

DIVISION 5 METALS**SECTION 05120 STRUCTURAL STEEL****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Structural steel framing members, and support members.
- B. Base plates.
- C. Grouting under base plates.

1.2 RELATED SECTIONS

- A. Section 04100 - Mortar and Masonry Grout; Grouting under base plates.

1.3 REFERENCES

- A. AISC - Code of Standard Practice - Manual of Steel Construction - Allowable Stress Design (ASD).
- B. ASTM A36/A36M - Structural Steel.
- C. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
- D. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality.
- E. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.
- F. ASTM A325 - High Strength Bolts for Structural Steel Joints.
- G. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- H. AWS A2.4 - Symbols for Welding, Brazing, and Nondestructive Examination.
- I. AWS D1.1 - Structural Welding Code.
- J. SSPC (Steel Structures Painting Council) - Painting Manual.

1.4 SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
 - 2. Connections not detailed.
 - 3. Cambers.

4. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths.

1.5 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC Code of Standard Practice.
- D. Fabricator: Company specializing in performing the work of this section with minimum 5 years experience.
- E. Erector: Company specializing in performing the work of this section with minimum 5 years experience.
- F. Design connections not detailed on the Drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the place where the Project is located.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Structural Steel Members: ASTM A36/A36M.
- B. Structural Tubing: ASTM A500, Grade B.
- C. Pipe: ASTM A53, Grade B.
- D. Shear Stud Connectors: ASTM A108 Grade 1015 or 1020 Forged steel, headed, unfinished.
- E. Sag Rods: ASTM A36.
- F. Bolts, Nuts, and Washers: ASTM A325 bolts, galvanized to ASTM A153 for galvanized structural members.
- G. Anchor Bolts: ASTM A307.
- H. Welding Materials: AWS D1.1; type required for materials being welded.
- I. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi 48 at 28 days..
- J. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

2.2 FABRICATION

- A. Space shear stud connectors at 3 inches oc.
- B. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- C. Fabricate connections for bolt, nut, and washer connectors.
- D. Develop required camber for members.

2.3 FINISH

- A. Prepare structural component surfaces in accordance with SSPC SP 2.
- B. Shop prime structural steel members. Do not prime surfaces that will be field welded, in contact with concrete, and high strength bolted.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01039 - Coordination and Meetings: Verification of existing conditions prior to beginning work.

3.2 ERECTION

- A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- B. Field weld components indicated on Drawings.
- C. Field connect members with threaded fasteners; torque to required resistance.
- D. Do not field cut or alter structural members without approval of Architect/Engineer.
- E. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- F. Grout under base plates in accordance with Section 04100. Trowel grouted surface smooth, splay neatly to 45 degrees.

END OF SECTION



SECTION 05210 STEEL JOISTS**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Open web steel joists with bridging, attached seats and anchors.
- B. Loose bearing plates and anchor bolts for site placement.
- C. Framed roof openings greater than 18 inches.

1.2 RELATED SECTIONS

- A. Section 05311 - Steel Roof Deck: Support framing for openings less than 18 inches in decking.
- B. Section 05500 - Metal Fabrications: Non-framing steel fabrications attached to joists.

1.3 REFERENCES

- A. ASTM A36/A36M - Structural Steel.
- B. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality.
- C. ASTM A307 - Carbon Steel Threaded Standard Fasteners.
- D. AWS D1.1 - Structural Welding Code.
- E. FM - Roof Assembly Classifications.
- F. SJI (Steel Joist Institute) - Specifications, Load tables, and Weight Tables for Steel Joists and Joist Girders.
- G. SSPC (Steel Structures Painting Council) - Steel Structures Painting Manual.

1.4 SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Shop Drawings:
 - 1. Indicate standard designations, configuration, sizes, spacing and locations of joists.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with SJI, Load Tables, and Weight Tables, including headers and other supplementary framing.
- B. Fabricator: Company specializing in performing the work of this section with minimum three years experience.
- C. Erector: Company specializing in performing the work of this section with minimum three years experience.

1.6 REGULATORY REQUIREMENTS

- A. Conform to F.M.I-90 Wind uplift.

