NOTICE TO ALL FIRMS

Date: December 15, 2023

To: All Prospective Bidders

From: Sam Li
Interim Director of Procurement Services

Re: Addendum Number 6
IFB # C1558 – East Courtyard & Pomerantz Center Air Handler Units Replacement

Notes:

1) See updated schedule below:

<table>
<thead>
<tr>
<th>Description of work on the roof</th>
<th>Start</th>
<th>End</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submission critical equipment defined in Section III Contractor Terms and Conditions</td>
<td>1/15/2024</td>
<td>2/1/2024</td>
</tr>
<tr>
<td>Start fabrication AC units (AC units MUST be delivered by 6/15/2024)</td>
<td>2/8/2024</td>
<td>6/15/2024</td>
</tr>
<tr>
<td>Coordination dunnage shop drawing with the AC units shop drawing.. Review by roofing contractor and HVAC contractor. Adjust dunnage design to coordinate with final AC units.</td>
<td>2/1/2024</td>
<td>4/30/2024</td>
</tr>
<tr>
<td>Duct layout shop drawing for review and coordination with roofing contractor.</td>
<td>2/1/2024</td>
<td>4/30/2024</td>
</tr>
<tr>
<td>disconnect and remove the existing units and curbs.</td>
<td>5/28/2024</td>
<td>5/31/2024</td>
</tr>
<tr>
<td>Install new dunnage and duct supports</td>
<td>5/28/2024</td>
<td>6/17/2024</td>
</tr>
<tr>
<td>Install/rig new units</td>
<td>6/17/2024</td>
<td>6/30/2024</td>
</tr>
<tr>
<td>Install new duct and piping</td>
<td>6/30/2024</td>
<td>7/14/2023</td>
</tr>
<tr>
<td>Install all hookups (steam, CHW, electric, controls, FA)</td>
<td>6/30/2024</td>
<td>8/6/2024</td>
</tr>
<tr>
<td>Startup the AC units</td>
<td>8/7/2024</td>
<td>8/8/2024</td>
</tr>
<tr>
<td>Commissioning the AC units</td>
<td>8/8/2024</td>
<td>8/15/2024</td>
</tr>
<tr>
<td>Substantial completion East Courtyard AC units</td>
<td>8/15/2024</td>
<td>8/15/2024</td>
</tr>
</tbody>
</table>
2) Kindly find revised drawings and specifications for Addendum #6. A summary of scope is below:

1. Structural drawings include revisions to the design that are bubbled throughout.

2. Specification Section 051200 “Structural Steel Framing” includes revisions to delegated design requirements and clarification that all steel shall be galvanized.

3. Specification Section 055000 “Miscellaneous Metal Fabrications” has been removed and replaced with the following specifications for clarity of scope:
   a. Specification Section 055119 “Metal Grating Stairs”
   b. Specification Section 055213 “Pipe and Tube Railings”
   c. Specification Section 055313 “Bar Gratings”

3) Reminder, the bid due date has been changed from December 18, 2023, 12:00 PM to December 27, 2023, 12:00 PM. Your bid must be emailed to Purchasingbids@fitnyc.edu by December 27, 2023, on or before 12:00 PM.

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 APPROPRIATE ADJUSTMENTS IN YOUR PROPOSAL AND CALCULATIONS.

________________________________________ __________
Signature

____________________________________________
Print Name and Title of Authorized Representative

____________________________________________
Print Name of Company/Partnership/Individual

____________________________________________
Date
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Structural steel.
   2. Shrinkage-resistant grout.

B. Related Requirements:
   1. Section 055113 Metal Grating Stairs
   2. Section 055213 Pipe and Tube Railings
   3. Section 055313 Bar Gratings

1.2 DEFINITIONS

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

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data:
   2. High-strength, bolt-nut-washer assemblies.
   4. Etching cleaner.
   5. Galvanized repair paint.
   6. Shrinkage-resistant grout.

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

1.5 INFORMATIONAL SUBMITTALS
A. Welding certificates.
B. Mill test reports for structural-steel materials, including chemical and physical properties.
C. Field quality-control reports.

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

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. Fabricator's experienced steel detailer selects or completes connections in accordance with ANSI/AISC 303.
      a. Select and complete connections using schematic details indicated and ANSI/AISC 360.
      b. Use Allowable Stress Design; data are given at service-load level.

2.2 STRUCTURAL-STEEL MATERIALS
A. W-Shapes: ASTM A992/A992M.

B. Angles: ASTM A36/A36M.

C. Plate and Bar: ASTM A36/A36M.

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

E. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.

