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SECTION 05120

STRUCTURAL STEEL

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SECTION 05120

STRUCTURAL STEEL

PART 1 GENERAL

The work under this section shall include the furnishing, fabrication, and erection of the structural steel. Also included is the furnishing, fabrication, and erection of the light gauge framing systems.

1.1 REFERENCES

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

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC FCD	(1995a) Quality Certification Program Description
AISC ASD Manual	(1989) Manual of Steel Construction Allowable Stress Design

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 6/A 6M	(1998a) General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
ASTM A 36/A 36M	(1997) Carbon Structural Steel
ASTM A 53	(1998) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 123	(1997) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 325	(1997) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 500	(1998) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B18.21.1	(1994) Lock Washers (Inch Series)
ASME B46.1	(1995) Surface Texture (Surface Roughness, Waviness, and Lay)

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(1993) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS D1.1	(1996) Structural Welding Code - Steel

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC Paint 25	(1991) Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (without Lead and Chromate Pigments)

1.2 GENERAL REQUIREMENTS

The Contractor shall be responsible for detailing, fabrication, and for the correct fitting of structural members. Connections, for any part of the structure not shown on the contract drawings, shall be considered simple shear connections and shall be designed and detailed in accordance with pertinent provisions of AISC ASD Manual. AISC ASD Manual shall govern the work. Welding shall be in accordance with AWS D1.1. High-strength bolting shall be in accordance with AISC ASD Manual.

1.3 QUALIFICATIONS

The fabricating plant shall be certified under the AISC FCD for Category I structural steelwork.

1.4 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

Structural Steel System; GA.

Detailed drawings shall include all shop and erection details. Members and connections for any portion of the structure not shown on contract drawings shall be detailed by the fabricator and indicated on the detail drawings. Welds shall be indicated by standard welding symbols in accordance with AWS A2.4.

SD-08 Statements

Erection; FIO.

Prior to erection, erection plan of the structural steel framing describing all necessary temporary supports, including the sequence of installation and removal.

SD-13 Certificates

Mill Test Reports; FIO.

Certified copies of mill test reports for structural steel, structural

bolts, nuts, washers and other related structural steel items.

Welder Qualifications; FIO.

Certified copies of welder qualifications test records showing qualification in accordance with AWS D1.1.

Fabrication; FIO.

A copy of the AISC certificate indicating that the fabrication plant meets the specified structural steelwork category.

1.5 STORAGE

Material shall be stored out of contact with the ground in such manner and location as will minimize deterioration and distortion.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Structural Steel

Carbon grade. ASTM A 36/A 36M.

2.1.2 Round Steel Pipe

ASTM A 53, Grade B.

2.1.3 Square or Rectangular Steel Tube

ASTM A 500, Grade B.

2.1.4 High Strength Bolts and Nuts

High strength bolts shall conform to ASTM A 325, Type I with carbon steel nuts conforming to ASTM A 563, Grade C.

2.1.5 Paint

Paint shall conform to SSPC Paint 25.

2.2 GALVANIZING

Items specified to be galvanized, when practical, and not indicated otherwise, shall be hot-dip galvanized after fabrication. Galvanizing shall be in accordance with ASTM A 123.

PART 3 EXECUTION

3.1 FABRICATION

Fabrication shall be in accordance with the applicable provisions of AISC ASD Manual. Fabrication and assembly shall be done in the shop to the greatest extent possible. The fabricating plant shall be certified under the AISC quality certification program for Category I structural steelwork. Compression joints depending on contact bearing shall have a surface

roughness not in excess of 500 micro inches as determined by ASME B46.1, and ends shall be square within the tolerances for milled ends specified in ASTM A 6/A 6M. Structural steelwork, except surfaces of steel to be encased in concrete, surfaces to be field welded, surfaces to be fireproofed, and contact surfaces of friction-type high-strength bolted connections shall be prepared for painting in accordance with AISC ASD Manual and primed with the specified paint.

3.2 ERECTION

Erection of structural steel shall be in accordance with the applicable provisions of AISC ASD Manual.

3.2.1 Structural Connections

Anchor bolts and other connections between the structural steel and foundations shall be provided and shall be properly located and built into connecting work. Field welded structural connections shall be completed before load is applied.

