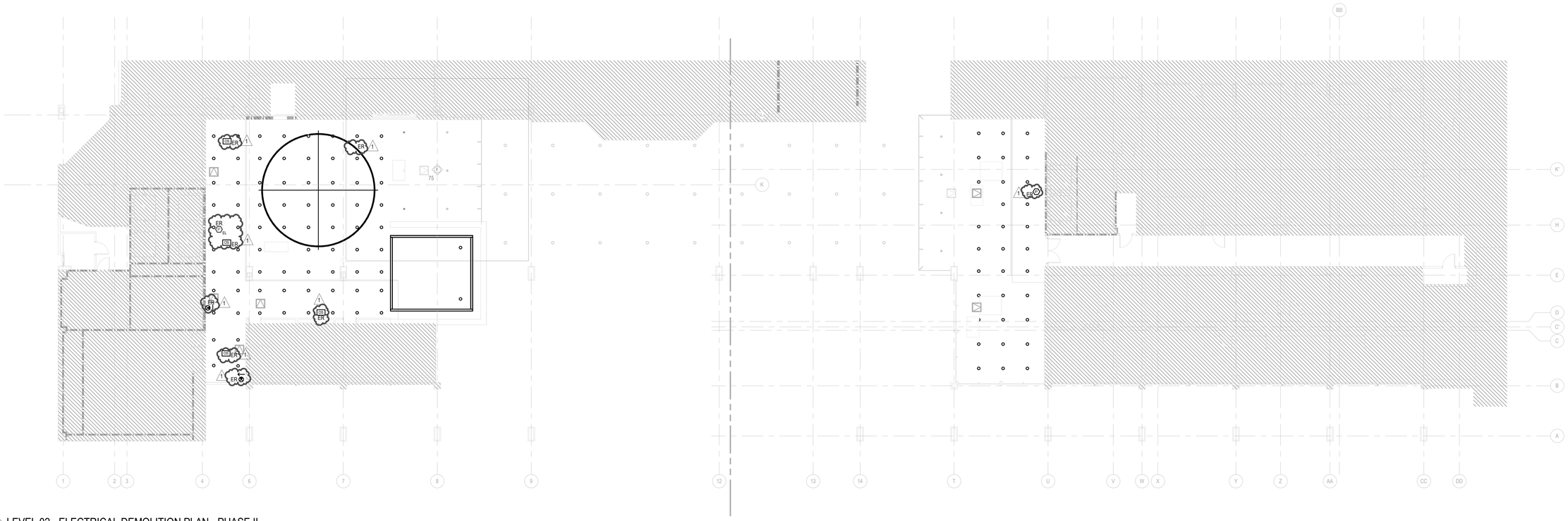
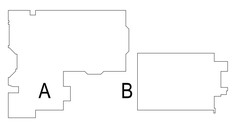


1 ED112.00 LEVEL 02 - ELECTRICAL DEMOLITION PLAN - PHASE II
SCALE: 3/32" = 1'-0"

SHEET NOTES

KEY PLAN



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LEVEL 02 - ELECTRICAL DEMOLITION PLAN - PHASE II

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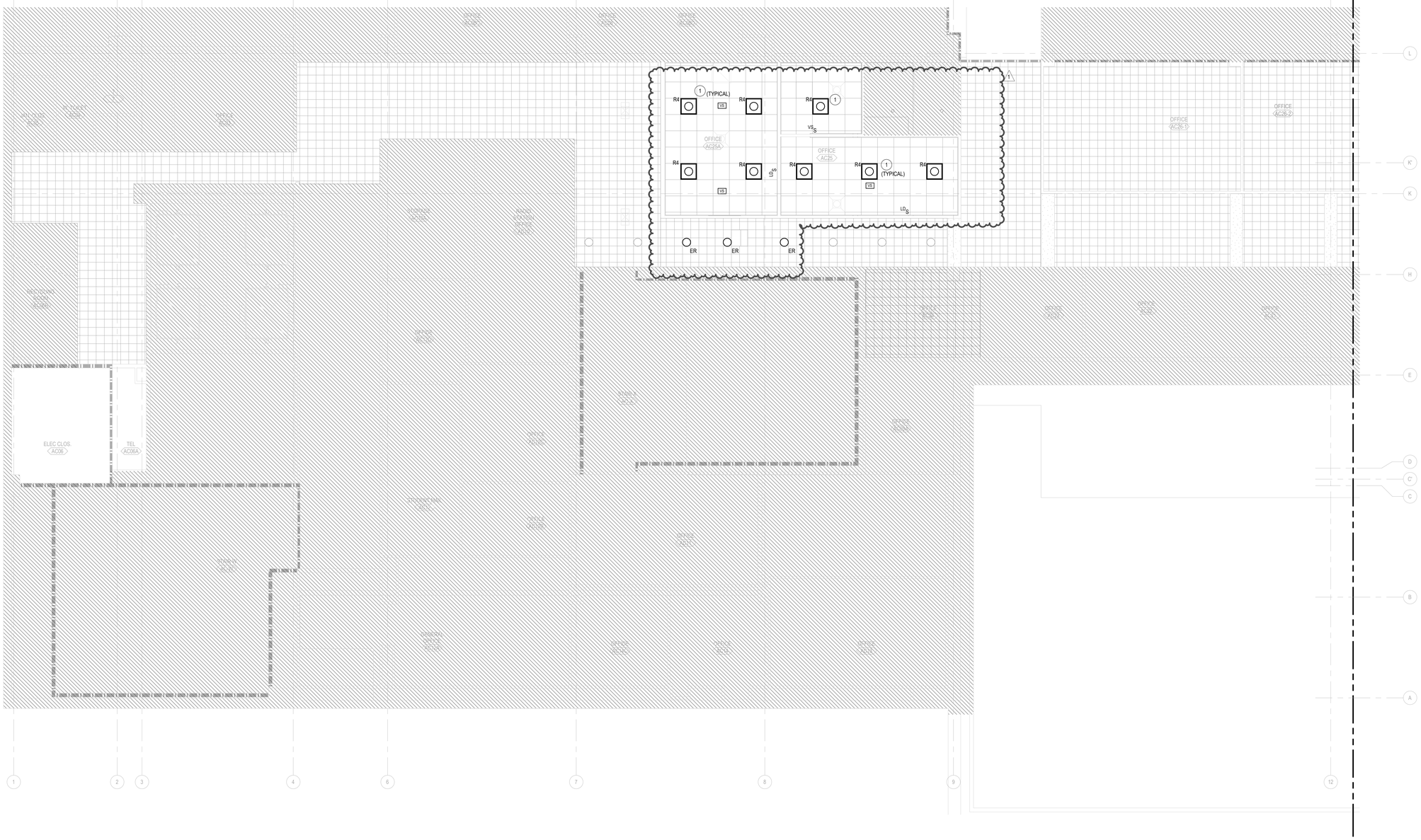
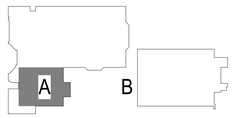


1 LEVEL 00 - AREA A - LIGHTING PLAN - PHASE I
EL100A.00 SCALE: 3/16" = 1'-0"

SHEET NOTES

1 INSTALL NEW LUMINAIRES IN NEW SUSPENDED GRID CEILING. INTERCEPT CIRCUIT FEEDING EXISTING LIGHTING AND INSTALL NEW WALL MOUNTED DIMMING SWITCH TO CONTROL ONLY THE LIGHTING IN THE SAME ROOM AS THE NEW SWITCH.

KEY PLAN



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LEVEL 00 - AREA A - LIGHTING PLAN - PHASE I

EL100A.00

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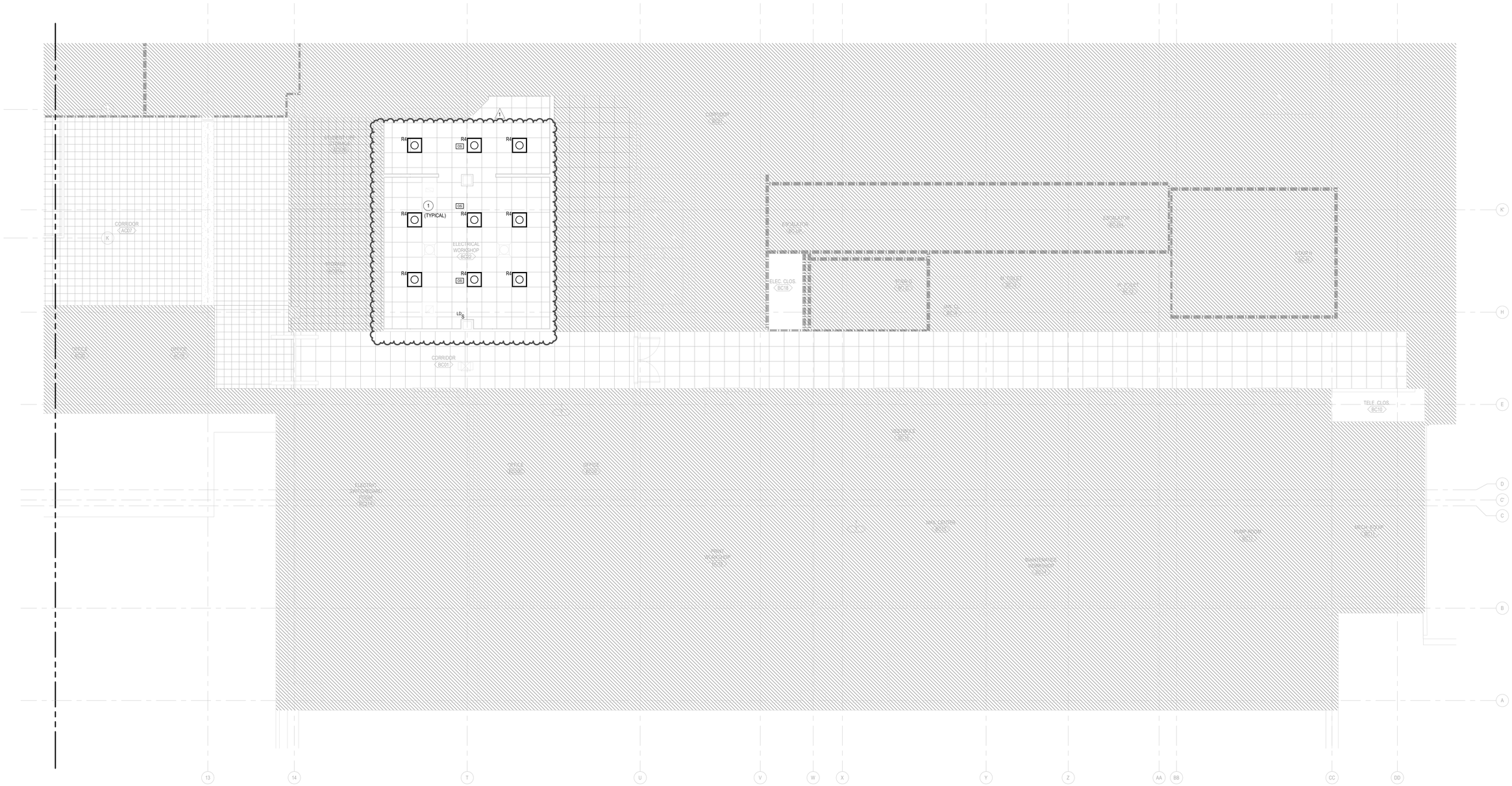

1 LEVEL 00 - AREA B - LIGHTING PLAN - PHASE I
EL100B.00 SCALE: 3/16" = 1'-0"

SHEET NOTES

1 INSTALL NEW LUMINAIRES IN NEW SUSPENDED GRID CEILING. INTERCEPT CIRCUIT FEEDING EXISTING LIGHTING AND INSTALL NEW WALL MOUNTED DIMMING SWITCH TO CONTROL ONLY THE LIGHTING IN THE SAME ROOM AS THE NEW SWITCH.

KEY PLAN

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LEVEL 00 - AREA B - LIGHTING PLAN - PHASE I

EL100B.00

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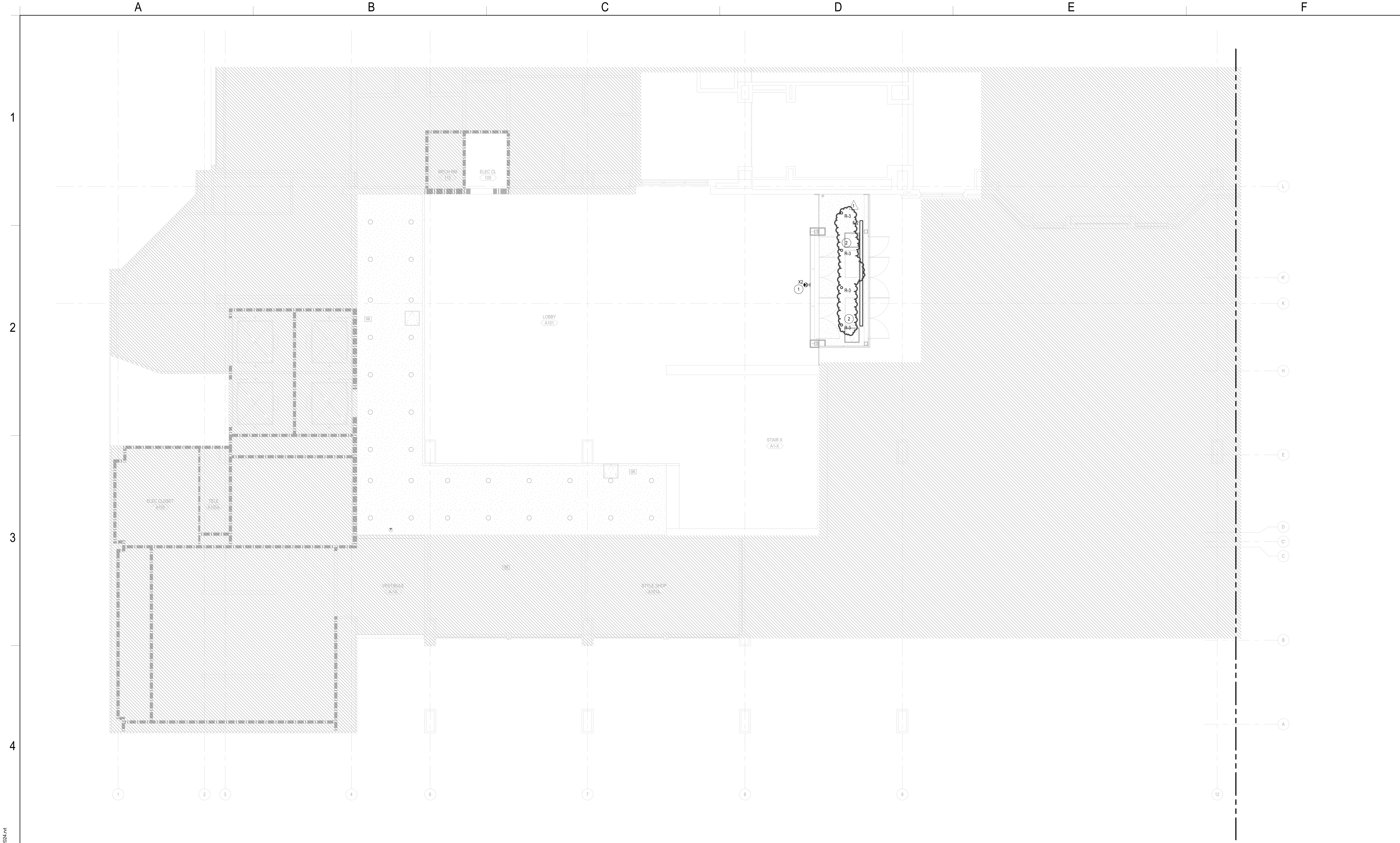


1 EL101A.00 LEVEL 01 - AREA A - LIGHTING PLAN - PHASE I

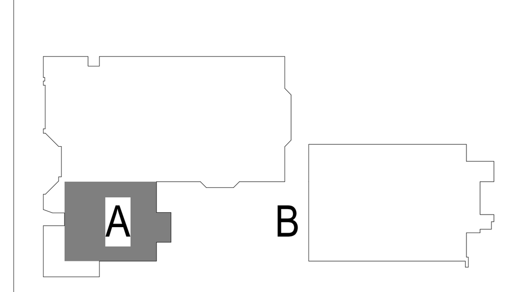
SCALE: 3/16" = 1'-0"

