SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

SUMMARY:

Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings, including:

Miscellaneous Shapes and Sections.
Bolts, anchors and accessories.
Grout.
Shear Connectors.

RELATED WORK:

Section 05400, Light Gauge Metal Framing
Section 05500, Metal Fabrications.

SUBMITTALS:

1. Product Data: Manufacturer's specifications and installation instructions for all specified products, include laboratory test reports.

2. Shop Drawings: Complete details of each member and connection, schedules and errection plans. Submit structural calculations prepared and certified by a licensed professional engineer registered in the State of Minnesota.

QUALITY ASSURANCE:

1. Codes and Standards: Comply with current provisions of following, except as otherwise indicated below:

1) AISC "Code of Standard Practice for Steel Buildings and Bridges".

Paragraph 4.2.1 of the above code is hereby modified by deletion of the following sentence: "This approval constitutes the owner's acceptance of all responsibility for the design adequacy of any connections designed by the fabricator as a part of his preparation of these shop drawings".

2) AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings", including the "Commentary" and Supplements thereto as issued.

3) American Welding Society (AWS) D1.1 "Structural Welding Code - Steel".

4) ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".

2. Qualifications for Welding Work: AWS certified welders.

3. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work and promptly notify Architect of inconsistancies.

DELIVERY, STORAGE AND HANDLING:

Deliver materials to site at such intervals to insure uninterrupted progress of work.

Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not to delay work.

Store materials for easy access and inspection.

PART 2 - PRODUCTS

MATERIALS:

Metal Surfaces, General: Use materials which are smooth and free of surface blemishes.

Structural Steel Shapes, Plates and Bars: ASTM A 36.

Cold-Formed Steel Tubing: ASTM A 500, Grade B, Fy=46 KSI.

Steel Pipe: ASTM A 53, Type E, Grade B; Fy=35 KSI.

Steel Castings: ASTM A 27, Grade 65-35, medium-strength carbon steel.

Headed Stud-Type Shear Connectors: ASTM A 108, Grade 1015 or 1020, cold finished carbon steel; with dimensions complying with AISC Specifications. Furnish 3/4" diameter studs unless otherwise noted.

Anchor Bolts: ASTM A 367, nonheaded type with 3" hook unless otherwise indicated.

Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular low- carbon steel bolts and nuts, with hex heads. and hardened washers.

Electrodes for Welding: Comply with AWS Code, E70XX.

Non-Metallic Shrinkage-Resistant Grout: Refer to Section 03310, Concrete for material and acceptable manufacturers.

Special Primer: For rolled sections, trusses, miscellaneous plates and sections, joists, and catwalk framing in the Arena space (members which do not recieve fireproofing), provide one coat high performance primer, equal in quality and finish to Tnemec Series 10-1009 Primer, or approved equal. Coating shall be 3.0 mil minimum.

FABRICATION:

Shop Fabrication and Assembly: Shop fabricate to greatest extent possible. Properly mark and match-mark materials for field assembly expeditious field handling and assembly.

Connections: Weld or bolt shop connections, as indicated.

Welded Construction: In accordance with AWS Code.

Shear Connectors: Per manufacturer recommendations. Use automatic end welding of headed stud shear connectors.

PART 3 - EXECUTION

ERECTION:

Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections as required. Remove only after permanent members are in place and final connections are made.

Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.

Setting Bases and Bearing Plates: Clean and prepare concrete and masonry bearing surfaces, and bottom surface of base and bearing plates. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.

Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.

Do not load structural frame until all bolted and welded connections have been completed. Steel Foreman shall personally inspect all connections prior to installation of joists and deck.

Pack grout solidly so that no voids remain, and in accordance with manufacturers' instructions.

Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
Splice members only where indicated and accepted on shop drawings.

Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces.

Errect work in accordance with AISC Specifications.

Apply touch-up primer to connections and areas which are missing primer coat in the field after components are

erected and fully connected.

FIELD QUALITY CONTROL:

Owner has option of engaging an independent testing and inspection company to inspect work, perform tests and prepare test reports, including those items listed below.

