SECTION 05 40 00 - ALUMINUM HANDRAIL

PART 1 - GENERAL

1.1 SCOPE

A. The work covered by this section includes furnishing all labor, equipment and materials required to furnish and install aluminum component handrail including all fittings, anchors, bases and accessories, as required by the Contract Documents.

B. All guardrails shall be furnished with a toe board, except where concrete curbs are shown (if any).

C. This section shall be used for all handrail except in areas where stairs and handrail are congruent as specified in Section 05 52 13.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Related work specified elsewhere includes:

1. Section 03 30 00 – Cast-in-Place Concrete
2. Section 05 50 00 – Metal Fabrications
3. Section 05 52 13 – Pipe and Tube Railings

1.3 SUBMITTALS

A. Submit complete shop drawings and product data in accordance with the requirements of Section 01 33 00 – Submittal Procedures.

B. Submit structural calculations, including anchorages.

1.4 STORAGE AND PROTECTION

A. Handrails shall be properly packaged to prevent scratching and denting during shipment, storage and erection. Maintain protective wrapping until project is completed.

PART 2 - PRODUCTS

2.1 DESIGN REQUIREMENTS

A. Component aluminum handrail system shall be designed and constructed in strict compliance with the requirements of OSHA and the International Building Code.

B. Guardrails shall be designed to withstand a uniform horizontal load of 50 pounds per foot with a simultaneous vertical load of 100 pounds per foot applied to the top rail.

C. Handrail shall be designed to withstand a uniform horizontal load of 50 pounds per foot applied to the top rail.

D. In addition, guardrails, handrails shall be designed to withstand a concentrated load of 200 pounds applied in any direction, at any point on the railing system.

2.2 ACCEPTABLE PRODUCTS/MANUFACTURERS

A. Component aluminum handrail system shall be "TUFrail" by Thompson Fabricating - B'ham., AL., "Interna-Rail" by Hollaender Corp. - Cinn., Ohio, or equal by Alumagard - Denver, CO.

2.3 MATERIAL AND CONSTRUCTION

A. Handrail shall be the product of a company normally engaged in the manufacture of pipe railing. Railing shall be shop assembled in lengths not to exceed 24 feet for field erection.

B. Post spacing shall be a maximum of 6'-0". Posts and rails shall be a minimum of 1 1/2" schedule 40 aluminum pipe, alloy 6063-T6 or 6105-T5, ASTM B-429 or B-221.

C. Handrail shall be made of pipe and fittings mechanically fastened together with stainless steel hardware. Handrail systems which use fittings that are glued or pop-riveted will not be acceptable.

D. Toe board shall conform to OSHA standards. Toe board shall be a minimum of 4" high and shall attach to the post using clamps which will allow for expansion and contraction between posts. Toe board shall be set 1/4" above the walking surface.

E. Wedge anchors shall be spaced 10d apart and 5d edge distance for no reduction in pullout strength. A safety factor of 4 shall be used on pullout values published by the manufacturer. Wedge anchors shall be type 304 stainless steel.

F. Openings in the railing shall guarded by a self-closing gate (OSHA 1910.23). Safety chains are not acceptable.

G. All handrail and components shall be clear anodized per Aluminum Association M10C22A41 (215-R1). The pipe shall be plastic wrapped to protect the finish.

H. All aluminum surfaces in contact with concrete, grout or dissimilar metals shall be protected with a coat of bituminous paint, mylar isolators or other approved material.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Field fabrication of the railing system is not permitted.

B. Set handrails plumb within 1/8" of vertical and align horizontally to within 1/8" in 12 feet.

C. Install wedge anchors to proper depth to develop full pullout and shear values. Check all fasteners and bolts in base connections and splices for tightness.

D. Adequate provisions for expansion and contraction shall be incorporated into the rail. Expansion joints shall be placed at 60-foot intervals and at all concrete expansion joints.

E. Toe boards shall be shipped loose and attached to the handrail in the field. Attachment to the posts shall be made with clamps which will allow for expansion and contraction while maintaining a straight line.

F. All defective, damaged or otherwise improperly installed handrail shall be removed and replaced with material which complies with this section at no additional cost to the Owner.