F. 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.

B. Zinc-Coated 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.

1. Finish: Hot-dip zinc coating.
2. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1 (Type 8.8-1), compressible washer type with mechanically deposited zinc coating or mechanically deposited zinc coating, baked epoxy-coated finish.

C. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 1, heavy-hex head assemblies, consisting of steel structural bolts with splined ends; ASTM A563, Grade DH (ASTM A563M, Class 10S), heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.

1. Finish: Mechanically deposited zinc coating.

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.

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: As indicated.

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 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.

1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.

2.10 SOURCE QUALITY CONTROL

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

1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
   a. Liquid Penetrant Inspection: ASTM E165/E165M.
   b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
   c. Ultrasonic Inspection: ASTM E164.
   d. Radiographic Inspection: ASTM E94/E94M.
4. Prepare test and inspection reports.
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.

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

3.2 ERECTION

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

   1. Set plates for structural members on wedges, shims, or setting nuts as required.
   2. Weld plate washers to top of baseplate.
   3. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. C. Maintain erection tolerances of structural steel within ANSI/AISC 303.

3.3 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: As indicated.

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.
3.4 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.

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
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Industrial Class stairs with steel-grating treads.
   2. Steel railings and guards attached to metal stairs.

B. Related Requirements:
   1. Section 051200 – Structural Steel Framing
   2. Section 055213 – Pipe and Tube Railings
   3. Section 055313 – Bar Grating

1.2 COORDINATION

A. Coordinate installation with Section 051200 – Structural Steel Framing

B. Filed Measurements: Verify slope of deck and other construction contiguous with metal fabrications to ensure stair treads are level and plumb

1.3 ACTION SUBMITTALS

A. Product Data: For metal grating stairs and the following:
   1. Miscellaneous steel materials
   2. Bolt-nut-washer assemblies
   3. Steel Gratings.
   4. Galvanization

B. Shop Drawings:
   1. Include plans, elevations, sections, details, and attachment to other work.
   2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
   3. Include plan at each level.
C. Delegated Design Submittal: For stairs, railings, and guards including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer's experience with providing delegated design engineering services of the kind indicated, including documentation that engineer is licensed in the state in which Project is located.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Welding Qualifications: Qualify procedures and personnel according to the following welding codes:

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer to design stairs, railings, and guards, including attachment to structural dunnage.
   1. Qualified: When used with an entity or individual, "qualified" 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. Structural Performance of Stairs: Metal stairs withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Uniform Load: 100 lbf/sq. ft.
   2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.
   3. Uniform and concentrated loads need not be assumed to act concurrently.
   4. Stair Framing: Capable of withstanding stresses resulting from railing and guard loads in addition to loads specified above.
   5. Limit deflection of treads, platforms, and framing members to L/360

C. Structural Performance of Railings and Guards: Railings and guards, including attachment to building construction, withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Handrails and Top Rails of Guards:
METAL GRATING STAIRS

2. Uniform load of 50 lbf/ft. applied in any direction.  
b. Concentrated load of 200 lbf applied in any direction.  
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:  
a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.  
b. Infill load and other loads need not be assumed to act concurrently.

3. Thermal Movements: Allow for thermal movement from ambient and surface temperature changes acting on exterior metal fabrication by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

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

E. 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.

2.2 METALS

A. Galvanizing: All steel elements shall be hot dipped galvanized items as indicated to comply with ASTM A153/A153M for steel hardware and ASTM A123/A123M for other steel products.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Rolled-Steel Floor Plate: ASTM A786/A786M, rolled from plate complying with ASTM A36/A36M or ASTM A283/A283M, Grade C or D.

D. Steel Bars for Grating Treads: ASTM A36/A36M or steel strip, ASTM A1011/A1011M or ASTM A1018/A1018M.

E. Steel Wire Rod for Grating Crossbars: ASTM A510/A510M.

F. Steel Tubing for Railings and Guards: ASTM A500 / A500M (cold formed)

G. Steel Pipe for Railings and Guards: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

2.3 FASTENERS

A. General: Hot-Dip Galvanized Railing Components: Type 304 stainless steel or hot-dip zinc-coated steel fasteners complying with ASTM A153/A153M or ASTM F2329/F2329M for zinc coating.
B. Fasteners for Anchoring Railings and Guards to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings and guards to other types of construction indicated.

2.4 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, railings, guards, clips, brackets, bearing plates, adjustable pedestals, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. Assemble stairs, railings, and guards in shop to greatest extent possible.

1. Disassemble units only as necessary for shipping and handling limitations.
2. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
2. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply 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.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.

