

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE	PAGE OF PAGES 1 19
2. AMENDMENT/MODIFICATION NO. A0002	3. EFFECTIVE DATE 20-Apr-2018	4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT NO.(If applicable)
6. ISSUED BY USA ENGINEER DISTRICT, JACKSONVILLE CONTRACTING DIVISION 701 SAN MARCO BLVD JACKSONVILLE FL 32207-8175	CODE W912EP	7. ADMINISTERED BY (If other than item 6) See Item 6		
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)		X	9A. AMENDMENT OF SOLICITATION NO. W912EP18R0013	
		X	9B. DATED (SEE ITEM 11) 22-Mar-2018	
			10A. MOD. OF CONTRACT/ORDER NO.	
			10B. DATED (SEE ITEM 13)	
CODE	FACILITY CODE			
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS				
<input checked="" type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer <input type="checkbox"/> is extended, <input checked="" type="checkbox"/> is not extended. Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.				
12. ACCOUNTING AND APPROPRIATION DATA (If required)				
13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.				
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.				
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).				
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:				
D. OTHER (Specify type of modification and authority)				
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.				
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) Herbert Hoover Dike Rehabilitation, Structure Replacement S-288 (HP-1) Reconstruction See Continuation Sheet for complete description of changes. Receipt of Proposals remains the same 27 April 2018 @ 2:00 pm. All other conditions remain unchanged. Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.				
15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)		
		TEL:	EMAIL:	
15B. CONTRACTOR/OFFEROR _____ (Signature of person authorized to sign)	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY _____ (Signature of Contracting Officer)		16C. DATE SIGNED

SF 30 CONTINUATION
SHEET

Herbert Hoover Dike Rehabilitation, Structure Replacement S-288 (HP-1) Reconstruction
Amendment 0002

SUMMARY OF CHANGES

1. SPECIFICATIONS:

The text changes have been updated with additions noted by underlined text and deletions noted by line/cross-outs, and pertain only to changes made by this amendment. The entire section is replaced if there is any change. The Project Table of Contents and Submittal Register are replaced without underlines and cross-outs if there are changes to these documents.

Changes to Specifications:

Volume 1 of 2 - Technical Specifications:

N/A

Volume 2 of 2 - Technical Specifications:

DELETE Section 05 50 15 and **REPLACE** with the attached revised Section 05 50 15.

2. DRAWINGS:

DELETE Drawing No. S-46 and **REPLACE** with the attached revised Drawing No. S-46.

(End of Summary of
Changes)

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SECTION 05 50 15

CIVIL WORKS FABRICATIONS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 303 (2016) Code of Standard Practice for Steel Buildings and Bridges

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M (2015; Errata 1 2015; Errata 2 2016) Structural Welding Code - Steel

AWS D1.2/D1.2M (2014) Structural Welding Code - Aluminum

AWS D1.6/D1.6M (2007) Structural Welding Code - Stainless Steel

ASME INTERNATIONAL (ASME)

ASME B18.2.1 (2012; Errata 2013) Square and Hex Bolts and Screws (Inch Series)

ASME B18.2.2 (2015) Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)

ASME B18.21.1 (2009; R 2016) Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)

ASME B18.3 (2003; R 2008) Socket Cap Shoulder and Set Screws, Hex and Spline Keys (Inch Series)

ASME B18.6.2 (1998; R 2010) Slotted Head Cap Screws, Square Head Set Screws, and Slotted Headless Set Screws: Inch Series

ASME B18.6.3 (2013; R 2017) Machine Screws, Tapping Screws, and Machine Drive Screws (Inch Series)

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M (2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and