1.7 DELIVERY, STORAGE, AND PROTECTION

- A. Section 01600 - Material and Equipment: Transport, handle, store, and protect products and to SJI requirements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Open Web Joists Members: SJI Type K.
- B. Anchor Bolts, Nuts and Washers: ASTM A307.
- C. Structural Steel For Supplementary Framing and Joist Leg Extensions: ASTM A36/A36M.
- D. Welding Materials: AWS D1.1; type required for materials being welded.
- E. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

2.2 FABRICATION

- A. Provide bottom and top chord extensions as indicated.
- B. Fabricate to achieve end bearing of:
 - 1. 2-1/2 inches on steel
- C. Drill holes in chords necessary for attachment of wood nailers.

2.3 FINISH

- A. Prepare joist component surfaces in accordance with SSPC SP 2.
- B. Shop prime joists. Do not prime surfaces that will be field welded and in contact with concrete.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01039 - Coordination and Meetings: Verification of existing conditions prior to beginning work.

3.2 ERECTION

- A. Erect and bear joists on supports.

- B. Allow for erection loads. Provide sufficient temporary bracing to maintain framing safe, plumb, and in true alignment.
- C. After joist alignment and installation of framing, field weld joist seat to bearing plates.
- D. Position and field weld joist chord extensions and wall attachments as detailed.
- E. Frame roof openings greater than 18 inches with supplementary framing.
- F. Do not permit erection of decking until joists are braced bridged, and secured or until completion of erection and installation of permanent bridging and bracing.
- G. Do not field cut or alter structural members without approval of joist manufacturer.
- H. After erection, prime welds, abrasions, and surfaces not shop primed.

3.3 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Alignment: 1/4 inch.

3.4 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Assurance: Field inspection and testing of welds.

END OF SECTION



SECTION 05311 STEEL ROOF DECK**PART 1 GENERAL****1.01. SECTION INCLUDES**

- A. Steel roof deck and accessories.
- B. Framing for openings up to and including 18 inches.

1.02. RELATED SECTIONS

- A. Section 05120 - Structural Steel: Support framing for openings larger than 18 inches.
- B. Section 05210 - Steel Joists: Support framing for openings larger than 18 inches.

1.03. REFERENCES

- A. ASTM A36/A36M - Structural Steel.
- B. ASTM A446 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip process, Structural (Physical) Quality.
- C. ASTM A525 - Steel Sheet, Zinc-Coated, Galvanized by the Hot-Dip Process.
- D. AWS D1.1 - Structural Welding Code.
- E. FM - Roof Assembly Classifications.
- F. SDI (Steel Deck Institute) - Design Manual for Composite Decks, Form Decks, Roof Decks, Cellular Metal Floor Deck with Electrical Distribution.
- G. SSPC (Steel Structures Painting Council) - Painting Manual.

1.04. PERFORMANCE REQUIREMENTS

- A. Design metal deck in accordance with SDI Design Manual.
- B. Calculate to structural working stress design and maximum vertical deck deflection of 1/240.
- C. Lateral deflection of diaphragm shall not exceed 1/500 of the height of the wall.

1.05. SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Shop Drawings: Indicate deck plan, support locations, projections, openings and reinforcement, pertinent details, and accessories.
- C. Product Data: Provide deck profile characteristics and dimensions, structural properties and finishes.

1.06. QUALITY ASSURANCE

- A. Installer: Company specializing in performing the work of this Section with minimum three years experience.
- B. Design deck layout, spans, fastening, joints, and opening less than 18" under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the place where the Project is located.

1.07. REGULATORY REQUIREMENTS

- A. Conform to FM I-90 wind uplift rating.

1.08. DELIVERY, STORAGE, AND HANDLING

- A. Section 01600 - Material and Equipment: Transport, handle, store, and protect products.
- B. Cut plastic wrap to encourage ventilation.
- C. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.01. MATERIALS

- A. Manufacturers:
 - 1. United Steel Deck, Inc.
 - 2. Vulcraft Division, Nucor Corporation
 - 3. Wheeling Corrugation Company
 - 4. Section 01600 - Materials and Equipment: Substitutions: Permitted.
- B. Sheet Steel: ASTM A446, Grade A Structural Quality 33 ksi minimum yield point; with G-90 galvanized.
- C. Bearing Plates and Angles: ASTM A36 steel, unfinished.
- D. Welding Materials: AWS D1.1.
- E. Touch-Up Primer compatible with galvanized coating.