1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
2. Locate joints where least conspicuous.
3. Fabricate joints that are exposed to weather in a manner to exclude water.
4. Provide weep holes where water may accumulate internally.

2.5 FABRICATION OF STEEL-FRAMED STAIRS

A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Industrial Class, unless more stringent requirements are indicated.
B. Stair Framing:

1. Fabricate stringers of steel plates or channels.
   a. Stringer Size: As required to comply with "Performance Requirements"
   b. Provide closures for exposed ends of channel stringers.
   c. Finish: Galvanized.

2. Construct platforms and tread supports of steel plates headers and miscellaneous framing members as required to comply with “Performance Requirements”.
   a. Provide closures for exposed ends of channel framing.
   b. Finish: Galvanized

3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers.

C. Metal Bar-Grating Stairs: Form treads and platforms to configurations shown from metal bar grating; fabricate to comply with NAAMM MBG 531, "Metal Bar Grating Manual."

1. See Section 055313 Bar Grating for performance requirements.
2. Fabricate treads and platforms from pressure-locked steel grating.
3. Fabricate treads and platforms from pressure-locked steel grating with openings in gratings no more than 1/2 inch in least dimension.
   a. Surface: Serrated
   b. Finish: Galvanized.

4. Fabricate grating treads with rolled-steel floor plate nosing and with steel angle or steel plate carrier at each end for stringer connections.
   a. Secure treads to stringers with welding or bolts.

5. Fabricate grating platforms with nosing matching that on grating treads.
   a. Secure grating to platform framing by welding or with bolts.

D. Risers: Open

2.6 FABRICATION OF STAIR RAILINGS AND GUARDS

A. Comply with applicable requirements in Section 055213 "Pipe and Tube Railings."

2.7 FINISHES

A. Finish metal stairs after assembly.

B. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
1. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

PART 3 - EXECUTION

3.1 INSTALLATION OF METAL STAIRS

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place structural steel dunnage.
   1. Include threaded fasteners for concrete paver inserts, through-bolts, lag bolts, and other connectors.
   2. Include adjustable pedestals or leveling nuts to enable the stair to remain level and plumb to the bar gating walking surface due to the existing slope at the roof.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure unless otherwise indicated.

D. After stairs have been positioned and aligned, tighten adjustable pedestal anchors/

E. Fit exposed connections accurately together to form hairline joints.
   1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
   2. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
   3. Comply with requirements for welding in "Fabrication, General" Article.

3.2 INSTALLATION OF RAILINGS AND GUARDS

A. Adjust railing and guard systems before anchoring to ensure matching alignment at abutting joints with tight, hairline joints.
   1. Space posts as required by design loads. Plumb posts in each direction, within a tolerance of 1/16 inch in 3 feet.
   2. Align rails and guards so variations from level for horizontal members and variations from parallel with rake of stairs for sloping members do not exceed 1/4 inches in 12 feet.
   3. Secure posts, rail ends, and guard ends to building construction as follows:
      a. Anchor posts to steel by welding or bolting to steel supporting members.
3.3 REPAIR

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055119
SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel railings.

B. Related Requirements:

1. Section 051200 – Structural Steel Framing
2. Section 055119 – Metal Grating Stairs
3. Section 055313 – Bar Grating

1.2 COORDINATION

A. Coordinate installation with Section 051200 – Structural Steel Framing

1.3 ACTION SUBMITTALS

A. Product Data:

1. Manufacturer’s product lines of mechanically connected railings.
2. Handrail brackets.
3. Metal finishes.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish.

D. Delegated Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For delegated design professional engineer.

B. Welding certificates.
C.  Product Test Reports: For tests on railings performed by a qualified testing agency, in accordance with ASTM E894 and ASTM E935.

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."

PART 2 - PRODUCTS

A.  Delegated Design: Engage a qualified professional engineer to design railings, including attachment to structural dunnage.

B.  Structural Performance: Railings, including attachment to building construction, withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1.  Handrails and Top Rails of Guards:
   a.  Uniform load of 50 lbf/ft (0.73 kN/m) applied in any direction.
   b.  Concentrated load of 200 lbf (0.89 kN) applied in any direction.
   c.  Uniform and concentrated loads need not be assumed to act concurrently.

2.  Infill of Guards:
   a.  Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
   b.  Infill load and other loads need not be assumed to act concurrently.

2.2  METALS, GENERAL

A.  Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B.  Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

1.  Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt that provides 1-1/2-inch (38-mm) clearance from inside face of handrail to finished wall surface.

