

DIVISION 5 - STEEL
SECTION 05 50 00 - MISCELLANEOUS METAL FABRICATIONS
PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Miscellaneous metal fabrications, in place.
- B. Templates shall be furnished, where required.
- C. This subcontractor is advised that he is required to review all drawings and include all miscellaneous steel items depicted or called for anywhere in the drawing set or specifications. This includes, but is not limited to, the following:
 - 1. Steel stairs, walkways, ships ladders and ladders; including related components
 - 2. Steel grating
 - 3. Steel handrails and railing systems
 - 4. Bollards, pipe guard assemblies and door protection post assemblies, including related components
 - 5. Lintels and jamb channels in masonry walls for doors, windows and similar openings
 - 6. Support frames and sleeves for openings in roof and elevated construction; for mechanical equipment, roof drains, exhaust fans, intake hoods, ductwork and similar items coordinated with the Mechanical Drawings
 - 7. Support frames and sleeves for openings in interior and exterior walls; for louvers, mechanical fans and similar items coordinated with the Mechanical Drawings
 - 8. Support frames and sleeves for floor openings
 - 9. Angles and flat bars embedded in floor slabs
 - 10. Miscellaneous steel angles, channels, plates, rods and hangers
 - 11. Abrasive safety tread/nosing at concrete stairs and steel pan concrete- filled stairs
 - 12. Tactile Warning Strips, where required, shown or called for
 - 13. Field touch up of primer paint
- D. Metal fabrications are detailed on Site, Structural, Architectural and Mechanical Drawings.
- E. The Fabricator shall detail all components and assemblies for compliance with local building codes and OSHA requirements.

1.2 REFERENCE STANDARDS

- A. Except as otherwise specified herein, perform work in accordance with specifications noted below, including latest editions of applicable specifications, codes, and standards cited therein, and latest applicable addenda and supplements. Copies of specifications noted below shall be kept available in shop and field:
- B. IBC; latest edition
- C. "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings," American Institute of Steel Construction, latest edition including supplements thereto as issued. (AISC Specification).

- D. "Code for Welding in Building Construction (AWS D1.1-90)." American Welding Society. (AWS Code).
- E. "Specification for the Design of Cold-Formed Steel Structural Members – American Iron and Steel Institute. (AISI SPEC).
- F. N.A.A.M.M. Specification – National Association of Architectural Metal Manufacturers.
- G. "Standard Specifications for Metal Bar Grating and Metal Bar Grating Treads" ANSI/NAAMM A202.1 Metal Bar Grating Manual.
- H. American Society for Testing and Material (ASTM) Standards and Specifications shall apply to all materials.
- I. Any material or operation specified by reference to published specifications of manufacturer or published standard shall comply with said specification or standard. In case of conflict between referenced specifications, most stringent requirement shall govern. In case of conflict between referenced specifications and Project Specification, Project Specifications shall govern.

1.3 REFERENCES

- A. ASTM A36 - Structural Steel.
- B. ASTM A53 - Black, and Hot-Dipped Zinc-coated, Welded and Seamless Steel Pipe.
- C. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality.
- D. ASTM A123 - Zinc Coatings on Products Fabricated From Rolled, Pressed and Forged Steel Shapes, Plates, Bars, and Strip.
- E. ASTM A153 - Zinc Coating on Iron and Steel Hardware.
- F. ASTM A283 - Carbon Steel Plates, Shapes, and Bars.
- G. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.
- H. ASTM A325 - High Strength Bolts for Structural Steel Joints.
- I. ASTM A386 - Zinc-Coating on Assembled Steel Products.
- J. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- K. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- L. ASTM A123/123M – Zinc-Coating on Iron and Steel Products
- M. AWS D1.1 - Structural Welding Code
- N. SSPC - Steel Structures Painting Council

1.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. Structural Performance of Handrails and Railing Systems: Design, Contractor, fabricate, and install handrails and railing systems to comply with requirements of the building code in effect at the project location, ASTM E 894 and E 935.
 - 1. Concentrated load of 200 lb. applied at any point non-concurrently, vertically downward or horizontal.
 - 2. Uniformed load of 100 lb. per linear ft. applied non-concurrently, vertically downward or horizontal.
- B. Treads and Steel Stairs: Uniform load of 100 lb. per sq. ft. or concentrated load of 300 lb.

on an area of 4 sq. inches located in the center of the tread, whichever produces the greater stress.