2.02. FABRICATION

- A. Deck: Sheet steel, configured as follows:

- | | |
|--|--------------------------------------|
| 1. Span Design: | Multiple |
| 2. Minimum Metal Thickness Excluding Finish: | 22 gage |
| 3. Nominal Height: | 1-1/2 inch, Type F intermediate rib. |
| 4. Formed Sheet Width: | 32 inch |
| 5. Side Joints: | Lapped |

6. Finish: G-90 Galvanized

B. Fasteners: Galvanized hardened steel, self-tapping.

PART 3 EXECUTION

3.01. EXAMINATION

A. Section 01039 - Coordination and Meetings: Verification of existing conditions prior to beginning work.

3.02. INSTALLATION

A. Erect metal deck in accordance with SDI Manual.

B. Bear deck on masonry support surfaces with 4-inch minimum bearing. Align and level.

C. Bear deck on steel supports with 1-1/2 inch minimum bearing. Align and level.

D. Fasten deck to steel support members at ends and intermediate supports with mechanical fasteners at 12 inches center to center maximum, parallel with the deck flute and at each transverse flute.

E. Weld in accordance with AWS D1.1.

F. Mechanically clinch male/female side laps at 24 inches center to center maximum.

G. Reinforce steel deck openings from 6 to 18 inches in size with 2 x 2 x 1/4-inch steel angles. Place framing angles perpendicular to flutes, extend minimum two flutes beyond each side of opening and fusion mechanically attach to deck at each flute.

H. Install 6 inch minimum wide sheet steel cover plates, of same thickness as deck, where deck changes direction. Mechanically attach 12 inches center to center maximum.

END OF SECTION



ECTION 05400 COLD FORMED METAL FRAMING**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Load bearing formed steel stud framing.
- B. Formed steel joist, purlins, slotted channel, framing and bridging.

1.2 RELATED SECTIONS

- A. Section 09260 - Gypsum Board Systems: Light weight, non-load bearing metal stud framing.
- B. Section 05500 - Metal Fabrications: Placement of anchors for securing the work of this section.

1.3 REFERENCES

- A. AISI (American Iron and Steel Institute) - Cold-Formed Steel Design Manual.
- B. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- C. ASTM A446/A446M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- D. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging, for Screw Application of Gypsum Board and Metal Plaster Bases.
- E. AWS D1.3 - Structural Welding Code - Sheet Steel.
- F. MFMA (Metal Framing Manufacturers Association) - Guidelines for the Use of Metal Framing.

1.4 SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, and limitations.

1.5 QUALITY ASSURANCE

- A. Calculate structural properties of framing members in accordance with MFMA - Guidelines for the Use of Metal Framing and AWS D1.3 requirements.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum 3 years experience approved by manufacturer.

- D. Design structural elements under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at the place where the Project is located.
- E. Form, fabricate, install, and connect components in accordance with ML/SFA 540 - Lightweight Steel Framing Systems Manual.

1.6 PROJECT CONDITIONS

- A. Section 01039 - Coordination and Meetings.
- B. Coordinate the placement of components within the stud framing system specified in Section 05500.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Clark Steel Framing Systems.
- B. Dale/Incor.
- C. Marino Ware.
- D. Substitutions: Refer to Section 01600 - Material and Equipment.

2.2 FRAMING MATERIALS

- A. Studs: ASTM C955, formed to channel shape, solid web, knurled faces.
- B. Joists: ASTM A446/A446M Grade A sheet steel, formed to open box shape, solid web.
- C. Track: Formed steel; channel shaped; same width as studs, tight fit; solid web.
- D. Framing Materials: Roll from new sheet steel; re-rolled steel not acceptable.

2.3 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel with thickness determined by performance requirements specified.
- B. Plates, Gussets, Clips: Formed sheet steel, thickness determined by performance requirements specified.
- C. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I inorganic zinc rich.

2.4 FASTENERS

- A. Self-drilling, Self-tapping Screws, Bolts, Nuts, and Washers: Steel, hot dip galvanized to ASTM A123 1.25 oz/sq ft .
- B. Anchorage Devices: Power actuated, drilled expansion bolts, and screws with sleeves.
- C. Welding: In conformance with AWS D1.1 and AWS D1.3.

2.5 FABRICATION

- A. Fabricate assemblies of formed sections of sizes and profiles required.
- B. Fit, reinforce, and brace framing members to suit design requirements.
- C. Fit and assemble in largest practical sections for delivery to site, ready for installation.