3.2.2 Base Plates and Bearing Plates

Column base plates for columns and bearing plates for beams, girders, and similar members shall be provided. Base plates and bearing plates shall be provided with full bearing after the supported members have been plumbed and properly positioned, but prior to placing superimposed loads. Separate setting plates under column base plates will not be permitted. The area under the plate shall be damp-packed solidly with non-shrink grout, except where expansive grout is indicated on the drawings. Grout shall be as specified in SECTION: NON-SHRINK GROUT.

3.2.3 Field Priming

After erection, the field bolt heads and nuts, field welds, and any abrasions in the shop coat shall be cleaned and primed with paint of the same quality as that used for the shop coat.

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SECTION 05300

STEEL DECKING

-- End of Section Table of Contents --

SECTION 05300

STEEL DECKING

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 in the text by basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC-04	(1989) Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI-01	(1996) Cold-Formed Steel Design Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 611	(1997) Structural Steel, Sheet, Carbon, Cold-Rolled
ASTM A 653/A 653M	(1998a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 780	(1993a) Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings
ASTM A 792/A 792M	(1997) Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

STEEL DECK INSTITUTE (SDI)

SDI Pub No 29	(1995) Design Manual for Composite Decks, Form Decks, Roof Decks, and Cellular Metal Floor Deck with Electrical Distribution

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC Paint 20	(1991) Zinc-Rich Primers (Type I - Inorganic and Type II - Organic)

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Deck Unit Design; FIO.

Design computations for the structural properties of the deck units or SDI certification that the units are designed in accordance with SDI specifications.

SD-04 Drawings

Deck Units; GA.

Drawings shall include type, configuration, structural properties, location, and necessary details of deck units, accessories, and supporting members; size and location of holes to be cut and reinforcement to be provided; location and sequence of welded or fastener connections; and the manufacturer's erection instructions.

SD-18 Records

Welding; FIO.

Prior to welding operations, copies of qualified procedures and lists of names and identification symbols of qualified welders and welding operators.

1.3 DELIVERY, STORAGE, AND HANDLING

Deck units shall be delivered to the site in a dry and undamaged condition, stored off the ground with one end elevated, and stored under a weathertight covering permitting good air circulation. Finish of deck units shall be maintained at all times by using touch-up paint whenever necessary to prevent the formation of rust.

PART 2 PRODUCTS

2.1 DECK UNITS

Deck units shall conform to SDI Pub No 29, ASTM A 611, and AISC-04. Section properties shall be determined in accordance with AISI-01. Roof deck units shall be fabricated of 20 gauge thick or thicker steel. Floor deck units shall be fabricated of 18 gauge thick or thicker steel. Deck units shall be painted with an epoxy coating or equivalent applied to prime-coating in accordance with manufacturer's standard, zinc-coated in conformance with ASTM A 653/A 653M G90 coating class, or aluminum-zinc coated in accordance with ASTM A 792/A 792M Coating Designation AZ55. Panels of maximum possible lengths shall be used to minimize end laps. Deck units shall be fabricated in lengths to span 3 or more supports with flush, telescoped, or nested 2 inch laps at ends, and interlocking, or nested side laps, unless otherwise indicated.

2.2 TOUCH-UP PAINT

Touch-up paint for shop-painted units shall be of the same type used for the shop painting, and touch-up paint for zinc-coated units shall be an approved galvanizing repair paint with a high-zinc dust content. Welds shall be touched-up with paint conforming to SSPC Paint 20 in accordance with ASTM A 780. Finish of deck units and accessories shall be maintained

by using touch-up paint whenever necessary to prevent the formation of rust.

2.3 ADJUSTING PLATES

Adjusting plates or segments of deck units shall be provided in locations too narrow to accommodate full-size units. As far as practical, the plates shall be the same thickness and configuration as the deck units.

2.4 CLOSURE PLATES

Voids above interior walls shall be closed with 22 gauge sheet metal. Open deck cells at parapets, end walls, eaves, and openings through roofs shall be closed with 22 gauge sheet metal.

2.5 ACCESSORIES

The manufacturer's standard accessories shall be furnished as necessary to complete the deck installation. Metal accessories shall be of the same material as the deck and have minimum gauge as follows: saddles 18 gauge; welding washers 10 gauge; cant strip 22 gauge; other metal accessories 20 gauge; unless otherwise indicated.

2.5.1 Sump Pans

Sump pans shall be provided for roof drains and shall be minimum 14 gauge steel, flat type, and shaped to meet roof slope. Bearing flanges of sump pans shall overlap steel deck a minimum of 3 inches. Opening in bottom of pan shall be shaped, dimensioned, and reinforced to receive roof drain.

