SECTION 055200 – Metal railings, or secton 057360 – decorative metal railings

HANDRAIL ALONG walls, ramps or stairs

1. GENERAL
   * + 1. RELATED DOCUMENTS
          1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
       2. SUMMARY
          1. This Section includes the following:

Aluminum handrail along walls, ramps or stairs.

* + - 1. PERFORMANCE REQUIREMENTS
         1. All railings shall be supplied to conform to applicable sections of the following codes:

International Building Code

ADAAG

* + - * 1. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

Handrails:

Uniform load of 50 lbf/ft. applied in any direction.

Concentrated load of 200 lbf. applied in any direction.

Uniform and concentrated loads need not be assumed to act concurrently.

* + - * 1. Thermal Movements: Provide exterior railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

Temperature Change (Range): 120°F, ambient; 180°F, material surfaces.

* + - 1. Handrail for ramps
         1. Ramps with a rise greater than 6 inches shall have handrails on both sides.
         2. Handrail will be installed at a height of 34 – 38 inches above ramp surface.
         3. A curb, rail, wall, or barrier shall be provided to serve as edge protection. Curb must be minimum 4 inches in height. A barrier must be constructed so as to prevent the passage of a 4 inch diameter sphere above ramp grade level.
         4. On circular cross sections, the gripping surface shall have a diameter of between 1 ½” inches and 2 inches.]

The gripping surface shall be continuous without interruption by newel posts or other obstructions.

* + - * 1. A clearance of a minimum 1 ½” shall exist between the wall or post surface and the handrail.
        2. At the top and bottoms of handrail sections that stop at a landing, the handrail shall extend 12 in horizontally beyond the top riser and continue to slope for the depth of one tread beyond the bottom riser.
        3. Ramps with a drop off of 30 inches or more to grade shall require guards.

Handrails shall return to a wall, guard or walking surface or be continuous to the handrail on the adjacent run.

* + - 1. Handrail for stairs
         1. Handrail shall be required on both side of a stairway.

Handrail will be installed at a height of 34 – 38 inches above ramp surface.

* + - * 1. On circular cross sections, the gripping surface shall have a diameter of between 1 ½” inches and 2 inches.]

The gripping surface shall be continuous without interruption by newel posts or other obstructions.

* + - * 1. A clearance of a minimum 1 ½” shall exist between the wall or post surface and the handrail.
        2. Handrail shall return to the wall, guard, or walking surface if not continuous between flights.
      1. SUBMITTALS
         1. Product Data: For the following:

Manufacturer's product lines of mechanically connected railings.

Grout, anchoring cement, and paint products.

* + - * 1. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

* + - * 1. Samples for Initial Selection: For products involving selection of color, texture, or design.
        2. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
        3. Product Test Reports: Supplier shall submit calculations and test reports for complete system.

If required, supplier shall provide PE stamped calculations and / or drawings.

* + - * 1. QUALITY ASSURANCE
        2. Source Limitations: Obtain each type of handrail through one source from a single manufacturer.
      1. PROJECT CONDITIONS
         1. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.
      2. COORDINATION AND SCHEDULING
         1. Schedule installation so wall attachments are made only to completed walls. Do not support railing temporarily by any means that do not satisfy structural performance requirements.

1. PRODUCTS
   * + 1. MANUFACTURERS
          1. Post Mounted Handrail
          2. Basis-of-Design Railing Product: Subject to compliance with requirements, provide Interna-Rail® Handrail aluminum component railing as manufactured and assembled by Hollaender® Manufacturing or an approved equivalent. Single source manufacturer is required. Welded railing will not be accepted.

Posts will be anodized aluminum 6005 Sch 80, 1 ½ in IPS nominal (1.90 in. OD). Rail and handrail will be Sch 40. Where necessary, lengths of the handrail will be spliced using Hollaender Model 70ES-8 internal locking splices.

Handrail will be attached to the post sections using Hollaender model 173 and 174 angles tee fittings and 5/16” – 18 anodized aluminum rivet nuts.

In conditions where railing is top mounted to the ramp, flanges shall be Hollaender 45 SBCS angled flanges.

In conditions where handrail is mounted to stair tread or stringer, Hollaender mounting flanges appropriate to the size and angle of the mounting surface shall be used

When conditions dictate core mounting, drill core holes 6 in deep x 3 in OD, fill with non- shrink grout.