2.3  STEEL RAILINGS

A.  Tubing: ASTM A500/A500M
B. Pipe: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
   1. Provide galvanized finish for exterior installations of all railings
C. Plates, Shapes, and Bars: ASTM A36/A36M.
D. Cast Iron Fittings: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

2.4 FASTENERS
A. Fastener Materials:

2.5 MISCELLANEOUS MATERIALS
A. Handrail Brackets: Shall be of the same material as the railings. Center of handrail shall be 3 1/8 inches from edge of railing.
B. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for metal alloy welded.
C. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
D. Galvanizing Repair Paint: High-zinc-dust-content paint, complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.6 FABRICATION
A. Cut, drill, and punch metals cleanly and accurately.
   1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
   2. Remove sharp or rough areas on exposed surfaces.
B. Form work true to line and level with accurate angles and surfaces.
C. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
   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 flux immediately.
4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #3 welds; utilitarian appearance not subject to view, partially dressed weld with spatter removed.

D. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

E. Form changes in direction as follows:
   1. By inserting prefabricated elbow fittings

F. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.

G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

H. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.7 STEEL AND IRON FINISHES

A. Galvanized Railings:
   1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
   2. Comply with ASTM A123/A123M for hot-dip galvanized railings.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Perform cutting, drilling, and fitting required for installing railings.
   1. Fit exposed connections together to form tight, hairline joints.
   2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
   3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
   4. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
   5. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

3.2 ATTACHING RAILINGS

A. Secure railings to structural dunnage.

B. Provide 1 1/2 inch clearance from inside face of handrail and guardrail.

3.3 CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055213
SECTION 055313 - BAR GRATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal bar gratings.
   2. Grating frames and supports.

B. Related Requirements:
   1. Section 051200 – Structural Steel Framing
   2. Section 055213 – Pipe and Tube Railings
   3. Section 055119 – Metal Grating Stairs

1.2 COORDINATION

A. Coordinate installation with Section 051200 – Structural Steel Framing

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, sections, and attachment details.

C. Delegated Design Submittals: For gratings, including manufacturer’s published load tables and analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates:
   1. Welding certificates.

B. Delegated design engineer qualifications.

1.5 QUALITY ASSURANCE

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

2. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:
   a. AWS D1.1/D1.1M - Steel

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Delegated Design: Engage a qualified professional engineer to design gratings.
   B. Structural Performance: Gratings to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
      2. Limit deflection to L/360 or 1/4 inch (6.4 mm), whichever is less.

2.2 METAL BAR GRATINGS
   A. Metal Bar Grating Standards: Comply with NAAMM MBG 531
   B. Performance Requirements.
      1. Bearing Bar Spacing: No gap less than 1/2 inch in shorter direction
      2. Bearing Bar Depth: As required to comply with structural performance requirements.
      3. Bearing Bar Thickness: As required to comply with structural performance requirements.
      4. Crossbar Spacing: 2 inches on center
      5. Traffic Surface: Serrated
   C. Steel Finish: Hot-dip galvanized with a coating weight or not less than 1.8oz/sw. ft. of coated surface
   D. Pressure-Locked Steel Grating: Fabricated by pressing rectangular flush-top crossbars into slotted bearing bars.

2.3 GRATING FRAMES AND SUPPORTS
   A. Support shall be provided by the structural dunnage as indicated on the drawings.
B. Supports shall be fabricated from the same basic metal as grating and galvanized in the same fashion. Cut, drill, and tap units to receive hardware and similar items. Miter and weld connections for perimeter angle frames.

2.4 FASTENERS

A. General: Hot-Dip Galvanized Railing Components: Type 304 stainless steel or hot-dip zinc-coated steel fasteners complying with ASTM A153/A153M or ASTM F2329/F2329M for zinc coating.

B. Fasteners for Anchoring Railings and Guards to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings and guards to other types of construction indicated.

2.5 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.6 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

B. Steel Bars for Bar Gratings: ASTM A36/A36M or steel strip, ASTM A1011/A1011M or ASTM A1018/A1018M.

2.7 FABRICATION

A. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

B. Fit exposed connections accurately together to form hairline joints.

2.8 STEEL FINISHES

A. Finish gratings, frames, and supports after assembly.

B. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

B. Fit exposed connections accurately together to form hairline joints.

1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

3.2 INSTALLATION OF METAL BAR GRATINGS

A. Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.

B. Attach removable units to supporting members with type and size of clips and fasteners indicated or, if not indicated, as recommended by grating manufacturer for type of installation conditions shown.

C. Attach nonremovable units to supporting members by welding where both materials are same; otherwise, fasten by bolting as indicated above.

3.3 REPAIR

A. Repair of Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055313