Steel Products

ASTM A240/A240M	(2017) Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
ASTM A269	(2010) Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
ASTM A276	(2013a) Standard Specification for Stainless Steel Bars and Shapes
ASTM A29/A29M	(2016) Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought
ASTM A307	(2014; E 2017) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A312/A312M	(2017) Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
ASTM A320/A320M	(2017b) Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service
ASTM A322	(2013) Standard Specification Steel Bars, Alloy, Standard Grades
ASTM A325	(2014) Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A36/A36M	(2014) Standard Specification for Carbon Structural Steel
ASTM A484/A484M	(2016) Standard Specification for General Requirements for Stainless Steel Bars, Billets, and Forgings
ASTM A490	(2014a) Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
ASTM A493	(2009; R 2013) Standard Specification for Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging
ASTM A500/A500M	(2013) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A53/A53M	(2012) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated,

Welded and Seamless

ASTM A536	(1984; R 2014) Standard Specification for Ductile Iron Castings
ASTM A572/A572M	(2015) Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A576	(1990b; R 2012) Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality
ASTM A653/A653M	(2017) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A752	(2004; R 2010) Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Alloy Steel
ASTM A780/A780M	(2009; R 2015) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A786/A786M	(2015a) Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates
ASTM A924/A924M	(2017a) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B148	(2014) Standard Specification for Aluminum-Bronze Sand Castings
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B211	(2012) Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire
ASTM B241/B241M	(2016) Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube
ASTM B271	(2011) Standard Specification for Copper-Base Alloy Centrifugal Castings
ASTM B308/B308M	(2010) Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles
ASTM B505/B505M	(2014) Standard Specification for Copper-Base Alloy Continuous Castings
ASTM C955	(2017) Standard Specification for

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Cold-Formed Steel Structural Framing
Members

ASTM D1187/D1187M

(1997; E 2011; R 2011) Asphalt-Base
Emulsions for Use as Protective Coatings
for Metal

ASTM F436

(2011) Hardened Steel Washers

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM MBG 531

(2017) Metal Bar Grating Manual

NAAMM MBG 531S

(1989) Guide Specification for Stainless
Steel Grating

RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS (RCSC)

RCSC S348

(2014; Errata 2015) RCSC Specification for
Structural Joints Using High-strength Bolts

SOCIETY OF AUTOMOTIVE ENGINEERS INTERNATIONAL (SAE)

SAE J514

(2012) Hydraulic Tube Fittings

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 20

(2002; E 2004) Zinc-Rich Primers (Type I,
Inorganic, and Type II, Organic)

SSPC Paint 29

(2002; E 2004) Zinc Dust Sacrificial
Primer, Performance-Based

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1

Safety and Health Requirements Manual

The most recent USACE EM 385-1-1 can be viewed at the web site indicated
in Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS.

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS RR-W-410

(Rev H) Wire Rope and Strand

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation;
submittals not having a "G" designation are for information only. When
used, a designation following the "G" designation identifies the office
that will review the submittal for the Government. Submit the following
in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Quality Control Plan; G, DO

Miscellaneous Metals & Standard Metal Articles; G, DO

Shop Fabricated Metal Items; G, DO

Submit fabrication drawings showing layout(s), member sizing,

description of connections to structural system, and anchoring details as specified in AISC 303. Drawings shall be signed and sealed by a qualified Licensed Professional Engineer registered in the state of Florida and experienced in the design of metal fabrications.

Submit templates, erection and installation drawings indicating thickness, type, grade, class of metal, and dimensions. Show construction details, reinforcement, anchorage, and installation with relation to the culverts construction.

Control Dimensions; G, DO

SD-03 Product Data

Miscellaneous Metals & Standard Metal Articles; G, DO
Shop Fabricated Metal Items; G, DO

Lists of materials and records which identify the disposition of approved material and fabricated items in the work. Also comply with Product Data as specified in Section 05 50 14 STRUCTURAL METAL FABRICATION.