G. Following installation, aluminum handrail shall be cleaned with a mild soap and clean water. Acid solutions, steel wool or harsh abrasives shall not be used.

END OF SECTION 05 40 00

SECTION 05 50 00 – METAL FABRICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work described in this section includes metal fabrications, which include items made from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not a part of structural steel or other metal systems specified elsewhere. Types of work in this section includes metal fabrications for:
   1. Rough hardware.
   2. Loose bearing and leveling plates.
   3. Loose steel lintels.
   4. Miscellaneous framing and supports.
   5. Guard Posts (bollards)
   6. Stair Treads and Nosings

1.2 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Related work specified elsewhere includes:
   1. Section 03 20 00 – Anchorage in Concrete

1.3 QUALITY ASSURANCE

A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's specifications, anchor details and installation instructions for products used in miscellaneous metal fabrications, including paint products and grout.

B. Shop Drawings: Submit shop drawings for fabrication and erection of miscellaneous metal fabrications. Include plans, elevations and details of sections and connections. Show anchorage and accessory items. Provide templates for anchor and bolt installation by others. Where materials or fabrications are indicated to comply with certain requirements for design loadings include structural computations, material properties and other information needed for structural analysis.

C. Samples: Submit representative samples of materials and finished products as may be requested by ENGINEER.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metal Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.

B. Ferrous Metals
1. Steel Plates, Shapes and Bars: ASTM A 36.
2. Steel Bar Grating: ASTM A 569 or ASTM A 36
3. Steel Tubing: Cold formed, ASTM A 500; or hot rolled, ASTM A 501.
4. Structural Steel Sheet: Hot-rolled, ASTM A 570; or cold-rolled ASTM A 611, Class 1; of grade required for design loading.
5. Galvanized Structural Sheet Steel: ASTM A 446, of grade required for design loading. Coating designation as indicated, or if not indicated, G90.
6. Steel Pipe: ASTM A 53; Type and grade (If applicable) as selected by fabricator and as required for design loading; black finish unless galvanizing is indicated; standard weight (schedule 40), unless otherwise indicated.
7. Gray Iron Castings: ASTM A 48, Class 30.
8. Malleable Iron Castings: ASTM A 47, grade as selected by fabricator.
9. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.
10. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A 153.

C. Non-Ferrous Metals
1. Aluminum Drawn Seamless Tube: ASTM B 483, 6063-T832.
2. Aluminum Castings: ASTM B 26, 356.0-T6.
3. Aluminum Plate and Sheet: ASTM B 209, 6061-T6

D. Grout: Non-Shrink Non-Metallic Grout: Pre-mixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with CE-CRD-C621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.

E. Fasteners
1. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.

F. Paint:
1. Metal Primer Paint: Southern Coating "Heavy Duty RIP Primer 1-0900", Tnemec "10-99 Primer", or approved equal.
2. Primer selected must be compatible with finish coats of paint.
3. Galvanizing Repair Paint: High zinc dust content paint for re-galvanizing welds in galvanized steel, complying with Military Specifications MIL-P-21035 (Ships), or SSPC-Paint-20.

2.2 STAIR TREADS AND NOSINGS

A. MATERIALS
1. ASTM B 221 Standard Specification for Aluminum and Aluminum-Alloy extruded bars, rods, wire, shapes and tubes.

B. TYPE
1. SINGLE PART BAR ABRASIVE, FULL ABRASIVE STAIR TREADS AND NOSINGS
   a. Base and Nosing: Extruded aluminum type 6063-T5, mill finish
   b. Nosing Types for concrete pour, steel pan, wood and sloped stairs and risers.
   c. Tread abrasive filler: Bar type ribbed
      1) Includes virgin grain Aluminum Oxide and/or Silicon Carbide. Binder is a UV protected 2-part epoxy continuous throughout entire tread. Color shall extend uniformly throughout filler. Black is standard color unless other specified.
      2) Black is the standard abrasive fill color unless other specified

C. Bar Abrasive width [1.375”, 1.875”, 3”, 4”] Full Abrasive width [2”, 2.125”, 2.25”, 3”, 3.125”, 4”, 4.125”]

D. Installation fastening type: [Extruded anchors] [Drilled countersunk holes]

E. Acceptable Product Series: STSB-C3E

F. Acceptable Manufacturers:
1. Victory Treads, LLC
2. OR APPROVED EQUAL

PART 3 - EXECUTION

3.1 FABRICATION, GENERAL

A. Workmanship
1. Use materials of size and thickness shown or, if not shown, of required size and thickness to produce strength and durability in finished product. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.
2. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise shown. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
3. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.
4. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown, or if not shown, Phillips flat-head (countersunk) screws or bolts.

5. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.
6. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.
7. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.

B. Galvanizing: Provide a zinc coating for those items shown or specified to be galvanized, as follows:
1. ASTM A 153 for galvanizing iron and steel hardware.
2. ASTM A 123 for galvanizing rolled, pressed and forged steel shapes, plates, bars and strip 1/8" thick and heavier.
3. ASTM A 386 for galvanizing assembled steel products.

C. Shop Painting
1. Apply shop primer to surfaces of metal fabrications except those which are galvanized or as indicated to be embedded in concrete or masonry, unless otherwise indicated, and in compliance with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.
2. Stripe paint all edges, corners, crevices, bolts, welds and sharp edges.

D. Surface Preparation
1. Prepare ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specification and environmental exposure conditions of installed metal fabrications:
   a. Exterior (SSPC Zone 1B): SSPC-SP6 "Commercial Blast Cleaning."
   b. Interiors (SSPC Zone 1A): SSPC-SP3 "Power Tool Cleaning."

3.2 ROUGH HARDWARE

A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures.

B. Fabricate items of sizes, shapes and dimensions required. Furnish malleable iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

3.3 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

3.4 LOOSE STEEL LINTELS

A. Provide loose structural steel lintels for openings and recesses in masonry walls and partitions as shown. Weld adjoining members together to form a single unit where indicated. Provide not less than 8" bearing at each side of openings, unless otherwise shown.

1. Galvanize all loose steel lintels in exterior walls.

3.5 MISCELLANEOUS FRAMING AND SUPPORTS

A. Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required to complete work.

B. Fabricate miscellaneous units to sizes, shapes and profiles shown or, if not shown, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise shown, fabricate from structural steel shapes and plates and steel bars, of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.

C. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed. Except as otherwise shown, space anchors 24" o.c. and provide minimum anchor units of 1-1/4" x 1/4" x 8" steel straps.

D. Galvanize exterior miscellaneous frames and supports.

3.6 PREPARATION

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.

B. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete insets, sleeves, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.7 INSTALLATION

A. General:
   1. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction, including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.
   2. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.
   3. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch up shop paint coat. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip-galvanized after fabrication, and are intended for bolted or screwed field connections.

B. Field Welding: Comply with AWS Code for procedures of manual shielded metal arc welding, appearance and quality of welds made, and methods used in correcting welding work.

C. Setting Loose Plates:
1. Clean concrete and masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.
2. Set loose leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout. Use non-metallic, non-shrink grout.
3. Pack grout solidly between bearing surfaces and plates to insure that no voids remain.

D. Stair Treads
1. Install stair treads and nosing's in accordance with the governing regulations, the industry standards applicable to the work and the manufacturer's written instructions
2. Work shall be aligned plumb, level and where required, flush with adjacent surfaced and rigidly anchored to the substrate.

3.8 ADJUST AND CLEAN

A. Touch up Painting
1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same materials as used for shop painting.
2. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. For Galvanized Surfaces: Clean field welds, bolted connections and abraded areas and apply galvanized repair paint to comply with ASTM A 780.

END OF SECTION 05 50 00

SECTION 05 51 19 - METAL GRATING STAIRS

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 industrial-type, straight-run stairs with aluminum-grating treads and railings attached to aluminum grating stairs.

1.3 COORDINATION

A. Coordinate installation of anchorages for metal stairs. 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.

1.4 ACTION SUBMITTALS

A. Product Data: For metal grating stairs and the following:
   1. Grout.

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

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

B. Structural Performance of Stairs: Metal stairs shall 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 loads in addition to loads specified above.
5. Limit deflection of treads, platforms, and framing members to **L/360**.

