

DIVISION 5 - METALS

SECTION 05100 - STRUCTURAL STEEL AND STEEL JOISTS

PART 1 - GENERAL

Provide all materials, labor, equipment and incidental services necessary for the fabrication, painting and erection of all structural steel, incidental steel framing, and steel joists included in the Contract.

Fabricate and erect all structural steel in conformance with the 1989 Specification for Structural Steel for Buildings - Allowable Stress Design and Plastic Design by the American Institute of Steel Construction (AISC), except that references to the AISC Code of Standard Practice shall apply only to dimensional tolerances and quality of work for fabrication and erection. Other provisions of the AISC Code of Standard Practice may be voluntarily adopted by the Contractor as a basis for fabrication and erection subcontracts, but these other provisions are not part of this project specification.

All steel joists shall be designed, fabricated and erected in conformance with the Standard Specifications for Steel Joists and Joist Girders and the Recommended Code of Standard Practice for Steel Joists and Joist Girders as published by the Steel Joist Institute and with all recommendations and guidelines stipulated by the joist manufacturer

All references herein to standards of the American Institute of Steel Construction (AISC) and the American Society for Testing Materials (ASTM) and the American Welding Society (AWS) apply to the latest revision thereof.

Shop drawings shall be prepared by the Contractor to guide workmen in fabrication and placement of reinforcing and to provide additional assurance that there are no substantive discrepancies in the broader description of the project contained in the Contract Documents.

Submit to the Architect for review, two prints and one sepia of all Shop and Erection drawings. Before submittal to the Architect, all shop drawings shall be checked by the Contractor and shall be signed to verify that this has been done. The Architect will review these Drawings and return the sepia to the Contractor with marks thereon indicating any exceptions taken to the content of these Drawings. Review of Shop Drawings shall be only for general conformance with design concept of the Project and for general compliance with information given in the Contract Documents. Review of the Shop Drawings shall not be construed as approval of quantities and dimensions, fabricating processes, erection sequences, construction techniques or of approval of any variance from the intent of the Contract Documents.

Contractor shall provide all structural steel and joist suppliers with a complete set of Contract Drawings and Specifications. Shop drawings shall be comprehensive documents which include and coordinate structural steel and miscellaneous steel items described or indicated on any drawing or in any specification included in the Contract Documents. Steel items shown or indicated on the

Contract Drawings or described in the Contract Specifications shall be provided by the Contractor whether or not the items have been included on the shop drawings.

Shop drawings are the instrument of the Contractor. Structural Contract Drawings are not intended to be used or adapted as shop drawings. The Contractor shall not use or adapt structural Contract Drawings as part of the shop drawing submittal without first carefully checking all Contract Documents for discrepancies and resolving all such discrepancies. By the use or adaptation of Structural Contract Drawings as part of the shop drawing submittal the Contractor shall be deemed to warrant that any discrepancies undetected in the shop drawing phase which may be detected as construction progresses will not be used as a basis for extra cost claims under this Contract.

If structural framing depends on dimensions, member sizes, and arrangement of existing construction, Contractor shall field verify arrangement, sizes, and dimensions and include accurate, existing conditions on the shop drawings.

Splices and connections not shown on the Drawings shall be designed by the Contractor to develop the full strength of the largest connecting member. Such connections shall be submitted for review separately from the shop drawings. Fully descriptive sketches and a written request for review shall be submitted by the Contractor.

PART 2 - PRODUCTS

All materials shall be new and undamaged.

Structural steel W-shapes shall conform to ASTM A992, or to ASTM A572 Grade 50 with special requirements per AISC Technical Bulletin #3, dated March 1997.

Channels, S, M and HP shapes shall conform to ASTM A36.

Steel plates and angles shall conform to ASTM A36.

Pipe shall conform to ASTM A53 Grade B.

Square and rectangular structural tubes shall conform to ASTM A500 Grade B.