SHEET NOTES

1 CONNECT TO EXISTING EXIT SIGN CIRCUIT.

2 CONNECT TO EXISTING EMERGENCY LIGHTING CIRCUIT

KEY PLAN



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01/15/2025

FIT TURNSTILES - BUILDING A & B

344 8TH AVENUE, NY, NY 10001 - BUILDING A
340-356 8TH AVENUE, NY, NY, 10001 - BUILDING B

BIN: 1014250
BLK: 777
LOT: 001

ISSUE FOR ADDENDUM #3-C1667

01.23.25

REVISIONS

#3 01/23/25

57-24140-02

LEVEL 01 - AREA A - LIGHTING PLAN - PHASE I

EL101A.00

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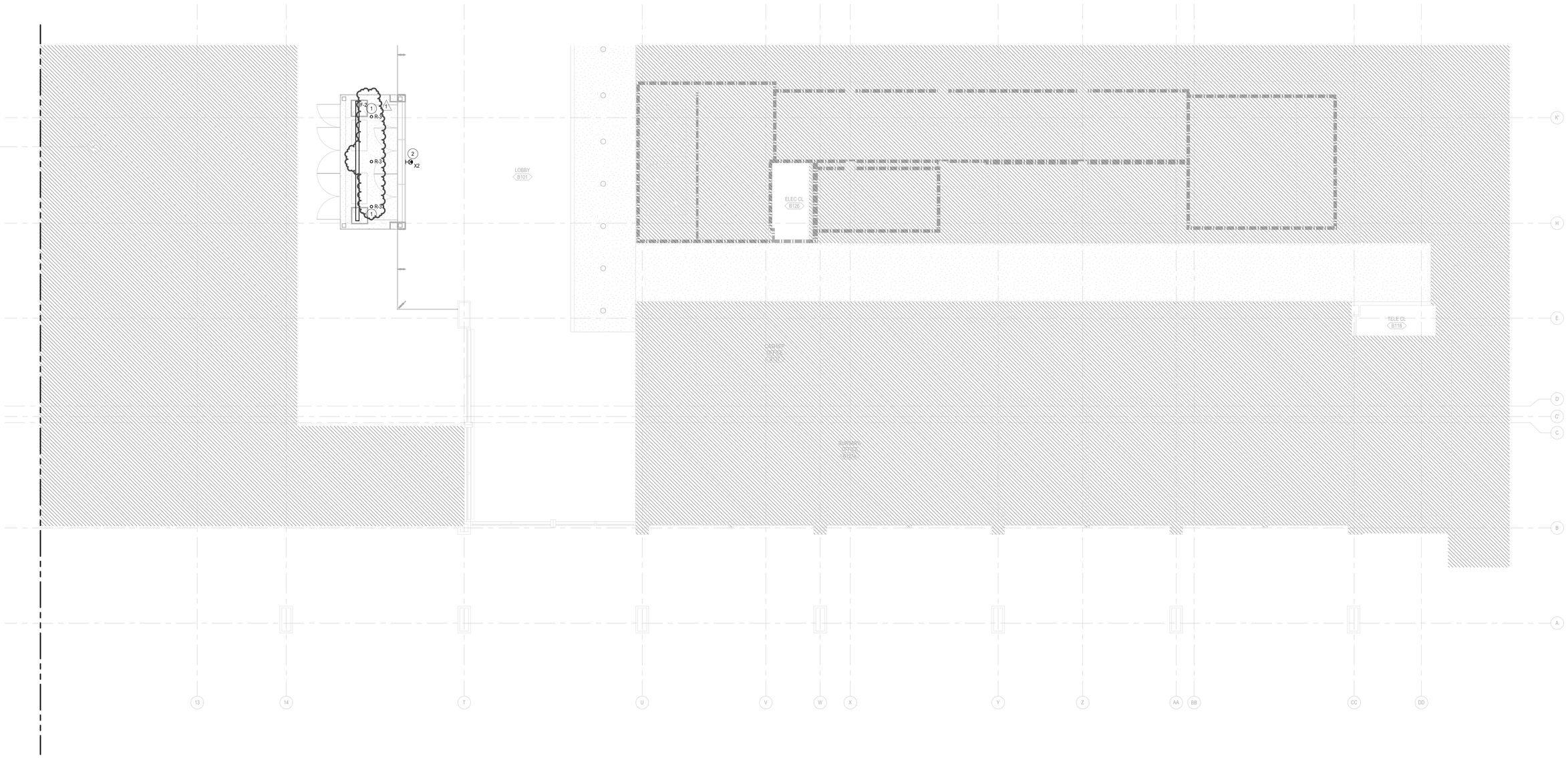

1 LEVEL 01 - AREA B - LIGHTING PLAN - PHASE I
EL101B.00 SCALE: 3/16" = 1'-0"

SHEET NOTES

1 CONNECT TO EXISTING EMERGENCY LIGHTING CIRCUIT
2 CONNECT TO EXISTING EXIT SIGN CIRCUIT.

KEY PLAN

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LEVEL 01 - AREA B - LIGHTING PLAN - PHASE I

EL101B.00

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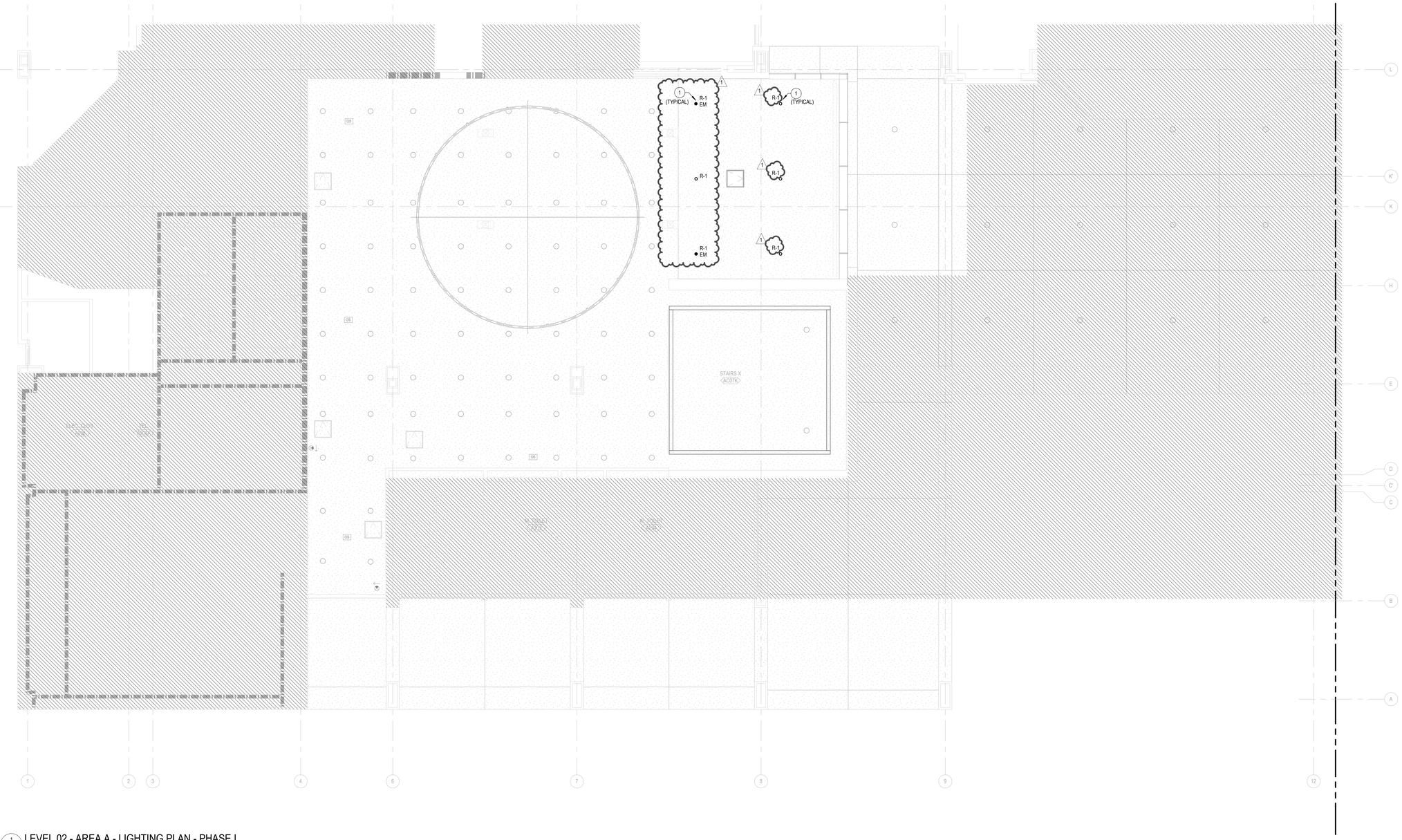
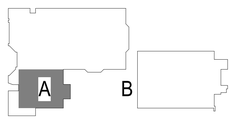


1 LEVEL 02 - AREA A - LIGHTING PLAN - PHASE I
EL102A.00 SCALE: 3/16" = 1'-0"

SHEET NOTES

1 EXTEND EXISTING EMERGENCY AND NORMAL CIRCUITS FROM INTERIOR HIGH CEILING FIXTURES.

KEY PLAN



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BLK: 777
LOT: 001

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LEVEL 02 - AREA A - LIGHTING PLAN - PHASE I

EL102A.00

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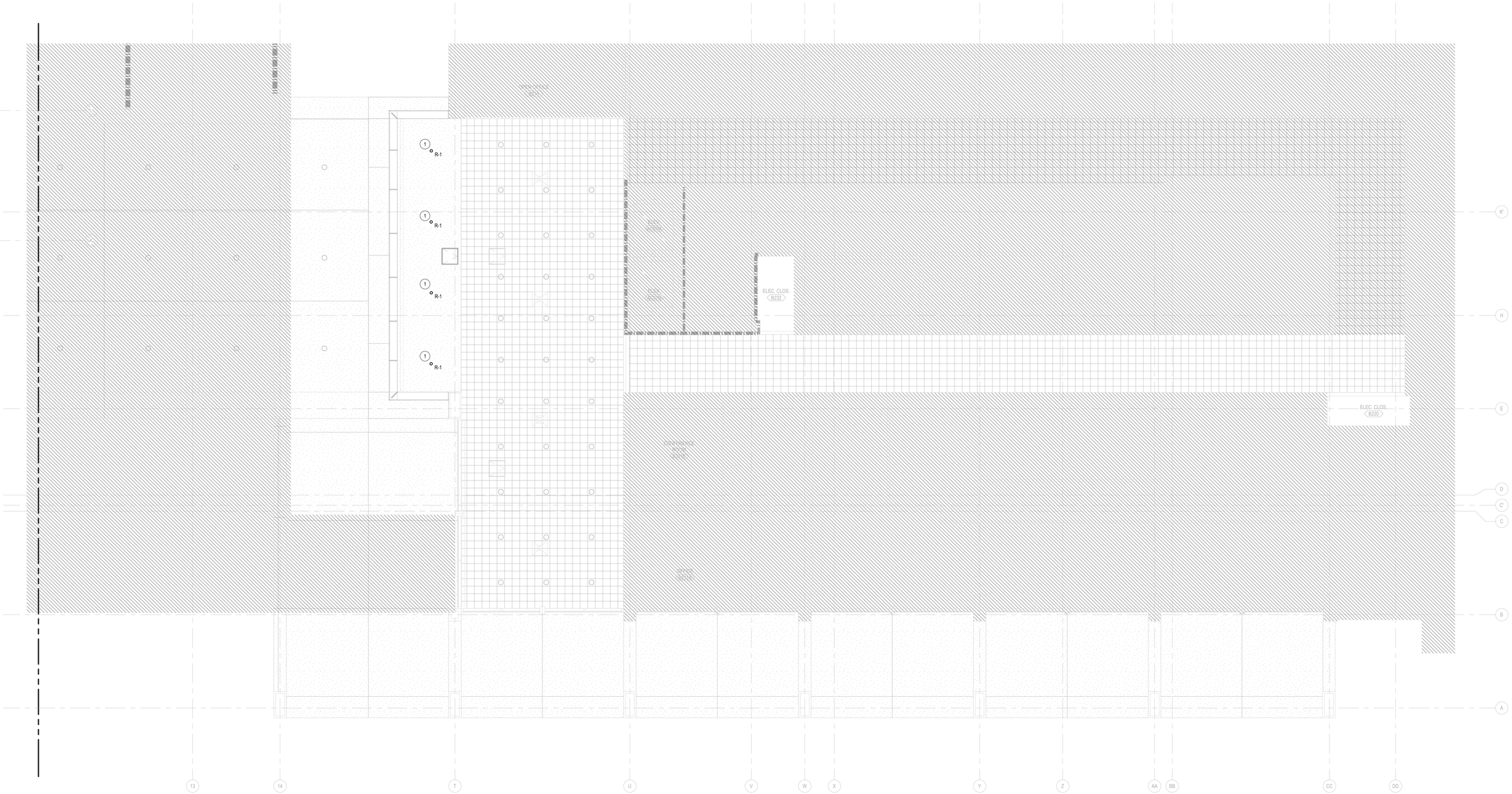

1 LEVEL 02 - AREA B - LIGHTING PLAN - PHASE I
EL102B.00 SCALE: 3/16" = 1'-0"

SHEET NOTES

1 EXTEND EXISTING EMERGENCY AND NORMAL CIRCUITS FROM INTERIOR HIGH CEILING FIXTURES.

KEY PLAN

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LEVEL 02 - AREA B - LIGHTING PLAN - PHASE I

EL102B.00

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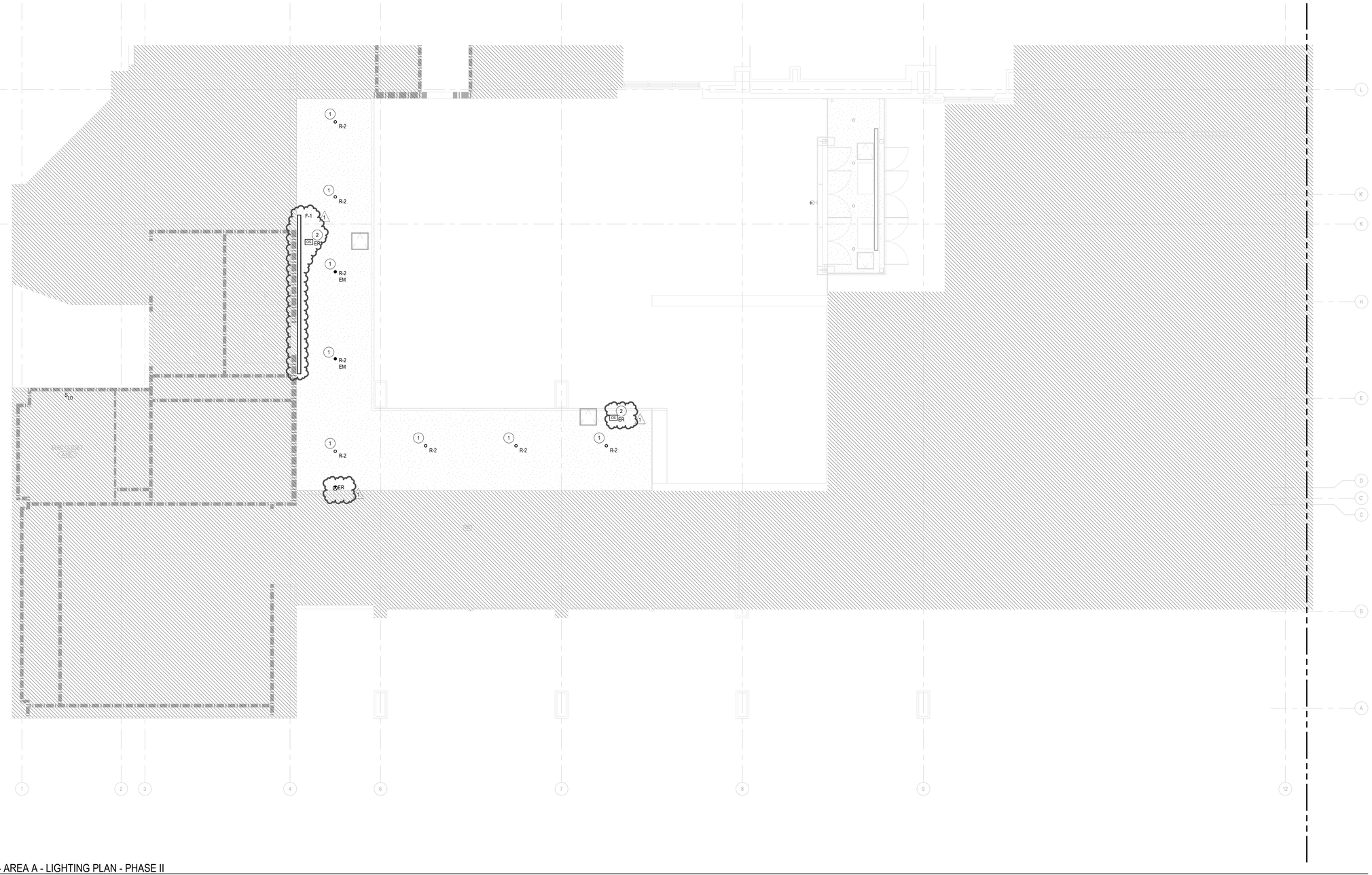


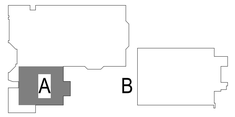
1 LEVEL 01 - AREA A - LIGHTING PLAN - PHASE II
EL111A.00 SCALE: 3/16" = 1'-0"

SHEET NOTES

1 EXTEND EXISTING EMERGENCY AND NORMAL CIRCUITS FROM INTERIOR PREPARING CEILING FIXTURES.

2 EXISTING WIRELESS OCCUPANCY SENSOR. REMOVE FOR CEILING DEMOLITION AND REINSTALL ON NEW CEILING IN EXISTING LOCATION.

KEY PLAN



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ISSUE FOR ADDENDUM #3-C1667
01.23.25
REVISIONS
#3 01/23/25

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LEVEL 01 - AREA A - LIGHTING PLAN - PHASE II