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Aluminum Plates, Shapes, and Bars: ASTM A 429, Alloy 6063-T5.

C. Steel Bars for Grating Treads: Conform to requirements of section 055313-Bar

D. Corrugated Nosings: Extruded aluminum, with an integral corrugated non-slip finish.

2.3 FASTENERS

A. General: Provide type 316 stainless steel fasteners with coating complying with ASTM F 593. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers.

C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
   1. Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.4 MISCELLANEOUS MATERIALS

A. Bituminous Paint: Cold applied asphalt emulsion complying with ASTM D1187.

B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, clips, brackets, bearing plates, 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. Form exposed work with accurate angles and surfaces and straight edges.

C. 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.
4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 4 welds: good quality, uniform undressed weld with minimal splatter.

D. Fabricate joints that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.6 ALUMINUM-FRAMED STAIRS

A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," Industrial Class, unless more stringent requirements are indicated.

B. Stair Framing:

1. Fabricate stringers of structural aluminum channels.

    a. Provide closures for exposed ends of channel stringers.

2. Construct platforms of aluminum channel headers and miscellaneous framing members as needed to comply with performance requirements.
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. Fabricate treads and platforms from pressure-locked aluminum grating with 1-1/4-by-3/16-inch bearing bars at 15/16 inch o.c. and crossbars at 4 inches o.c.
2. Fabricate treads and platforms from pressure-locked steel grating with openings in gratings no more than 1/2 inch in least dimension.
3. Surface: Serrated.
4. Finish: Mill finish.
5. Fabricate grating treads with non-slip nosing and with aluminum angle or aluminum plate carrier at each end for stringer connections. Secure treads to stringers with bolts.
6. Fabricate grating platforms with nosing matching that on grating treads. Provide toeplates at open-sided edges of grating platforms. Mechanically attach grating to platform framing.

2.7 STAIR RAILINGS

A. Comply with applicable requirements in Section 05 52 13 "Pipe and Tube Railings."

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

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.

3.2 INSTALLING METAL STAIRS WITH GROUTED BASEPLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of baseplates.

B. Set stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use nonmetallic, nonshrink grout unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

END OF SECTION 05 51 19

SECTION 05 52 13 - PIPE AND TUBE RAILINGS

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. Stainless handrails for interior installation located in Council Chamber at stairs and ramps.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Railings, including attachment to building construction, shall 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. 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.

B. Thermal Movements: Design handrails and railings that allow for thermal movements resulting from specified maximum change (range) in ambient and surface temperatures without buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120-deg F, ambient; 180-deg F, material surfaces.
2. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1.4 SUBMITTALS

A. Product Data: Submit data for the following:

1. Railing brackets.
2. Grout and anchoring cement products.

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

1. Show anchorage and accessory items.
2. Indicate that the qualified professional engineer responsible for preparing structural analysis has reviewed shop drawings.

C. Structural Analysis: Submit for railings and handrails indicating compliance with specified performance requirements, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Samples:

1. Railing: Submit 6-inch sections of each distinctly different linear railing member, including handrails, top rails and posts.
2. Fittings and brackets: Submit for each type required for installation.

E. Qualification Data: Submit for qualified professional engineer and for fabricator to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified. (Submit for Architect's information only.)

F. Welding Certificates: Submit welders' certificates for personnel performing the work complying with qualification requirements. Certificates shall be current within the previous twelve (12) months. (Submit for Architect's information only.)

G. Paint Compatibility Certificates: Submit written approval from manufacturers of topcoats to be applied over shop primers certifying that shop primers are compatible with topcoat material. (Submit for Architect's information only.)

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Fabricator shall have minimum Five (5) years experience in the successful production and installation of railings and handrails of similar design and complexity as indicated for this Project.

B. Professional Engineer Qualifications: A professional engineer legally qualified to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated for the installation of railings and handrails similar in material, design, and extent to those required for this Project with a record of successful in-service performance. Engineer's service shall include review of shop drawings.

C. Welder Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

D. Source Limitations: Obtain railings from a single source.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to job site undamaged and protected.

B. Store materials above ground in a clean, dry location and protected to avoid damages. Cover with waterproof covering with provisions for adequate air circulation.