Correct deficiencies in structural steel, whether discovered by regular inspection, special inspections, or punch list review. Additional tests shall be performed as necessary, and paid for by the Contractor, until full compliance is achieved. A change order with the appropriate deduct shall be issued.

Bolted Connections: Inspect or test in accordance with AISC specifications.

Welded Connections: Include visual inspection of welds, ultrasonic testing of all penetration welds, and shear connection testing in accordance with AWS D1.1.

END OF SECTION 05I20

SECTION 05400 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

SUMMARY:

Extent of cold-formed metal framing is shown on drawings.

Types of cold-formed metal framing units include the following:

"C"-shaped load-bearing steel studs.

20 guage and lighter studs are specified in Section 09250 - Gypsum Drywall.

SUBMITTALS:

Product Data: Submit manufacturer's product information and installation instructions for each item of cold-formed metal framing and accessories.

Shop Drawings: Submit shop drawings for special components and installations not fully dimensioned or detailed in manufacturer's product data.

Include placing drawings for framing members showing size and gage designations, number, type, location and spacing. Indicate supplemental strapping, bracing, splices, bridging, accessories, and details required for proper installation.

QUALITY ASSURANCE:

Component Design: Compute structural properties of studs and joists in accordance with American Iron and Steel Institute (AISI) "Specification for Design of Cold-Formed Steel Structural Members."

Welding: Use qualified welders and comply with American Welding Society (AWS) D1.3, "Structural Welding Code - Sheet Steel."

Fire-Rated Assemblies: Where framing units are components of assemblies indicated for a fire-resistance rating, including those required for compliance with governing regulations, provide units which have been approved by governing authorities having jurisdiction.

DELIVERY, STORAGE AND HANDLING:

Protect metal framing units from rusting and damage. Deliver to project site in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade. Store off ground in a dry ventilated space or protect with

breathable waterproof tarpaulins.

PART 2 - PRODUCTS

MANUFACTURERS:

Manufacturers: Subject to compliance with requirements, provide products of one of the following:

Alabama Metal Industries Corp.
Bostwick Steel Framing Co.
Dale Industries Inc.
Milcor Division, Inryco Inc.
Marino Industries Corp.
U.S. Gypsum Co.

METAL FRAMING:

System Components: With each type of metal framing required, provide manufacturer's standard steel runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories as recommended by manufacturer for applications indicated, as needed to provide a complete metal framing system.

Materials and Finishes:

For 16-gage and heavier units, fabricate metal framing components of structural quality steel sheet with a minimum yield point of 40,000 psi; ASTM A 446, A 570, or A 611.

For 18-gage and lighter units, fabricate metal framing components of commercial quality steel sheet with a minimum yield point of 33,000 psi; ASTM A 446, A 570, or A 611.

Provide galvanized finish to metal framing components in exterior walls and roof framing complying with ASTM A 525 for minimum G 60 coating. Provide galvanized finish for all metal studs in exterior wall assemblies and other locations exposed to weather.

Provide prime coated finish to all metal framing componenets in interior walls with one coat of shop-applied red-oxide, zinc-chromate, or other similar rust-inhibitive primer for all locations not specified or shown as galvanized.

Finish of installation accessories to match that of main framing components, unless otherwise indicated.

"C"-Shape Studs: Manufacturer's standard load-bearing steel studs of size, shape, and gage indicated, with 1.625" flange and flange return lip.

Electrodes for Welding: Comply with AWS Code.

Galvanizing Repair Paint: High zinc dust content paint for repair of galvanized surfaces damaged by welding, complying with M.I. Spec. MIL-P-21035.

FABRICATION:

General: Framing components may be prefabricated into panels prior to erection. Fabricate panels plumb, square, true to line and braced against racking with joints welded. Perform lifting of prefabricated panels in a manner to

prevent damage or distortion.

Fabricate panels in jig templates to hold members in proper alignment and position and to assure consistent component placement.

Fastenings: Attach similar components by welding. Attach dissimilar components by welding, bolting, or screw fasteners, as standard with manufacturer.

