

ITEM 11607.9301 M - RAILING FOR FIXED PIER

DESCRIPTION

Under this item, the contractor shall install a given length of railing along the sides of the walkway pier. Any and all custom decorative metal work shall be included under this item. Any and all timber skirting and wooden handrail shall also be included.

Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents and includes all labor, materials, equipment, and services necessary to complete the railing as shown on the drawings and/or specified herein, including but not limited to:

1. Individual railing panels, consisting of 2 stainless steel support stanchions, an upper and lower stainless steel pipe supports, a custom-patterned stainless steel wave motif panel insert, and intermediate plate steel panel supports.
2. Round diameter custom bollards and connections as shown in construction documents.
3. Solid sawn timber deck edging bolted thru to structure as shown in construction documents.
4. Laminated timber deck edging bolted thru to structure as shown in construction documents.
5. Wooden handrails
6. Cutting, fitting, drilling and tapping work to accommodate work as required for attaching and installing work of this Section.
7. All rough hardware and fastenings for work of this pay item.

MATERIALS

A. Metals

1. Appearance: Provide materials which have been selected for their surface flatness, smoothness and freedom from surface blemishes where exposed to view in the finished unit. Exposed to view surfaces which exhibit pitting, seam marks, roller marks, "oil-canning" stains, discolorations or other imperfections on the finished units will not be acceptable.
2. Protection: Provide necessary protection to all exposed surfaces of architectural metal work, so as to prevent damage, staining, discoloration, abrasion, etc., to these surfaces from time of shipment from factory to acceptance of work of this project.

Protection shall be provided by wrappings, strippable coatings, or other means. After installation, remove protective paper or strippable coating and clean exposed surfaces, and then provide additional temporary protection to protect architectural metal work from damage during subsequent construction activities.

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- Surfaces which are damaged, stained discolored, abraded etc., shall be rejected and replaced with new materials, at no cost to the State.
3. Stainless Steel: Comply with following standards and requirements for stainless steel components:
 - a. Brushed No 4. finish to match Architect's sample.
 - b. Tubing: ASTM A 554, Grade MT 304, as standard with manufacturer.
 - c. Pipe: ASTM A 312/A312M, Grade TP 304.
 - d.. Castings: ASTM A 743/A, Grade CF 8 or CF 20.
 - e. Plate: ASTM A 666, Type 304.
 4. Fasteners: Furnish basic metal and alloy, matching finished color and texture as the metal being fastened, unless otherwise indicated. Provide Phillips flat-head screws for exposed fasteners, unless otherwise indicated.
 - a. Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended by producer of the metal to be welded, and as required for color match, strength and compatibility in the fabricated items.
 - b. Anchors and Inserts: Either furnish inserts to be set in concrete or masonry work, or provide other anchoring devices as required for the installation of ornamental metal items. Provide toothed steel or lead shield expansion bolt devices for drilled-in-place anchors. Provide galvanized or cadmium-coated anchors and inserts for exterior installations.
 5. Finish: Provide units with exposed surfaces matching the texture and finish of the metal item. Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations, except as otherwise indicated.

Provide colors or color matches as indicated on selected samples.

Protect mechanical finishes on exposed surfaces from damage by application of strippable temporary protective covering prior to shipment.

6. Protective Lacquer: Clear non-yellowing, of type recommended by metal producer for protection of the finished metal surface.
7. Corrosion Protection: Coat concealed surfaces which will be in contact with concrete, masonry, wood or dissimilar metals, in exterior work and work to be built into exterior and below grade walls and decks, with a heavy coat of bituminous paint. Do not extend coating onto exposed surfaces.
8. Structural Performance of Handrails and Railing: Provide handrails and railings capable of withstanding the following structural loads without exceeding allowable design working stresses of materials for handrails, railings, anchors, and connections:

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- a. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:
 - 1) Concentrated load of 200lb/ft applied at any point and in any direction
 - 2) Uniform Load of 50lb/ft applied horizontally and concurrently with uniform load of 100lb/ft applied vertically downward.
 - 3) Concentrated and uniform loads above need not be assumed to act concurrently.
 - b. Handrails not serving as Top Rails: Capable of withstanding the following loads applied as indicated:
 - 1) Concentrated load of 200lb/ft applied at any point and in any direction
 - 2) Uniform Load of 50lb/ft applied in any direction.
 - 3) Concentrated and uniform loads above need not be assumed to act concurrently.
 - c. Fabrication
 - 1) General: Fabricate handrails and 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 handrails and 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) Form changes in direction of railing members as detailed.
 - 4) Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- B. *Timber Edging*
1. Solid sawn Lumber: AWI Section 100 with the following requirements:
 - a. Hardwood for Opaque Finish: American Mahogany.
 2. Laminated Timber
- C. *Railings* - Provide railings of the sizes, profiles, species and finish as specified or shown and complying with AWI Section 300, Premium Grade.

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CONSTRUCTION DETAILS

A. *Quality Assurance - metals*

1. General: Work of this section shall be fabricated and installed by an experienced fabricator or manufacturer, who has been engaged in work of equivalent scope and fabrication standards for at least five (5) years.

Materials, methods of fabrication, fitting, assembly, bracing, supporting, fastening, operating devices, and erection shall be in accordance with drawings and specifications, approved shop drawings, and best practices of the industry, using new and clean materials as specified, having structural properties sufficient to safely sustain or withstand stresses and strains to which materials and assembled work will be subjected.

All work shall be accurately and neatly fabricated, assembled and erected.

2. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of the work. However, do not delay job progress; allow for adjustments and fitting where taking of field measurements before fabrication might delay the work.
3. Shop Assembly: Insofar as practicable, fitting and assembly of work shall be done in shop. Work that cannot be permanently shop assembled, shall be completely assembled, marked and disassembled in shop before shipment to insure proper assembly in field. Shop assemble work in largest practical sizes to minimize field work. It is the responsibility of the Contractor for this work to assure himself that the shop fabricated items will properly fit the field condition. In the event that shop fabricated items do not fit the field condition, the item shall be returned to the shop for correction..
4. Product Handling:
 - A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.
 - B. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the State.
5. Submittals
 - A. Standard Pieces
 - 1) Manufacturer's Literature: Submit manufacturer's specifications, load tables, dimension diagrams, anchor details and installation instructions for products to be used in the fabrication of miscellaneous metal work, including paint products.
 - 2) Shop Drawings: Shop drawings for the fabrication and erection of all assemblies of miscellaneous iron work which are not completely shown by

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manufacturer's data sheets. Include plans and elevations at not less than 1" to 1'-0" scale, and include details of sections and connections at not less than 3" to 1'-0" scale. Show anchorage and accessory items.

- 3) Welding: Welding shall be indicated on shop drawings using AWS symbols and showing length, size and spacing (if not continuous). Auxiliary views shall be shown to clarify all welding. Notes such as 1/4" weld, weld and tack weld are not acceptable.

B. Custom Pieces

- 1) Manufacturer's Literature: Submit literature for all items custom pieces of work of this Section, showing locations, layouts, materials, thicknesses, finishes, dimensions, construction, relation to adjoining construction, erection details, profiles, jointing and all other details to fully illustrate the work of this Section.

Submit manufacturer's, fabricator's and finisher's specifications and installation instructions for products used in ornamental metal work, including finishing materials and methods.

- 2) Samples: Submit fabricated samples (of sufficient size to fully show construction, materials and finishes) of all items of custom work.
 - 3) Welding: Welding shall be indicated on shop drawings using AWS symbols and showing length, size and spacing (if not continuous). Auxiliary views shall be shown to clarify all welding. Notes such as 1/4" weld, weld and tack weld are not acceptable.
6. Cutting: Cut metal by sawing, shearing, or blanking. Flame cutting will be permitted only if cut edges are ground back to clean, smooth edges. Make cuts accurate, clean, sharp, square and free of burrs, without deforming adjacent surfaces or metals.
 7. Holes: Drill or cleanly punch holes; do not burn. Holes shall be accurate, clean, neat and sharp without deforming adjacent surfaces or metals.
 8. Connections: Make connections with tight joints, capable of developing full strength of member, flush unless indicated otherwise, formed to exclude water where exposed to weather. Locate joints where indicated on drawings. Provide connections to allow for thermal movement of metal at locations and by methods approved by Architect. For work exposed to view, use concealed fasteners (unless welded or other connections indicated) with joints accurately fitted, flush and rigidly secured with hairline contacts.