- C. Platforms of Steel Stairs: Capable of withstanding a uniform load of 100 lb. per sq. ft. or concentrated load of 300 lb. located in the center, whichever produces the greater stress.
- D. Concrete filled Steel Pan Stairs: Capable of supporting uniform load of 100 psf. Or concentrated load of 300 lb. over 48 sq. inches without concrete in the pan.

1.5 QUALITY ASSURANCE

- A. Fabricator: Firm experienced in successfully producing miscellaneous metal fabrications similar to those indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.
- B. Installer: Arrange for installation of ornamental metal work specified in this section by same firm, which fabricated them, unless otherwise approved by Contractor.
- C. Qualify welding processes and welding operators in accordance with the following:
 - 1. AWS D1.1 "Structural Welding Code – Steel"
 - 2. AWS D1.2 "Structural Welding Code – Aluminum"
- D. Certify that each welder employed in unit of Work of this section has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- E. Testing for recertification is subcontractor's responsibility.

1.6 PROJECT CONDITIONS

- A. Field Measurements: When required take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of miscellaneous metal fabrications. Do not delay job progress; allow for adjustments and fitting where taking of field measurements before fabrication might delay Work.

1.7 COORDINATION

- A. Coordinate this work with other related Sections of Work.
- B. The fabricator shall detail all stairs, landings and guards to conform to the latest requirements of the building code in effect at the project location and OSHA regulations.

1.8 WARRANTY

- A. In accordance with the General Conditions of the Construction Contract.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General requirement surfaces: Those surfaces that are exposed to view shall be true, smooth and free from blemishes, pitting, seam marks, roller marks, rolled or scribed trademarks, roughness and scale.
- B. Miscellaneous Metal Fabrications: ASTM A36, ASTM A53 Grade B, ASTM A283, or other appropriate standards for specific items as applicable.
- C. Steel tubing, hot-formed, welded or seamless: ASTM A501
- D. Steel bars and bar sized shapes: ASTM A306 Grade 65 or A36
- E. Cold-finished steel bars: ASTM A108 Grade as selected by fabricator

- F. Cold-rolled carbon steel sheets: ASTM 336
- G. Galvanized steel carbon sheets: ASTM A526, with ASTM A525, G90 galvanizing
- H. Gray iron castings: ASTM A48 class 30
- I. Malleable iron castings: ASTM A47 grade as selected by the fabricator
- J. Steel pipe: ASTM A53 black pipe. Schedule 40 unless otherwise detailed
- K. Aluminum Plates, Shapes and Bars: Alloy 6061-T6
- L. Aluminum Pipe: Alloy 6061-T6
- M. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.
- N. Concrete inserts: Use ASTM A47 malleable iron or ASTM A27 cast steel, galvanized where threaded or wedge type are used. Bolts, washers and shims shall be ASTM A153 hot-dip galvanized.
- O. Stainless steel: Sheet and pipe shall be ASTM 276, Type 304L, 2B mill finish
- P. Bolts and Nuts at Steel Connections: ASTM A325, with hardened steel washers
- Q. Anchor Bolts at Concrete Masonry: ASTM A307
- R. Welding Materials: AWS D1.1; of type as appropriate for materials being welded
- S. Shop and Field Primer: Unless specifically noted otherwise, SSPC, Type 1, light gray
Note: Materials used shall not contain lead.
- T. Touch-Up Primer for Galvanized Surfaces: SSPC cold galvanizing compound
- U. Non-shrink grout, where called for, is to be General Construction grade, natural aggregate material; "Set-Grout", as manufactured by Master Builders, Inc., or an approved alternate.