SD-06 Test Reports

Miscellaneous Metals & Standard Metal Articles; G, DO
Shop Fabricated Metal Items; G, DO

SD-07 Certificates

NDT Equipment Calibration Records; G, DO
Welder Qualification Records; G, DO
Inspector Qualifications; G, DO

SD-08 Manufacturer's Instructions

Welding Procedure Specifications; G, DO
NDT Written Practice; G, DO

1.3 QUALITY ASSURANCE

Material shall be straight before being laid off or worked. If straightening is necessary, it shall be done by methods that will not impair the metal. Sharp kinks or bends will be cause for rejection of the material. Material with welds will not be accepted except where welding is definitely specified, indicated or otherwise approved. Bends shall be made by approved dies, press brakes or bending rolls. Where heating is required, precautions shall be taken to avoid overheating the metal and it shall be allowed to cool in a manner that will not impair the original properties of the metal. Shearing shall be accurate and all portions of the work shall be neatly finished. Corners shall be square and true unless otherwise shown. Re-entrant cuts shall be filleted round to a minimum radius in accordance with AWS D1.1/D1.1M unless otherwise indicated or approved. Members shall be free of twists, bends and deformation. Straighten material without shearing, fracturing, stressing, or damaging the bolts, welds, or base metal. Use heat straightening methods approved by the Engineer. Replace material damaged during straightening operations with new material at no additional cost to the Government. Do not heat metal to temperatures greater than 1200 degrees

F. The use of cutting heads for heating and straightening will not be permitted. After heating and straightening, allow the metal to slowly cool to ambient before inspecting for evidence of fracture or other damage. If the Engineer determines it is not possible to straighten a member as part of an assembly, remove the bent material from the assembly, straighten, and re-assemble or replace the component as required by the Engineer.

a. Dimensional Tolerances for Structural Work.

(1) The overall dimensions of an assembled structural unit shall be within the tolerances indicated on the drawings or as specified for the item of work. Where tolerances are not specified in other sections of these specifications or shown, a variation of 1/32 inch is permissible in the overall length of component members with both ends milled, and component members without milled ends shall not deviate from the dimensions shown by not more than 1/16 inch for members 30 feet or less in length and by not more than 1/8 inch for members over 30 feet in length.

(2) Structure dimensions indicated on the drawings are based on a structure temperature of 70 degrees F. The Contractor shall be responsible for any and all dimensional adjustments to compensate for actual temperature variations during construction. Measure tolerances of the final assembly with the structure in the orientation in which it will be used.

b. Structural Steel Fabrication. Structural steel may be cut by mechanically guided or hand-guided torches, provided an accurate profile with a surface that is smooth and free from cracks and notches is obtained. Surfaces and edges must be prepared in accordance with AWS D1.1/D1.1M. Hand-guided cuts must be chipped, ground or machined to sound metal.

c. Seal Welding. See drawings for areas that require seal welding.

d. Qualify welders, perform welding, welding inspection, and corrective welding, in accordance with AWS D1.1/D1.1M, AWS D1.2/D1.2M and AWS D1.6/D1.6M. GRIND ALL BUTT WELDS FLUSH IN THE FINISHED INSTALLATION. Use procedures, materials, and equipment of the type required for the work.

1.4 ENVIRONMENTAL REQUIREMENTS

Do not clean or paint surface when damp or exposed to foggy or rainy weather, when metallic surface temperature is less than 5 degrees F above the dew point of the surrounding air, or when surface temperature is below 45 degrees F or over 95 degrees F, unless approved by the Contracting Officer.

PART 2 PRODUCTS

2.1 MISCELLANEOUS METALS & STANDARD METAL ARTICLES

Conform to the respective specifications and other designated requirements for miscellaneous metal materials and standard metal articles. Sizes shall be as specified or shown. Where material requirements are not specified, furnish materials suitable for the intended use and subject to approval.

2.1.1 Structural Steel

ASTM A572/A572M, Grade 50.

2.1.2 Steel Plates

2.1.2.1 Structural

ASTM A572/A572M, Grade 50.