Wire tying of framing components is not permitted.

Fabrication Tolerances: Fabricate panels to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8" in 10'-0".

PART 3 - EXECUTION

INSPECTION AND PREPARATION:

Pre-Installation Conference: Prior to start of installation of metal framing systems, meet at project site with installers of other work including door and window frames and mechanical and electrical work. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing work.

INSTALLATION:

Manufacturer's Instructions: Install metal framing systems in accordance with manufacturer's printed or written instructions and recommendations, unless otherwise indicated.

Runner Tracks: Install continuous tracks sized to match studs. Align tracks accurately to layout at base and tops of studs. Secure tracks as recommended by stud manufacturer for type of construction involved, except do not exceed 24" o.c. spacing for nail or power-driven fasteners, or 16" o.c. for other types of attachment. Provide fasteners at corners and ends of tracks.

Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

Where stud system abuts structural columns or walls, including masonry walls, anchor ends of stiffeners to supporting structure.

Install supplementary framing, blocking and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with stud manufacturer's recommendations and industry standards in each case, considering weight or loading resulting from item supported.

Installation of Wall Stud System: Secure studs to top and bottom runner tracks by either welding or screw fastening at both inside and outside flanges.

Frame wall openings larger than 2'-0" square with double stud at each jamb of frame except where more than 2 are either shown or indicated in manufacturer's instructions. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes or by welding, and space jack studs same as full-height studs of wall. Secure stud system wall opening frame in manner indicated.

Frame both sides of expansion and control joints, with separate studs; do not bridge the joint with components of stud system.

Install horizontal stiffeners in stud system, spaced (vertical distance) at not more than 4'-0" o.c. Weld at each intersection.

Erection Tolerances: Bolt or weld wall panels (at both horizontal and vertical junctures) to produce flush, even, true to line joints. Step in face and jog in alignment between panels not to exceed 1/16".

Field Painting: Touch-up shop-applied protective coatings damaged during handling and installation. Use compatible primer for prime coated surfaces; use galvanizing repair paint for galvanized surfaces.

END OF SECTION 05400

SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

SUMMARY

This section contains miscellaneous metal fabrications, including the following:

Brick angles, lintels, bracing and support.
Supports for electrical and mechanical equipment.
Supports for equipment.
Supports for elevator guiderail and hoisting beam.
Misc. framing, supports and water/sewer pipe guards.
Metal stairs.
Ornamental railings.
Steel imbeds for interior stairs.

Provide high performance primer as specified in Section 05120, and finish coat as specified in Section 09900, for these components.

RELATED WORK:

Section 03310, Concrete.
Section 05120, Structural Steel.
Section 08410, Operable Windows.
Section 15000, Mechanical.
Section 16000, Electrical.

DEFINITIONS

Definitions in ASTM E 985 for railing-related terms apply to this section.

SUBMITTALS

Submit the following to the Architect:

1. Product data for all products.

2. Shop drawings including plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections.

3. Other Samples as may be requested by Architect.

4. Welder certificates including signature of Contractor.

5. Calculations: Where materials or fabrications are indicated to comply with certain requirements for design loadings and at all metal stairs, include structural computations, material properties, and other information needed for structural analysis.

QUALITY ASSURANCE

Qualify welding processes and welding operators in accordance with AWS D1.1.

Engineer Qualifications: Professional engineer licensed in State of Minnesota experienced with similar materials and design as this Project.

PROJECT CONDITIONS

Field Measurements: Verify field dimensions and conditions. Coordinate fabrication schedule with construction progress to avoid delay of Work.

PART 2 - PRODUCTS

Ferrous Metal Surfaces, General: Exposed materials shall be free of pitting, seam marks, roller marks, rolled trade names, roughness, and other variations.

Steel Plates, Shapes, and Bars: ASTM A 36.

Steel Tubing: Product type (manufacturing method) and as follows:

Cold-Formed Steel Tubing: ASTM A 500, grade A.