2.2 FABRICATION

- A. All work shall be fabricated in accordance with reviewed shop drawings; review of shop drawings, by the Design-Builder, shall be for design intent only. Review of shop drawings shall not relieve the subcontractor of his responsibility for correct fabrication as designed.
- B. All items shall be fabricated true, plumb and level; all units shall be welded and/or bolted to develop the full strength of the assembly, as designed. Joints shall be accurately cut, mitered, and connected as designed.
- C. Continuously seal weld-joined members; where not specifically called for, a minimum 3/16" continuous fillet.
- D. Where appropriate, welded joints shall be ground smooth; this is especially important for interior "finish" type work exposed to touch or close-up view. Work having significant grinding flaws will not be accepted.

2.3 FINISH

- A. Prepare miscellaneous metal surfaces in accordance with SSPC SP3, Power Tool Cleaning.
- B. Shop prime members; one prime coat is required, except for portions to be embedded in concrete or masonry, surfaces requiring welding, or contact faces of bolted connections.
- C. Galvanizing shall be done following fabrication, where specifically called for, in units as large as practical.

2.4 PAINTING AND PROTECTIVE COATING

- A. All ferrous metal, except stainless steel and galvanized surfaces and castings to be left unpainted shall be cleaned with SSPC, SP-3 (Power Tool Cleaning) and given one shop coat of TNEMEC Primer, 37H (gray). Anchors that are built into masonry shall not be primed.
- B. Metal work to be encased in concrete shall be left unpainted unless specified or noted otherwise. Where hot-dip galvanized or zinc-coated materials are specified or shown, they shall not be shop primed unless specifically required. Castings that are to be left unpainted shall be cleaned and coated with a coal-tar-pitch varnish.
- C. Hot-dip galvanizing or zinc coatings applied on products fabricated from rolled, pressed and forged steel shaped plates, bars and strips shall comply with ASTM Specification A123. Hot-dip galvanizing or zinc coatings shall be as designated in Table 1 for the class and thickness of material to be coated. Galvanized surfaces for which a shop coat of paint is specified shall be chemically treated to provide a bond for the paint. Except for bolts, nuts and threaded rod, all galvanizing shall be done after fabrication. All window and door exterior lintels in masonry walls shall be galvanized.

2.5 GALVANIZING

- A. Galvanize steel members, fabrications and assemblies after fabrication by the hot-dip process in accordance with ASTM A123/123M.
- B. Galvanize bolts, nuts, washers and iron and steel hardware components in accordance with ASTM A153/153M.
- C. Safeguard products against steel embrittlement in conformance with ASTM A143.
- D. Handle all articles to be galvanized in such a manner as to avoid any mechanical damage and to minimize distortion.
- E. Conform to paragraph 6.1 of ASTM A123/123M, Table 1 of ASTM A153/153M, or Table 2 of A767, as appropriate.
- F. Surface Finish: Continuous, adherent, as smooth and evenly distributed as possible and free from any defect detrimental to the stated end use of the coated article.
- G. Adhesion: Withstand normal handling consistent with the nature and thickness of the coating and normal use of the article.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work. Ensure that dimensions agree with drawings.
- B. Special attention shall be given to verification of stubbed-out bolts at foundations and walls, embedded or other anchorage items, etc.

3.2 FABRICATION, GENERAL

- A. Form miscellaneous metal fabrications to required shapes and sizes, with true curves, but not less than required to comply with requirements indicated for structural performance.
- B. Provide necessary rebates, lugs and brackets for assembly of units. Use concealed fasteners wherever possible.
- C. Comply with AWS for recommended practices in shop welding. Provide welds behind finished surfaces without distortion of exposed side. Clean exposed welded joints of all welding flux, and dress on all exposed and contact surfaces.

- D. Mill joints to a tight, hairline fit. Cope or miter corner joints. Form joints exposed to weather to exclude water penetration.
- E. Finish exposed surfaces to smooth, sharp, well-defined lines and arises.
- F. 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.