2.1.3 Steel Pipes

2.1.3.1 Posts and Rails

ASTM A53/A53M, Type S, Grade B, or ASTM A500/A500M Grade C, seamless galvanized, nominal size and weight class or outside diameter and nominal wall thickness as shown, plain ends.

2.1.4 Stainless Steel

2.1.4.1 Plate, Sheet, and Strip

ASTM A240/A240M, UNS S30403 or S31603. Plate finish shall be hot-rolled and annealed or heat treated, and blast cleaned or pickled. Provide No. 1 sheet and strip finish.

2.1.4.2 Bars and Shapes

ASTM A276, UNS S30403 or S31603 with a maximum carbon content of 0.08 percent, Condition A, hot-finished or cold-finished, Class C.

2.1.4.3 Roller Axle, Shaft, Pins

ASTM A276, UNS ~~S20910~~S21800, Condition A, cold-finished or hot-rolled and machine-finished to the tolerances specified in ASTM A484/A484M for cold-finished round bars, Class C.

2.1.4.4 Grease Fittings

Heavy-duty, push type, with built-in flush ball check. The stainless steel fittings shall be straight or 90 degree angle style as required by the installation.

2.1.4.5 Tubing and Fittings

Tubing shall be stainless steel, Type 304 or 316, ASTM A269, full finished welded or seamless drawn, annealed and pickled. Tube fittings shall be of stainless steel type 304 and shall be of the flareless type with SAE straight threads and Buna N or Viton O-ring seals. The fittings shall conform with SAE J514. Allowable Working Pressure rating shall be 4000 psi, minimum.

2.1.4.6 Pipe

ASTM A312/A312M, seamless, UNS S30400, NPS and schedule number or outside diameter and nominal wall thickness as shown.

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2.1.4.7 Sleeves and Shaft Collars

Sleeves and shaft collars shall be stainless steel, Type 316L, ASTM A276, Condition A, cold finished and machine finished as shown on the drawings.

2.1.5 Steel Machinery

2.1.5.1 Sleeves and Shaft Collars

ASTM A29/A29M, ASTM A576 UNS G 10400 with a minimum tensile strength of 87,000 psi, yield strength of 52,500, and Brinell Hardness of 180.

2.1.5.2 Rods, Rocker, Arm, Cam

ASTM A322, ASTM A752 UNS G 4140 with a minimum tensile strength of 98,000 psi, yield strength of 61,000 psi, and Brinell Hardness of 197.

2.1.5.3 Pickup Beam Rollers

ASTM A322 UNS G 43400 with a minimum tensile strength of 106,000 psi, yield strength of 85,500 psi and Brinell Hardness of 217.

2.1.6 Aluminum

2.1.6.1 Sheets and Plates

ASTM B209, Alloy 6061, Temper T6.

2.1.6.2 Bars, Rods and Wire

ASTM B211, Alloy 6061, Temper T6.

2.1.6.3 Structural Shapes

ASTM B308/B308M, Alloy 6061, Temper T6.

2.1.6.4 Pipes and Tubes

ASTM B241/B241M, Alloy 6063, Temper T6, size and schedule number or outside diameter and wall thickness as shown.

2.1.7 Aluminum Bronze Rods, Bars, Shapes and Bushings

2.1.7.1 Bushings

ASTM B148, Copper Alloy UNS No. C95400. ASTM B505/B505M

2.1.7.2 Sleeve (SAE 660)

ASTM B505/B505M. ASTM B271, Copper Alloy UNS C93200.

2.1.8 Ductile Iron Casting

ASTM A536 Grade 80-55-06.

2.1.9 Bolts, Nuts, and Washers

Bolts, nuts, and washers shall be of the material, grade, type, class, style and finish indicated or best suited for intended use.