PART 3 EXECUTION

3.1 ERECTION

Erection of deck and accessories shall be in accordance with SDI Pub No 29 and the approved detail drawings. Damaged deck and accessories including material which is permanently stained or contaminated, with burned holes or deformed shall not be installed. The deck units shall be placed on secure supports, properly adjusted, and aligned at right angles to supports before being permanently secured in place. The deck shall not be used for storage or as a working platform until the units have been secured in position. Loads shall be distributed by appropriate means to prevent damage during construction and to the completed assembly. The maximum uniform distributed storage load shall not exceed the design live load. There shall be no loads suspended directly from the steel deck.

3.2 ATTACHMENT

The deck units shall be fastened to supports with screws to resist the shear loads as shown on the drawings. Sidelaps between supports shall be fastened with screws. Minimum screw size is No. 12.

3.3 HOLES AND OPENINGS

All holes and openings required shall be coordinated with the drawings, specifications, and other trades. Holes and openings shall be drilled or cut, reinforced and framed as indicated on the drawings or described in the specifications and as required for rigidity and load capacity. Holes and openings less than 6 inches across require no reinforcement. Holes and

openings 6 to 12 inches across shall be reinforced by 0.0474 inch thick steel sheet at least 12 inches wider and longer than the opening and be fastened to the steel deck at each corner of the sheet and at a maximum of 6 inches on center. Holes and openings larger than 12 inches shall be reinforced by steel angles installed perpendicular to the steel joists and supported by the adjacent steel joists. Steel angles shall be installed perpendicular to the deck ribs and shall be fastened to the angles perpendicular to the steel joists. Openings must not interfere with members such as chords and drag struts.

3.4 PREPARATION OF FIRE-PROOFED SURFACES

Deck surfaces, both composite and noncomposite, which are to receive sprayed-on fireproofing, shall be galvanized and shall be free of all grease, mill oil, paraffin, dirt, salt, and other contaminants which impair adhesion of the fireproofing. Any required cleaning shall be done prior to steel deck installation using a cleaning method that is compatible with the sprayed-on fireproofing.

3.5 REPAIR OF COATINGS

Welds shall be touched up with an approved paint. Finish of deck units and accessories shall be maintained by using touchup paint whenever necessary to prevent the formation of rust.

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DIVISION 05 - METALS

SECTION 05400

METAL FRAMING

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SECTION 05400

METAL FRAMING

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 in the text by the basic designation only.

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI SG-673	(1986) Cold-Formed Steel Design Manual

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 611	(1997) Structural Steel (SS) Sheet, Carbon, Cold-Rolled
ASTM A 653/A 653M	(1998a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

AMERICAN WELDING SOCIETY, INC. (AWS)

AWS D1.3	(1998) Structural Welding Code - Sheet Steel

1.2 DELIVERY, STORAGE, AND HANDLING

Deliver materials to job site and store in adequately ventilated, dry locations. If necessary to store materials outside, stack off the ground, support on a level platform, and protect from the weather.

1.3 LOAD-BEARING COLD-FORMED METAL FRAMING

Include tracks, bracing, fastenings, and other accessories necessary for complete installation. Framing members shall have the structural properties indicated. Where physical structural properties are not indicated, they shall be as necessary to withstand all imposed loads. Design framing in accordance with AISI SG-673.

PART 2 PRODUCTS

2.1 STUDS AND JOISTS

Galvanized steel, ASTM A 653/A 653M, SS, Grade 50 33 ksi G60 or carbon steel, ASTM A 611, Grade C. Size and gage as indicated. Studs shall be stamped with manufacturer's name, initials, or logo, an ICBO number, material thickness and yield strength.

2.2 PLASTIC GROMMETS

Supply plastic grommets, recommended by stud manufacturer, to protect electrical wires. Prevent metal to metal contact for plumbing pipes.

PART 3 EXECUTION

3.1 FASTENING

Fasten framing members together by welding or by using self-drilling or self-tapping screws. Welding shall conform to AWS D1.3 welding procedure. Electrodes and screw connections shall be as required and indicated in the design calculations. Do not field weld materials lighter than 18 gage.

3.2 TRACKS

Provide accurately aligned runners at top and bottom of partitions. Anchor tracks as indicated in design calculations. Butt weld joints in tracks or splice with stud inserts. Fasteners shall be at least 3 inches from the edge of concrete slabs.