EL111A.00

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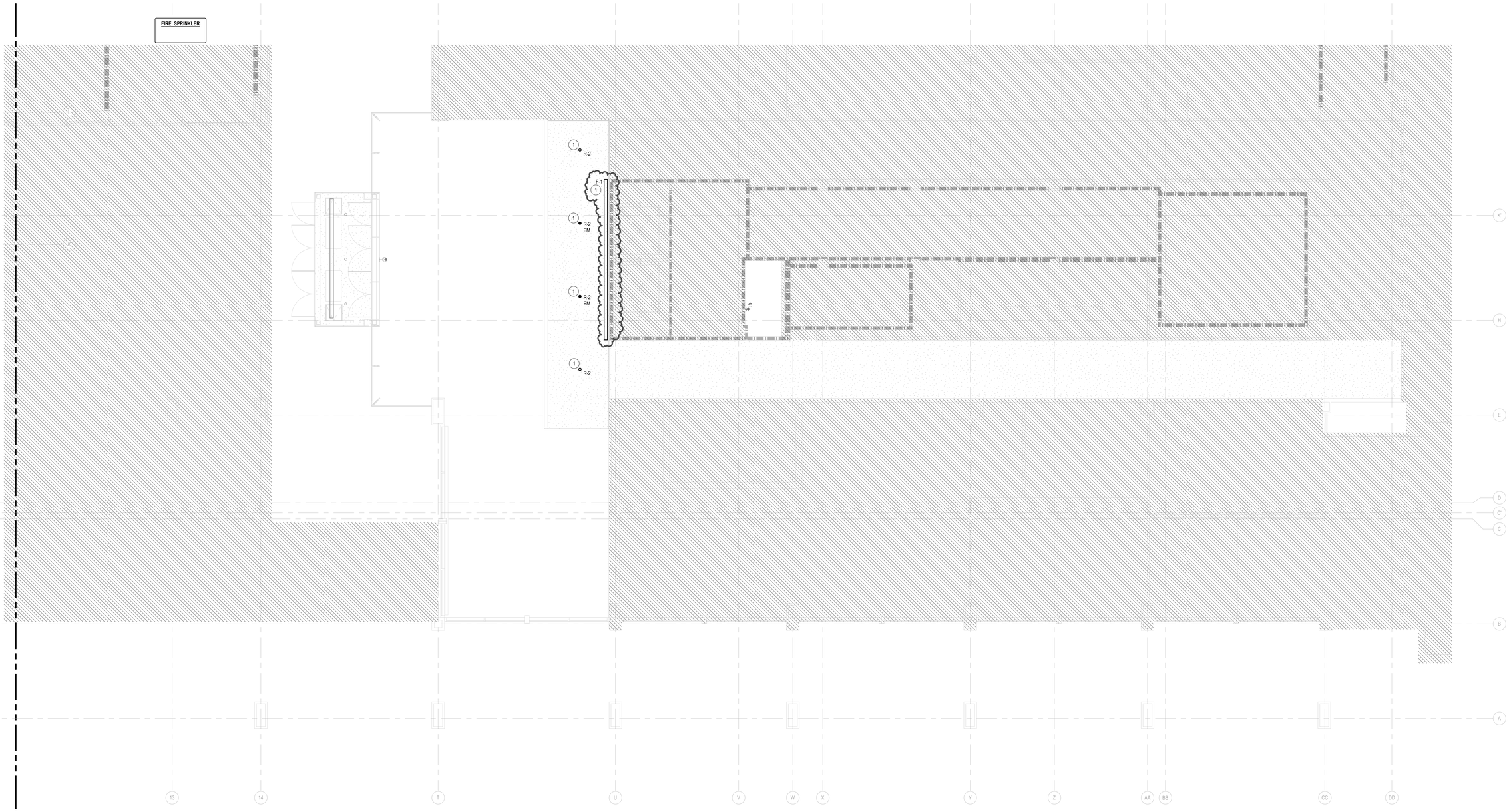

1 LEVEL 01 - AREA B - LIGHTING PLAN - AREA B
EL111B.00 SCALE: 3/16" = 1'-0"

SHEET NOTES

1 EXTEND EXISTING EMERGENCY AND NORMAL CIRCUITS FROM INTERIOR OVERHANG CEILING FIXTURES.

KEY PLAN

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BIN: 1014259
BLK: 777
LOT: 001

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LEVEL 01 - AREA B - LIGHTING PLAN - PHASE II

EL111B.00

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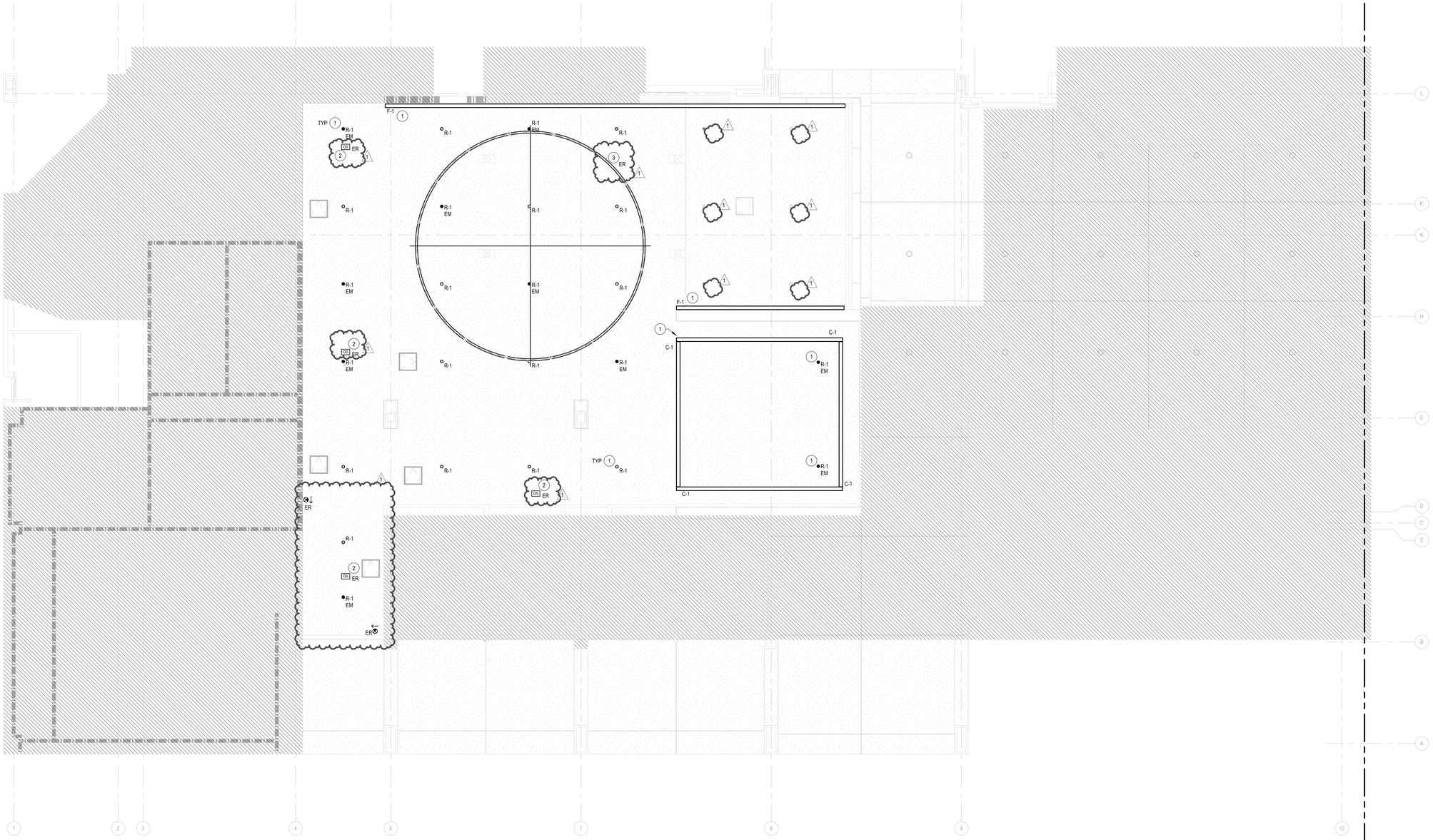
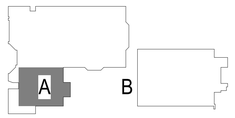


1 LEVEL 02 - LIGHTING PLAN - PHASE II
EL112A.00 SCALE: 3/16" = 1'-0"

SHEET NOTES

1. EXTEND EXISTING EMERGENCY AND NORMAL CIRCUITS FROM INTERIOR HIGH CEILING FIXTURES.
2. EXISTING WIRELESS OCCUPANCY SENSOR. REMOVE FOR CEILING DEMOLITION AND REINSTALL ON NEW CEILING IN EXISTING LOCATION.
3. EXISTING SUSPENDED RING LUMINAIRE. REMOVE FOR CEILING DEMOLITION AND REINSTALL ON NEW CEILING IN EXISTING LOCATION. CIRCUIT TO EXISTING LIGHTING CIRCUIT IN SPACE AND ROUTE THROUGH NEW LIGHTING CONTROL SYSTEM TO PROVIDE DEDICATED DIMMING CONTROL ZONE FOR THIS LUMINAIRE.

KEY PLAN



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LEVEL 02 - AREA A - LIGHTING PLAN - PHASE II

EL112A.00

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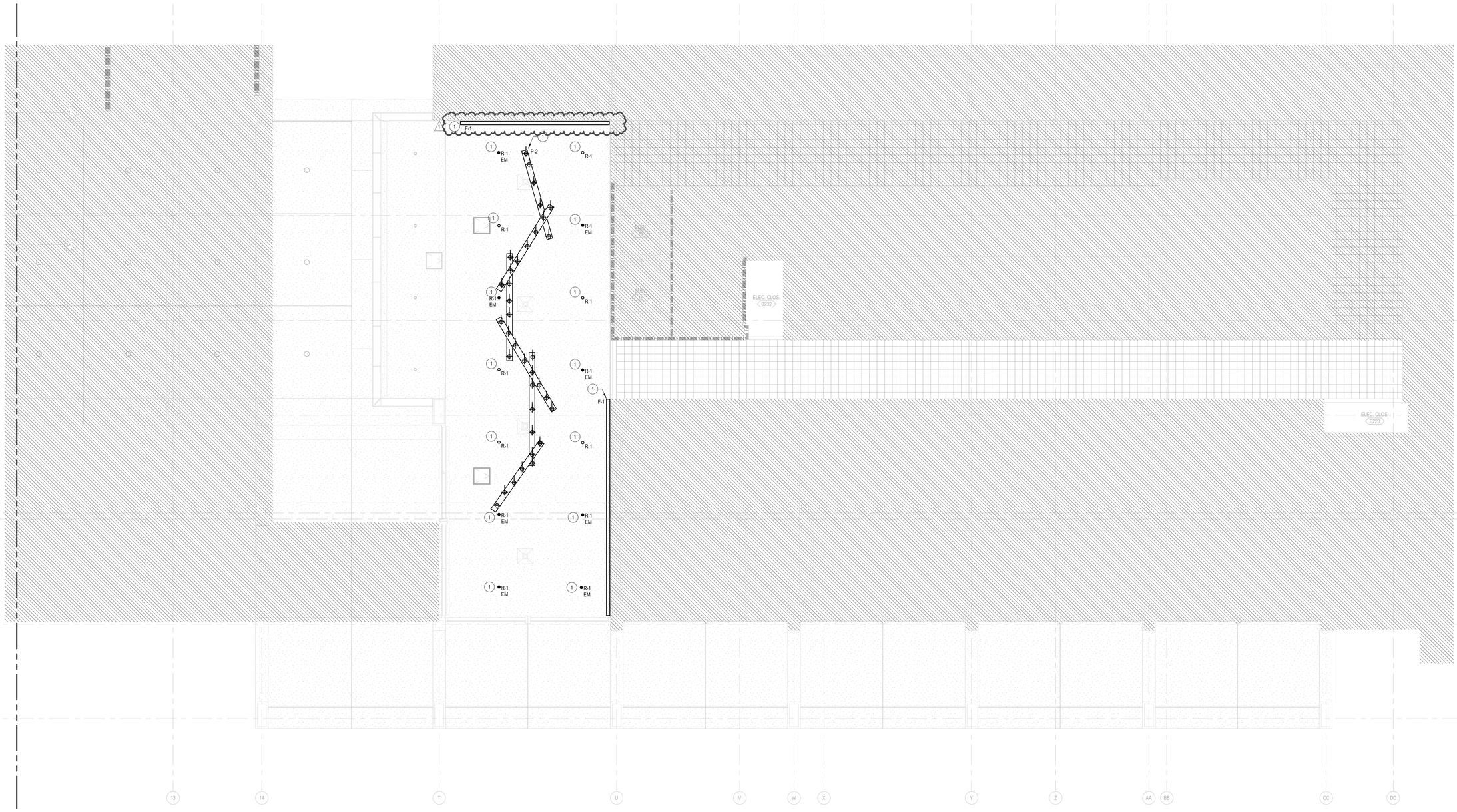

1 LEVEL 02 - LIGHTING PLAN - PHASE II
EL112B.00 SCALE: 3/16" = 1'-0"

SHEET NOTES

1 EXTEND EXISTING EMERGENCY AND NORMAL CIRCUITS FROM INTERIOR HIGH CEILING FIXTURES.

KEY PLAN

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LEVEL 02 - AREA B - LIGHTING PLAN - PHASE II

EL112B.00

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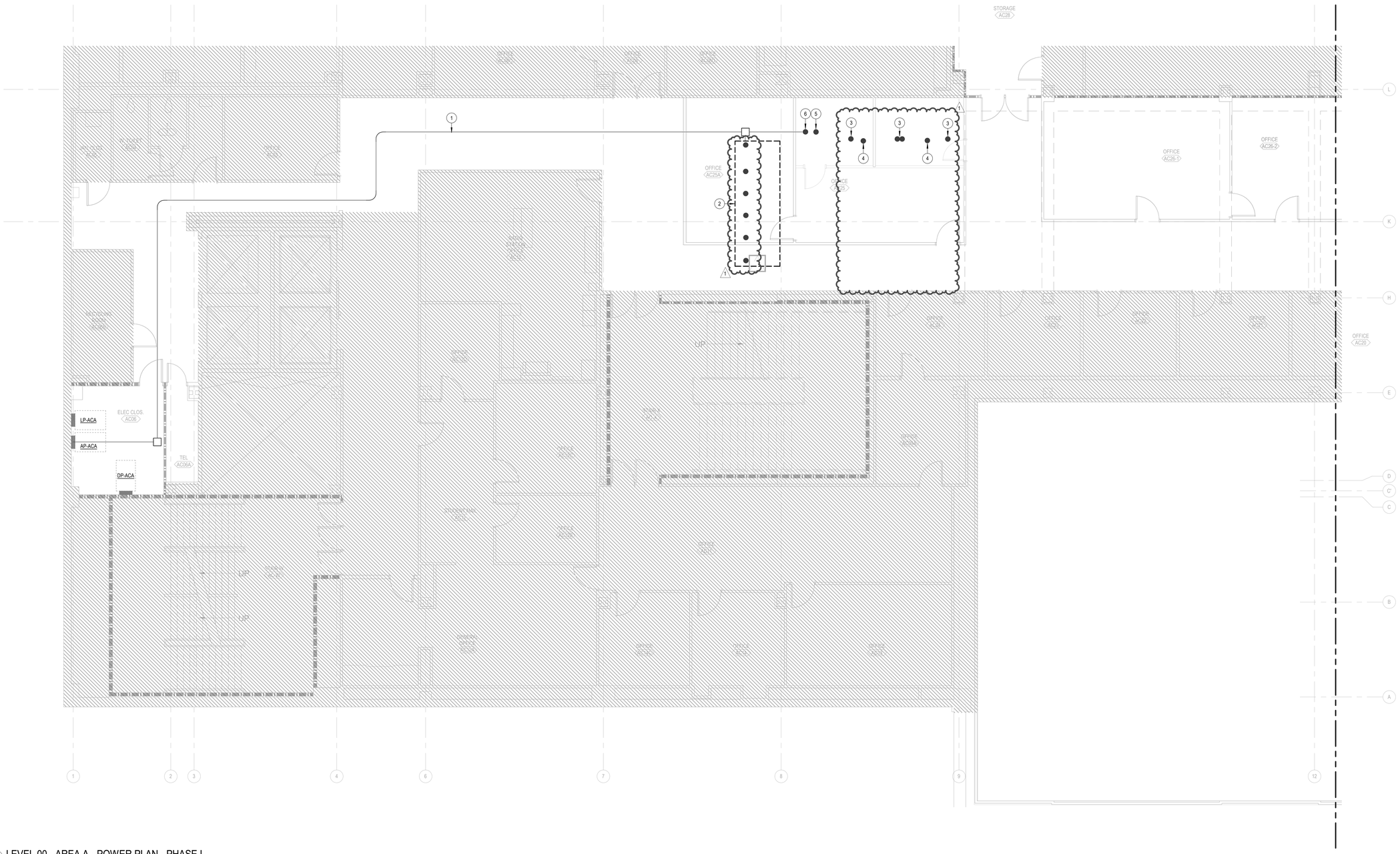


1 LEVEL 00 - AREA A - POWER PLAN - PHASE I
E100A.00 SCALE: 3/16" = 1'-0"

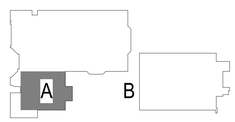
GENERAL NOTES

A SAMPLE NOTE 1
B SAMPLE NOTE 2

SHEET NOTES

1 ROUTING OF CONDUIT FOR SECURITY DESK AND TURNSTILE POWER.
2 LOCATION OF TURNSTILES ON LEVEL ABOVE. PROVIDE STUB UP INTO EACH TURNSTILE FOR POWER AND ACCESS CONTROL. REFER TO MANUFACTURER CUTSHEETS FOR MOUNTING DETAILS.
3 STUB-UPS FOR ADA DOOR OPERATOR PEDESTAL ON LEVEL ABOVE
4 POWER FOR ADA DOOR OPERATOR. POKE-THRU ON LEVEL ABOVE. CONNECT TO EXISTING CIRCUIT.
5 STUB UP FOR ACCESS CONTROL & ADA OPERATOR CONTROL AT SECURITY DESK
6 POKE-THRU FOR SECURITY DESK POWER AND DATA FLOOR BOX

KEY PLAN



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BIN: 1014250
BLK: 777
LOT: 001

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LEVEL 00 - AREA A - POWER PLAN - PHASE I

