SPECIFICATION FOR STEEL HANDRAILS FOR RAMPS
TOWN OF LYMAN
TOWN PARK RAMPS AND SIDEWALK PROJECT
MAY, 2018

Description:

Work under this item shall consist of furnishing and installing hand rails of the locations given on the plans and in accordance with the dimensions and details shown on the plans or as directed by the Engineer. Handrails shall be provided and installed so as to comply with ADA Standards for handrails and ramps Sections 405 and 505.

1. Design Criteria: Steel Pipe Hand Rails:

A. Structural Performance: Design, engineer, fabricate, and install handrails, and railing systems to comply with requirements of ASTM E985 for structural performance based on testing performed in accordance with ASTM E894 and E935 and to comply with all applicable code requirements

B. Handrail: Capable of withstanding concentrated load of 300 lbf applied at any point non-concurrently, vertically downward, or horizontally

C. Handrails Not Serving as Top Rails: Capable of withstanding concentrated load of 300 lbf applied at any point non-concurrently, vertically downward, or horizontally.

D. Infill Area of Handrail Systems:

a) Capable of withstanding horizontal concentrated load of 300 lbf applied to 1 sq. ft. at any point in system including panels, intermediate rails, balusters, or other elements comprising infill area.

b) Above load need not be assumed to act concurrently with uniform horizontal Loads on top rails of railing systems in determining stress on rail.

2. Submittals:

A. Shop Drawings:
1. Submit shop drawings for fabrication and erection of all miscellaneous metal fabrications.
2. Include plans, elevations, and details of sections and connections.
3. Show anchorage and accessory items.
4. Provide templates for anchor bolt installation by others.
5. 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.
6. Provide shop drawings signed and sealed by registered professional engineer licensed in State of South Carolina.

B. Welder certificates signed by Contractor certifying welders comply with requirements of this Section.

C. Qualification data for firms and persons performing Work of this Section demonstrate their capabilities and experience; include list of completed projects with Project name, addresses, names of Architect and Owners, and other information specified.

3. Quality Assurance:

A. Qualifications:

1. Fabricator: Firm experienced in successfully producing metal fabrications similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in Work.

2. Installer: Arrange for installation of metal fabrications specified in this Section by same firm that fabricated them.

3. Welding and Welders:

a) Qualify welding processes and welding operators
in accordance with AWS D1.l, Structural Welding
Code - Steel; D1.3, Structural Welding Code
Sheet Steel; and Dl.2, Structural Welding Code – Aluminum

b) Certify each welder has satisfactorily passed AWS qualification tests for welding processes involved and if pertinent, has undergone recertification.

4. Engineer: Professional engineer licensed to practice in South Carolina and experienced in providing engineering services of kind indicated that have resulted in successful installation of metal fabrications similar in material, design, and extent to that indicated for this Project.

4. Project Conditions:

A. Field Measurements:

1. Check actual locations of walls and other construction to which metal fabrications must fit, by accurate field measurements before fabrication.

2. Show recorded measurements on final shop drawings.

3. Coordinate Fabrication Schedule with construction progress to avoid delay of work.

9.14.02 Materials:

A. Ferrous Metals:

1. 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.

2. Steel Plates, Shapes and Bars: ASTM A36.

3. Steel Pipe: ASTM A53, finish, type and weight class as follows:

a) Type S: Grade A, standard weight, Schedule 40, unless otherwise indicated, or another grade or weight, or both, required by structural loads.

4. Brackets, Flanges and Anchors: Cast or formed metal of same type material and finish as supported rails, unless otherwise indicated.

B. Shop Applied Finish Coatings:

Paint System: To be by Pittsburgh Paints or approval equal. Paint to be a 2-component epoxy primer – one coat Pitt-Guard All Weather Coating 97-948 (A component) and 97-949 (B component). Wet film per coat, un-thinned, to be 7-10 mils. Dry film per coat to be 5-7 mils. Finish paint to be two coats of a gloss urethane enamel, Pitthane Ultra 95 – 8000 series. Color to be black. Wet film per coat to be 3.4 to 5.1 mils. Dry film per coat to be 2.0 to 3.0 mils.