2.1.9.1 High-Strength Bolts, Nuts, and Washers

- a. **ASTM A325**, Type 1, hot-dip galvanized or **ASTM A490**, Type 1.
- b. Meet the requirements of **RCSC S348** for Slip Critical Connections. Conduct Rotational-capacity testing for all fastener assemblies. Test as an assembly each combination of bolt production lot, nut lot, and washer lot. Assign a rotational-capacity lot number to each combination of lots tested. Test bolts in a Skidmore-Wilhelm Calibrator or an acceptable equivalent device.

2.1.9.2 Bolts, Nuts, and Washers (Other Than High-Strength)

- a. Bolts and Nuts - **ASTM A307**, Grade A, hot-dip galvanized or **ASTM A320/A320M**, Ferritic Steel, Grade L73 Austenitic Steel, Class 2.
- b. Bolts - **ASME B18.2.1**.
- c. Nuts - **ASME B18.2.2**.
- d. Washers
 - (1) Plain Washers - **ASME B18.21.1**, Type B.
 - (2) Lock Washer - **ASME B18.21.1**.
 - (3) Beveled Washers - **ASTM F436**, Type 1, Beveled.

2.1.10 Screws

Provide screws of the material, grade, type, style, and finish indicated or best suited for use intended.

2.1.10.1 Cap Screws

ASME B18.2.1, **ASME B18.3**, or **ASME B18.6.2** as required.

2.1.10.2 Machine Screws

ASME B18.6.3.

2.1.10.3 Set Screws

ASME B18.6.2.

2.1.11 Expansion Anchors

Type 304 or 316 stainless steel.

2.1.12 Safety Treads

Provide slip-on skid resistant treads made from aluminum alloy as best suited for the intended location.

2.1.13 Wire Rope

FS RR-W-410, Type I, Class 2, Construction 1 IWRC, 0.75 inch diameter with a minimum breaking strength of 48,400 pounds.

2.1.14 Gratings

NAAMM MBG 531 and NAAMM MBG 531S.

- a. Description of grating: As indicated on the drawings.
- b. Anchorage: Grating shall be anchored to the support frame with removable fasteners.
- c. Finish: Hot-dip galvanized after fabrication.

2.1.15 Steel Floor Plate

ASTM A786/A786M, Pattern No. 5.

2.1.16 Submittals Requirements

This applies to SHOP FABRICATED METAL ITEMS also. Submit the following:

- a. Detail drawings indicating material thickness, type, grade, and class; dimensions; and construction details. Include in the drawings catalog cuts, erection details, manufacturer's descriptive data and installation instructions, and templates. Detail drawings for the following items: slide/flap gate and actuator, manatee screen, gate recess armor, thimble, and bulkhead seal plates.
- b. Lists of materials, and records which identify the disposition of approved material and fabricated items in the work.
- c. Certified test reports for materials tests and analyses.

2.1.17 Stainless Steel Studs

Studs shall be made from cold drawn bar stock conforming to ASTM A493 or ASTM A276. The following 300-series alloys may be used; 304L and 316L or the low carbon version thereof. Other Type 300 series alloys may be used with the approval of the Contracting Officer; however, Type 303 shall not be used. Where studs are to be cyclically loaded, they shall be tested and furnished in the annealed condition.

2.2 SHOP FABRICATED METAL ITEMS

Conform shop fabricated metal items to the requirements and details as specified or shown and to the workmanship provisions and other applicable fabrication requirements as specified in Section 05 50 14 STRUCTURAL METAL FABRICATIONS.

2.2.1 Railings

Provide railings as type specified and show, furnish, and install complete with all fittings, brackets, fasteners, sleeves, anchors, and other appurtenances as shown and as required for proper installation. Design handrails to resist a minimum concentrated load of 200 lbf in any direction at any point of the top of the rail or 50 lb/ft applied horizontally to top of the rail, whichever is more severe.

2.2.1.1 Materials

Steel handrails, including inserts in concrete, shall be steel pipe conforming to [ASTM A53/A53M](#), Grade B, Schedule 80; or [ASTM A500/A500M](#), Grade B, minimum 0.200 inch wall thickness. Provide steel railings with [1-1/2 inch](#) nominal size. Railings shall be hot-dip galvanized. Pipe collars shall be hot-dip galvanized steel. Provide all fasteners of Series 300 stainless steel.