Uncoated Structural Steel Sheet: Product type (manufacturing method), quality, and grade, as follows:

Cold-Rolled Structural Steel Sheet: ASTM A 611, grade A.

Uncoated Steel Sheet: Commercial quality, product type (method of manufacture) as follows:

Cold-Rolled Steel Sheet: ASTM A 366.

Steel Pipe: ASTM A 53; finish, type, and weight class as follows:

Galvanized finish for exterior installations.

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

Gray Iron Castings: ASTM A 48, Class 30.

Malleable Iron Castings: ASTM A 47, grade 32510.

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

Aluminum Bar Gratings: ASTM B 221, alloy 6061-T6 or 6063-T6 for bearing bars; alloy 6061-T1 for cross bars.

Structural Aluminum Shapes: ASTM B 221, alloy 6061-T6 or 6063-T6.

Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.

Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for the metal alloy to be welded.

GROUT AND ANCHORING CEMENT

Nonshrink Metallic Grout: Premixed, factory-packaged, ferrous aggregate grout complying with CE CRD-C 621, specifically recommended by manufacturer for heavy duty loading applications of type specified in this section, from one the following:

"Hi Mod Grout"; Euclid Chemical Co.
"Embeco 885 and 636"; Master Builders.
"Ferrolith G Redi-Mix and G-NC"; Sonneborn Building Products Div., Rexnord Chemical Products, Inc.

FASTENERS

General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A.

Lag Bolts: Square head type, FS FF-B-561.

Machine Screws: Cadmium plated steel, FS FF-S-92.

Wood Screws: Flat head carbon steel, FS FF-S-111.

Plain Washers: Round, carbon steel, FS FF-W-92.

Masonry Anchorage Devices: Expansion Shields, FS FF-S-325.

Drilled-In Expansion Anchors: Expansion anchors complying with FS FF-S-325, Group VIII (anchors, expansion, [nondrilling]), Type I (internally threaded tubular expansion anchor); and machine bolts complying with FS FF-B-575, Grade 5.

Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class, and style as required.

Lock Washers: Helical spring type carbon steel, FS FF-W-84.

PAINT

Shop Primer for Ferrous Metal: Mfgr's standard, fast-curing, lead-free, modified alkyd primer coplying with FS TT-P-

645.

Galvanizing Repair Paint: Where applicable by County codes, provide high zinc dust content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC- Paint-20.

Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 except containing no asbestos fibers.

CONCRETE FILL AND REINFORCING MATERIALS

Concrete Materials and Properties: Refer to "Concrete" section and provide 2,500 psi(min. 28 day test), 440 lb. cement per cu. ft. minimum, and W/C ratio of 0.58 maximum, unless higher strengths indicated.

Nonslip Aggregate Finish: Factory-graded and packaged fused aluminum oxide grits or crushed emery.

FABRICATION, GENERAL

Form metal fabrications, working to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support.

Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

Allow for thermal movement consistent with Temperature extremes in Woodbury, Minnesota.

Shear and punch metals cleanly and accurately. Remove burrs.

Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

Weld corners and seams per AWS recommendations.

Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat- head (countersunk) screws or bolts. Locate joints where least conspicuous.

Shop Assembly: Preassemble to greatest extent possible. Disassemble units as necessary for shipping.

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

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

Provide all metal and steel products as shown on the drawings and as required for completion of all the work, that are not included in other sections within this specification. The following subcategories are listed as a general guide for fabricating common components on this project.

MISCELLANEOUS METALS

Furnish and fabricate bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as

required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures.

Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction with drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

Provide steel framing and supports for applications indicated or which are not a part of structural steel framework, as required to complete work.

Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

Fabricate relieving angles, bent plates, and lintels from steel of sizes indicated.

For cavity walls, provide vertical channel brackets to support shelf/relieving angles from back-up masonry and concrete. Align expansion joints in angles with indicated expansion joints in cavity wall exterior wythe.

Galvanize shelf angles to be installed on exterior concrete framing.

Furnish wedge-type concrete inserts, complete with fasteners, for attachment of shelf angles to cast-in-place concrete.