3.3 STUDS

Cut studs square and set with firm bearing against webs of top and bottom tracks. Position studs vertically in tracks and space as indicated in design. Do not splice studs. Provide at least two studs at jambs of doors and other openings 2 feet wide or larger. Provide jack studs over openings, as necessary, to maintain indicated stud spacing. Provide tripled studs at corners, positioned to receive interior and exterior finishes. Fasten studs to top and bottom tracks by welding or screwing both flanges to the tracks.

3.4 JOISTS

Locate each joist directly above a stud. Joists shall have at least 2.50 inches of bearing on steel, 4 inches on masonry, and shall be reinforced over bearings where required to prevent web crippling. Splice joists over bearings only. Lap and weld splices as indicated. Provide manufacturer's standard bridging which shall not be less than the following:

CLEAR SPAN	BRIDGING
Up to 14 feet	One row near center
14 to 20 feet	Two rows at 1/3 points
20 to 26 feet	Three rows at 1/4 points
26 to 32 feet	Four rows at 1/5 points

3.5 ERECTION TOLERANCES

a. Framing members which will be covered by finishes such as wallboard, plaster, or ceramic tile set in a mortar setting bed, shall be within the following limits:

(1) Layout of walls and partitions: 1/4 inch from intended position;
(2) Plates and runners: 1/4 inch in 8 feet from a straight line;
(3) Studs: 1/4 inch in 8 feet out of plumb, not cumulative.

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DIVISION 05 - METALS

SECTION 05500

MISCELLANEOUS METAL

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SECTION 05500

MISCELLANEOUS METAL

PART 1 GENERAL

The work under this section shall include the fabrication and installation of the miscellaneous metal items. All metal fabrications not specified elsewhere shall be included in this section.

1.1 REFERENCES

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

AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE))

ASSE A14.3	(1992) Safety Requirements for Fixed Ladders

ALUMINUM ASSOCIATION (AA)

AA DAF-45	(1997) Designation System for Aluminum Finishes
AA ADM-1	(1994) Aluminum Design Manual - Specifications and Guidelines for Aluminum Structures

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36	(1997a) Carbon Structural Steel
ASTM A 48	(1994a) Gray Iron Castings
ASTM A 53	(1998) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 123	(1997) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 536	(1984) Ductile Iron Castings
ASTM A 653	(1998a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 924	(1997) Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM B 209	(1996) Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	(1996) Aluminum and Aluminum-Alloy

	Extruded Bars, Rods, Wire, Shapes, and Tubes
ASTM B 632	(1995) Aluminum-Alloy Rolled Tread Plate

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(1998) Structural Welding Code - Steel

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM MBG 531	(1993) Metal Bar Grating Manual

COMMERCIAL ITEM DESCRIPTIONS (CID)

CID A-A-2867	(Basic) Coating, Polyurethane, Single Component Moisture Cure, Alipathic

FEDERAL SPECIFICATIONS

FF-S-325	Shield, Expansion; Nail Expansion; (AM 3)and Nail Drive Screw (Devices) nchoring, Masonry)

Steel Structures Painting Council (SSPC)

Paint 27	(1991) Basic Zinc Chromate-Vinyl Butyral Wash Primer

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Manufacturer's Descriptive Data; FIO.

Manufacturer's descriptive data shall include catalog cuts, descriptive data, and installation instructions.

SD-04 Drawings

Miscellaneous Metal Items; GA.

Detail drawings indicating material thickness, type, grade, and class; dimensions; and construction details. Drawings shall include catalog cuts, erection details, manufacturer's descriptive data and installation instructions, and templates. Detail drawings shall be submitted for all work included in this section.

SD-18 Records

Aluminum Welding; FIO.

Prior to welding operations, copies of qualified procedures and lists of

names and identification symbols of qualified welders and welding operators.

1.3 GENERAL REQUIREMENTS

The Contractor shall verify all measurements and shall take all field measurements necessary before fabrication. Welding to or on structural steel shall be in accordance with AWS D1.1. Items specified to be galvanized, when practicable and not indicated otherwise, shall be hot-dip galvanized after fabrication. Exposed fastenings shall be compatible materials, shall generally match in color and finish, and shall 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 shall be cause for rejection. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall provide strength and stiffness. Joints exposed to the weather shall be formed to exclude water.