2.2.1.2 Fabrication

Rigid joints in railings shall be of welded assembly and be flush-finished. Reinforce welded joints with tight-fitting interior sleeves assembled by welding rails and posts to flush-type fittings, or by mitering and welding joining rails and posts. Provide stainless steel fasteners for steel fittings. Expansion joints in railings shall be an inner-sleeved slip-joint, with one end of the sleeve secured to one rail and the ends of the adjoining rails separated a minimum of [1 inch](#) in the installed position. Locate expansion joints in rails near the intersection of rails and posts. Make bends in railings in a manner that railings are not crushed and maintain their original cross-sectional shape. Ground welds smooth. Provide railings free of burrs, sharp corners, and sharp edges. For railings of other than welded assembly, manufacturer design calculations, showing that the installed railings are capable of withstanding a design working load of [200 lbf](#) applied in any direction at any point on the top rail without permanent deformation, shall be submitted and approved prior to installation.

2.2.2 Gratings and Cover Plates

Provide grating and cover plates of the material and size shown, and fabricated in sectional panels of the width and length shown, or as appropriate, to accurately fit within the supporting recess frames. Provide openings through panels as shown or as required.

2.2.2.1 Grating

Gratings are as specified in previous paragraph titled GRATINGS. Band edges of gratings and openings through gratings which require the cutting of more than one bearing bar. Provide fasteners of the type recommended by the manufacturer and approved. Provide nonslip nosing on stair tread gratings.

2.2.2.2 Cover Plates

Provide cover plates as specified in paragraph titled STEEL FLOOR PLATE. Provide cover plate panels with holes for insertion of removal tool as shown. Remove sharp edges and burrs from plates.

2.2.3 Steel Stairs

Provide steel stairs complete with structural or formed channel stringers, grating treads, slip-resistant metallic treads, landings, columns, handrails, and necessary bolts and other fastenings as indicated. Close exposed ends of stringers and continue around landings which they support. Conform to [ASTM A36/A36M](#) for structural steel. Stairs and accessories shall be galvanized after fabrication. Integral nosings shall have braces extended into the concrete fill. Fabricate stair treads and landings of steel gratings of the type specified in paragraph GRATING.

Provide grating treads with slip-resistant nosings. Provide bolts, nuts and other fastenings as shown and as required for proper installation. Use lock washers under all nuts. Anchor railings of the type specified above in paragraph RAILINGS to stairs as shown.

2.2.4 Recess Frames

Fabricate recess frames of structural shapes of the type shown. Grind welded joints in frames smooth. Anchor frames to supports in the manner shown and not be continuous across contraction or expansion joints.

2.2.5 Ladders

Provide fixed-rail metal ladders conforming to the requirements of [EM 385-1-1](#) and to details shown. Fabricate ladders of aluminum as shown. Fabrication of ladders shall consist of solid-section rod rungs fitted into holes in bar side rails and welded. Make splices in side rails using full penetration welds and provide a flush and smooth transition between connecting ends. Grind all welds smooth. Weld ladder rails to bent-bar supporting brackets anchored to supporting structure as shown. The Contractor shall install a rigid rail fall protection system as shown.

2.2.6 Ladder Rungs, Grab Bars, Safety Fall Arrest Anchors

Fabricate Ladder rungs, grab bars, and safety fall arrest anchors from stainless steel rods in accordance with [ASTM C955](#), Grade 75, Alloy S31653 or S31803.