A. Welding

- 1) Shall be in accordance with "Standard Code for Welding in Building Construction" of the American Welding Society, and shall be done with electrodes and/or methods recommended by the manufacturer of the metals being welded.

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- 2) Welds shall be continuous, except where spot welding is specifically permitted. Welds exposed to view shall be ground flush and dressed smooth with and to match finish of adjoining surfaces; undercut metal edges where welds are required to be flush.
 - 3) All welds on or behind surfaces which will be exposed to view shall be done so as to prevent distortion of finished surface. Remove weld spatter and welding oxides from all welded surfaces.
- B. Bolts and Screws - Make threaded connections tight with threads entirely concealed. Use lock nuts. Bolts and screw heads exposed to view shall be flat and countersunk. Cut off projecting ends of exposed bolts and screws flush with nuts or adjacent metal.
9. Operating Mechanism: Operating devices (i.e. pivots, hinges, etc.) mechanism and hardware used in connection with this work shall be fabricated, assembled, installed and adjusted after installation so that they will operate smoothly, freely, noiselessly and without excessive friction.
 10. Built-In Work: Furnish anchor bolts, inserts, plates and any other anchorage devices, and all other items specified under this Section of the Specifications to be built into concrete, masonry or work of other trades, with necessary templates and instructions, and in ample time to facilitate proper placing and installation.
 11. Supplementary Parts: Provide as necessary to complete each item of work, even though such supplementary parts are not shown or specified.
 12. Coordination: Accurately cut, fit, drill and tap work of this Section to accommodate and fit work of other trades. Furnish or obtain, as applicable, templates and drawings to or from applicable trades for proper coordination of this work.
 13. Exposed Work
 - a. In addition to requirements specified herein and shown on drawings, all surfaces exposed to view shall be clean and free from dirt, stains, grease, scratches, distortions, waves, dents, buckles, tool marks, butts, and other defects which mar appearance of finished work.
 - b. Metal work exposed to view shall be straight and true to line or curve, smooth arrises and angles as sharp as practicable, miters formed in true alignment, profiles accurately intersecting, and with joints carefully matched to produce continuity of line and design.
 - c. Exposed fastenings, where permitted, shall be of the same material, color and finish as the metal to which applied, unless otherwise indicated, and shall be of the smallest practicable size.

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- d. Materials used shall be of such strength, thickness and alloy that they are capable of meeting all standards and descriptions specified herein and as detailed on drawings.
14. Supplementary Parts: Provide as necessary to complete each item of work, even though such supplementary parts are not shown or specified.
15. Coordination: Accurately cut, fit, drill and tap work of this Section to accommodate and fit work of other trades. Furnish or obtain, as applicable, templates and drawings to or from applicable trades for proper coordination of this work.

B. *Quality Assurance - timber*

1. Standards: The quality standards of the Architectural Woodwork Institute, latest edition, shall apply to all workmanship for architectural woodwork and by reference are made a part of this specification. All work shall conform to "Premium" grade requirements of the AWI Quality Standards, unless otherwise modified herein.

In the event of a dispute as to the quality grade (or grades), all parties involved will (1) call upon the Architectural Woodwork Institute for an inspection under AWI's established inspection procedures, and (2) agree to abide by the decision of AWI. The cost of said inspection shall be borne by the Contractor.

2. Submittals: Field Measurements: Take accurate field measurements before preparation of fabrication. Do not delay job progress; allow for field cutting and fitting where taking field measurements before fabrication is not possible.
3. Verification Samples: Submit at least two fully finished representative samples of each material that is to be exposed in the finished work, showing the full range of color and finish variations expected.
4. Qualifications: The work of this Section shall be provided by a firm having a minimum of five (5) years experience on projects of similar size and quality to that specified and shown.
5. Coordination: Coordinate the work of this Section with other appropriate Sections of the specifications to insure proper scheduling for fabrication and installation of the work specified herein.

Coordinate with partition and finish trades to insure that proper provisions are made for the installation of the work specified herein

Verify all dimensions in the field prior to fabrication of all Architectural Woodwork to assure proper fit.