1.4 WORKMANSHIP

Miscellaneous metalwork shall be well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching shall produce clean true lines and surfaces. Welding shall be continuous along the entire area of contact except where tack welding is permitted. Exposed connections of work in place shall not be tack welded. Exposed welds shall be ground smooth. Exposed surfaces of work in place shall have a smooth finish, and unless otherwise approved, exposed riveting shall be flush. Where tight fits are required, joints shall be milled. Corner joints shall be coped or mitered, well formed, and in true alignment. Work shall be accurately set to established lines and elevations and securely fastened in place. Installation shall be in accordance with manufacturer's installation instructions and approved drawings, cuts, and details.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

a. Steel shapes shall conform to ASTM A 36.

b. Steel pipe shall conform to ASTM A 53, Grade A or B. Also, pipe shall not have surface defects that impair its appearance.

c. Cast iron shall conform to ASTM A 48, Class 30B.

d. Aluminum shapes shall conform to ASTM B 221, Alloy 6061-T6. Aluminum shall be of the alloy and temper described under the respective item and, if not described, shall be of an alloy and temper suited for the work in each case.

e. Aluminum Sheets and Plates. ASTM B 209, Alloy 6061, Temper T651.

f. Diamond Tread Plates. Trench covers and other items as shown shall be fabricated from metal meeting the requirements of ASTM B 632, Alloy 6061, Temper T6.

g. Aluminum Bars, Rods and Wire: ASTM B 221, Alloy 6061, Temper T6511.

2.1.1 Dissimilar Materials

Factory supplied products with dissimilar metals shall have adequate provisions for protection against corrosion. Where dissimilar metals will contact by field placement, or where aluminum will be in contact with concrete, mortar, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protected as follows: At contacts with dissimilar metals, boths surfaces shall be painted with a polyurethane coating conforming to commercial item description A-A-2867.

2.1.2 Miscellaneous Shapes

Miscellaneous plates and shapes for items that do not form a part of the structural steel framework, such as lintels, sill angles, miscellaneous mountings, and frames, shall be provided to complete the work.

2.2 FINISHES

2.2.1 Aluminum Finishes

Unless otherwise specified, aluminum items shall have finishes in accordance with AA-DAF-45.

2.2.2 Shop Painting

Surfaces of ferrous metal, except galvanized surfaces, shall be cleaned and shop-coated with the manufacturer's standard protective coating, unless otherwise specified. Surfaces of items to be embedded in concrete shall not be painted. Items to be finish-painted shall be prepared according to manufacturer's recommendations or as specified.

2.2.3 Galvanizing

Items specified to be galvanized, when practicable and not indicated otherwise, shall be hot-dip galvanized after fabrication. Galvanizing shall be in accordance with ASTM A 123, ASTM A 653, or ASTM A 924, as applicable.

2.3 MATERIALS

2.3.1 Trench Drains

Trench drains shall be cast from gray iron ASTM A 48 or ductile iron ASTM A 536, Grade 65-45-12. Casting size shall be as shown on the drawings. Trench drains shall be designed for HS-20 truck loading.

2.3.2 Steel Pipe Bollards

Steel pipe bollards shall be standard weight, Schedule 40 pipe conforming to ASTM A 53, of sizes and shapes indicated. Fill with concrete specified in SECTION: CONCRETE FOR BUILDING CONSTRUCTION, finish to domed top.

2.3.3 Ladder

Ladder shall be galvanized steel, fixed rail type in accordance with ASSE 14.3.

2.3.4 Access Hatches

Electrical Vault and Oil Separator Pit. Access hatches shall be a prefabricated unit, including frame and door leaves, and shall be of aluminum construction. Size and number of leaves shall be as shown on the drawings. All hatches shall be designed to be cast into concrete. Provide unit complete with all fittings, mounting hardware, straps, handles and latch with removable "key wrench." The doors shall open to at least 90 degrees and lock automatically in the open position. There shall be a release handle for closing each leaf. Concealed cast hinges shall be assisted by torsion devices to counterbalance the door weight as each door is raised. Hardware shall be zinc plated with a protective seal coating applied. A slam or snap lock shall be provided with a removable handle. The handle hole shall have closure plug supplied. The frame shall be of welded aluminum extrusions, with strap anchors on the embedded surfaces which shall be coated with a bituminous coating. The access cover shall provide safe ladder access. The doors shall be designed to accept a live load of 150 pounds per square foot. Provide the wording "Electric" in 3 inch high block lettering engraved into one leaf for the electrical vault and "Oil Separator Pit" in 3 inch high block lettering engraved into one leaf for the oil separator pit.