Bolts, including anchor bolts, shall conform to ASTM A-307 unless specifically noted otherwise on the Drawings.

Rods shall conform to ASTM A36. Turnbuckles shall have a safe working load of triple the ultimate strength of the connected rods.

High strength bolts shall be heavy hexagon structural bolts conforming to ASTM A-325.

Steel joists shall be as designated on the Drawings and shall conform to the latest "Standard Specifications and Load Tables for Steel Joists and Joist Girders", as adopted by the Steel Joist Institute.

Non-shrink grout beneath column base plates shall be non-ferrous and shall conform to ASTM C1107.

PART 3 - EXECUTION

WELDING

Materials and processes used, and details of all joints shall comply with the American Welding Society Code for Arc and Gas Welding in Building Construction.

Use AWS A5.1 or A5.5 E70XX electrodes for manual arc welding and AWS A5.17 F7X-EXXX electrodes for submerged arc welding.

All welders shall be qualified according to AWS Standards for the type of welding that they perform on this Project. Welders shall carry their certification papers and show them to the Owner's representatives upon request.

HIGH STRENGTH BOLTING

High strength bolted joints, where called for on Drawings, shall be assembled in accordance with "Specification for Structural Joints using ASTM A-325 or A490 Bolts" as approved by the Research Council on Structural Connections of the Engineering Foundation and endorsed by the AISC.

ERECTION

The steel framing system described in these drawings and specifications is designed for strength and serviceability as a completed and functioning structure under loads prescribed by the governing codes. The strength and stability of the incomplete steel framing system will vary throughout construction and will depend on the means, methods, and sequence of construction selected by the Contractor.

The lateral load resisting system for the building is not complete until all framing is aligned, fully connected and secured in final position, all floor decks are fully fastened to supporting members, all floor slabs are poured and cured for seven days, all roof decks are fastened in final position and all bearing walls and designated shear walls are complete and connected to the structural frame(s).

The Contractor has sole authority and responsibility for the means, methods, sequence and safety of construction. The Contractor shall, at all times, provide temporary shoring, bracing and tie-down anchorage consistent with the Contractor's selected means, methods and sequence of construction and such temporary supports shall be adequate to assure stability and to prevent movement or collapse of the steel framing, or any portion thereof, during erection and throughout construction.

Anchor bolts and other anchorage devices are designed for loads required by governing codes after the project is complete. The Contractor is responsible for independent structural analysis to verify the safety of these bolts and devices under loads which may be imposed during erection and construction.

Erect all steel in accordance with standards and specifications of the AISC. Locate anchor bolts accurately and install into connecting work in advance. Install base plates true to line and level and set solid in non-shrinking grout.

Do not enlarge shop-made bolt holes by flame cutting in the field. If shop-fabricated components do not assemble properly in the field, do not modify them in any manner without first obtaining the approval of the Architect.

Install steel joists to the spacing shown on the Plans with the top chord of all joists in the same plane. Install joist bridging immediately after each joist is placed so that no joist is unbraced during the time that other joists are being erected.

Unless noted otherwise on the Drawings, all joist bridging shall be as required by the Steel Joist Institute and top chord bridging shall be placed directly above bottom chord bridging. Splices in bridging members shall develop the full strength of the bridging member.

At end of each run of bridging, the horizontal angles shall be x-braced with two additional angles between the last two pairs of joists at the end of the run, thus x-bracing the last two joist spaces.

All bridging shall be completely welded prior to beginning the installation of the roof deck. Connect bridging to all K-series joists with a minimum of 1/8" fillet weld 1/2" long and to LH-series joists with a minimum of 1/8" fillet weld 1" long. The ends of all bridging shall be securely anchored to the building walls.

PAINTING

Paint all structural steel and steel joists in the shop after fabrication is completed. After erection, paint all field connections, all welded areas and touch up all abrasions, damaged or defective paint and rust areas and remove all dirt, mud, mortar, debris, etc., from all steel surfaces.