Provide supports for various equipment where shown on the drawings. At all visible locations weld and fully grind surfaces to be smooth and blemish free.

Provide other supports and anchors for mechanical equipment, electrical equipment and other items where shown.

Provide steel railings and handrails as indicated on the drawings.

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, cracking, or otherwise deforming exposed surfaces of pipe.

Provide clean steel strand "aircraft" cable at the horizontal "rails" for guardrails and rails in the Arena, and as shown on the drawings. Cables shall be taught and tight, and shall not exhibit any elongation when applied with a concentrated load as specified herein for handrails under "System Performances."

Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.

Close exposed ends of pipe with welding 3/16" thick plate.

Toe Boards: Provide toe boards at railings around openings and at the edge of open-sided floors and platforms. Fabricate to dimensions and details indicated, or if not indicated, use 4 inches high x 1/8 inch steel plate welded to, and centered between, each railing post.

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. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.

For exterior steel railings and handrails formed from steel pipe with galvanized finish, galvanize fittings, brackets, fasteners, sleeves, and other ferrous components.

Provide anchors for embedding units in concrete, either integral or applied to units, as standard with the manufacturer.

Apply black asphaltic coating to concealed bottoms, sides, and edges of cast-iron units set into concrete.

PIPE BOLLARDS:

Manufacture lengths of pipe bollards to extend 3'-8" below grade. Provide 4" round o.d. pipe unless larger sizes are shown on the drawings. Insert pipes into concrete footings, and fill with concrete fill. Tops of pipe should be slightly rounded with fill at top.

LOOSE STEEL LINTELS:

Provide loose steel lintels for openings and recesses shown in masonry walls and partitions. Weld adjoining memebers together to form a single unit where indicated. Provide not less than 8" bearing at each side of opening, unless otherwise indicated. In general, provide steel lintels at masonry openings including but not limited to the following locations: doors, framed openings, windows, exterior or interior louvers, transfer grilles, framed blockouts and recesses, ductwork penetrations, piping penetrations, cabinet unit heaters, fire hose cabinets, chimney breeching penetrations, bundled piping and conduit.

Galvanize loose steel lintels to be installed in exterior walls.

EXPANSION JOINTS:

Provide fire rated, UL listed, metal expansion joint covers at the intersection of floor and wall building components and finishes as required.

Provide the following models of fire rated expansion joints as manufactured by Conspec Systems, Inc., (C.S. Group) or other manufacturer approved by the Architect. Provide elastomer expansion joint filler and extruded aluminum frame at exposed surfaces, with manufacturer's fire barrier system, FB-88, in joint width below cover plate.

Floor to Floor	1 hr. rated, "Metaflex" 1H RDA Series
Floor to Wall	1 hr. rated, "Metaflex" 1H RDA Series
Wall to Wall	1 hr. rated, "Metaflex" 1H KF Series

FINISHES

Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot-dip process compliance with the following requirements:

ASTM A 153 for galvanizing iron and steel hardware.

ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick and heavier.

Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.

After installation, welding and grinding, touch-up all areas where the primer has been removed. Remove all signs of rust and damage.

PART 3 - EXECUTION

PREPARATION

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

Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

INSTALLATION, GENERAL

Fastening to In-Place Construction: Provide anchorage devices
and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.

Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made.

Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint or zinc chromate primer.

SETTING LOOSE PLATES

Clean concrete and masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

Set loose leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.

Use metallic nonshrink grout in concealed locations where not exposed to moisture; use nonmetallic nonshrink grout in exposed locations, unless otherwise indicated.

Do not place grout when overnight temperatures are expected to drop below freezing, if left unprotected.

Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

Expansion Joints: Provide expansion joints at locations indicated, or if not indicated, at intervals not to exceed 40 feet. Provide slip joint with internal sleeve extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; locate joint within 6 inches of post.

ADJUSTING AND CLEANING

Touch-Up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of the shop paint on miscellaneous metal is specified in Division 9 Section "Painting" of these specifications.

For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION 05500