C. Handle materials, exercising particular care to prevent damage to prefinished components; keep handling to a minimum.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating handrails and railings without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate installation of anchorages for railings. 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.

B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 METAL QUALITY

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

2.2 STAINLESS STEEL

A. Stainless Steel Tubing: ASTM A 554, Grade MT 304.
B. Handrail Brackets, Flanges, and Anchors: Cast or formed stainless steel of same finish as supported rails unless otherwise indicated. Brackets shall be sized to provide minimum 1-

1/2 inch clearance from inside face of handrail to finished wall surface when installed in place. Provide wall brackets comparable to Julius Blum & Company, Inc., model no. 275.

2.3 FASTENERS AND ANCHORS

A. Fasteners:

1. Fastener Types:

a. For Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
b. For Interconnecting Railing Components:

1) Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
2) Provide Phillips flat-head machine screws for exposed fasteners unless otherwise indicated.

2. Fastener Materials and Finishes: Type 304 or Type 316 stainless-steel fasteners.

B. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors with alloy Group 1 or Group 2 stainless-steel bolts meeting ASTM F 593, and nuts meeting ASTM F 594. Anchors shall be capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded. Provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Shop Primers: Provide primers that comply with Division 9 Section - "Painting" for type metal surfaces to be painted.

C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

D. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound designed for exterior applications.

1. Water-Resistant Product: Product shall be of formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.
2. Compressive Strength: 7000 psi (48.2MPa), minimum, at 28-days when tested according to ASTM C109.

2.5 FABRICATION

A. Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly.

1. Disassemble units only as necessary for shipping and handling limitations.
2. Clearly mark units for reassembly and coordinated installation.
3. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals 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.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Welded Connections: Fabricate railings with welded connections unless otherwise indicated. Cope components at connections to provide close fit, or use fittings designed for this purpose.

1. Weld all around at connections, including at fittings.
2. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
3. Obtain fusion without undercut or overlap.
4. Remove flux immediately.
5. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

H. Form changes in direction by radius bends of radius indicated or by inserting prefabricated elbow fittings of radius indicated.

I. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire

bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

J. Close exposed ends of railing members with prefabricated end fittings.

K. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4-inch or less.

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

M. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

N. Fabricate railing posts for setting in concrete with sleeved, formed or core-drilled holes used as method for anchorage.

O. Stainless Steel Handrails: Fabricate from specified stainless steel tubing material for mounting to wall construction at stairs and ramps located in Council Chamber.

2.6 FINISHES

A. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved samples.

1. Noticeable variations in the same piece are unacceptable.
2. Variations in appearance of other components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.

B. Stainless Steel Railing Finish: No. 6 dull satin finish (240-grit polished finish).

1. Remove tool and die marks and stretch lines, or blend into finish.
2. Grind and polish surfaces to produce uniform finish, free of cross scratches.
3. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. 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.
2. Set posts plumb within a tolerance of 1/16-inch in 3-feet.
3. 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.

C. Adjust railings before anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.2 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections as specified for fabrication whether welding is performed in the shop or in the field.

B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2-inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6-inches of post.

3.3 ANCHORING POSTS

A. Anchor posts to concrete construction by either of the following methods specified:

1. Preset Pipe Sleeves: Use metal sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with anchoring cement as specified.
2. Formed or Core-Drilled Holes: Form or core-drill holes not less than 5-inches deep and 3/4-inch larger than outside diameter (OD) of post for installing posts in concrete. After posts are inserted in holes, fill annular space between post and concrete with anchoring cement as specified.

B. Anchoring Cement Installation: Mix and place to comply with anchoring material manufacturer's written instructions.

1. Clean holes of loose material, insert posts, and fill annular space between post and concrete with prepared anchoring cement.
2. Fill annular space leaving 1/8-inch approximate recess for capping with sealant.
3. Caulk around joint of post set in anchoring cement with urethane sealant specified in Division 7 - Section - "Joint Sealants." Apply sealant with 1/8-inch buildup and troweled smooth to form slope away from post.

C. Anchor posts attached to metal substrates with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members. Weld flanges to post and bolt to metal supporting surfaces.