E100A.00

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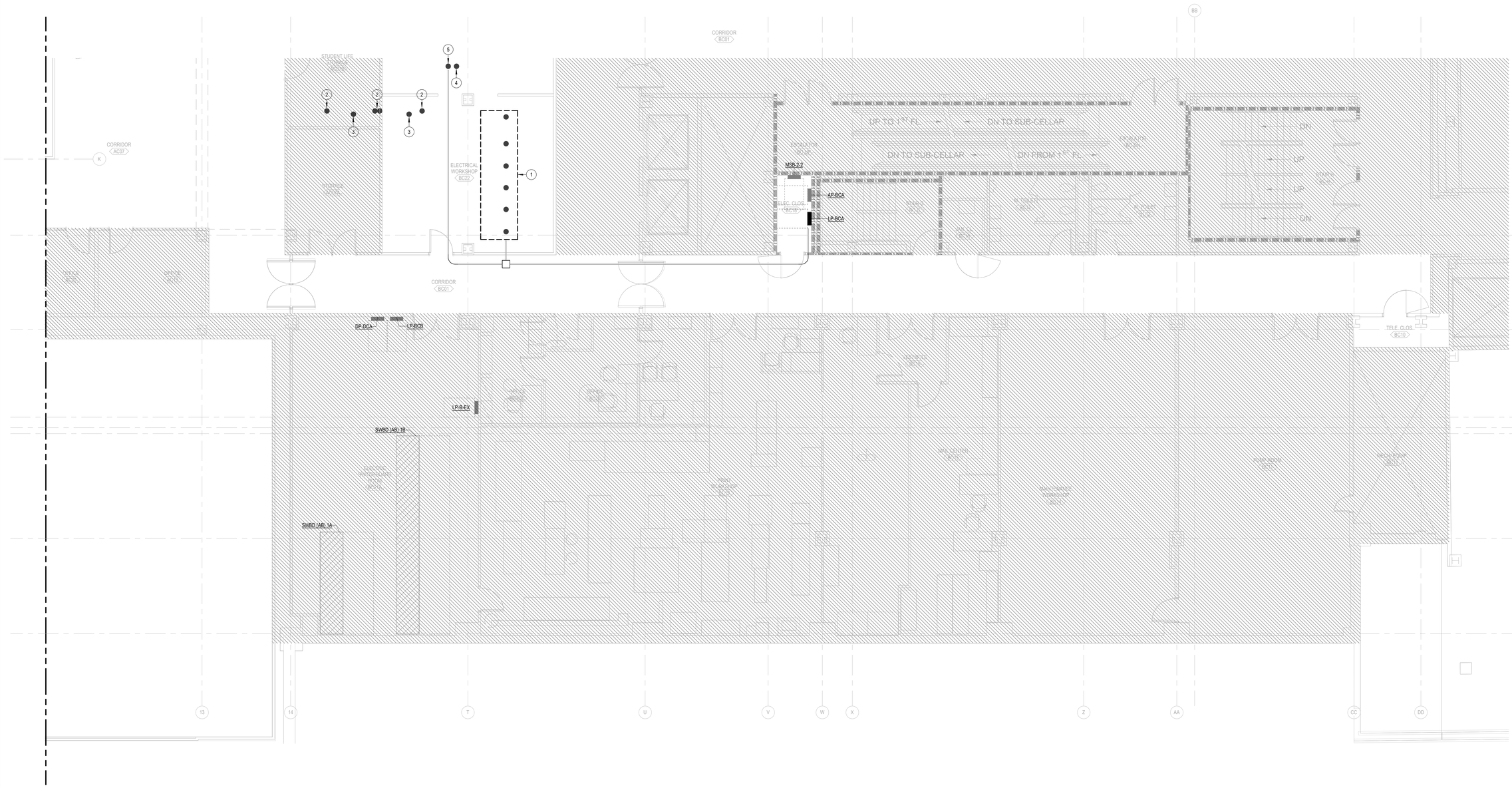

1 LEVEL 00 - AREA B - POWER PLAN - PHASE I
E100B.00 SCALE: 3/16" = 1'-0"

GENERAL NOTES

A SAMPLE NOTE 1
B SAMPLE NOTE 2

SHEET NOTES

1 LOCATION OF TURNSTILES ON LEVEL ABOVE. PROVIDE STUB UP INTO EACH TURNSTILE FOR POWER AND ACCESS CONTROL. REFER TO MANUFACTURER CUTSHEETS FOR MOUNTING DETAILS.
2 STUB-UPS FOR ADA DOOR OPERATOR PEDESTAL ON LEVEL ABOVE
3 POWER FOR ADA DOOR OPERATOR POKE-THRU ON LEVEL ABOVE. CONNECT TO EXISTING CIRCUIT.
4 STUB UP FOR ACCESS CONTROL & ADA OPERATOR CONTROL AT SECURITY DESK
5 POKE-THRU FOR SECURITY DESK POWER AND DATA FLOOR BOX

KEY PLAN

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LEVEL 00 - AREA B - POWER PLAN - PHASE I

E100B.00

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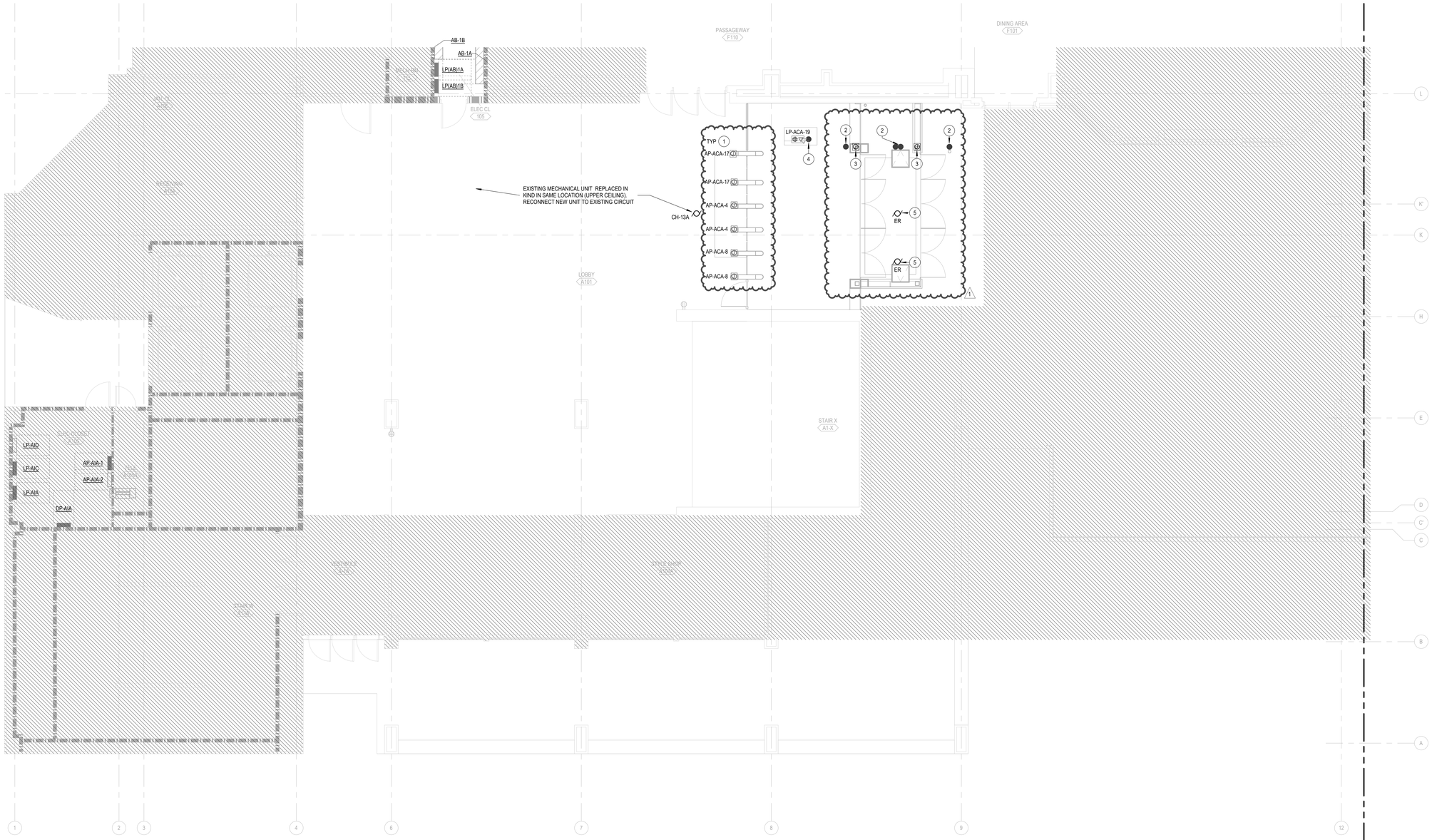


1 LEVEL 01 - AREA A - POWER PLAN - PHASE I
E101A.00 SCALE: 3/16" = 1'-0"

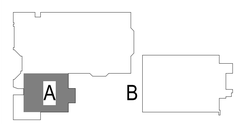
GENERAL NOTES

A SAMPLE NOTE 1
B SAMPLE NOTE 2

SHEET NOTES

1 TURNSTILE STUB-UPS. REFER TO MANUFACTURER CUTSHEETS FOR MOUNTING DETAILS.
2 STUB-UPS FOR ADA DOOR OPERATOR PEDESTAL
3 POWER FOR ADA DOOR OPERATOR POKE-THRU ON LEVEL ABOVE. CONNECT TO EXISTING CIRCUIT.
4 STUB UP FOR ACCESS CONTROL & ADA OPERATOR CONTROL AT SECURITY DESK
5 EXTEND EXISTING MECHANICAL ELECTRIC CIRCUIT TO NEW EQUIPMENT LOCATION.

KEY PLAN



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LEVEL 01 - AREA A - POWER PLAN - PHASE I

E101A.00

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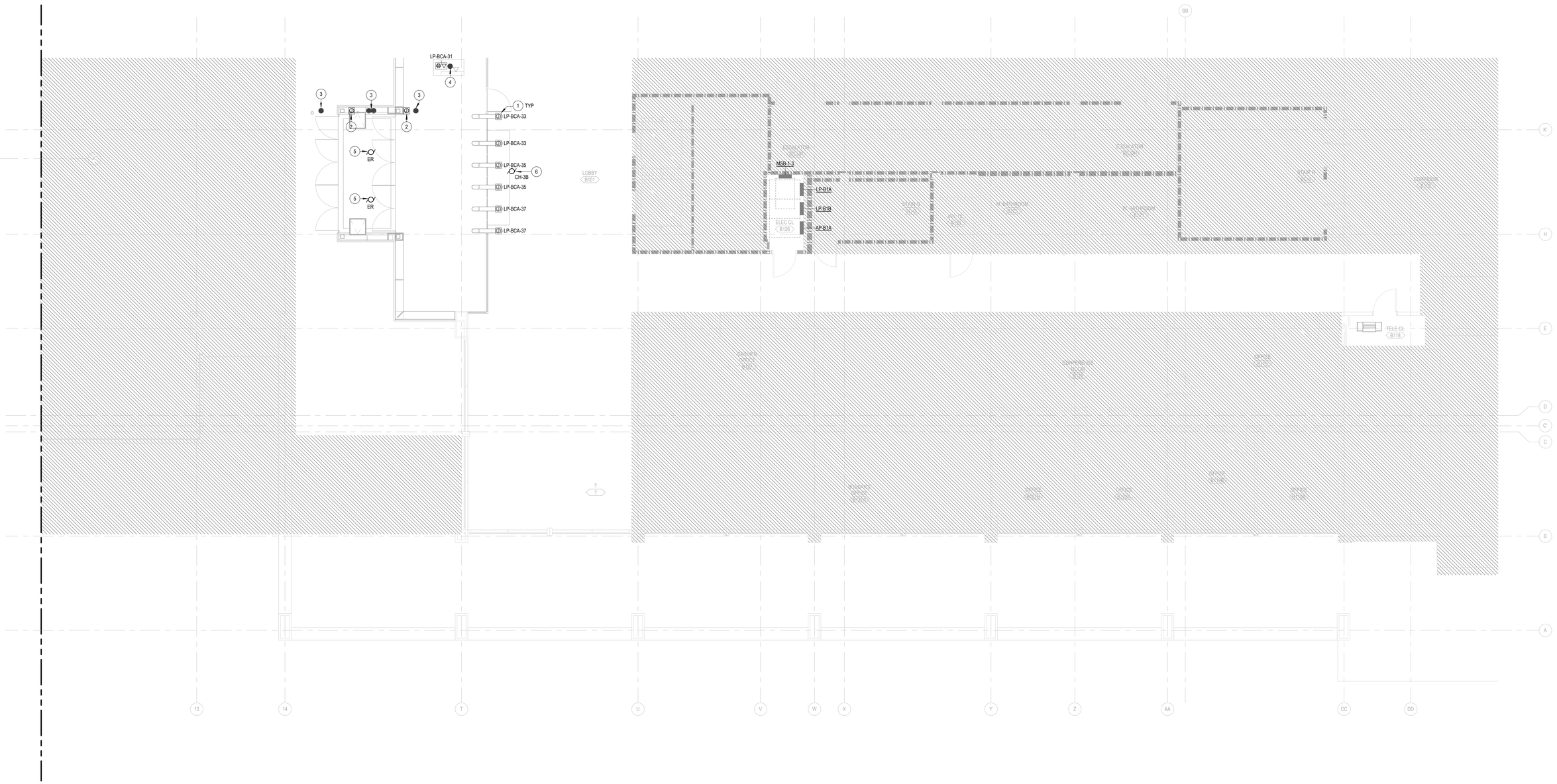


1 LEVEL 01 - AREA B - POWER PLAN - PHASE I
E101B.00 SCALE: 3/16" = 1'-0"

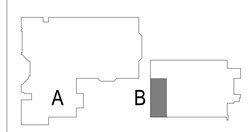
GENERAL NOTES

A SAMPLE NOTE 1
B SAMPLE NOTE 2

SHEET NOTES

1 TURNSTILE STUB-UPS. REFER TO MANUFACTURER CUTSHEETS FOR MOUNTING DETAILS.
2 POWER FOR ADA DOOR OPERATOR. CONNECT TO EXISTING CIRCUIT.
3 STUB-UPS FOR ADA DOOR OPERATOR PEDESTAL
4 STUB UP FOR ACCESS CONTROL & ADA OPERATOR CONTROL AT SECURITY DESK
5 EXTEND EXISTING MECHANICAL ELECTRIC CIRCUIT TO NEW EQUIPMENT LOCATION.
6 EXISTING MECHANICAL UNIT REPLACED IN KIND IN SAME LOCATION (UPPER CEILING). RECONNECT NEW UNIT TO EXISTING CIRCUIT

KEY PLAN



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01.23.25
REVISIONS

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LEVEL 01 - AREA B - POWER PLAN - PHASE I

E101B.00

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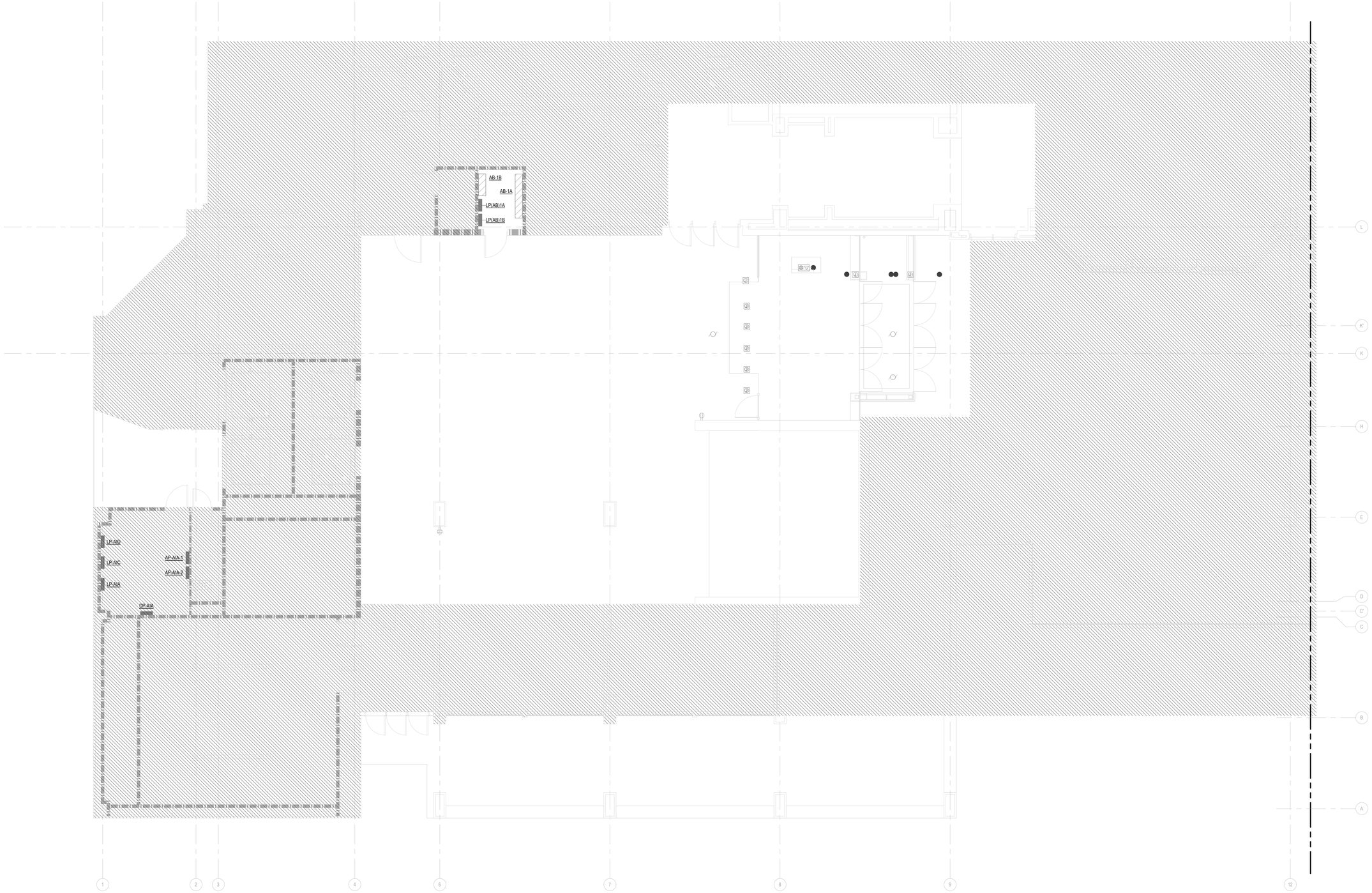


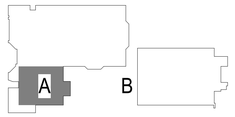
1 LEVEL 01 - AREA A - POWER PLAN - PHASE II
E211A.00 SCALE: 3/16" = 1'-0"

GENERAL NOTES

A COORDINATE FIRE ALARM TIE-INS WITH BASE BUILDING FIRE ALARM VENDOR AS FOLLOWS:
HIGH RISER FIRE PROTECTION CORPORATION
ATTN: FATMIR ISAKOSKI - (C) 1-917-685-3965, (O) 1-718-369-3434
fisakoski@highriserfire.com

