

**ITEM 10615.8006 M - ALUMINUM HANDRAIL**  
**ITEM 10615.8007 M - ALUMINUM GUARD RAIL ASSEMBLY**

**DESCRIPTION**

This work shall consist of furnishing and installing aluminum handrails on stairs and aluminum guardrail assembly for platforms and stairs in accordance with the plans and this specification.

**MATERIALS**

**Metals:**

All railing material to be 6061-T6 aluminum and shall have a minimum tensile strength of 262 MPa, a minimum yield strength of 242 MPa meeting the requirements of Subsection 715-04 of NYSDOT Standard Specifications and shall be as follows:

Guardrail Post:	64mm x 64mm x 3mm Wall Thk. Tubing
Top Rail:	See Contract Drawings
Bottom Rail:	See Contract Drawings
Vertical Rail Frame:	38mm x 25mm x 3mm Wall Thk. Tubing
Intermediate Horizontal Rails:	38mm x 25mm x 3mm Wall Thk. Channels
Main and Intermediate Pickets:	19mm x 19mm x 3mm Wall Thk. Tubing
Handrails:	38mm O.D. x 3mm Wall Thk.

All structural extrusions, i.e. posts, top and bottom rails, handrails, angles, etc., shall be of 6061-T6 alloy meeting the requirements of Subsection 715-04 of NYSDOT Standard Specifications.

All fasteners shall be series AISI 300 stainless steel.

**Nonshrink Nonmetallic Grout:**

Nonshrink nonmetallic grout shall be premixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with the Corps of Engineers Specification CRD-C621 and ASTM C1107. The Contractor shall provide grout specifically recommended by the manufacturer for interior and exterior applications as required.

**Welding Electrodes and Filler Material:**

The Contractor shall use the type and alloy of filler metal and electrodes recommended by the producer of the metal to be welded, and as required to match colors, and strength and for compatibility with the individual components of fabricated items.

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Finishes:

Finished color for posts, infill panels, plates, brackets, and other accessories shall be Amber Red (#7191); and Woodland Night (#7009) for railing. Colors as per Pittsburgh Paint Color System or equal.

**SUBMITTALS**

The Contractor shall submit the following for approval:

- 1) **Product Data:** The Contractor shall submit the manufacturer's product specifications and installation instructions for products and processes used in fabricating handrail and guardrail, including mounting brackets, finishes, and grout, as required.
- 2) **Shop Drawings:** The Contractor shall submit shop drawings for fabrication and erection of handrail and guardrail including plans, elevations and details of fittings, connections, and anchorages to other work. Fabrication shall not begin until the shop drawings are approved by the Engineer or designee.
- 3) **Calculations:** Where materials or fabrications are indicated to comply with certain requirements for design loadings, structural computations, material properties and other information needed for structural analysis shall also be submitted.
- 4) **Samples:** The Contractor shall submit a 1/2-meter sample for each size and type of rail and metal finish indicated. The samples shall be prepared from metal of the same gauge and alloy used in the work. Where normal color and texture variations are to be expected, the Contractor shall provide "range" samples showing the limits of such variations.

**CONSTRUCTION DETAILS**

Fabrication:

- 1) The Contractor shall fabricate handrail and guardrail to the design dimensions and details shown. Individual members shall be of the sizes and profiles indicated, with supporting posts and brackets sized and spaced as shown, but not less than required to support the required design loads.
- 2) Fabricator shall supply all necessary fittings, bolts, and other accessories required to install a complete railing system as shown on the contract drawings.

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- 3) Guardrail shop assembled components (GSA) as shown on the contract drawings shall be completely fabricated prior to shipment.
- 4) All railing systems shall come with a 75 µm coating finish. Components shall go through a three stage wash, then be primed prior to factory finish. Finish with a thermo setting coating of polyester powder applied by electrostatic spray and fused at 232-260 degrees Celsius for 12 to 14 minutes.
- 5) All pipe cuts shall be square and accurate for hairline gap. Cuts shall be clean and free of chamfer from deburring, burrs, and nicks.
- 6) Rail-post shall be a single unspliced pipe length with post reinforcement.
- 7) 38 mm O.D. handrails shall be a single unspliced pipe length between posts.
- 8) All welded connections to be ground smooth and free of visual weld defects, including but not limited to porosity, spatter, arc strikes, crazes, and cracks.
- 9) Round off all corners of hand-rail connector.
- 10) Expansion joints shall be provided at 60 meters of railing and/or in accordance with the manufacturer's requirements. Align expansion joints at railings with expansion joints in the concrete platform. Bridge joints between stairs and the platform.
- 11) Bends and curves in the railing alignment shall comply with the following:
  - a. Bends shall be formed with prefabricated elbow fittings and radius bends, as applicable, of the radii indicated, except where the configuration requires bending of the railing members.
  - b. Simple and compound curves shall be formed by bending members in jigs to produce uniform curvature for each repetitive configuration required. The profile of the member shall be maintained throughout the entire bend without buckling, twisting or otherwise deforming the surfaces of the rail and its components.
- 12) The manufacturer's standard wall brackets, flanges, miscellaneous fittings and anchors shall be used to interconnect the rail members to other work, unless otherwise indicated. Inserts and other anchorage devices shall be used for connecting railings to concrete masonry work. Anchorage devices shall be spaced as indicated and as required to provide adequate support. The installation of anchorage devices shall be coordinated with the construction and/or modification of the support structure.
- 13) All finishes shall comply with National Association of Architectural Metal