2.3.5 Stairs

Bent plate steel stairs shall be complete with structural or formed channel or tube stringers, metal pan bent plate tread and risers, and landings, columns, handrails, and necessary bolts and other fastenings as indicated. Structural steel shall conform to ASTM A 36. Treads and risers shall be formed from 12 gauge bent plate. Coordinate stair construction with SECTION: TERRAZZO.

2.3.6 Grating

Carbon steel grating shall be designed in accordance with NAAMM MBG 531 to meet the indicated load requirements. Edges shall be banded with bars 1/4 inch less in height than bearing bars for grating sizes above 3/4 inches. Banding bars shall be flush with the top of bearing grating. Floor grating shall be galvanized after fabrication.

2.3.6.1 Stair Grating

Grating stairs framing shall be structural or formed steel channel or tube stringers, grating treads and landings, structural columns, aluminum handrails, and necessary bolts and other fastenings as indicated. Stair framing shall be galvanized steel, and gratings shall be aluminum and serrated as described below. All exterior grating shall be serrated.

2.3.6.2 Safety Treads

Safety treads shall be installed at stairway #2. The treads shall be SUPERGRIT, Type 231, safety yellow SY-1, manufactured by Wooster Products Inc., or equal.

2.3.6.3 Aluminum Grating

All exterior grating shall be serrated. Aluminum grating shall be in conformance with NAAMM MBG 531, designation P-19-4, bearing bar sizes as shown on the drawings. Bearing bars shall be Alloy 6063-T6, conforming to ASTM B 221. Cross bars and connecting bars shall be Alloy 6063, conforming to ASTM B 221. Finish shall be mill finish as fabricated. All ends of grating sections and openings in gratings shall be provided with banding

bars of the same height and material as the grating. Anchor blocks shall be provided to secure grating to substructure. Stair treads shall be of the same materials, type, and spacing as grating. Stair treads shall be supplied with full-width, cast aluminum abrasive nosings. Gratings shall have a maximum transverse bow, within a panel, of 1/16 inch per lineal foot. Gratings and supports thereof shall be fabricated and installed so that gratings will have at least 1 inch of bearing when each grating section is in its extreme position. Gratings shall be handled and stored to prevent damage, and any grating sections, with bent or otherwise damaged bars or parts, shall not be installed in the work. Provide sections complete with frames and/or support angles, tie-down clips, fasteners, and all else required for a complete ready-to-use installation. Except where shown otherwise, all grating panels shall be attached to the supporting structure with a minimum of one tie-down clip at each corner, plus a clip per side over intermediate supports.

2.3.7 Cable Trench Covers

Trench covers shall be of the materials and sizes shown and shall be fabricated in sectional panels of the width and length as shown, or as appropriate, to accurately fit within the supporting recess frames. Openings through panels shall be provided as required. Contractor shall field verify all dimensions prior to fabrication and adjust panel dimensions to accommodate variations in the lock wall concrete at the contract project work site. The Contractor shall be responsible for providing a smooth finished planar surface over trenching. Due to lock wall monolith settlements, the Contractor shall modify cover plates as required and provide additional material or modify existing materials in order to achieve this requirement.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

The Contractor shall verify all measurements and shall take all field measurements necessary before fabrication. Welding to or on structural steel shall be in accordance with AWS D1.1. Exposed fastenings shall be compatible materials, shall generally match in color and finish, and shall 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 shall be cause for rejection. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall provide strength and stiffness. Joints exposed to the weather shall be formed to exclude water.

3.2 GENERAL INSTALLATION REQUIREMENTS

All items shall be installed at the locations shown and according to the manufacturer's recommendations. Items listed below require additional procedures as specified.

3.3 TRENCH COVER CASTINGS

Trench covers shall be installed flush with the surrounding concrete. Frames shall be held securely in place for grout operations. Protect bolt holes in the frame from concrete.

3.4 WELDING OF ALUMINUM

Welding of aluminum shall conform to AA SAS-30 or AWS D1.2, Sections 1 through 7, 9 and 10. The welding process and welding operators shall be prequalified as required by AWS D1.2, Section 5 or AA SAS-30, subsection 7.2.4 in accordance with the methods described in ASME-BPV IX, Section IX. A certified report giving the results of the qualifying tests shall be furnished for approval. A complete schedule for the welding process for each aluminum fabrication to be welded shall be furnished for approval.