3.4 ATTACHING RAILINGS

A. Anchor railing ends at walls with round flanges anchored to wall construction with concealed anchors and connected to railing ends using nonwelded connections.

B. Attach handrails to wall with wall brackets.

1. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
2. Install brackets to provide not less than 1-1/2 inch clearance from inside face of handrail and finished wall surface.

C. Secure wall brackets to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For steel-framed partitions, use either of the following methods:

a. Attach with self-tapping screws or through-bolts fastened to steel framing or to concealed heavy gauge steel plate reinforcements.
b. Attach with hanger bolts or lag bolts set in fire-retardant-treated wood blocking located between studs. Coordinate location of blocking members with stud installation.

3.5 CLEANING AND PROTECTION

A. Clean stainless steel railings by washing thoroughly with clean water and soap and rinsing with clean water.

B. Protect finishes of railings and handrails from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 05 52 13

SECTION 05 53 13 - BAR GRATINGS

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 metal bar gratings and metal frames and supports for gratings.

B. Related Requirements:

1. Section 05 51 19 “Metal Grating Stairs”

1.3 COORDINATION

A. Coordinate installation of anchorages for gratings, grating frames, and supports. 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.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Clips and anchorage devices for gratings.
2. Paint products.

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

C. Delegated-Design Submittal: For gratings, including manufacturers' published load tables.

1.5 INFORMATIONAL SUBMITTALS

A. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.

B. Welding certificates.

1.6 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."
3. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
4. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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. Alabama Metal Industries Company; a Gibraltar Industries company.
2. All American Grating.
3. Harsco Industrial IKG, a division of Harsco Corporation.
4. Ohio Gratings, Inc.
5. Or Approved Equivalent

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Gratings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Floors: Uniform load of 150 lbf/sq. ft. or concentrated load of 2000 lbf, whichever produces the greater stress.
2. Walkways and Elevated Platforms Used as Exits: Uniform load of 125 lbf/sq. ft.
3. Heavy Equipment Room Floors: 300 lbf/sq. ft. or concentrated load of 3000 lbf, whichever produces the greater stress.
4. Electrical Room Floors: 250 lbf/sq. ft. or concentrated load of 2500 lbf, whichever produces the greater stress.
5. Limit deflection to L/360 or 1/4 inch, whichever is less.

B. Seismic Performance: Gratings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Component Importance Factor: 1.5.

2.3 METAL BAR GRATINGS

A. Metal Bar Grating Standards: Comply with NAAMM MBG 531, "Metal Bar Grating Manual."

B. Pressure-Locked, Rectangular-Bar Aluminum Grating: Fabricated by pressing rectangular flush-top crossbars into slotted bearing bars or swaging crossbars between bearing bars.

1. Bearing Bar Spacing: 1-3/16 inch o.c.
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: 4 inches o.c.
5. Traffic Surface: Plain.
6. Aluminum Finish: Mill Finish.

2.4 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Bars for Bar Gratings: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or ASTM A 1018/A 1018M.

C. Wire Rod for Bar Grating Crossbars: ASTM A 510.

D. Uncoated Steel Sheet: ASTM A 1011/A 1011M, structural steel, Grade 30.

E. Galvanized-Steel Sheet: ASTM A 653/A 653M, structural quality, Grade 33, with G90 coating.

F. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 240/A 240M, Type 316L.

G. Stainless-Steel Bars and Shapes: ASTM A 276, Type 316L.

2.5 ALUMINUM

A. General: Provide alloy and temper recommended by aluminum producer for type of use indicated, with not less than the strength and durability properties of alloy, and temper designated below for each aluminum form required.

B. Extruded Bars and Shapes: ASTM B 221, alloys as follows:

1. 6061-T6 or 6063-T6, for bearing bars of gratings and shapes.
2. 6061-T1, for grating crossbars.

C. Aluminum Sheet: ASTM B 209, Alloy 5052-H32.

2.6 FASTENERS

A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide stainless-steel fasteners for fastening stainless steel.

B. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts, and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 2.

C. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

1. Material for All Locations and Where Stainless Steel Is Indicated: Alloy Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.7 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. 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.