SHEET NOTES

KEY PLAN



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BIN: 1014260
BLK: 777
LOT: 001

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LEVEL 01 - AREA A - POWER PLAN - PHASE II

E211A.00

Autodesk Docs://57-24140-00 FIT - Lobby_ Turnstile Reno Concept Study/57-24140-00 FIT Turnstile_EL_2024.rvt
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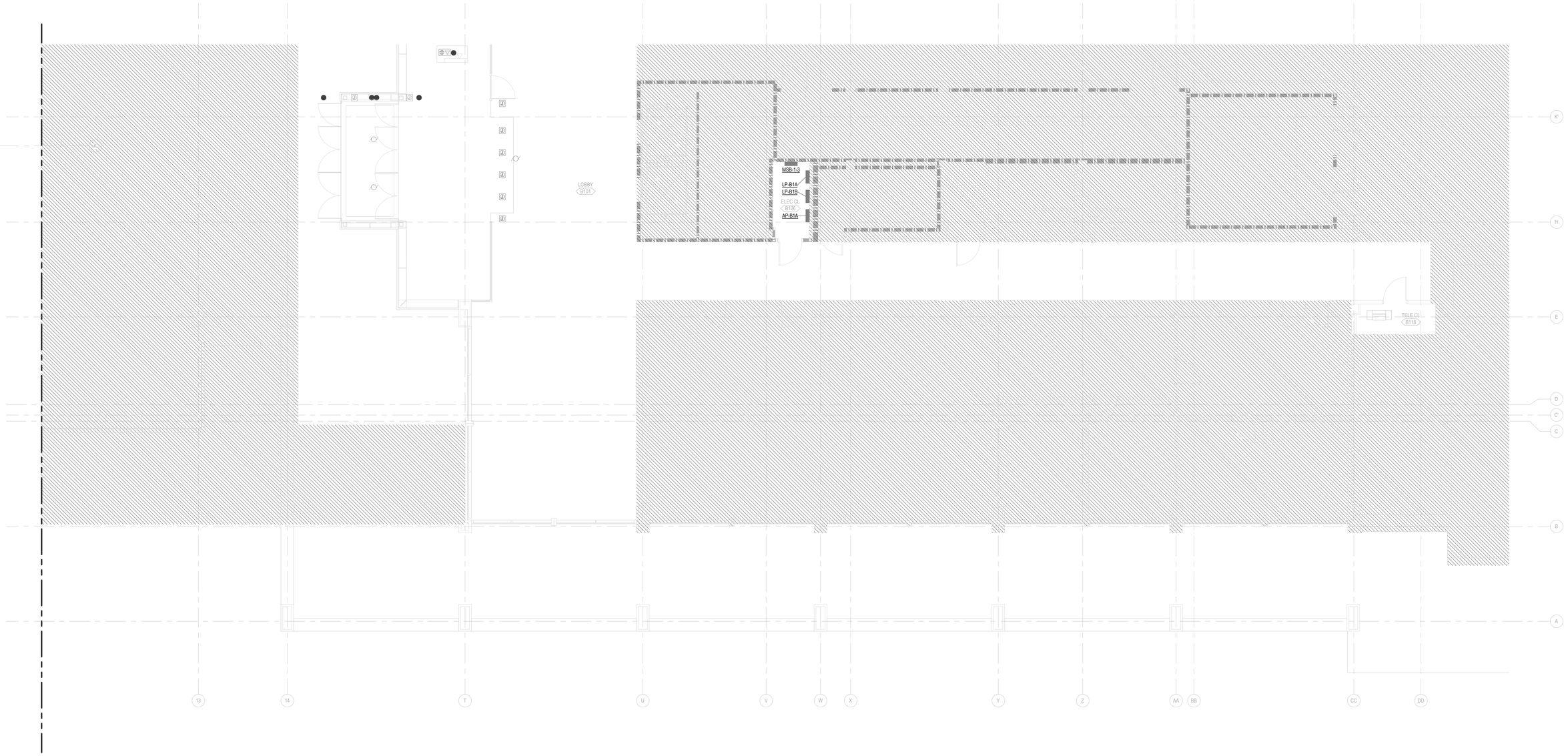

1 LEVEL 01 - AREA B - POWER PLAN - PHASE II
E211B.00 SCALE: 3/16" = 1'-0"

GENERAL NOTES

A COORDINATE FIRE ALARM TIE-INS WITH BASE BUILDING FIRE ALARM VENDOR AS FOLLOWS:
HIGH RISER FIRE PROTECTION CORPORATION
ATTN: FATMIR ISAKOSKI - (C) 1-917-685-3965, (O) 1-718-369-3434
fisakoski@highrisefire.com

SHEET NOTES

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STATE OF NEW YORK
RAYMOND E. HEINTEL
086917
LICENSED PROFESSIONAL ENGINEER
01/15/2025

FIT TURNSTILES - BUILDING A & B

344 8TH AVENUE, NY, NY 10001 - BUILDING A
340-356 8TH AVENUE, NY, NY, 10001 - BUILDING B

BIN: 1014250
BLK: 777
LOT: 001

ISSUE FOR ADDENDUM #3-C1667
01.23.25
REVISIONS

57-24140-02

LEVEL 01 - AREA B - POWER PLAN - PHASE II

E211B.00

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SYMBOLS LIST

- FACP — FIRE ALARM CONTROL PANEL MOUNT CENTER OF DISPLAY 54-INCHES AFF
- FAA — FIRE ALARM ANNUNCIATOR PANEL MOUNT CENTER OF DISPLAY 54-INCHES AFF
- LOC — LOCAL OPERATOR'S CONSOLE MOUNT CENTER OF DISPLAY 54-INCHES AFF
- NAC — NOTIFICATION APPLIANCE CIRCUIT CABINET MOUNT CENTER OF DISPLAY 54-INCHES AFF
- F — MANUAL FIRE ALARM PULL STATION MOUNT 42-INCHES AFF

FIRE ALARM A/V DEVICES: MOUNT 94-INCHES AFF, OR 6-INCHES BELOW CEILING, WHICHEVER IS LOWER UNO

- F — FIRE ALARM BELL
- F — FIRE ALARM HORN
- F — FIRE ALARM VISUAL WARNING SIGNAL
- F — FIRE ALARM HORN WITH VISUAL WARNING SIGNAL
- F — FIRE ALARM SPEAKER WITH VISUAL WARNING SIGNAL
- F — FIRE ALARM SPEAKER, FLUSH IN CEILING
- F — FIRE ALARM SPEAKER WITH VISUAL WARNING SIGNAL, CEILING
- F — FIRE ALARM VISUAL WARNING SIGNAL, CEILING

- AOM — TURNSTILE ADDRESSABLE OUTPUT MODULE
- I — SMOKE DETECTOR - IONIZATION TYPE
- P — SMOKE DETECTOR - PHOTOELECTRIC TYPE
- P EL — SMOKE DETECTOR - PHOTOELECTRIC TYPE - ELEVATOR RECALL

ABBREVIATIONS

AOM	ADDRESSABLE OUTPUT MODULE
E	EXISTING
ER	EXISTING TO BE RELOCATED
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
NIC	NEW
NTS	NOT TO SCLAE
R	EXISTING TO BE REMOVED
TYP	TYPICAL

FIRE ALARM NOTES:

1. PRIOR TO BID, CONTRACTOR SHALL CONTACT THE BUILDING FIRE ALARM MAINTENANCE CONTRATOR AND OBTAIN PRICING FOR THE EQUIPMENT AND SERVICES LISTED BELOW WHICH MUST BE PROVIDED BY THAT CONSTRACTOR. (SEE GENERAL NOTES).
2. ALL EQUIPMENT FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR SHALL BE PURCHASED FROM THE BUILDING FIRE ALARM MAINTENANCE CONTRACTOR TO ASSURE COMPATIBILITY WITH EXISTING FIRE ALARM SYSTEM.
3. REPROGRAMMING OF FIRE COMMAND STATION AND FINAL CONNECTIONS AT THE FIRE ALARM COMMAND STATION OR DATA GATHERING PANELS ARE BY BUILDING'S FIRE ALARM MAINTENANCE CONTRACTOR. INCLUDE PRICE FOR SAME IN BID PRICE.
4. INSTALL FIRE ALARM EQUIPMENT, FIRE ALARM COMBINATION SPEAKER/STROBE UNITS AND STROBE LIGHTS AT LOCATION AND WITH CANDELA INDICATED ON PLAN
5. CONNECT WIRES AS RECOMMENDED BY THE BUILDING'S FIRE ALARM MAINTENANCE CONTRACTOR. OPERATING VOLTAGE OF SPEAKER UNITS SHALL BE COMPATIBLE WITH EXISTING FIRE ALARM SYSTE.
6. FIRE ALARM WALL MOUNTED STROBE LIGHT UNITS OR COMBINATION SPEAKER/STROBE UNITS SHALL BE BASE BUILDING TYPE
7. ALL CABLING SHALL BE TEFLON INSULATED, JACKETED, AND RATED 200°C FIRE PROTECTION SERVICE APPROVED, (1) PAIR #14 AWG FOR STROBES AND #16 AWG FOR SPEAKERS, PROVIDE SHIELD WIRING WHERE REQUIRED. IN ANY EXPOSED AREA/CEILING AND STUB-UP, EMT CONDUIT SHALL BE UTILIZED FOR ALL WIRING RUN.
8. EXISTING BUILDING SYSTEMS ARE NOTE SHOWN (UNLESS THEY ARE PART OF NEW INSTALLATIONS) AND SHALL REMAIN INTACT.
9. OBTAIN PERMISSION FROM BUILIDNG MANAGER PRIOR TO RUNNING WIRE FROM NEW FIRE ALARM DEVICES TO EXISTING FIRE COMMAND STATION OR DATA GATHER PANELKS (DGP).
10. THE PART FIRE ALARM RISER DIAGRAM SHOWN IS AN INDICATION OF THE WORK REQUIRED AND SHALL BE USED FOR ESTIMATING PURPOSES ONLY. THE SUCCESSFUL 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. COORDINATE BUILDING DGP/TTB LOCATIONS WITH BUILDING FIRE ALARM VENDOR.
11. 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.
12. INCLUDE ALL FEES FOR FILING APPROVALS, AND SELF CERTIFICATION OF THE FIRE ALARM SYSTEM
13. ALTERNATE ZONING OF SPEAKERS AND STROBES TO AVOID ADJACENT DEVICES ON THE SAME ZONE.
14. BOLD LINES DENOTE NEW WORK, THIN LINES DENOTE EXISITNG TO REMAIN.
15. ALL NEW FIRE ALARM DEVICES SHALL BE INTELLIGENT/ADDRESSABLE TYPE COMPATIBLE WITH THE BASE BUILDING FIRE ALARM SYSTEM.
16. SPLICING IS NOT PERMITTED FOR FIRE ALARM WIRING.
17. CONTRACTOR TO REMOVE ALL DISCONNECTED UNUSED CONDUIT AND WIRING FOR FIRE ALARM SYSTEM.
18. ALL PENETRATIONS IN WALLS AND FLOORS MUST BE FIRESTOPPED WITH BUILDING OWNER APPROVED FIRE STOP MATERIAL. .

EXISTING FIRE ALARM DEVICE NOTES:

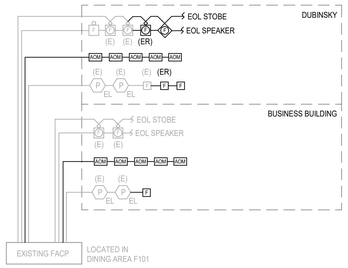
THE FOLLOWING SHALL APPLY FOR ALL DEVICES IDENTIFIED AS EXISTING TO REMAIN.

1. ALL CEILING MOUNTED DEVICES (I.E. SMOKE DETECTORS, SPEAKERS) SHALL BE REMOVED PRIOR TO DEMOLITION AND STORED AND PROTECTED UNTIL THEY CAN BE RE-INSTALLED IN THE LOCATIONS AS SHOWN ON PLANS.
2. 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 CONST TO THE OWNER.
3. THE ABOVE DESCRIBED WORK SHALL BE INCLUDED IN THE CONTRACT PRICE.

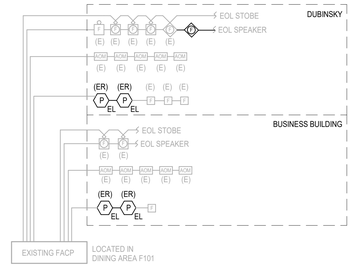
SYSTEM OUTPUTS

SYSTEM INPUTS	A: INDICATE DEVICE ADDRESS OR ZONE AT THE FIRE COMMAND STATION	B: ACTIVATE SPEAKERS AND STROBE DEVICES ON THE FLOOR IN ALARM AND THE FLOOR ABOVE	C: ACTIVATE ANCILLARY CONTROLS THROUGHOUT THE BUILDING	D: ACTIVATE THE FIRE SIGNAL AT THE FIRE COMMAND STATION	E: NOTIFY CENTRAL STATION	F: ILLUMINATE THE TROUBLE LAMP AT THE FIRE COMMAND STATION	G: OPERATE THE ELEVATOR RECALL ON ACTIVATION OF ANY ALARM	H: CLOSE EMERGENCY ELEVATOR CONTACTS FOR FAN SHUTDOWN	I: RELEASE ELECTRICAL LOCKS OPERATED DOORS IN THE EGRESS PRIMARY FLOOR IN ALARM	J: RECALL ELEVATORS BEFORE THE FLOOR IN ALARM TO THE GROUND FLOOR		
1. MANUAL PULL STATION	X	X	X	X	X						1.	
2. AREA SMOKE DETECTOR	X	X	X	X	X		X	X	X		2.	
3. TROUBLE CONDITION	X				X	X					3.	
4. ELEVATOR LOBBY SMOKE DETECTOR	X	X	X	X	X		X	X	X	X	4.	
	A	B	C	D	E	F	G	H	I			

FIRE ALARM INPUT / OUTPUT MATRIX



PARTIAL FIRE ALARM RISER DIAGRAM - PHASE I



PARTIAL FIRE ALARM RISER DIAGRAM - PHASE II

FIRE ALARM RISER DIAGRAM NOTES

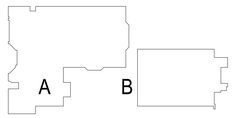
1. THIS IS NOT A POINT-TO-POINT WIRING DIAGRA. USE THIS DIAGRAM FOR ESTIMATING PURPOSES ONLY. PRIOR TO STARTING ANY WORK, A WORKING POINT-TO-POINT DIAGRAM SHALL BE OBTAINED FROM BUILDING FIRE ALARM MAINTENANCE CONTRACTOR.
2. MODIFY EXISTING DGP OR PROVIDE NEW STROBE PANEL TO ACCOMMODATE NEW FIRE ALARM DEVICES. PROVIDE NEW STROBE PANEL, POIWER SUPPLU, RELAY MODULES, ETC. AS REQUIRED TO POWER NEW FIRE ALARM STROBE UNITS IF REQUIRED.
3. CONNECT NEW STROBES AND/OR COMBINATION SPEAKER/STROBE LIGHT UNITS TO TWO ALTERNATE ZONES. COORDINATE WITH ARCHITECT FOR EXACT MOUNTING LOCATIONS.
4. THIS RISER DOES NOT SHOW ALL EXISTING BASE BUILDING FIRE ALARM DEVICES. THESE EXISTING DEVICES SHALL REMAIN INTACT UNLESS OTHERWISE NOTED.
5. SEE FIRE ALARM FLOOR PLANS FOR EXACT QUANTITY OF FIRE ALARM DEVICES.
6. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS OF FIRE ALARM DEVICES.
7. CONTRACTOR SHALL COORDINATE OPERATION OF FIRE ALARM SYSTEM WITH BASE BUILDING FIRE ALARM MANUFACTURER.
8. CONTRACTOR SHALL COORDIANTE WITH BUILDING FIRE ALARM VENDOR TO VERIFY DGP AND STROBE PANEL CAPACITY AND VERIFICATION OF POINT CAPACITY PRIOR TO PRICING.
9. ALL FIRE ALARM TIE-INS (DEMOLITION AND INSTALLATION) SHALL BE DONE BY BUILDING FIRE ALARM MAINTENANCE CONTRACTOR.
10. FIRE ALARM CONNECTION TO SECURITY PANEL FOR EGRESS DOOR AND TURNSTILE OPENING.