3.3 INSTALLATION, GENERAL

- A. Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to be in-place construction; including, threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.
- B. Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set products accurately in location, alignment and elevation, plumb, level and true, 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.
- C. Fit exposed connections accurately together to form tight, hairline joints or, where indicated, with uniform reveals and spaces for sealants and joint fillers. Where cutting, welding and grinding are required for proper shop fitting and jointing of miscellaneous metal fabrications, restore finishes to eliminate any evidence of such corrective work.
- D. Do not cut or abrade finishes which cannot be completely restored in the field. Return items with such finishes to shop for required alterations, followed by complete refinishing or provide new units as required.
- E. Install concealed gaskets, joint fillers, insulation and flashings as the work progresses, so as to make work weather tight, soundproof or lightproof as required.
- F. Restore protective coverings, which have been damaged during shipment or installation of work. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at the same location.
 - 1. Retain protective coverings intact and remove simultaneously from similarly finished items to preclude non-uniform oxidation and discoloration.
- G. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal-arc welding, for appearance and quality of welds made, and for methods used in correcting welding work. Weld connections, which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed welded joints smooth and restore finish to match finish of adjacent rail surfaces.
- H. Corrosion Protection: Coat concealed surfaces of aluminum, which will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint or zinc chromate primer.

3.4 FRAMES FABRICATED FROM STRUCTURAL SHAPES AND/OR PLATE

- A. Provide fabricated steel lintels for openings as scheduled and detailed. All exterior masonry lintels shall be hot-dipped galvanized.
- B. Construct frames to sizes indicated, of steel channels, bent plates, steel angles, steel plate or combination of shapes as detailed. Frames shall be accurately squared, mitered, butted or coped as necessary, shall be full welded and all welds on exposed surfaces ground smooth. Concealed clip angles shall be welded or flush-riveted to the bottom of jamb members and provided with two 1/2" diameter floor bolts for each clip angle. Provide sill members where indicated. All frames shall be hot-dipped galvanized unless otherwise

noted on Drawings.

- C. Provide steel strap anchors of sizes and spacing indicated, welded to back of frames for anchoring onto masonry, concrete or to steel as necessary. Where size and spacing of anchors are not shown, use 1/4" x 2" x 8" straps with ends turned 2". Space anchors not more than 16" on center if in masonry, locate on courses.
- D. Construct stanchion for block heater plug-in as detailed on Electrical Drawings. Submit Shop Drawings for approval before fabrication.

3.5 STEEL RAILING SYSTEMS AND PIPE ITEMS

- A. Fabricate steel pipe railings and handrails using 1-1/2" diameter nominal, Schedule 40 pipe, designed, dimensioned and detailed as required. Provide railings and handrails members formed of pipe of sizes and wall thickness as required to support design loading. Space vertical posts or brackets not greater than 6'-0" on center
- B. Interconnect railing and handrail members by butt-welding or welding with internal connectors, at fabricator's option. At tee and cross intersections provide coped joints. At bends interconnect pipe by means of prefabricated elbow fittings or flush radius bends, as applicable, of acceptable radiuses. Form simple and compound curves by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross-section of pipe throughout entire bend without buckling, twisting or otherwise deforming exposed surfaces of pipe.
 - 1. Non-welded Connections: Fabricate railing systems and handrails for interconnection of members by means of concealed mechanical fasteners and fittings unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 2. Fabricate splice joints for field connection using epoxy structural adhesive where this represents fabricator's standard splicing method.
 - 3. Welded Connections:
 - a. Fabricate handrails and railing systems for interconnection of members by concealed internal welds, which eliminate surface grinding, using fittings designed and fabricated for this purpose.
 - b. Fabricate handrails and railing systems of materials for interconnection of members by welding. Use welding method, which is appropriate for metal and finish indicated and develops strength required to comply with structural performance criteria. Finish exposed welds and surfaces smooth, flush, and blended to match adjoining surfaces.
 - 4. Form changes in direction of railing members by bending members, insertion of prefabricated elbow fittings, radius bends, or by mitering.
 - 5. At elbow bends provide mitered joints.
 - 6. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain profile of member throughout entire bend without buckling, twisting, or otherwise deforming exposed surfaces of handrail and railing components.
 - 7. For framework and railing systems with non-welded connections, which are exposed to exterior or to moisture from condensation or other sources, provide weep holes or other means for evacuation of entrapped water in hollow sections of railing members.
- C. Return ends of wall-mounted handrails, except where otherwise required, to within 1/4" clear of finished wall. Close exposed ends of pipe by welding 3/16" thick steel plate in

place or by use of prefabricated fittings.