3.5 ANCHORAGE

Anchorage shall be provided where necessary for fastening miscellaneous metal items securely in place and as applicable, be in conformance with Fed Spec FF-S-325, Group II, Type 4, Class 1, stainless steel, unless otherwise noted. Anchorage not otherwise specified or indicated shall include slotted inserts made to engage with the anchors, expansion shields, and powder-driven fasteners when approved for concrete, toggle bolts and through bolts for masonry, machine and carriage bolts for steel, lag bolts and screws for wood.

-- End of Section --

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ALUMINUM HANDRAILING

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SECTION 05503

ALUMINUM HANDRAILING

PART 1 GENERAL

This section covers the furnishing and installing of an aluminum railing system with a smooth top when assembled and slip-on fittings that allow the system to be easily assembled and disassembled; also includes spare handrail component requirements.

1.1 REFERENCES

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

ALUMINUM ASSOCIATION (AA)

AA DAF-45	(1997) Designation System for Aluminum Finishes
AA ADM-1	(1994) Aluminum Design Manual - Specifications and Guidelines for Aluminum Structures

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 240	(1998) Heat-Resisting Chromium and Chromium Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels
ASTM A 276	(1998) Stainless and Heat Resisting Steel Bars and Shapes
ASTM B 26	(1996) Aluminum-Alloy Sand Castings
ASTM B 179	(1996) Aluminum Alloys in Ingot and Molten Forms for Castings from All Casting Processes
ASTM B 221	(1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
ASTM B 429	(1995) Aluminum-Alloy Extruded Structural Pipe and Tube
ASTM F 593	(1995) Stainless Steel Bolts, Hexcap Screws, and Studs

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B 18.3	(1986) Socket Cap, Shoulder and Set

	Screws (Inch Series)Including Dimensions of Hexagon and Spline Sockets and Keys to Match

FEDERAL SPECIFICATIONS

TT-P-38 (Rev. E)	Paint, Aluminum (Ready-Mixed)

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Design Calculations; FIO.

Design calculations shall be submitted showing that the installed railings are capable of withstanding a design working load of 200 pounds applied in any direction at any point on the top rail without permanent deformation.

SD-04 Drawings

Erection and Installation Details; GA.

Detail drawings shall be submitted that indicate thickness, type, grade, class of metal, and dimensions; and shall show construction details, reinforcement, anchorage, and installation with relation to the construction. Catalog cuts shall be included. The submittal shall also include the method of isolating the aluminum handrailing from corrosion at the contacts with concrete or dissimilar metals, including paint and other materials.

SD-14 Samples

Handrail Sample; GA.

Samples shall be full size, shall be taken from manufacturer's stock, and shall be complete as required for installation in the structure. After approval, samples may be installed in the work, provided each sample is clearly identified and its location recorded. One sample of each type of fitting proposed shall be submitted.

1.3 STORAGE

Materials shall be stored off the ground and shall be protected from the elements.

1.4 SMOOTH TOP HANDRAILING

The drawings indicate locations where smooth top handrailing is required. The smooth top handrailing is generally located between the tow haulage units to prevent the cables from snagging when dragged along the handrail.

PART 2 PRODUCTS

2.1 MATERIALS

a. Aluminum Pipe. ASTM B 429, Alloy 6061, Temper T6, Schedule 40, for rails, unless noted otherwise, Schedule 80 for posts, sizes as shown. No splices permitted.

b. Setscrews. ASME B 18.3, type C counterbored, knurled, cup point specification.

c. Stainless steel rounds shall conform to ASTM A 276, Type 304.

d. Stainless steel plate shall conform to ASTM A 240, Type 304.

e. Stainless steel bolts shall conform to ASTM F 593, Grade 304.

f. Chain: ASTM A 276, type 304L stainless steel.

g. Shoulder Bolts: ASTM A 276, type 316 stainless steel.

h. Snap Swivels: ASTM A 276, type 304 or 316 stainless steel.

i. Aluminum structural shapes shall conform to ASTM B 221, Alloy 6061-T6.