GENERAL NOTES

A COORDINATE FIRE ALARM TIE-INS WITH BASE BUILDING FIRE ALARM VENDOR AS FOLLOWS:
HIGH RISER FIRE PROTECTION CORPORATION
AITN: FATMIR ISAKOSKI - (C) 1-917-685-3965, (O) 1-718-369-3434
fisakoski@highrisefire.com

SHEET NOTES

KEY PLAN



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STATE OF NEW YORK
RAYMOND E. HENTEL
086917
LICENSED PROFESSIONAL ENGINEER
01/15/2025

FIT TURNSTILES - BUILDING A & B

344 8TH AVENUE, NY, NY 10001 - BUILDING A
340-356 8TH AVENUE, NY, NY, 10001 - BUILDING B

BIN: 1014259
BLK: 777
LOT: 001

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#3 02/23/25

57-24140-02

FIRE ALARM PLAN SYMBOLS, ABBREVIATIONS & NOTES

E300.00

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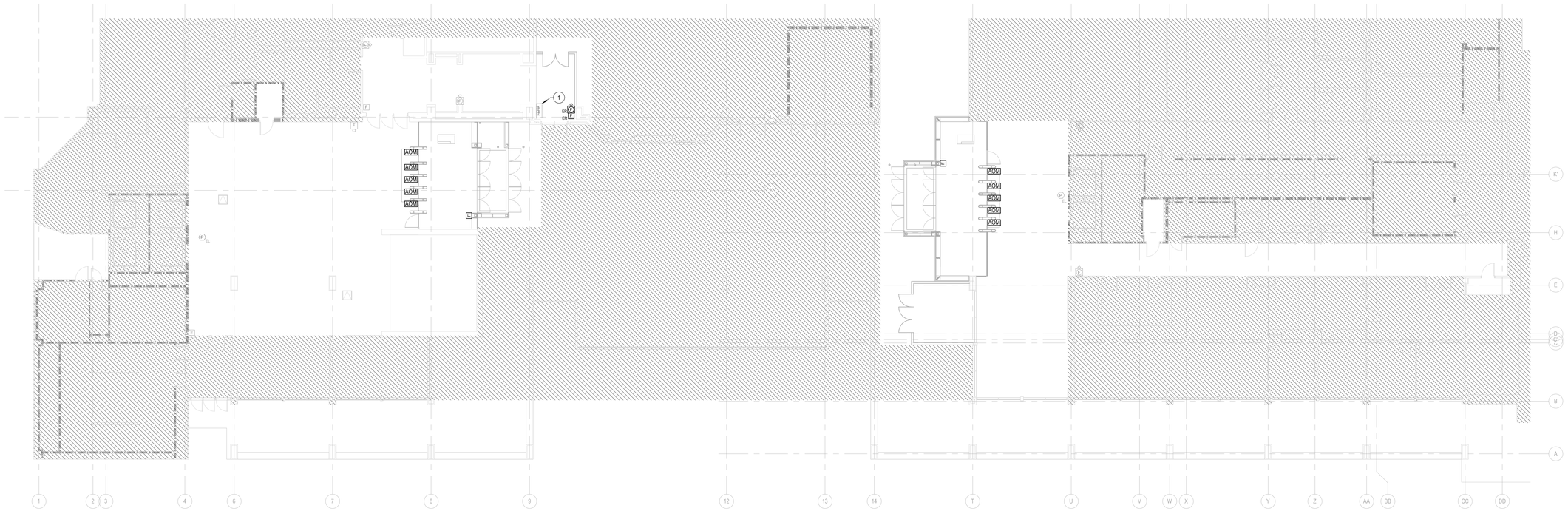
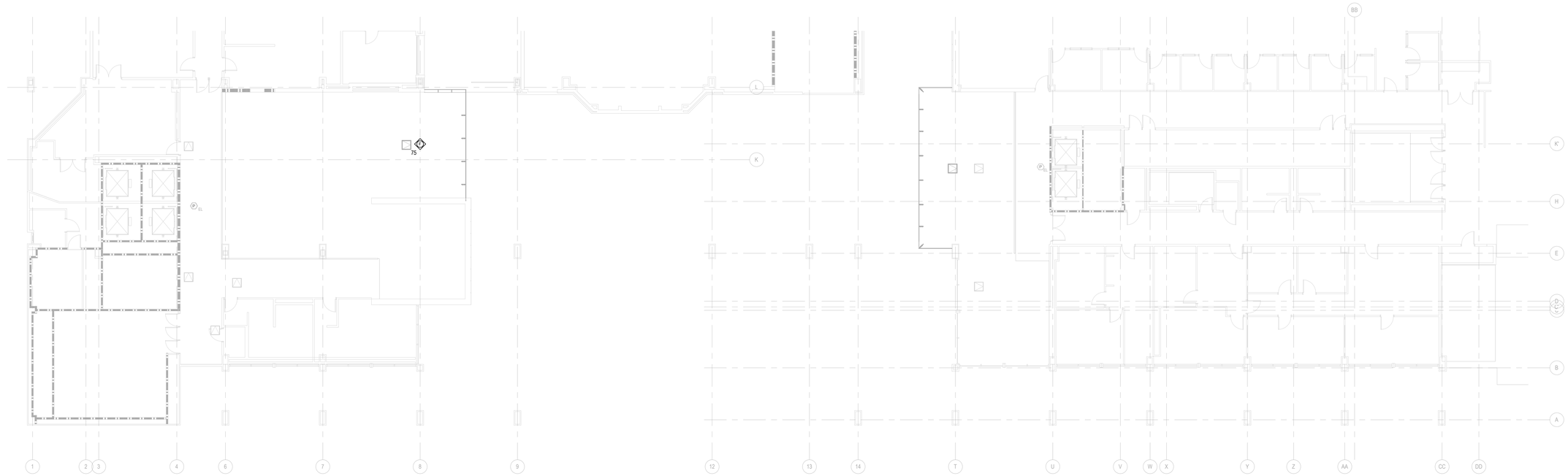


1 LEVEL 01 - FIRE ALARM PLAN - PHASE I
E301.00 SCALE: 3/32" = 1'-0"



2 LEVEL 02 - FIRE ALARM PLAN - PHASE I
E301.00 SCALE: 3/32" = 1'-0"

GENERAL NOTES

A COORDINATE FIRE ALARM TIE-INS WITH BASE BUILDING FIRE ALARM VENDOR AS FOLLOWS:
HIGH RISER FIRE PROTECTION CORPORATION
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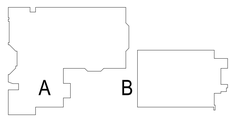
fisakoski@highriselfire.com

SHEET NOTES

1 EXISTING FIRE ALARM CONTROL PANEL. UTILIZE EXISTING LOW VOLTAGE CONDUCTOR PATHWAYS TO ROUTE NEW FIRE ALARM HOMERUNS ORIGINATING FROM NEW TURNSTILES TO PANEL FROM CEILING OF FLOOR BELOW.

KEY PLAN



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STATE OF NEW YORK
RAYMOND E. HEINTEL
086917
LICENSED PROFESSIONAL ENGINEER
01/15/2025

FIT TURNSTILES - BUILDING A & B

344 8TH AVENUE, NY, NY 10001 - BUILDING A
340-356 8TH AVENUE, NY, NY, 10001 - BUILDING B

BIN: 1014250
BLK: 777
LOT: 001

ISSUE FOR ADDENDUM #3-C1667
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57-24140-02
FIRE ALARM PLANS - PHASE I
E301.00

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EXISTING PANEL: AP-ACA

LOCATION:
BUS RATING: 100 A
MAIN BREAKER:
VOLTS: 208Y/120
PHASES: 3
WIRES: 4
SCCR:
MOUNTING: SURFACE
FED FROM:
INTEGRAL SPD:
LUG ACCESSORIES: SEE ONE-LINE

CKT	CIRCUIT DESCRIPTION	BKR TRIP	P	BKR TYPE	LOAD TYPE	PHASE A (VA)		PHASE B (VA)		PHASE C (VA)		LOAD TYPE	BKR TYPE	P	BKR TRIP	CIRCUIT DESCRIPTION	CKT
1	EXISTING LOAD	15	1	E	Spare	0	0					Spare	E	1	20	EXISTING LOAD	2
3	EXISTING LOAD	15	1	E	Spare			0	1,440			R		1	20	LOBBY TURNSTILES	4
5	EXISTING LOAD	15	1	E	Spare					0	0	Spare	E	1	15	EXISTING LOAD	6
7	EXISTING LOAD	15	1	E	Spare	0	1,440					R		1	20	LOBBY TURNSTILES	8
9	EXISTING LOAD	30	2	E	Spare			0	0			Spare	E	1	20	EXISTING LOAD	10
11										0	0	Spare	E	1	20	EXISTING LOAD	12
13	EXISTING LOAD	20	1	E	Spare	0	0					Spare	E	1	20	EXISTING LOAD	14
15	EXISTING LOAD	20	1	E	Spare			0	0			Spare	E	1	20	EXISTING LOAD	16
17	LOBBY TURNSTILES	20	1		R					720	0	Spare	E	1	20	EXISTING LOAD	18
19	EXISTING LOAD	15	1	E	Spare	0	0										20
21	EXISTING LOAD	15	1	E	Spare			0	0			Spare	E	3	30	EXISTING LOAD	22
23	EXISTING LOAD	15	1	E	Spare					0	0						24
					TOTAL LOAD:	1440 VA		1440 VA		720 VA							
					TOTAL AMPS	12.9 A		12.9 A		6.0 A							

LOAD TYPE	LOAD DESCRIPTION	CONNECTED LOAD (VA)	DEMAND...	ESTIMATED DEMAND (VA)	DEMAND FACTOR NOTES	BKR TYPE	PANEL TOTALS
L	LIGHTING	0 VA	0.00%	0 VA	CONTINUOUS LOAD @ 125%	G = GFCI (5mA)	
R	RECEPTACLES	3600 VA	100.00%	3600 VA	FIRST 10KVA @ 100%, REMAINDER @ 50%	GP = GFP (30mA)	**CONNECTED LOAD:** 4 kVA
K	KITCHEN	0 VA	0.00%	0 VA	NON-DWELLING KITCHEN LOADS, NEC ART. 220	ST = SHUNT TRIP	**ESTIMATED DEMAND:** 4 kVA
M	MOTOR	0 VA	0.00%	0 VA	LARGEST MOTOR, NEC ART. 430	LO = LOCK OUT	**CONNECTED CURRENT:** 10.0 A
C	COOLING	0 VA	0.00%	0 VA		E = EXSTING	**EMD CURRENT:** 10.0 A
H	HEATING	0 VA	0.00%	0 VA			
O	OTHER	0 VA	0.00%	0 VA			
Spare	SPARE	0 VA	0.00%	0 VA			

NOTES:

PANEL: LP-ACA

LOCATION:
BUS RATING: 225 A
MAIN BREAKER:
VOLTS: 208Y/120
PHASES: 3
WIRES: 4
SCCR:
MOUNTING: SURFACE
FED FROM:
INTEGRAL SPD:
LUG ACCESSORIES: SEE ONE-LINE

CKT	CIRCUIT DESCRIPTION	BKR TRIP	P	BKR TYPE	LOAD TYPE	A		B		C		LOAD TYPE	BKR TYPE	P	BKR TRIP	CIRCUIT DESCRIPTION	CKT
1	EXISTING LOAD	15	1		Spare	0	0					Spare		1	15	EXISTING LOAD	2
3	EXISTING LOAD	15	1		Spare			0	0			Spare		1	15	EXISTING LOAD	4
5	EXISTING LOAD	15	1		Spare					0	0	Spare		1	15	EXISTING LOAD	6
7	EXISTING LOAD	20	1		Spare	0	0					Spare		1	15	EXISTING LOAD	8
9	EXISTING LOAD	15	1		Spare			0	0			Spare		1	15	EXISTING LOAD	10
11	EXISTING LOAD	15	1		Spare					0	0	Spare		1	15	EXISTING LOAD	12
13	EXISTING LOAD	15	1		Spare	0	0					Spare		1	15	EXISTING LOAD	14
15	EXISTING LOAD	15	1		Spare			0	0			Spare		1	15	EXISTING LOAD	16
17	EXISTING LOAD	15	1		Spare					0	0	Spare		1	15	EXISTING LOAD	18
19	SECURITY DESK	20	1		R	500	--							1	--	SPACE	20
21	SPACE	--	1					--	--					1	--	SPACE	22
23	SPACE	--	1							--	--			1	--	SPACE	24
					TOTAL LOAD:	500 VA		0 VA		0 VA							
					TOTAL AMPS	4.2 A		0.0 A		0.0 A							

LOAD TYPE	LOAD DESCRIPTION	CONNECTED LOAD (VA)	DEMAND...	ESTIMATED DEMAND (VA)	DEMAND FACTOR NOTES	BKR TYPE	PANEL TOTALS
L	LIGHTING	0 VA	0.00%	0 VA	CONTINUOUS LOAD @ 125%	G = GFCI (5mA)	
R	RECEPTACLES	500 VA	100.00%	500 VA	FIRST 10KVA @ 100%, REMAINDER @ 50%	GP = GFP (30mA)	**CONNECTED LOAD:** 1 kVA
K	KITCHEN	0 VA	0.00%	0 VA	NON-DWELLING KITCHEN LOADS, NEC ART. 220	ST = SHUNT TRIP	**ESTIMATED DEMAND:** 1 kVA
M	MOTOR	0 VA	0.00%	0 VA	LARGEST MOTOR, NEC ART. 430	LO = LOCK OUT	**CONNECTED CURRENT:** 1.4 A
C	COOLING	0 VA	0.00%	0 VA			**EMD CURRENT:** 1.4 A
H	HEATING	0 VA	0.00%	0 VA			
O	OTHER	0 VA	0.00%	0 VA			
Spare	SPARE	0 VA	0.00%	0 VA			

NOTES:

PANEL: LP-BCA

LOCATION:
BUS RATING: 225 A
MAIN BREAKER:
VOLTS: 208Y/120
PHASES: 3
WIRES: 4
SCCR:
MOUNTING: SURFACE
FED FROM:
INTEGRAL SPD:
LUG ACCESSORIES: SEE ONE-LINE

CKT	CIRCUIT DESCRIPTION	BKR TRIP	P	BKR TYPE	LOAD TYPE	PHASE A (VA)		PHASE B (VA)		PHASE C (VA)		LOAD TYPE	BKR TYPE	P	BKR TRIP	CIRCUIT DESCRIPTION	CKT
1	ESCALATOR SIGNS	20	1	NE	Spare	0	0					Spare	NE	1	20	ESCALATOR SIGNS	2
3	ESCALATOR SIGNS	20	1	NE	Spare			0	0			Spare	NE	1	20	PRINT SHOP MERCH'	4
5	CLOCK SYSTEM	20	1	NE	Spare					0	0	Spare	NE	1	20	STORAGE BC19	6
7	SWITCHBOARD RM LIGHTS	20	1	NE	Spare	0	0					Spare	NE	1	20	STORAGE BC19	8
9	STORAGE BC03	20	1	NE	Spare			0	0			Spare	NE	1	20	STORAGE BC19	10
11	ST. BC03, BC01, BC06, ELEV RM	20	1	NE	Spare					0	0	Spare	NE	1	20	STORAGE BC19	12
13	BC-03	20	1	NE	Spare	0	0					Spare	NE	1	20	STORAGE BC15	14
15	BC-15	20	1	NE	Spare			0	0			Spare	NE	1	20	STORAGE BC15	16
17	ESCALATOR SIGN	20	1	NE	Spare					0	0	Spare	NE	1	20	STORAGE BC15	18
19	BC16	20	1	NE	Spare	0	0					Spare	NE	1	20	WORK ROOM BC14	20
21	BC18, BC16, BC12, BC13	20	1	NE	Spare			0	0			Spare	NE	1	20	WORK ROOM BC14	22
23	COAT RM / TELEPHONE	20	1	NE	Spare					0	0	Spare	NE	1	20	WORK ROOM BC14	24
25	AC22	20	1	NE	Spare	0	0					Spare	NE	1	20	STORAGE BC19	26
27	AC 23	20	1	NE	Spare			0	0			Spare	NE	1	20	STORAGE BC19	28
29	AC 24	20	1	NE	Spare					0	0	Spare	NE	1	20	BATTERY CHARGER	30
31	SECURITY DESK	20	1		R	500											32
33	LOBBY TURNSTILES	20	1		R			1,440									34
35	LOBBY TURNSTILES	20	1		R					1,440							36
37	LOBBY TURNSTILES	20	1		R	720											38
39																	40
41																	42
					TOTAL LOAD:	1220 VA		1440 VA		1440 VA							
					TOTAL AMPS	10.2 A		12.3 A		12.3 A							

LOAD TYPE	LOAD DESCRIPTION	CONNECTED LOAD (VA)	DEMAND...	ESTIMATED DEMAND (VA)	DEMAND FACTOR NOTES	BKR TYPE	PANEL TOTALS
L	LIGHTING	0 VA	0.00%	0 VA	CONTINUOUS LOAD @ 125%	G = GFCI (5mA)	
R	RECEPTACLES	4100 VA	100.00%	4100 VA	FIRST 10KVA @ 100%, REMAINDER @ 50%	GP = GFP (30mA)	**CONNECTED LOAD:** 4 kVA
K	KITCHEN	0 VA	0.00%	0 VA	NON-DWELLING KITCHEN LOADS, NEC ART. 220	ST = SHUNT TRIP	**ESTIMATED DEMAND:** 4 kVA
M	MOTOR	0 VA	0.00%	0 VA	LARGEST MOTOR, NEC ART. 430	LO = LOCK OUT	**CONNECTED CURRENT:** 11.4 A
C	COOLING	0 VA	0.00%	0 VA		E = NEW BREAKER ON EXISTING CIRCUIT	**EMD CURRENT:** 11.4 A
H	HEATING	0 VA	0.00%	0 VA			
O	OTHER	0 VA	0.00%	0 VA			
Spare	SPARE	0 VA	0.00%	0 VA			

NOTES:

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01/15/2025

FIT TURNSTILES - BUILDING A & B
344 8TH AVENUE, NY, NY 10001 - BUILDING A 340-356 8TH AVENUE, NY, NY, 10001 - BUILDING B

BIN: 1014260
BLK: 777
LOT: 001

ISSUE FOR ADDENDUM #3-C1667
01.23.25
REVISIONS

57-24140-02

ELECTRICAL SCHEDULES

E701.00

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LUMINAIRE SCHEDULE

LUMINAIRE CRITERIA				PRODUCT INFORMATION		SOURCE					ELECTRICAL INFORMATION					ADDITIONAL INFORMATION			
TYPE	DESCRIPTION	FINISH	LOCATION	MANUFACTURER	MODEL OR SERIES	LAMP	LUMENS	FT	COLOR TEMP	CRI	DIMMING TYPE	POWER SUPPLY	VOLTAGE	WATTAGE	FT	MOUNTING	MOUNTING HEIGHT	COMMENTS	ACCESSORIES
C-1	COVE MOUNTED LINEAR LED	WHITE	STAIRWELL	KELVIX	MELISSA SERIES	LED	500	FT	3500K	90+	0-10V	REMOTE ELECTRONIC DIMMING DRIVER	24V	5W	FT	COVE	N/A		
F-1	SURFACE MOUNT LINEAR LED WALL WASH	WHITE	GRAPHIC WALL	SELUX	WET-M60 SERIES	LED	500	FT	3500K	90+	0-10V	INTEGRAL ELECTRONIC DIMMING DRIVER	UNV	5W	FT	SURFACE	N/A		
F-2	SURFACE MOUNT LINEAR UPLIGHT	BLACK	TOP OF VESTIBULES	KELVIX	ZOLO SERIES	LED	1000	FT	3500K	90+	0-10V	REMOTE ELECTRONIC DIMMING DRIVER	24V	10W	FT	SURFACE	N/A		
P-2	DECORATIVE LED LINEAR PENDANT; 30 FOOT LENGTH IN EQUAL ADJUSTABLE SEGMENTS	BLACK	BUSINESS LOBBY	SONNEMAN	SUSPENDERS LINEAR SERIES SLS1150	LED	4000		3500K	90+	ELV	REMOTE ELECTRONIC DIMMING DRIVER	120V	75W		PENDANT	20'-0" A.F.F.	ALTERNATE TO P-3	
R-1	HIGH CEILING RECESSED DOWNLIGHT; NOMINAL 4 INCH DIAMETER; 40 DEGREE	CLEAR ALZAK	22'-0"	INTENSE	GRAVITY 4 INCH SERIES GD4DRR-L5-35-D101-40 IRDR400	LED	3000		3500K	90+	0-10V	INTEGRAL ELECTRONIC DIMMING DRIVER	UNV	15W		RECESSED	N/A		
R-2	LOW CEILING RECESSED DOWNLIGHT	CLEAR ALZAK	10'-0"	INTENSE	GRAVITY 4 INCH SERIES GD4DRR-L2-35-D101-20 IRDR400	LED	1500		3500K	90+	0-10V	INTEGRAL ELECTRONIC DIMMING DRIVER	UNV	31W		RECESSED	N/A		
R-3	LOW CEILING RECESSED DOWNLIGHT	CLEAR ALZAK	VESTIBULE	INTENSE	GRAVITY 4 INCH SERIES GD4DRR-L2-35-D101-20 IRDR400	LED	1500		3500K	90+	0-10V	INTEGRAL ELECTRONIC DIMMING DRIVER	UNV	31W		RECESSED	N/A		
R-4	RECESSED LED 2X2 TROFFER	WHITE	OFFICES	CORELITE	DIVIDE SERIES DRI-WD-3-L35-UNV-XX-STD	LED	3000		3500K	90+	0-10V	INTEGRAL ELECTRONIC DIMMING DRIVER	UNV	24W		RECESSED	N/A		
W-1	WALL MOUNTED 4' WRAPAROUND	WHITE	TEMPORARY EGRESS	LITHONIA	FMLWLSERIES FMLWL 48-8-35-ZT-MVOLT	LED	4500		3500K	80+	0-10V	INTEGRAL ELECTRONIC DIMMING DRIVER	UNV	42W		WALL	8'-0" A.F.F.		
X1	CEILING MOUNT EDGE LIT EXIT SIGN: RED LETTERS: ARROWS AS SHOWN ON DRAWINGS	BRUSHED ALUMINUM	VESTIBULE	LITHONIA	LRP-X-X-RMR-X-120/277	LED	N/A		RED	N/A	N/A	INTEGRAL ELECTRONIC DRIVER	UNV	4W		SURFACE	VARIES		
X2	CUSTOM EXIT SIGN TBD	CUSTOM	VESTIBULE	CONCEALITE	CONCEAL-X EXIT SIGN	LED	N/A		RED	N/A	N/A	INTEGRAL ELECTRONIC DRIVER	UNV	4W		RECESSED	VARIES		

GENERAL NOTES:

A.	CONTRACTOR IS RESPONSIBLE TO REVIEW ARCHITECTRUAL DRAWINGS TO CONIFIRM CEILING TYPES IN ALL ROOMS (ACCESSIBLE, EXPOSED OR "HARD") AND TO USE THE APPROPRIATE WIRING METHOD FOR EACH TYPE. ENSURE ALL J-BOXES ARE ACCESSIBLE AFTER ALL OTHER TRADE'S WORK IS COMPLETED. DO NOT LOCATE ANY J-BOXES ON "HARD" CEILINGS; ALL WIRING MUST BE ACCESSIBLE THROUGH LUMINAIRE ONLY IN "DAISY-CHAIN" METHOD OR WITH DEDICATED HOMERUNSTO EACH LUMINAIRE. J-BOXES MAY BE LOCATED ABOVE OTHER TRADE'S ACCESS DOORS IF FEASIBLE AND DOES NOT INTERFERE WITH ACCESS.
B.	ALL LOW VOLTAGE CABLING TO LIGHTING FIXTURES AND CONTROL DEVICES SHALL BE PLENUM RATED.
C.	EXIT SIGNS TO BE CIRCUITED TO NEAREST EMERGENCY CIRCUIT SERVING THE SPACE.

SCHEDULE NOTES

LIGHTING CONTROL NARRATIVES:

PHASE I:

NEW LIGHTING IN THE 2-STORY SPACES AND THE NEW VESTIBULES WILL BE INCORPORATED INTO THE EXISTING LOBBY LIGHTING CONTROL ZONES AND OPERATE ON TIMECLOCK CONTROL UTILIZING EXISTING LIGHTING CONTROL SYSTEM. 1

PHASE II:

EXISTING LUTRON GRAPHIC EYE LIGHTING CONTROLS FOR THE RENOVATED LOBBY SPACES AND VESTIBULES WILL BE REMOVED. EXISTING LUTRON GRAPHIC EYE CONTROLS SERVING OTHER AREAS OF THE BUILDING WILL REMAIN AS IS.

PROVIDE NEW LIGHTING CONTROL SYSTEM FOR LOBBY SPACES AND VESTIBLES IN SCOPE TO PROVIDE TIMECLOCK AND DIMMING CONTROL. DIMMING PROTOCOL IS 0-10V AND COORDINATIED WITH PROCURED LUMINAIRES TO ENSURE COMPATIBILITY. LIGHTING CONTROL SYSTEM ARCHITECTURE CONSISTS OF THE FOLLOWING:

(1) CENTRAL HUB FOR EACH BUILDING (2 TOTAL)
(1) 4-ZONE LOAD CONTROLLER ON NORMAL POWER PER BUILDING, AND (1) 4-ZONE LOAD CONTROLLER FOR EMERGENCY LIGHTING IN EACH BUILDING (TOTAL OF 4 LOAD CONTROLLERS)
(1) NORMAL POWER SENSING DEVICE WITH UL924 LISTING PER BUILDING (2 TOTAL)
(1) 5-BUTTON SCENE SELECT LOW VOLTAGE SWITCH PER BUILDING (2 TOTAL)
MISCELLANEOUS MATERIALS AND COMPONENTS TO PROVIDE A FULLY FUNCTIONING SYSTEM.

PROVIDE A TIE IN BETWEEN THE CENTRAL HUBS AND THE BUILDING'S AUTOMATION SYSTEM (BAS). PROVIDE BACNET COMPATIBILITY. SEE SPECIFICATION SECTION 230900.1 FOR MORE INFORMATION. 1

POWER SENSING DEVICE WILL COMMUNICATE WITH HUB AND LOAD CONTROLLERS TO OVERRIDE CONTROLS FOR EMERGENCY LIGHTING UPON LOSS OF NORMAL POWER TO PUSH EMERGENCY LIGHTING TO 100% OUTPUT.

PROVIDE ONE CONTROL ZONE PER LUMINAIRE TYPE WITHIN SCOPE. ALL ZONES DIM WITH THE EXCEPTION OF THE LIGHTS WITHIN THE SINGLE STORY VESTIBULES.

LOCATE HUBS, LOAD CONTROLLERS, NORMAL POWER SENSE AND SCENE SELECT WALLSWITCH IN ELECTRICAL CLOSET WHERE BRANCH PANEL FEEDING NORMAL POWER LIGHTING IS LOCATED. CLEARLY LABEL THE SCENE SELECT SWITCH TO IDENTIFY THE AREA CONTROLLED.

LIGHTING CONTROL SYSTEM BASIS OF DESIGN IS LUTRON ATHENA.

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LUMINIARE SCHEDULE

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COM*check* Software Version COMcheckWeb

Interior Lighting Compliance Certificate

Project Information

Energy Code: 2018 IECC
Project Title: FIT Turnstiles - Phase II Copy 2
Project Type: Addition

Construction Site:
344 8th Avenue
New York, New York 10001

Owner/Agent:
Fashion Institute of Technology

Designer/Contractor:
Scott Micucci
DLR Group
701 8th St NW, Suite 700
Washington, District of Columbia
20001
540-702-0234
smicucci@dlrgroup.com

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts
1-Lobby A Adjacency Stair (Common Space Types:Lobby - General)	505	1.00	505
2-Lobby B Adjacency Stair (Common Space Types:Lobby - General)	371	1.00	371
3-Lobby A101 - Single Story (Common Space Types:Lobby - General)	1988	1.00	1988
4-Lobby A101 - Two Story (Common Space Types:Lobby - General)	1821	1.00	1821
5-Lobby B101 Single Story (Common Space Types:Lobby - General)	680	1.00	680
6-Lobby B101 - Two Story (Common Space Types:Lobby - General)	970	1.00	970
		Total Allowed Watts =	6335

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixture	D Fixture Watt.	E (C X D)
1-Lobby A Adjacency Stair (Common Space Types:Lobby - General)				
LED: R1: Downlight: Other:	1	2	31	62
LED: C1: Cove Light: Other:	1	76	5	380
2-Lobby B Adjacency Stair (Common Space Types:Lobby - General)				
LED: R1: Downlight: Other:	1	5	31	155
3-Lobby A101 - Single Story (Common Space Types:Lobby - General)				
LED: R1: Downlight: Other:	1	10	31	310
LED: R2: Downlight: Other:	1	8	15	120
LED: F1: Linear grazing light: Other:	1	20	5	100
4-Lobby A101 - Two Story (Common Space Types:Lobby - General)				
LED: R1: Downlight: Other:	1	18	31	558
LED: F1: Linear Grazing Light: Other:	1	77	5	385
LED: ER: Existing - LED MR16: Other:	1	16	8	128
5-Lobby B101 Single Story (Common Space Types:Lobby - General)				

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixture	D Fixture Watt.	E (C X D)
LED: R2: Downlight: Other:	1	4	15	60
LED: R1: Downlight: Other:	1	4	31	124
6-Lobby B101 - Two Story (Common Space Types:Lobby - General)				
LED: R1: Downlight: Other:	1	10	31	310
LED: P2: Multihead pendant - per head: Other:	1	36	3	108
			Total Proposed Watts =	2800

Interior Lighting PASSES: Design 56% better than code

Interior Lighting Compliance Statement

Compliance Statement: The proposed interior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been designed to meet the 2018 IECC requirements in COM*check* Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title Signature Date

COM*check* Software Version COMcheckWeb

Inspection Checklist

Energy Code: 2018 IECC

Requirements: 100.0% were addressed directly in the COM*check* software

Text in the "Comments/Assumptions" column is provided by the user in the COM*check* Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
C103.2 [PR4][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the interior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include interior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** EL sheets
C406 [PR9][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** EL series plans

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
C405.2.2.2 [EL22][1]	Spaces required to have light-reduction controls have a manual control that allows the occupant to reduce the connected lighting load in a reasonably uniform illumination pattern >= 50 percent.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** EL sheets
C405.2.1, C405.2.1.1 [EL18][1]	Occupancy sensors installed in classrooms/lecture/training rooms, conference/meeting/multipurpose rooms, copy/print rooms, lounges/breakrooms, enclosed offices, open plan office areas, restrooms, storage rooms, locker rooms, warehouse storage areas, and other spaces <= 300 sqft that are enclosed by floor-to-ceiling height partitions. Reference section language C405.2.1.2 for control function in warehouses and section C405.2.1.3 for open plan office spaces.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C405.2.1.2 [EL19][1]	Occupancy sensors control function in warehouses: In warehouses, the lighting in aisleways and open areas is controlled with occupant sensors that automatically reduce lighting power by 50% or more when the areas are unoccupied. The occupant sensors control lighting in each aisleway independently and do not control lighting beyond the aisleway being controlled by the sensor.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C405.2.1.3 [EL20][1]	Occupant sensor control function in open plan office areas: Occupant sensor controls in open office spaces >= 300 sq.ft. have controls 1) configured so that general lighting can be controlled separately in control zones with floor areas <= 600 sq.ft. within the space, 2) automatically turn off general lighting in all control zones within 20 minutes after all occupants have left the space, 3) are configured so that general lighting power in each control zone is reduced by >= 80% of the full zone general lighting power within 20 minutes of all occupants leaving that control zone, and 4) are configured such that any daylight responsive control will activate space general lighting or control zone general lighting only when occupancy for the same area is detected.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C405.2.2, C405.2.2.1, C405.2.2.2 [EL21][1]	Each area not served by occupancy sensors (per C405.2.1) have time-switch controls and functions detailed in sections C405.2.2.1 and C405.2.2.2.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** EL sheets

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
C405.2.3, C405.2.3.1, C405.2.3.2 [EL23][2]	Daylight zones provided with individual controls that control the lights independent of general area lighting. See code section C405.2.3 Daylight-responsive controls for applicable spaces, C405.2.3.1 Daylight responsive control function and section C405.2.3.2 Sidelit zone.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C405.2.4 [EL26][1]	Separate lighting control devices for specific uses installed per approved lighting plans.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** EL series sheets
C405.2.4 [EL27][1]	Additional interior lighting power allowed for special functions per the approved lighting plans and is automatically controlled and separated from general lighting.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C405.3 [EL6][1]	Exit signs do not exceed 5 watts per face.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** EL series sheets
C405.6 [EL26][2]	Low-voltage dry-type distribution electric transformers meet the minimum efficiency requirements of Table C405.6.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C405.7 [EL27][2]	Electric motors meet the minimum efficiency requirements of Tables C405.7(1) through C405.7(4). Efficiency verified through certification under an approved certification program or the equipment efficiency ratings shall be provided by motor manufacturer (where certification programs do not exist).	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C405.8.2, C405.8.2.1 [EL28][2]	Escalators and moving walks comply with ASME A17.1/CSA B44 and have automatic controls configured to reduce speed to the minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C405.9 [EL29][2]	Total voltage drop across the combination of feeders and branch circuits <= 5%.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C303.3, C408.2.5.2 [FI17][1]	Furnished O&M instructions for systems and equipment to the building owner or designated representative.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C405.4.1 [FI18][1]	Interior installed lamp and fixture lighting power is consistent with what is shown on the approved lighting plans, demonstrating proposed watts are less than or equal to allowed watts.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Interior Lighting fixture schedule for values.*
C408.1.1 [FI57][1]	Building operations and maintenance documents will be provided to the owner. Documents will cover manufacturers' information, specifications, programming procedures and means of illustrating to owner how building, equipment and systems are intended to be installed, maintained, and operated.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.5.1 [FI16][3]	Furnished as-built drawings for electric power systems within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.3 [FI33][1]	Lighting systems have been tested to ensure proper calibration, adjustment, programming, and operation.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

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57-24140-02
ENERGY COMPLIANCE FORMS
EN110.0

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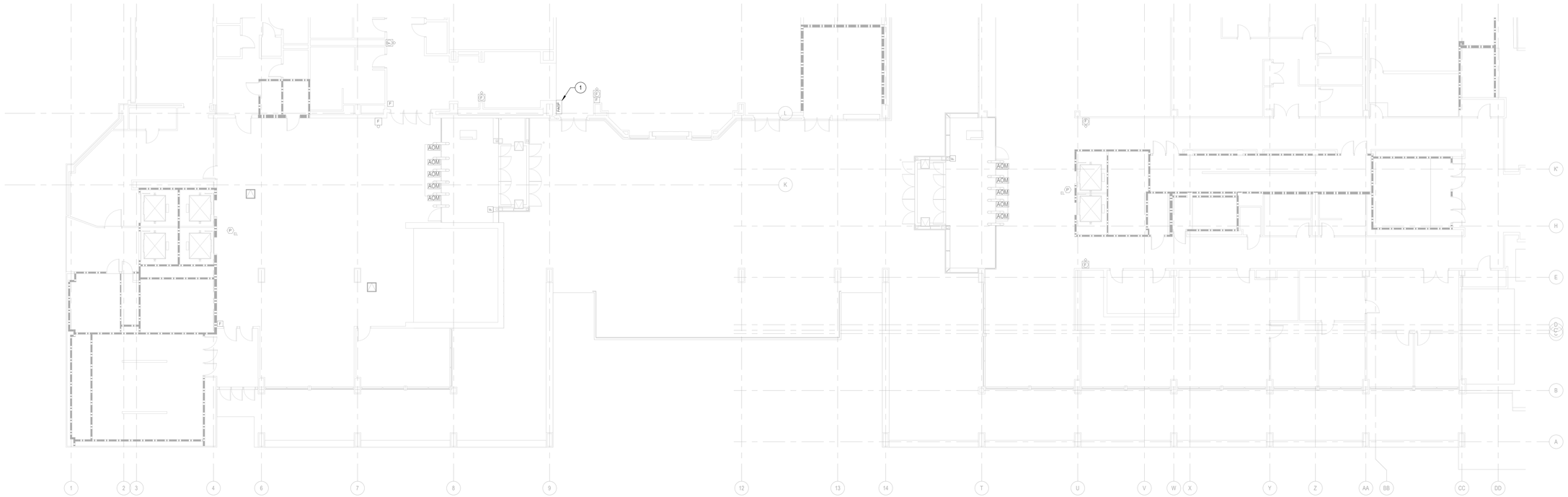
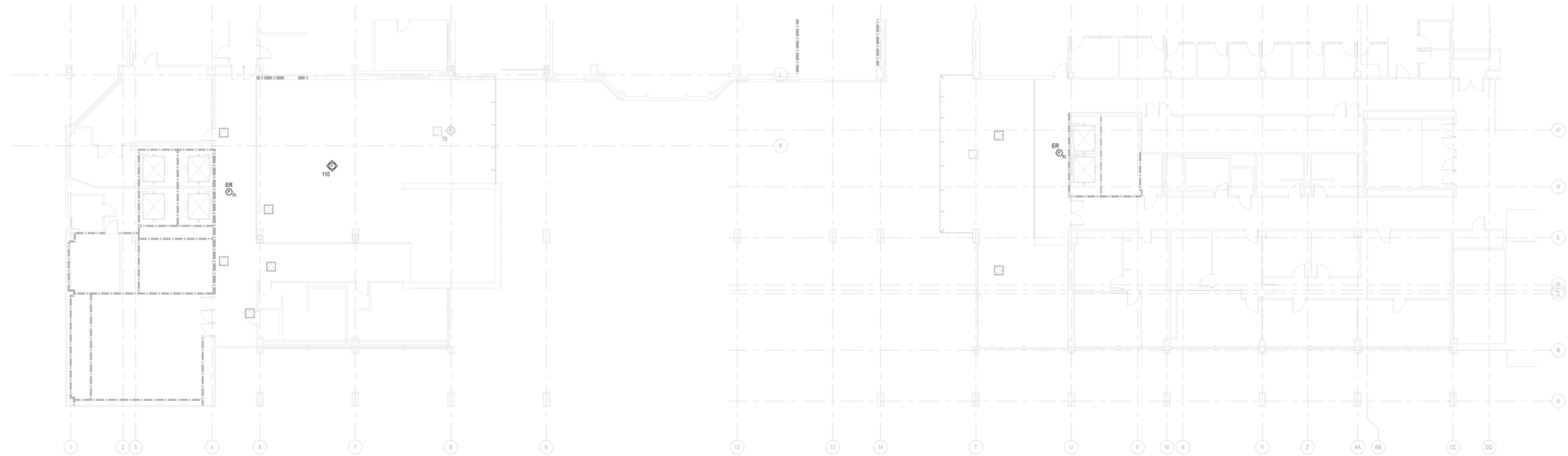


1 E311.00 LEVEL 01 - FIRE ALARM PLAN - PHASE II
SCALE: 3/32" = 1'-0"



2 E311.00 LEVEL 02 - FIRE ALARM PLAN - PHASE II
SCALE: 3/32" = 1'-0"

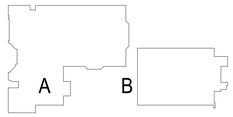
GENERAL NOTES

A COORDINATE FIRE ALARM TIE-INS WITH BASE BUILDING FIRE ALARM VENDOR AS FOLLOWS:
HIGH RISER FIRE PROTECTION CORPORATION
ATTN: FATMIR ISAKOSKI - (C) 1-917-685-3965, (O) 1-718-369-3434
fisakoski@highrisefire.com

SHEET NOTES

1 EXISTING FIRE ALARM CONTROL PANEL. UTILIZE EXISTING LOW VOLTAGE CONDUCTOR PATHWAYS TO ROUTE NEW FIRE ALARM HOMERUNS ORIGINATING FROM NEW TURNSTILES TO PANEL FROM CEILING OF FLOOR BELOW.