Follow manufacturer's recommendations for mixing, application equipment, and surface preparation. Steel fabricator shall certify that mill scale has been removed from steel product by acid pickling or abrasive blast cleaning prior to priming. Apply paint when air, product, and surface temperatures are above 50°F. and surface temperatures are at least 5°F. above the dew point and no frost or ice is present on the substrate. Avoid painting late in the day or when rain is threatening.

9.14.02.1 Fabrication:

A. General:

1. Form metal fabrications from materials of size, thickness, and shapes indicated, but not less than that needed to comply with performance requirements indicated.
2. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support.
3. Use type of materials indicated or specified for various components of each metal fabrication.
4. Form exposed Work true to line and level with accurate angles and surfaces and straight sharp edges.
5. Allow for thermal movement resulting from following maximum change (range) in ambient temperature in design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners; base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.
6. Temperature Change (Range): 100 deg. F (55.5 deg. C).
7. Shear and punch metals cleanly and accurately; remove burrs.
8. Ease exposed edges to radius of approximately 1/32 in., unless otherwise indicated.
9. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing Work.
10. Remove sharp or rough areas on exposed traffic surfaces.
11. Welding:

a) Weld corners and seams continuously, complying with AWS recommendations.

b) Exposed Connections: Grind exposed welds smooth and flush to match and blend with adjoining surfaces.

12. Exposed Connections:

a) Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible.

b) Use exposed fasteners of type indicated or, if not indicated, Phillips flathead (countersunk) screws or bolts.

13. Anchorage:

a) Provide for anchorage of type indicated, coordinated with supporting structure.

b) Fabricate and space anchoring devices to provide adequate support for intended use.

14. Shop Assembly:

a) Preassemble items in shop to greatest extent possible to minimize field splicing and assembly.

b) Disassemble units only as necessary for shipping and handling limitations.

c) Use connections that maintain structural value of joined pieces.

d) Clearly mark units for reassembly and coordinated installation.

e) Cut, reinforce, drill, and tap miscellaneous metal Work as indicated to receive finish hardware, screws, and similar items.

15. Fabricate joints that will be exposed to weather to exclude water, or provide weep holes where water may accumulate.

B. Steel Pipe and Handrails:

1. Fabricate steel pipe railings and handrails to design, dimensions, and details indicated.

2. Provide railings and handrails members formed of pipe of sizes and wall thickness indicated, minimum required to support design loading.

3 Interconnect railing and handrail members by butt welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.

4. Form simple and compound curves by bending pipe in jibs to produce uniform curvature for each repetitive configuration required.

5. Maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting or otherwise deforming exposed surfaces of pipe.

6. Brackets, Flanges, Fittings, and Anchors:

a) Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of railings and handrails to other Work.

h) Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry Work.

9.14.03 Construction Methods:

A. Preparation:

Field Measurements:

1. Take field measurements before preparation of shop drawings and fabrication, where possible.

2. Do not delay job progress.

3. Allow for trimming and fitting where taking field measurements before fabrication might delay Work.

Coordination:

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

2. Coordinate delivery of such items to Project site.

B. Installation

General:

1. Fastening to In-Place Construction:

a) Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction.

b) Include 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:

a) Perform as required for installation of miscellaneous metal fabrications.

b) Set Work accurately in location, alignment, and elevation, level, true and free of rack, measured from established lines and levels.

c) Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry, or similar construction.

d) Fit exposed connections accurately together to form tight hairline joints.

e) Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations.

f) Grind exposed joints smooth and touchup shop paint coat.

Steel Pipe Handrails:

1. Adjust railing before anchoring to ensure matching alignment at abutting joints.
2. Space posts at spacing indicated or, if not indicated, as required by design loadings.
3. Plumb posts in each direction.
4. Handrails:
    a) Cement handrails to grade with Porock in sleeves o be set in concrete base or holes cored into wall.
    b) The entire railing shall be thoroughly cleaned before painting or touch up painting is performed. Provide paint touch ups to shop primed and painted metals. For field painting, provide two coats finish paint as specified in paragraph 6.B.

9.14.04 Method of Measurement:

This work will be measured for payment by the number of linear feet of railing measured along the top of the rail from end to end of the rail.

9.14.05 Basis of Payment:

This work will be paid for at the contract unit price per linear feet for "Hand Rail" complete in place, which price shall include all materials, and finishes including sleeves and fastening devices in which the posts are set, and all equipment, tools, and labor incidental thereto.

End specification

Handrail specification