- D. Brackets, Flanges, Fittings and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings and anchors for interconnections of pipe and attachment of railings and handrails to other work. Wall brackets to be #275 by Julius Blum & Co., Inc. or approved equivalent.
 - 1. Furnish inserts and other anchorage devices for connecting handrails and railing systems to concrete or masonry work. Fabricate anchorage devices, which are capable of withstanding loadings imposed by handrails and railing systems. Coordinate anchorage devices with supporting structure.
- E. For railing posts set in concrete, provide sleeves of galvanized steel pipe not less than 6 inches long and with an inside diameter not less than 1/2 inch greater than the outside diameter of pipe. Provide steel plate closure welded to bottom of sleeve and of width and length not less than 1 inch greater than outside diameter of sleeve.
- F. Hot-dip galvanized exterior steel railings after fabrication, including pipe, fittings, brackets, fasteners, and other ferrous components. Provide primed steel pipe for interior railings.

3.6 INSTALLATION OF STEEL RAILING SYSTEMS

- A. Adjust railing systems prior to anchoring to ensure matching alignment at abutting joints. Space posts stiffeners at interval indicated but not less than that required by design loadings.
- B. Anchor posts to metal surfaces with fittings designed for this purpose.
- C. Welded Connections: Use fully welded joints for permanently connecting railing components by welding. Cope or butt components to provide 100 percent contact or use fittings designed for this purpose.
- D. Anchor railing ends into concrete or masonry with fittings designed for this purpose.
- E. Anchor railing ends to metal surfaces with fittings using concealed fasteners.
- F. Anchor framework ends to metal surfaces by welding.
- G. Expansion Joints: Provide expansion joints at locations indicated or, if not indicated, at intervals not to exceed 40 ft. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side, located joint within 6 inches of post.

3.7 STEEL STAIRS AND LANDINGS

- A. Provide complete stair assemblies of type indicated and including metal framing, hangers, columns, railings, newels, balusters, struts, clips, brackets, bearing plates and other components required for support of stairs and platforms.
- B. Stair Framing: Fabricate stringers of structural steel channels or plates or a combination thereof, and platforms of structural steel channel headers and miscellaneous framing members, of size indicated or required to support design live loads of 100 psf. Bolt or weld headers to stringers, newels and framing members to stringers and headers. Fabricate and join so that bolts, if used, do not appear on finish surfaces.
- C. Metal Pan Risers, Sub-treads and Sub-platforms: Shape metal pans to conform to configurations required. Provide thicknesses of structural steel sheet for metal pans as required to support total design loading. Form metal pans of cold-rolled carbon steel sheet unless otherwise indicated. Directly weld risers, sub-treads, and sub-platforms to steel framing, locate welds on side of metal pan to be concealed by concrete fill. Stair and landing pads shall be a minimum of 16 gauge to support construction traffic without concrete fill.

- D. Metal plank grating for stair loadings shall be galvanized steel with anti-skid surface and shall be able to support live loads of 100 psf.
- E. Metal plank grating for stair treads shall be 2" deep x 10" wide (minimum) galvanized steel with anti-skid nosing.
- F. Galvanized grating stair treads shall be by USG Corporation, McNichols Co., Inc. or equivalent. Grating treads shall be side bolted, serrated top or diamond plated as noted on Drawings, cast abrasive nosing, bar style, galvanized press-locked or welded, 1-1/2" high, and provided with galvanized hold down clips which screw attach at landing intermediate supports.
- G. Metal plank grating and stair treads shall be SGCS Series – 19-DT-4 manufactured by Ohio Gratings, Inc.
- H. Stainless steel stair treads shall be Sanitread Products by Mepaco. Field weld all treads to the adjacent stringer.

3.8 SHIPS LADDERS

- A. Provide ships ladders as detailed. Ladders shall be 68 degrees or as noted on the Drawings. Stringers shall be MC 12 x 10.6 with 1-1/2" O.D. standard steel pipe handrails. Treads shall be 10" wide type W/B 1-1/2" x 3/16" bars at 1 3/16" on center with check plate nosing. Treads shall be hot-dip galvanized. Stringers and handrails shall be prime-coated. Exterior ships ladder and platforms shall be hot-dip galvanized.