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Manufacturers (NAAMM) "Metal Finishes Manual" for recommendations and designations of finishes, except as otherwise indicated, or specified.

Preparation:

- 1) The Contractor shall take field measurements prior to the preparation of Shop Drawings and final fabrication of the railings. However, delays in job progress shall be avoided. The Contractor shall allow for field adjustments during installation where taking field measurements before fabrication might delay the completion of the work.
- 2) The Contractor shall prepare the necessary setting drawings, diagrams, templates, instructions, and directions for the installation of anchorages, such as sleeves, concrete inserts, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete and masonry construction. The Contractor shall coordinate the delivery of such items to the project site, and their installation in conjunction with other work.
- 3) The NYSDOT & LIRR reserves the right to inspect all railing sections prior to shipment. The fabricator shall notify the Engineer and the LIRR Engineering Department at least two weeks prior to any shipment.

Installation:

- 1) PIC- Piece Identification Code- each section to be identified with PIC as follows:
  - a) Markings to be waterproof.
  - b) Project name and railing section mark number to be marked at location shown on drawings.
- 2) Railing sections to be wrapped water tight for shipment. Paper in contact with aluminum is not acceptable.
- 3) Defective railings shall be rejected. The Contractor shall be responsible for the cost of corrections or replacement.
- 4) Exposed connections shall be fit accurately together to form tight, hairline joints.
- 5) Cutting , drilling and fitting of components and members shall be performed as required for the installation of railings and guardrails. The work shall be set accurately in location, alignment and elevation, plumb, level, true and free of rack. All measurements shall be taken from established lines and levels. No welding,

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cutting or abrading shall be permitted of the surfaces of railings, guardrails and components which have been coated or finished after fabrication, and which are intended for field connection by mechanical means without further cutting or fitting.

- 6) Railings and guardrails shall be adjusted prior to final anchoring to ensure matching alignment at abutting joints. Posts shall be spaced at the interval indicated, and as required by design loadings.
- 7) Where dissimilar metals will abut, and under other conditions where galvanic action is possible, the railing components will be painted with one coat of zinc chromate primer conforming to Federal Specification TT-P-645A.
- 8) Anchoring posts shall be anchored to the supporting work as indicated. Permanent attachment shall not be completed until the alignment has been approved by the Engineer.
- 9) Railing components shall be permanently connected together using the manufacturer's standard mechanical joinery methods and fittings with tamper proof connection, or welded unless otherwise indicated. Wood blocks and padding shall be used to prevent damage to railing members and fittings during transportation and installation. Recessed holes of exposed locking screws shall be sealed with plastic filler cement colored to match the finish of the railings.
- 10) Railing components to be permanently connected by welding shall utilize the manufacturer's standard fittings designed for this purpose, unless otherwise indicated. The welded joints shall be ground smooth, brushed clean and field painted to match the shop finish.
- 11) Handrail shall be secured with the manufacturer's standard brackets and end fittings, unless otherwise indicated.
- 12) The finishes of handrail and guardrail shall be protected from damage during the construction period by use of temporary protective coverings approved by the railing manufacturer. Protective coverings shall be removed at the project or when directed by the Engineer. Finishes damaged during the installation and construction period shall be restored so that no evidence remains of the correction work. Items which cannot be refinished in the field to the satisfaction of the Engineer shall be returned to the shop for required alterations and refinishing of the entire unit. New units shall be provided at no cost to NYSDOT if the necessary repairs cannot be made to the returned items to the satisfaction of the Engineer.

**METHOD OF MEASUREMENT**

Handrail will be measured by the number of linear meters of handrail installed, measured along the centerline of top handrail center to center posts.

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Guard Rail will be measured by the number of linear meters of Guard Rail installed, measured along the centerline of top guard rail center to center posts.

**BASIS OF PAYMENT**

The unit price bid for Handrail shall include the cost of furnishing all labor, materials and equipment necessary to complete the work. All brackets, fittings and related hardware shall also be included in the unit price bid.

The unit price bid for Guard Rail assembly shall include the cost of furnishing all labor, materials and equipment necessary to complete the work. All gates, fittings, anchorages and related hardware shall also be included in the unit price bid.