KEY PLAN



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FIRE ALARM PLANS - PHASE II

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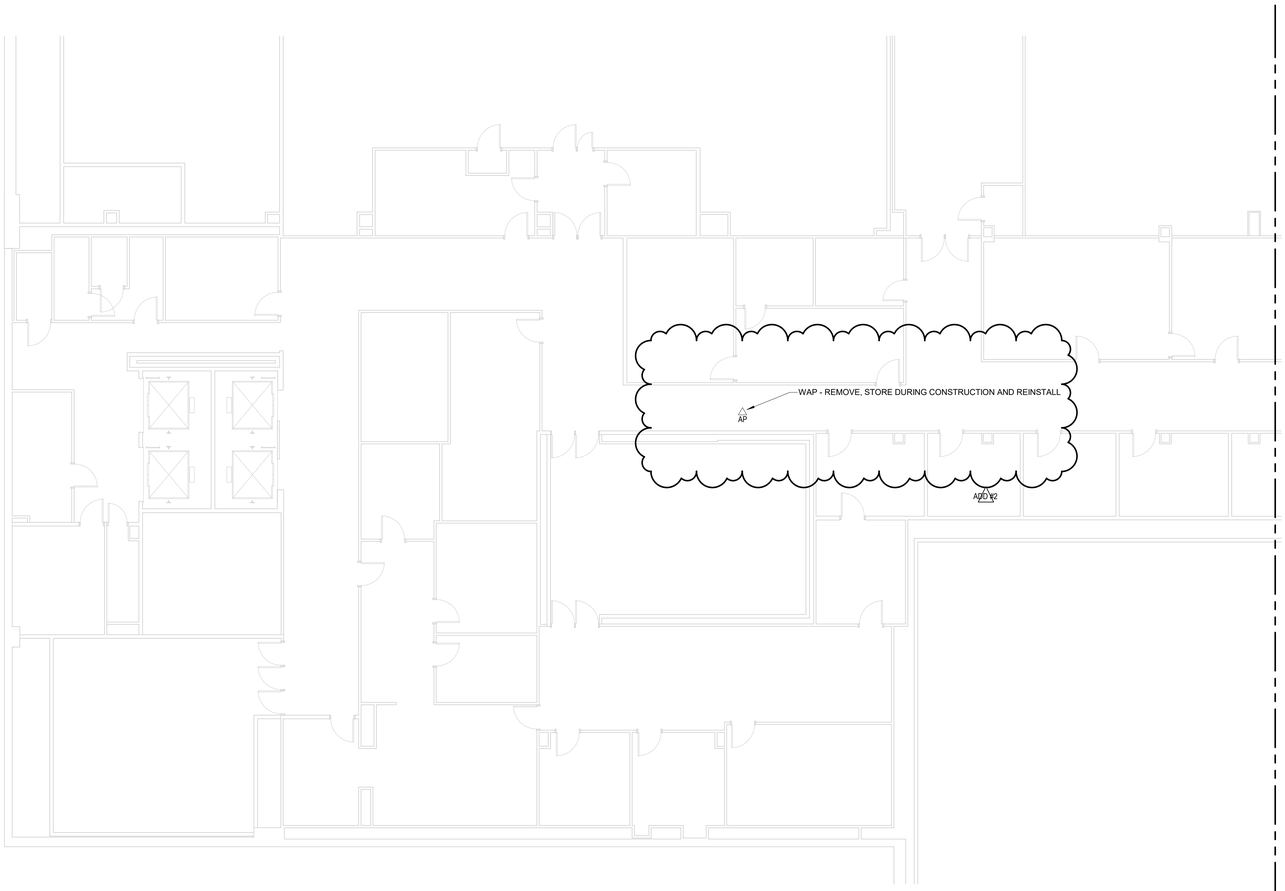

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LEVEL 00 - AREA A - TELECOM PLAN

SCALE: 1/8" = 1'-0"

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LEVEL 00 - AREA A - TELECOM PLAN

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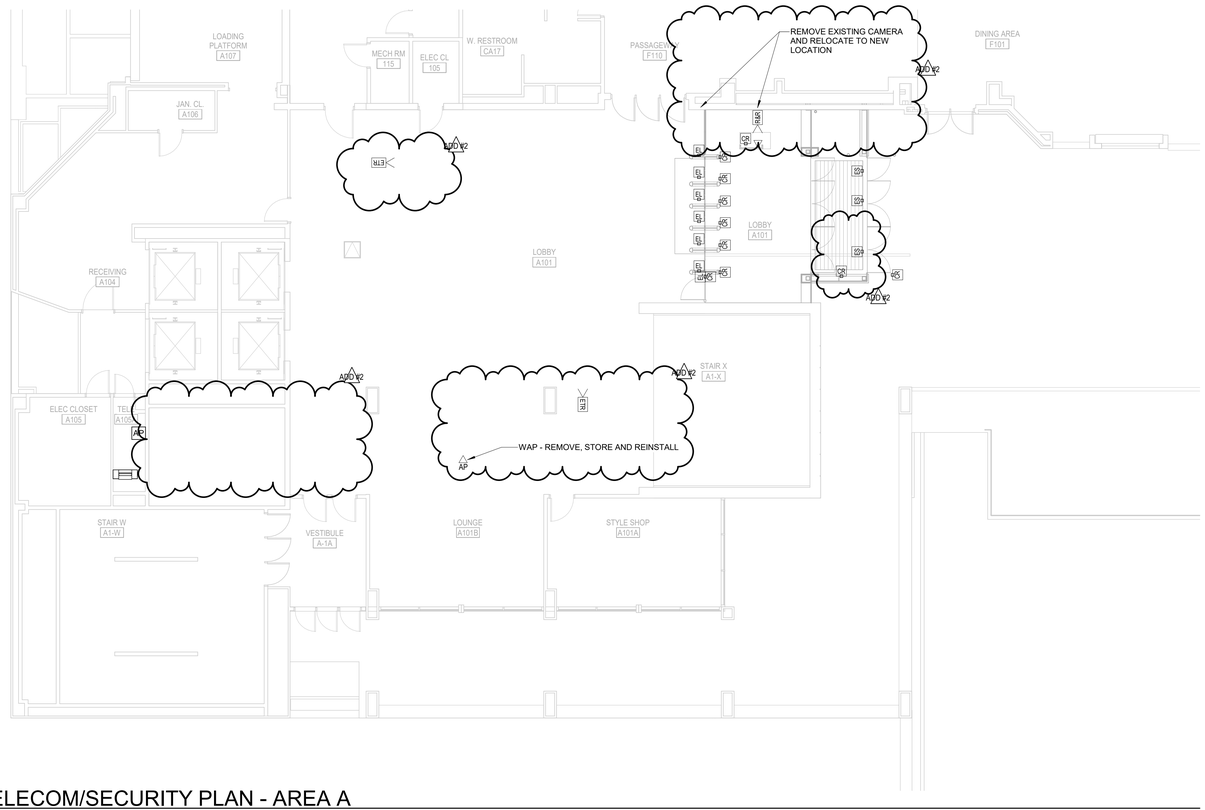
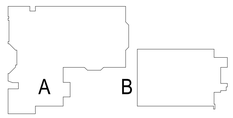


LEVEL 01 - TELECOM/SECURITY PLAN - AREA A

SCALE: 1/8" = 1'-0"

KEY PLAN



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Project Number

FIRST FLOOR TELECOM/ SECURITY PLAN AREA A

TE101A.00

Autodesk Docs://57-24140-00 FIT - Lobby_Turnstile Reno Concept Study/57-24140-00 FIT Turnstile_ITDG_2024.rvt
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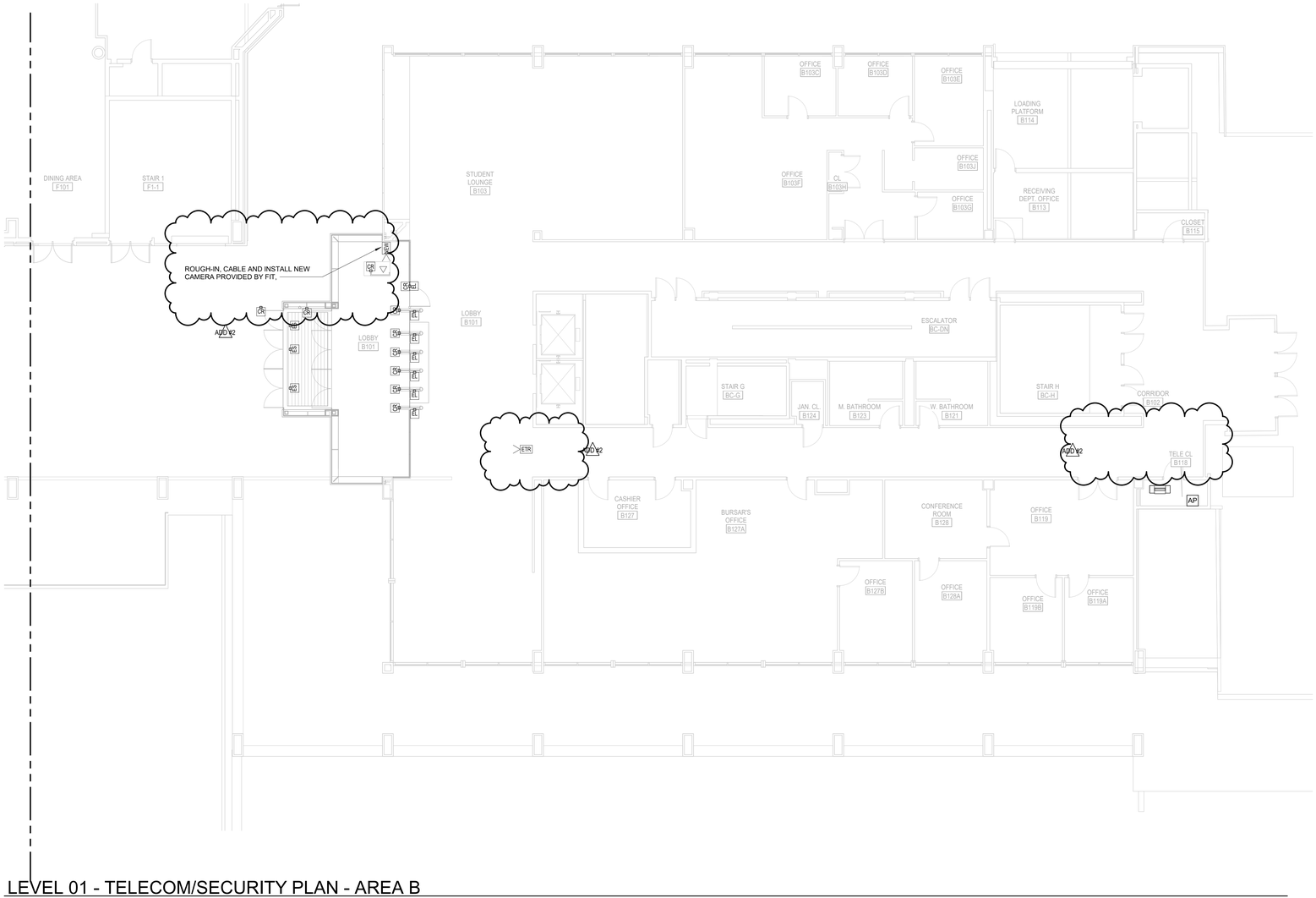

LEVEL 01 - TELECOM/SECURITY PLAN - AREA B

SCALE: 1/8" = 1'-0"

DLR Group

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FIT TURNSTILES - BUILDING A & B

344 - 8TH AVENUE, NY, NY 10001 - BUILDING A 340-356 8TH AVENUE, NY, NY 1001 - BUILDING B

BIN: 1014250
BLK: 2777
LOT: 001

ISSUE FOR ADDENDUM #3-C1667

01.23.25

REVISIONS

#3 01/23/25

Project Number

FIRST FLOOR TELECOM/ SECURITY PLAN AREA B

TE101B.00

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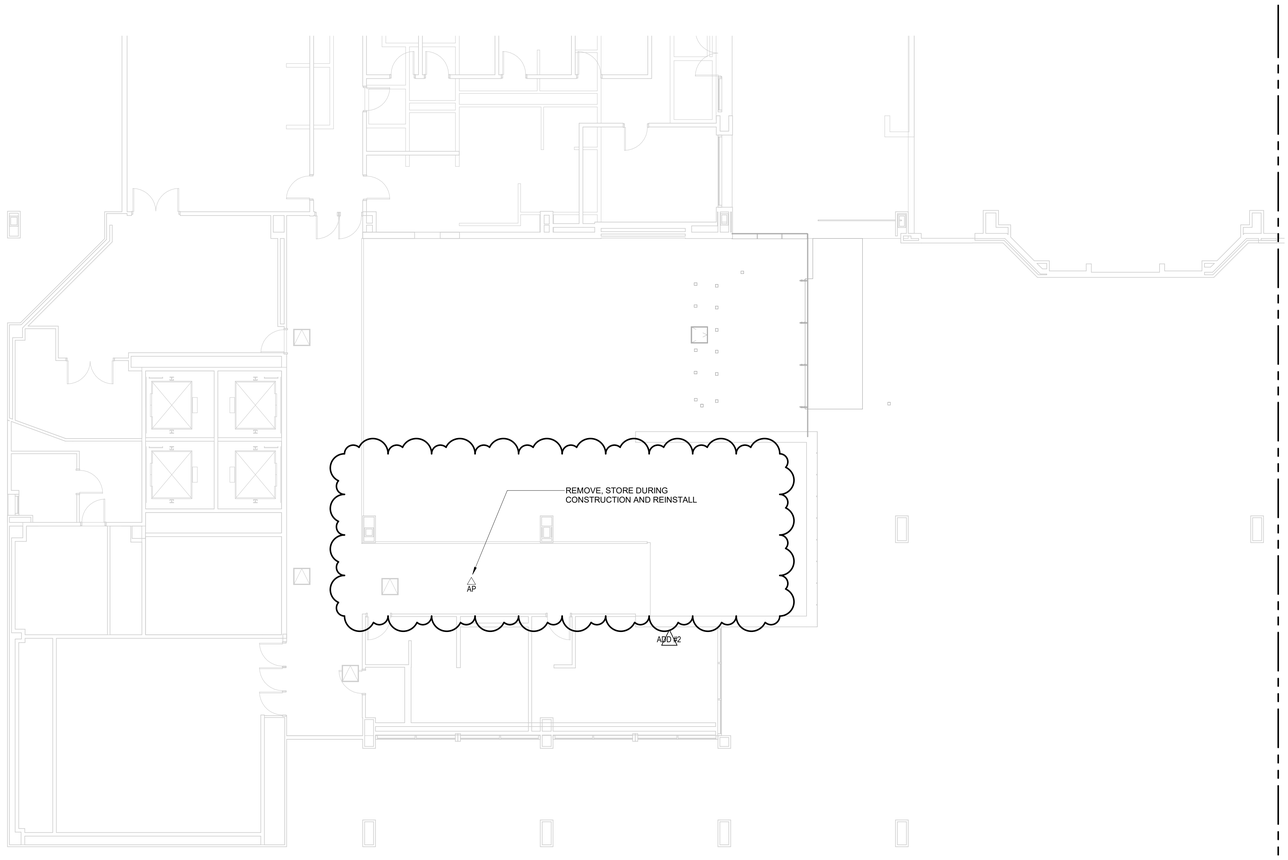

N

LEVEL 02 - AREA A - TELECOM PLAN

SCALE: 1/8" = 1'-0"

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FIT TURNSTILES - BUILDING A & B

344 - 8TH AVENUE, NY, NY 10001 - BUILDING A 340-356 8TH AVENUE, NY, NY 1001 - BUILDING B

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LOT: 001

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REVISIONS

#3 01/23/25

Project Number

LEVEL 02 - AREA A - TELECOM PLAN PHASEII

TE112A-00

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