End loops, upper and lower, shall extend horizontally beyond the post and be attached to the handrail using 70 ES-8 locking splices.

* + - * 1. Wall Mounted Handrail

Wall rail shall be 1 1 /2” IPS Sch 40 aluminum, 6063-T6 alloy, clear anodized.

Wall rail shall be attached to the wall, at maximum 5 ft. spacing, with Hollaender 82E brackets or Hollaender 88-8 brackets, based on the architects design choice.

Wall rail shall either be continuous between flights, or shall return to the wall at top or bottom of flight, as appropriate.

Wall rail shall be bent at the end that returns to the wall.

* + - 1. METALS, GENERAL
         1. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
         2. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.
      2. ALUMINUM
         1. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
         2. Extruded Bars and Tubing: ASTM B 221, Alloy 6063-T6 or 6005A-T5

Provide 1 ½ in IPS, (1.90 in OD) Standard Weight (Schedule 40) pipe for handrail, Sch. 80 for posts.

* + - * 1. Plate and Sheet: ASTM B 209, Alloy 6061-T6
        2. Die and Hand Forgings: ASTM B 247, Alloy 6061-T6
        3. Castings: ASTM B 26/B 26M, Alloy Almag 535
      1. FASTENERS
         1. General: Provide the following:

Aluminum Railings: Alloy steel fasteners with JS-600 zinc plating or 302 Stainless steel for exterior applications.

* + - * 1. Fasteners 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. Handrail attached to walls shall be attached using Hollaender 82E brackets. These brackets will be attached to the handrail using ¼-20 x 1” Stainless steel self-tapping screws.
        2. Fasteners for Interconnecting Railing Components:

Rails shall be attached to posts by means of Hollaender angled tee fittings, model 173 and 174, equipped with anodized aluminum, tubular rivet nut and stainless steel socket head cap screw. All structural fasteners such as tee fittings shall be machined from 6063-T6 aluminum alloy. The fitting shall be internally connected to the rail by means of an internal dual tang that is expanded with a stainless steel, internal /external, reverse knurl, cup point socket head set screw. This combination shall prevent any loosening of the system due to changes in temperature or vibration. Systems using pop rivets or adhesives will not be accepted.

* + - 1. MISCELLANEOUS MATERIALS
         1. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
      2. FABRICATION
         1. General: 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.
         2. Assemble railings in the 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. Use connections that maintain structural value of joined pieces.
         3. 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.
         4. Form work true to line and level with accurate angles and surfaces.
         5. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
         6. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items. Welding will not be accepted.
         7. Connections: Fabricate railings with non-welded connections, unless otherwise indicated. Welding will not be accepted.
         8. Non-welded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
         9. Form changes in direction as follows:

By flush bends or by inserting prefabricated flush-elbow fittings.

* + - * 1. Form simple and compound curves by bending members in 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.
        2. Close exposed ends of railing members with prefabricated end fittings.
        3. 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.
        4. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated. Flanges to be sand cast from aluminum alloy 535 with anodized finish and fastened directly to the post by means of two reverse knurl cup point set screws.
        5. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
      1. ALUMINUM FINISHES
         1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
         2. Unless indicated otherwise, provide aluminum pipe with the following finish:

Anodized Finish: AA-M10C22A41 (Architectural class, .7 mil thickness or greater)

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1. EXECUTION
   * + 1. EXAMINATION
          1. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for installer. Locate reinforcements and mark locations if not already done.
       2. INSTALLATION, GENERAL
          1. Fit exposed connections together to form tight, hairline joints.

Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.

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

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.

* + - * 1. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.
      1. RAILING CONNECTIONS
         1. Non-welded Connections: Use mechanical joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings.
         2. 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 1 side, and locate joint within 6 inches of post.
      2. ATTACHING HANDRAILS TO WALLS
         1. Attach handrails to wall with wall brackets. Provide brackets with 1-1/2 inch clearance from inside face of handrail and finished wall surface.
         2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
         3. Secure wall brackets to building construction as indicated, or if not indicated, as follows:

For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.

For hollow masonry anchorage, use toggle bolts.

Provide blocking between studs in stud wall construction.

* + - 1. ADJUSTING AND CLEANING
         1. Clean aluminum and stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.
      2. PROTECTION
         1. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
         2. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF metal handrail section