3.9 LADDERS

- A. Shall be 2'-0" wide constructed of 2-1/2" x d" flat bar stringers with 3/4" round, deformed, slip resistant, steel rungs at 1'-0" on centers. Provide 1" standard pipe stringer stiffeners for the stringer portions extending above rungs. Stringers shall project 3'-6" above platform. Fabrication and installation shall conform to OSHA requirements. Provide anchors at top and bottom and at intermediate points where detailed. Install top rung flush with the top of gravel stop or floor elevations. Provide protection cages with lockable safety cage as shown on the Drawings. Exterior ladders shall be hot dip galvanized.

3.10 STEEL GRATINGS

- A. Metal Bar Gratings: Produce metal bar gratings indicated per NAAMM marking system that complies with "Standard Specifications for Metal Bar Grating and Metal Bar Grating Treads published in ANSI/NAAMM A202.1 "Metal Bar Grating Manual".
- B. Welded Heavy Duty Steel Gratings: W-19-4 (welded with bearing bars 1-3/16 inch on center and cross bars 4 inches) bearing bar sizes as indicated; plain traffic surface.
- C. Fabricate removable grating sections with banding bars attached by welding to entire perimeter of each section. Include anchors and fasteners of type indicated for attachment to supports.
- D. Provide not less than 4 saddle clips for each grating section.
- E. Furnish threaded bolts with nuts and washers for each clip required.
- F. Fabricate cutouts in grating sections for penetration as indicted. Arrange layout of cutouts to permit grating removal without disturbing items penetrating gratings.
- G. Edge band openings in grating which interrupt 4 or more bearing bars with bars of same size and material as bearing bars.
- H. Interior and exterior equipment platform grating where shown on the Drawings shall be 1 1/2" deep, galvanized, serrated top bar, welded bar grating by USG Industries, McNichols Co. or equal. Grating shall be factory precut, with cold galvanized cut ends. Grating shall support the loads shown on the Structural Drawings. Furnish and install galvanized,

saddled style hold down fasteners on all grating, attach with stainless steel or galvanized self-tapping bolts.

3.11 BENT PLATE ANGLES

- A. Provide all 10 gauge (unless heavier is shown on Drawings) bent plate galvanized angles as detailed on the Architectural Drawings and Structural Drawings.
- B. Weld angle in place at the edge of the roof deck to provide accurate alignment for the wall panels.
- C. Provide all bent plate angles shown as "pour stops" for elevated concrete slabs.

3.12 STEEL PIPE BOLLARDS

- A. Fabricate pipe bollards from Schedule 40 steel pipe, galvanize where indicated. Fill pipe bollards with 3000 psi concrete after installation.
- B. Fabricate bases for bollard anchorage from steel plate welded to bottom of pipe.
- C. Close top of bollards with welded pipe caps.

3.13 STEEL LINTELS

- A. Provide steel lintels of sizes and arrangements shown on drawings. Unless otherwise shown, provide a bearing length at each end of lintel equal to one inch for each foot of lintel span length, with minimum 6 inches.
- B. Exterior lintels shall be galvanized.

3.14 CASTINGS

- A. Provide galvanized cast iron abrasive stair tread nosing for cast in place concrete stairs where detailed on the Drawings. Nosing shall be 4" wide and OSHA approved for non-slip. Nosing shall be Type 101 Ferrogrit by Wooster Products, Inc.