2.6 FINISHES

- A. Studs: Galvanize to G90 (Z275) coating class.
- B. Tracks and Headers: Galvanize to G90 (Z275) coating class.
- C. Joists and Purlins: Galvanize to G90 (Z275) coating class.
- D. Bracing, Furring, and Bridging: Same finish as framing members.
- E. Plates, Gussets, and Clips: Same finish as framing members.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01039 - Coordination and Meetings: Verification of existing conditions before starting work.
- B. Verify that substrate surface building framing components are ready to receive work.
- C. Verify that rough-in utility is in proper location.

3.2 ERECTION OF STUD WORK

- A. Install components in accordance with manufacturer's instructions.
- B. Align floor and ceiling tracks; locate to wall layout. Secure in place with fasteners at maximum 24 inches.
- C. Place studs at 16 inches oc; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using fastener method.
- D. Construct corners using minimum three studs. Double stud wall openings, door jambs, and window jambs.
- E. Erect load bearing studs one piece full length. Splicing of studs is not permitted.
- F. Erect load bearing studs, brace, and reinforce to develop full strength, to achieve design requirements.
- G. Coordinate placement of insulation in multiple stud spaces after erection.
- H. Install intermediate studs above and below openings to align with wall stud spacing.

- I. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
 - J. Attach cross studs to studs for attachment of fixtures anchored to walls.
 - K. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
 - L. Touch-up field welds and damaged galvanized surfaces with primer.
- 3.3 ERECTION OF JOISTS
- A. Install framing components in accordance with manufacturer's instructions.
 - B. Make provisions for erection stresses. Provide temporary alignment and bracing.
 - C. Place joists 24 inches oc not more than 2 inches from abutting walls. Connect joists to supports using fastener method.
 - D. Set floor joists parallel and level, with lateral bracing and bridging.
 - E. Locate joist end bearing directly over load bearing studs or provide load distributing member to top of stud track.
 - F. Provide web stiffeners at reaction points.
 - G. Complete framing ready to receive plywood decking and gypsum board ceiling as required to meet UL # L527 one hour rated floor assembly.

END OF SECTION

SECTION 05500 METAL FABRICATIONS**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Shop fabricated ferrous metal.

1.2 RELATED SECTIONS

- A. Section 05120 - Structural Steel column anchor bolts.
- B. Section 09900 - Painting: Paint finish.
- C. Section 03300 - Cast-In-Place Concrete: Placement of metal fabrications in concrete.

1.3 REFERENCES

- A. ASTM A36 - Structural Steel.
- B. ASTM A53 - Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
- C. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- D. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- E. ASTM A283 - Carbon Steel Plates, Shapes, and Bars.
- F. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- G. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- H. AWS A2.0 - Standard Welding Symbols.
- I. AWS D1.1 - Structural Welding Code.
- J. SSPC (Steel Structures Painting Council) - Steel Structures Painting Manual.
- K. FS Federal Specifications.

1.4 SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

- C. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

PART 2 PRODUCTS

2.1 MATERIALS - STEEL

- A. Steel Sections: ASTM A36.
- B. Steel Tubing: ASTM A500, Grade B.
- C. Plates: ASTM A283.
- D. Pipe: ASTM A53, Grade B.
- E. Fasteners: Lag bolts FS (FF-BB-561); machine screws FS (FF-S-92); wood screws FS (FF-S-111); expansion shields FS (FF-S-325); toggle bolts FS (FF-B-588); and lockwashers FS (FF-W-84).
- F. Bolts, Nuts, and Washers: ASTM A307 galvanized to ASTM A153 for galvanized components.
- G. Welding Materials: AWS D1.1; type required for materials being welded.
- H. Ladders: ANSI A14.3.
- I. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

2.2 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by continuous welds.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.3 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.

- D. Maximum Bow 1/8 inch in 48 inches.
 - E. Maximum Deviation from Plane: 1/16 inch in 48 inches.
- 2.4 FINISHES - STEEL
- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
 - B. Do not prime surfaces in direct contact with concrete or where field welding is required.
 - C. Prime paint items with one coat.
 - D. Structural Steel Members: Galvanize after fabrication to ASTM A123. Provide minimum 1.25 oz/sq ft galvanized coating.
 - E. Non-structural Items galvanized after fabrication to ASTM A123. Provide minimum 1.25 oz/sq ft galvanized coating.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions is acceptable and are ready to receive work.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply steel items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components indicated on shop drawings.
- D. Perform field welding in accordance with AWS D1.1.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed except surfaces to be in contact with concrete.

3.4 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch .

END OF SECTION