2.2.7 Surface Finishes

2.2.7.1 Galvanizing and Zinc Repair

Items specified to be galvanized, when practicable and not indicated otherwise, shall be hot-dip galvanized after fabrication. Galvanize in accordance with [ASTM A123/A123M](#), [ASTM A653/A653M](#), or [ASTM A924/A924M](#), as applicable. Regalvanize areas where zinc coatings are destroyed by cutting, welding or other causes. Coatings **2 ounces** or heavier shall be regalvanized with a suitable low-melting zinc base alloy similar to the recommendations of the American Hot-Dip Galvanizers Association to the thickness and quality specified for the original zinc coating. Repair coatings less than **2 ounces** in accordance with [ASTM A780/A780M](#).

2.2.7.2 Nonferrous Metal Surfaces

Protect by plating, anodic, or organic coatings.

2.2.7.3 Aluminum Surfaces

Before finishes are applied, remove roll marks, scratches, rolled-in scratches, kinks, stains, pits, orange peel, die marks, structural streaks, and other defects which will affect uniform appearance of finished surfaces. Unexposed sheet, plate and extrusions may have mill finish as fabricated. Unless otherwise specified, provide all other aluminum items with standard mill finish.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Install items at locations indicated, according to manufacturer's instructions. Verify all measurements and take all field measurements necessary before fabrication. Exposed fastenings shall be compatible materials, generally match in color and finish, and harmonize with the material to which fastenings are applied. Materials and parts necessary to complete each item, even though such work is not definitely shown or specified, shall be included. Poor matching of holes for fasteners will be cause for rejection. Conceal fastenings where practicable. Thickness of metal and details of assembly and supports shall provide strength and stiffness. Form joints exposed to the weather to exclude water. Items listed below require additional procedures.

3.2 ANCHORAGE, FASTENINGS, AND CONNECTIONS

Provide anchorage where necessary for fastening miscellaneous metal items securely in place. Include for anchorage not otherwise specified or indicated slotted inserts, expansion shields, and powder-driven fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; through bolts, lag bolts, and screws for wood. Do not use wood plugs in any material. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish, to which fastenings are applied. Conceal fastenings where practicable.

3.3 FINISHES

3.3.1 Dissimilar Materials

Where dissimilar metals are in contact, protect surfaces with a coat conforming to [SSPC Paint 20](#) or [SSPC Paint 29](#) to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, plaster, mortar, masonry, wood, or absorptive materials subject to wetting, protect with [ASTM D1187/D1187M](#), asphalt-base emulsion.

3.3.2 Field Preparation

Remove rust preventive coating just prior to field erection, using a remover approved by the rust preventive manufacturer. Provide surfaces, when assembled, free of rust, grease, dirt and other foreign matter.

3.4 ATTACHMENT OF HANDRAILS

Install railings as specified and shown. Railing posts anchored to concrete surfaces perpendicular to the posts shall be as shown. Railing posts anchored to structural metal shall be rigidly secured to flange fittings to structural metal. Rigidly secure ends of rails anchored to concrete or masonry to flange fittings anchored to concrete or masonry with expansion anchors. Install toeboards and brackets where indicated. Splices, where required, shall be made at expansion joints. Install removable sections as indicated.

3.4.1 Installation of Steel Handrails

Perform installation by means shown. Secure rail ends by steel pipe flanges anchored by expansion shields and bolts.

3.5 COVER PLATES AND FRAMES

Install the tops of cover plates and frames flush with floor.

3.6 LADDERS

Secure to the adjacent construction with the clip angles attached to the stringer. Secure to masonry or concrete with not less than two 1/2 inch diameter expansion bolts. Install intermediate clip angles not over 48 inches on center. Install brackets as required for securing of ladders welded or bolted to structural steel or built into the masonry or concrete.

3.7 STEEL STAIRS

Provide anchor bolts, grating fasteners, washers, and all parts or devices necessary for proper installation. Provide lock washers under nuts.

3.8 INSTALLATION OF GUARD POSTS (BOLLARDS/PIPE GUARDS)

Set pipe guards vertically in concrete piers. Piers shall be constructed as shown.

-- End of Section --