WOOSTER PRODUCTS
SUPERGRIT, TYPE 231BF
NON-SKID SAFETY

- A. TREAD NOSING

3.15 TREADS, NOSINGS AND WARNING STRIPS

- A. At Interior Concrete Stairs: Type 231 Super-grit Spectra Safety Treads, with Sure-Hold anchors. Color to be Safety Yellow or as selected.
- B. At Exterior "Industrial" Concrete Stairs: Type 101 Alumogrit by Wooster Products, Inc. Safety Treads/nosing, with wing type anchors at 12" on center, 5/16" x 3" cast aluminum stair nosing with cross-hatched surface abrasive with concealed steel anchors; 1-1/2" minimum concrete penetration.
- C. At Steel Pan Concrete-Filled Stairs (if shown with Safety Treads): Type 231BF Supergrit Safety Treads by Wooster Products, Inc. Color to be Safety Yellow, or as selected.
- D. Tactile warning strips (where required, shown or called for): Type 660 Stairmaster by Wooster Products, Inc. with wing type anchors at 12" on center, staggered in two rows. Color to be Safety Yellow, or as selected.
- E. Acceptable Manufacturers include Wooster Products Inc., American Safety Tread or approved equal.
- F. Installation: Cast integrally with concrete stairs. Maintain flush condition at edges. Begin stair tread in 2" from sides of stairs. (At steel pan stairs, provide 1/8" clearance at each end. Protect abrasive surfaces with tape during concrete placing operation. Clean off all

over run concrete to neat, straight line. Remove all tape and concrete residue from nosing prior to final acceptance.

3.16 INSTALLATION

- A. All work shall be installed in accordance with reviewed shop drawings; review of shop drawings, by the Design-Builder, shall be for design intent only.
- B. Review of shop drawings shall not relieve the subcontractor of his responsibility for correct installation as designed.
- C. Install items plumb and level, properly aligned and accurately fitted, free from distortion or other defects.
- D. All temporary supports and bracing shall be provided as necessary to stabilize items, and to safely maintain all loads imposed during erection.
- E. Safety during installation is to be the responsibility of this subcontractor.
- F. No alteration shall be made to members without the approval of the Design-Builder.

3.17 CONNECTIONS

- A. Welded and bolted connections are to be as detailed and shall conform to appropriate AWS and AISC Requirements.

3.18 WORKMANSHIP

- A. Metal surfaces shall be clean and free from mill scale, flake rust and rust pitting; well formed and finished to shape and size, with sharp lines and angles and smooth surfaces. Shearing and punching shall leave clean true lines and surfaces. Weld or rivet permanent connections. Welds and flush rivets shall be finished flush and smooth on surface that will be exposed after installation. Do not use screws or bolts where they can be avoided; where used, heads shall be countersunk, screwed up tight and threads nicked to prevent loosening. Welds in stainless steel shall be made with the Heliarc-inert atmosphere process. Grind and polish all welds to match the finish.
- B. Castings shall be of uniform quality, free from blow holes, porosity, hard spots, shrinkage, distortion or other defects. Casting shall conform to the dimensions indicated with a tolerance of plus or minus c", except in the dimensions of covers and the openings to receive them shall be limited to plus or minus 1/16". Castings shall be smooth and well cleaned by shot blasting or other approved method. Covers subject to street or foot traffic shall be made "non-rocking" by having machined horizontal bearing surfaces, provide machined bearing or contact surfaces for other joints where indicated or required.
- C. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Joints exposed to weather shall be formed to exclude water. Provide holes and connections for the work of other trades.
- D. At proper time, deliver and set in place items of metal work to be built into adjoining construction.
- E. The subcontractor will verify all dimensions at the job site before commencing fabrication.

3.19 FIELD QUALITY CONTROL

- A. As applicable, where related to structural steel applications, inspection shall be performed in accordance with the AISC.
- B. Provide free access to Work and cooperate with the appointed firm.
- C. The Testing Laboratory Representative may require, of the subcontractor, any reasonable

modification of work, which is necessary to allow proper inspection.

- D. Welds shall comply with AWS Standards for Visual Inspection; the Testing Laboratory Representative may, at his discretion, employ any additional, commonly accepted test method, which he feels is necessary for a specific situation.
- E. Additional inspection, re-inspection, and any necessary corrective measures, are to be at no extra cost to the Owner.

3.20 TOLERANCES

- A. As applicable, allowable variation from plumb, level, and alignment; in accordance with appropriate AISC Requirements.

3.21 FINISH

- A. After installation, areas where prime coat has been damaged shall be touched up.
- B. Field connections (welds, bolt heads, nuts, and washers) shall be cleaned and given one prime coat, using the same material as the shop coat.
- C. If galvanized finish has been damaged, it shall be touched up with an approved cold galvanizing compound.

PART 4 COMPLETION

4.1 CLEANUP

- A. All work shall be left clean and undamaged, ready for finish, as appropriate, under Separate Sections.

END OF SECTION