6. Product Handling: All materials and work of this Section shall be protected from damage, from time of shipment from shop to final acceptance of work. Cover, ventilate, and protect work of this Section from damage caused by weather, moisture, heat, staining, dirt, abrasions, any other causes which may adversely affect appearance

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of use, or which may cause deterioration of finish, warping, distortion, twisting, opening of joints and seams, delamination, loosening, etc., of work of this Section.

Keep all finish carpentry, millwork, and cabinet work under cover both in transit and at the premises. Do not deliver any finish carpentry, millwork or cabinet work before it is required for installation. Protect such work to avoid damage in transit, during erection and after erection until acceptance of the building; use all such methods to provide the proper protection. Remove such protection when directed by the Architect.

Deliver finish carpentry, millwork, and cabinet work in a dry stable condition; protect same against injury and dampness. Do not store or install finish carpentry, millwork or cabinet work until after the concrete, masonry and plaster work are thoroughly dry.

Damaged or defective items or work of this Section are subject to rejection and replacement with new by Contractor, at no cost to State.

7. Job Conditions: Humidity and Temperature Controls: Advise Contractor of requirements for maintaining heating, cooling and ventilation in installation areas as required to reach relative humidity necessary to maintain optimum moisture content specified for woodwork.

Determine equilibrium moisture content and maintain required temperature and relative humidity as required for a tolerance of plus or minus one (1) percent of the specified optimum moisture content until woodwork receives specified finishes. Refer to "Guide to Wood Species Selection", AWI, for method of determining equilibrium moisture content values.

8. Examination of Substrate and Conditions: The installer must examine the substrate and the conditions under which the work of this Section is to be performed, and notify the Contractor in writing of unsatisfactory conditions. Do not proceed with work under this Section until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

C. Execution - metals

1. Inspection: Examine the areas and conditions where metal is to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.
2. 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.
3. 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

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established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry, or similar construction

4. Fitting Connections: 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.+
5. Installation
 - a. Fit exposed connections together to form tight, hairline joints.
 - b. Perform cutting, drilling, and fitting required to install handrails and railings. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.
 - c. Do not weld, cut, or abrade surfaces of handrail and 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.
 - d. Set posts plumb within a tolerance of 1/16" in 3'
 - e. Adjust handrails and railings before anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.
 - f. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.
6. Railing Connections
 - a. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article 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" beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6" of post.
7. 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.
8. Anchoring Posts: Anchor posts to metal surfaces, angle type, or floor type as required by conditions, connected to posts and to metal supporting members. For stainless-steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

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D. Execution - wood

- A. Inspection: Examine the areas and conditions where architectural woodwork is to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.
- B. Wood Railing
 - A. Wood shall be planed straight, square and level, then sanded smooth with flush finished surfaces. Joints shall occur over supports, Right angle joints shall be mitered.
 - B. All exposed fastening devices shall be countersunk and set below finished wood surfaces, and fitted with matching wood plugs; sand plugs and finish smooth and flush with exposed surfaces.
 - C. Handrails shall be capable of withstanding a force of two hundred (200) lbs. applied to rail at any point from any direction.
 - D. Provide all hardware and metal supports required for complete installation as detailed on drawings.
 - E. Field Touch-Up: Field touch-up shall be the responsibility of the installing Subcontractor, and shall include the filling and touch-up of exposed job made nail or screw holes, refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and mars, and final cleaning up of the finished surfaces.
- C. Clean-up and Protection
 - A. Clean Up: At regular intervals during the course of the work, all debris and excess material shall be cleaned up and removed from the site. Upon completion of installation, clean all spaces of debris caused by woodwork installation.
 - B. Protection: Protect all woodwork from marring, defacement of other damage until final completion and acceptance of the project by the State. Repair or replace all defective units prior to final inspection as directed by the Architect. Any units that cannot be satisfactorily repaired in the opinion of the Architect shall be replaced with new units of same original design, at no additional cost to the State.

METHOD OF MEASUREMENT

The quantity of railing to be fabricated and assembled shall be paid for by linear meter.

BASIS OF PAYMENT

The Unit Price Bid shall include the cost of furnishing all labor, materials, and equipment necessary to complete this work to the standard of quality described in this specification. This payment item shall be priced by meter.