Immediately before painting, thoroughly prepare the steel surface in compliance with the Steel Structures Painting Council Specifications SP-3. Remove all oil and grease, loose mill scale, loose rust, loose paint and other detrimental foreign matter from the steel surface.

Apply paint with brush, roller or spray; or dip in accordance with manufacturer's specifications.

For shop painting and touch up painting of steel joists use a primer conforming to Steel Structures Painting Council Specification Paint 15. Dry film thickness shall be 1.0 - 1.4 mils.

For shop painting of and touch up field painting of hot rolled steel shapes, a primer conforming to Steel Structures Painting Council Paint System No. 1. Dry film thickness shall be 1.7 - 2.0 mils.

Where called for on Drawings, galvanizing shall conform to ASTM A 123 and A 153. The Contractor shall consult with the galvanizer to assure that fabricated components will not warp during the galvanizing process. Subassemblies which are warped beyond normal tolerances will not be installed and will be replaced at Contractor's expense.

Steel to receive cementitious fireproofing shall not be painted. Such steel shall be cleaned and surface prepared as required by the manufacturer of the fireproofing material.

FABRICATOR'S QUALITY CONTROL

Fabrication procedures and fabricated steel shall be independently inspected unless the steel fabricator is approved by the American Institute of Steel Construction Quality Certification Program in the following category:

- I: Conventional Steel Structures - Small Public Service and Institutional Buildings, (Schools, etc.), Shopping Centers, Light Manufacturing Plants, Miscellaneous and Ornamental Iron Work, Warehouses, Sign Structures, Low Rise, Truss Beam/Column Structures, Simple Rolled Beam Bridges.**

If the fabricator chosen by the Contractor does not comply with the above Certification, fabrication procedures and fabricated steel shall be periodically tested and inspected by an independent testing agency. Payment for these tests and inspections will be by the Contractor. Tests and inspections are to be performed by AWS Certified Welding Inspectors and inspection reports shall be provided to the Contractor. The purpose of these inspections is to aid the Contractor in verifying that the steel is being fabricated in accordance with the project specifications. A minimum of one inspection per week is required. The first inspection shall be scheduled in the first week of fabrication. Tests and inspections shall include the following:

1. Examine mill test reports and verify that material being used is the same as the mill test reports and the project specifications.
2. Review the fabricator's written welding procedures. Verify that the fabricator's welding procedures are being followed. Verify that welders are certified with current papers and that they demonstrate proper techniques.
3. Examine joint preparation for complete penetration joints Ultrasonically test complete penetration joints.
4. Examine fillet welds for proper size, profile, throat, porosity and end returns.
5. Examine steel members for lamination. Spot check dimensions and hole sizes.

END OF SECTION 05100



SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

1. Loose steel lintels.
2. Shelf angles (at canopy connection to existing bldg. wall).
3. Steel pipe columns for supporting wood or metal frame construction.
4. Steel framing and supports for applications where framing and supports are not specified in other Sections.
5. Miscellaneous metal trim.

1.3 SUBMITTALS

- A. Shop drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1. Provide templates for anchors and bolts specified for installation under other sections.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce require units.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.6 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

2.3 PAINT

- A. Shop Primers: Provide primers that comply with Division 9 Section "Painting."

2.4 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Shear and punch metals cleanly and accurately. Remove burrs.
- C. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

- D. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

2.5 LOOSE STEEL LINTELS

- A. Fabricate loose structural-steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- B. Weld adjoining members together to form a single unit where indicated.
- C. Size loose lintels to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches, unless otherwise indicated.
- D. Galvanize loose steel lintels located in exterior walls.

2.6 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete. Align expansion joints in angles with indicated control and expansion joints in cavity-wall exterior wythe.
- C. Galvanize shelf angles to be installed in exterior walls.
- D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.
- B. General: Provide steel framing and supports indicated and as necessary to complete the Work.

2.8 MISCELLANEOUS STEEL TRIM