

SECTION 055301 – METAL GRATINGS FOR PIER A INLET WALKWAY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:

1. Stainless steel metal bar gratings at Pier A inlet walkway.
2. Anti-slip surfacing.
3. Slip resistance testing.

- B. Related Requirements:

1. Section 018113 "Sustainability Requirements" for documentation of recycled material content of metal grating materials.
2. Section 051200 "Structural Steel" for additional requirements for steel framing and supports for metal gratings.
3. Section 055010 "Miscellaneous Metals" for additional requirements for steel framing and supports for metal gratings.
4. Section 055241 "Railings and Guardrails for Park Areas" for handrails and guardrails attached to the perimeter framing of metal grating surfacing areas.

1.03 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Gratings: Provide gratings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Walkways and Elevated Platforms: Uniform load of 100 psf or concentrated load of 300 lbf, whichever produces the greater stress.
2. Limit deflection to L/240 or 1/4 inch, whichever is less.

1.04 REFERENCE STANDARDS

- A. Unless more restrictive criteria or differing requirements are explicitly stated in the Specifications, or mandated by governing codes or regulations, the recommendations,

suggestions, and requirements described in the referenced standards shall be deemed mandatory and applicable to the Work.

- B. The latest edition, as of the date of the executed construction contract, of referenced standards listed below applies to this contract.
 - 1. American Society for Testing Materials (ASTM)
 - a. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.
 - b. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - c. ASTM C 633 - Adhesion or Cohesive Strength of Flame-Sprayed Coatings.
 - d. ASTM E 140 - Hardness Conversion Tables for Metals.
 - e. ASTM E303 - Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester.
 - f. ASTM E 384 - Microhardness of Materials.
 - g. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - h. ASTM F594 - Standard Specification for Stainless Steel Nuts.
 - 2. American Welding Society (AWS)
 - a. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.05 ACTION SUBMITTALS

- A. Product Data:
 - 1. Grating
 - 2. Anti-Slip Surfacing.
- B. Sustainable Design Submittals:
 - 1. Certificates indicating recycled material content for stainless steel materials.
- C. Slip Resistance Evaluation: Test Reports completed in a laboratory prior to fabrication and test reports completed on site after completion of installation.
- D. Shop Drawings: Include plans, elevations, sections, details, attachments, and attachments to other work.
 - 1. Coordinate shop drawings with shop drawing of metal grating support members, edging and attachment of guardrails.
- E. Samples for Initial Selection:
 - 1. Grating: Provide a 12"x24" sample of the grating of the indicated grating member sizing with anti-slip surfacing. Include laboratory test report of slip resistance.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data:
 - 1. Grating Manufacturer.
 - 2. Anti-Slip Surfacing Manufacturer.
 - 3. Installer
 - 4. Testing Lab.
- B. Welding certificates.
- C. Mill Certificates: Signed by manufacturers of stainless steel products, certifying that products furnished comply with requirements.

1.07 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Grating Manufacturer: A manufacturer with a minimum of five years of experience producing gratings of similar materials and dimensions.
 - 2. Anti-Slip Surfacing Manufacturer: A manufacturer with a minimum of five years of experience producing slip resistant surfacing on metal panels.
 - 3. Installer: An installer with a minimum of five years of experience installing similar grating systems.
 - 4. Testing Laboratory: A third-party, independent ASTM certified testing laboratory not owned or operated by the stone material supplier, contractor or installing contractor.
- B. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."
- C. Source Restrictions: Obtain gratings and slip resistant surfacing each from a single manufacturer.
- D. Slip Resistance Evaluation: Metal grating expected to be walked on when wet shall be tested in accordance with ASTM E303 to meet a minimum British Pendulum Number (BPN) of 45.
 - 1. Testing shall be performed on metal grating prepare with non-slip surface in the following locations:
 - a. Laboratory:
 - 1) Test results shall be submitted during the submittal process for material approval.
 - 2) Testing shall be performed by testing laboratory. Reports shall Include identification of the finished samples and test results. Product literature will not be accepted. The cost of testing and reporting shall be paid for by the Contractor.

b. Field:

- 1) At completion of the work, test at least three separate grating unit locations. Include identification of the materials, areas tested with photographs and results.
- 2) The cost of testing for Field testing and any necessary retesting and reporting shall be paid for by the Contractor.

E. Pre-installation Conference: Conduct conference at Project site.

1.08 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of support framing, bulkhead walls and other construction contiguous with gratings by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating gratings without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
2. Provide allowance for trimming and fitting at site.
3. Field welding of metal grating materials is not permitted.