1. Fabricate toeplates for attaching in the field.
2. Toeplate Height: 4 inches unless otherwise indicated.

F. Removable Grating Sections: Fabricate with banding bars attached by welding to entire perimeter of each section. Include anchors and fasteners of type indicated or, if not indicated, as recommended by manufacturer for attaching to supports.

1. Provide no fewer than four weld lugs for each heavy-duty grating section, with each lug shop welded to two bearing bars.

2. Provide no fewer than four saddle clips for each grating section containing rectangular bearing bars 3/16 inch or less in thickness and spaced 15/16 inch or more o.c., with each clip designed and fabricated to fit over two bearing bars.
3. Provide no fewer than four weld lugs for each grating section containing rectangular bearing bars 3/16 inch or less in thickness and spaced less than 15/16 inch o.c., with each lug shop welded to three or more bearing bars. Interrupt intermediate bearing bars as necessary for fasteners securing grating to supports.
4. Provide no fewer than four flange blocks for each section of aluminum I-bar grating, with block designed to fit over lower flange of I-shaped bearing bars.
5. Furnish stainless steel flange clamp with galvanized bolt for securing grating to supports. Furnish as a system designed to be installed from above grating by one person.

G. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.

1. Edge-band openings in grating that interrupt four or more bearing bars with bars of same size and material as bearing bars.

H. Do not notch bearing bars at supports to maintain elevation.

2.8 GRATING FRAMES AND SUPPORTS

A. Aluminum or stainless-steel frames and supports in the following locations:

1. Exterior.
2. Interior.

2.9 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I.

B. The portion of aluminum frames in contact with concrete shall have a bitumastic coating for protection.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

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. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.

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

E. Attach toe plates to gratings by welding at locations indicated.

F. Field 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.

G. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.2 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 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 ADJUSTING AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 05 53 13

SECTION 05 60 00 –ACCESS HATCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes watertight access hatches for pumping station wetwells and valve vaults.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Concrete

1.3 DESIGN REQUIREMENTS

A. Aluminum Hatches in vaults and structures:

1. Opening size: As shown on drawings.
2. Material: Aluminum with maximum design stress of 17,300 psi per the Aluminum Association
3. Live load: 300 lb/sq ft
4. Single leaf with hinges on one side, spring loaded assist, locking upright door (Provide double leaf doors for hinged openings exceeding 48 inches wide.
5. Gasket sealed for containment of odors
6. Safety Grate: Powder coated aluminum safety Grate with separate, lockable access. Shall be included.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, materials, individual components and profiles, and finishes.

PART 2 - PRODUCTS

2.1 FABRICATION

A. Frame: Aluminum, channel or angle type as shown on the drawings, 1/4-inch thickness, coal tar coats all surfaces in contact with concrete, 10 mils min.

B. Doors to be equipped with:

1. Heavy duty, stainless steel pneumatic dampened spring.
2. Cover to be counterbalanced.

3. Aluminum automatic hold open arm with a red vinyl grip release handle.

C. Door to lock open in the 90-degree position.

D. Hinges: 316 stainless steel with 316 stainless steel bolts.

E. Hardware: All Type 316 stainless steel.

F. Lift Handle: Flush with top of the 1/4-inch diamond plate.

G. Sealed with gasket for odor control.

H. Safety Accessories: Covers installed over wetwells or other water holding structures shall be equipped with lockable aluminum I-bar safety grating.

1. Aluminum I-bar construction
2. 316 stainless steel hardware
3. Tamper-proof stainless-steel hinge bolts
4. Hinged with positive latch to maintain upright position
5. 300 p.s.f. load rated.
6. View are for observation and limited maintenance.
7. Safety Orange powder coated.
8. Nut rail and stainless-steel spring nuts.

I. As manufactured by Halliday, Bilco, Thompson Fabricating or equal

2.2 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. 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.

D. Stainless-Steel Finish: Bright, cold-rolled, unpolished No. 2B finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrate 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 aluminum access hatches.

B. Repair nicks or other damage to bituminous surface of frame prior to installation.

C. Install frames plumb and level in opening. Secure rigidly in place.

D. Lubricate and adjust for proper operation

3.3 ADJUSTING

A. Adjust access hatches, after installation, for proper operation.

END OF SECTION 05 60 00