j. Slip-on fittings shall be cast aluminum conforming to ASTM B 26 or ASTM B 179, Alloy 535.2, with stainless steel setscrew anchorages. Fittings, other than special flanges, shall be the standard catalog product of a manufacturer regularly engaged in the manufacture of such and shall essentially duplicate products that have been in satisfactory use for at least two years. Special flanges shall have such dimensions that, when drilled or punched to fit existing anchor bolts, there will be at least 1 inch between center of hole and edge of flange. Manufacturer shall submit either complete design calculations or load test data as follows showing that their fittings possess adequate strength.

k. Smooth Top Fittings. Smooth top connector fittings shall be a cast primary grade aluminum magnesium alloy with an internal double tang type activated by 3/8-16 diameter stainless steel knurled cup setscrews. The fitting shall be externally connected to the pipe by means of an anodized aluminum tubular rivet nut, and stainless steel socket head cap screw. Pop rivets, sheet metal screws and adhesives shall not be acceptable alternatives.

2.2 ALUMINUM FINISH

Handrailing located in the interior of a building and building exterior stairs shall have an anodized finish conforming to AA SAA-46. Exterior handrailing, except for those items noted above or noted to be safety yellow, shall have a standard mill finish. For anodized finished, the thickness of the coating shall be not less than that specified for protective and decorative type finishes for items used in interior locations or architectural Class I type finish for items used in exterior locations in AA DAF-45. Items to be anodized shall receive a polished satin finish pretreatment and a clear lacquer overcoating. For items noted to be safety yellow, coating shall be equal to Fuller-O'Brien Polyester Coating System PFY-500-S8 and shall be factory applied and touched-up in the field. All handrailing shall be free of stains and discoloration before acceptance.

2.3 SPARE HANDRAIL COMPONENTS

The following spare handrail components shall be supplied by the Contractor and delivered to the site after completion of the new central control station:

For 2-inch handrail (Uncoated):

Base mount flanges	10
Side mount flanges	10
Tees	10
Crosses	10
El	10
Spare gate	1

For 1 ½-inch handrail (Uncoated):

Side mount flange	10
Tees	10
Crosses	10
El	10
Spare gate	1

For 2-inch handrail (safety yellow coated):

42-inch posts (Sch 80)	20
8-foot rails (Sch 40)	5

For 1 ½-inch handrail (safety yellow coated):

20-foot-length rail (Sch 40)	2
42-inch posts (Sch 80)	20

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall verify all measurements and shall take all field measurements necessary before fabrications. Exposed fastenings shall be compatible materials, shall generally match in color and finish, and shall harmonize with the material to which fastenings are applied. Holes for bolts and screws shall be drilled or punched. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Care shall be exercised during performance of the work to prevent dropping of material into existing bulkheads, gates, and other equipment and into the river.

3.1.1 Inspection and Supervision

The Contractor shall acquire the services of a representative of the handrail manufacturer to provide initial on-site inspection and supervision for a minimum of 3 days from the start of handrail installation. Periodic on-site inspection and technical assistance shall be provided throughout the length of handrail installation as required and as approved by the Contracting Officer.

3.2 INSTALLATION

Aluminum railing system shall be installed such that posts are installed plumb and rails are installed straight and level. Joints and connections

at posts and at concrete shall be rigid and secure. Anchor bolts shall be installed perpendicular to the lock wall. Installation of fittings and provisions for expansion shall be in accordance with the manufacturer's recommendations.

3.2.1 Mounting Flanges

Aluminum in contact with concrete, grout or steel shall be protected from galvanic or corrosive action. The contact surfaces may be painted or isolated with a neoprene rubber gasket. If a neoprene rubber is proposed, a sample of material shall be submitted and method of installation demonstrated to the Contractiong Officer.

3.2.2 Painting for Isolation

For mounting on concrete, the aluminum surface shall be painted. At contacts with dissimilar metals, boths surfaces shall be painted. The surfaces shall be first washed with clean mineral spirits and then pretreated with a primer conforming to SSPC-Paint 27. The primer shall be mixed by adding 1 volume of acid component (dilutent) to 4 volumes of resin component (base solution) slowly and with constant stirring. After mixing, the material shall be used within 8 hours. Primer may be applied by brush or swab. The acid component (dilutent), over and above the amount prescribed above, shall not be used for thinning purposes. Two coats of aluminum paint conforming to federal standard TT-P-38 shall be applied. Surfaces shall receive the first coat of paint after at least 1 hour but not more than 24 hours after primer application.

-- End of Section --