1.09 COORDINATION

A. Coordinate installation of anchorages for gratings, grating frames, handrails, guardrails and supports. Furnish setting drawings, templates, and directions for installing anchorages. Deliver such items to Project site in time for installation.

B. Coordinate design of grating closure and kick plates with handrails and guard rails.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to meeting the requirements, metal grating materials are available from the following manufacturers:

1. Brown Campbell
2. Nucor Grating
3. AMICO Grating

2.02 STAINLESS STEEL GRATING

- A. Recycled content for stainless steel materials: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 20 percent.
- B. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
 - 1. Stainless Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 316L.
 - 2. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 316L.
- C. Metal Bar Grating Configuration:
 - 1. Bearing Bar Spacing: 7/16”.
 - 2. Bearing Bar Depth: 2 1/4”.
 - 3. Bearing Bar Thickness: 3/16”.
 - 4. Crossbar Spacing: 4”.
 - 5. Maximum Opening between Bearing Bars: 1/4” (ADA compliant and heel proof)
 - 6. Grating Style: Swaged locked.

2.03 FASTENERS

- A. General: Unless otherwise indicated, provide Type 316 stainless steel fasteners for exterior use.
- B. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593 (ASTM F738M); with hex nuts, ASTM F594 (ASTM F836M); and, where indicated, flat washers; Alloy Group 2 (A4).
- C. Furnish threaded bolts with nuts and washers, self-drilling fasteners with washers, or stainless steel flange clamps with stainless steel bolt for securing grating to framing supports.

2.04 FABRICATION

- A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

- C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.
- D. Fit exposed connections accurately together to form hairline joints.
- E. Welding: Comply with AWS recommendations and 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.
- F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.

2.05 STAINLESS STEEL FINISHES

- A. Finish: Commercially cleaned.
 - 1. Finish gratings after grating panels are assembled.

2.06 SLIP RESISTANT SURFACE

- A. Basis of Design for Slip Resistant Grating: SlipNOT® Metal Safety Flooring, Division of W.S. Molnar Company, 2545 Beaufait Street, Detroit, Michigan 48207, (800) 754-7668.
- B. Stainless Steel Surface on Stainless Steel Substrate: Abrasive material metallicity bonded to stainless steel walking surface.
 - 1. Type: Anti-slip, non-gritted, stainless steel surface on stainless steel substrate.
 - 2. Surface Texture: Grade 2, Medium.
 - 3. Surface: Anti-slip stainless steel surface consisting of a random hatch matrix.
 - 4. Surface Hardness, Rockwell C Scale, ASTM E 140 and E 384: Minimum of 55.
 - 5. Bond Strength, Surface to Substrate, ASTM C 633: Minimum of 4,000 psi.
 - 6. Coefficient of Friction, Anti-Slip Surface: Minimum of 0.6.
 - 7. UL Listed: Slip-resistant.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level metal framing, adjacent pavement finished grade, mounting

surfaces, installation tolerances, and other conditions affecting performance of the Work.

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

3.02 INSTALLATION, GENERAL

- A. Install metal grating in accordance with manufacturer's writing instructions and the approved shop drawings.
- B. 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.
- C. Fit exposed connections accurately together to form hairline joints.
- D. Metal grating shall be mechanically fastened in place. Do not field weld metal gratings.

3.03 INSTALLING METAL BAR GRATINGS

- A. General: 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 grating 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 units to kick plates and supporting members by mechanical methods.
- D. Isolate dissimilar metals to prevent galvanic corrosion.

3.04 INSTALLATION TOLERANCES

- A. Surface Tolerance: Do not exceed 1/16-inch unit-to-unit offset from flush (lippage) or 1/8 inch in 10 feet from level, or indicated slope, for finished surface of grating.
- B. Lines and Locations: For location and alignment of units and edging or toe plates in plan, do not vary from straight by more than plus or minus 1/4 inch.

3.05 POST-INSTALLATION TESTING

- A. Complete post-installation slip resistance testing in this location as indicated in Quality Assurance Article of this specification in locations as directed by the Engineer and Landscape Architect.
- B. Submit testing results.

3.06 ADJUSTING AND CLEANING

- A. Adjust grating units to align between rows and edging conditions and to meet indicated tolerances.
- B. Clean grating and edging units to remove stains and scuff marks to match commercially cleaned finish as shown on the approved grating sample.
- C. Remove and legally dispose off-site excess materials and packaging.

END OF SECTION 055301