

## SECTION 05 40 00 - COLD-FORMED METAL FRAMING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Exterior load-bearing wall framing.
  - 2. Interior load-bearing wall framing.
  - 3. Exterior non-load-bearing wall framing.
  - 4. Floor joist framing.
  - 5. Roof trusses.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
  - 1. Design Loads: As indicated on drawings.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product and accessory indicated.
- B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
  - 1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Welding certificates showing that welders have been qualified in the 6 months previous to the project start date.
- D. Qualification data.
- E. Product test reports.
- F. Research/evaluation reports.

#### 1.4 QUALITY ASSURANCE

- A. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements.

- B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code--Sheet Steel." All welders must be WABO certified.
- C. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- D. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
  - 1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Truss Design."
  - 2. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."
- E. Comply with AISI's "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."
- F. Referenced standards: Steel Stud Manufacturer's Association [www.ssma.com](http://www.ssma.com)

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
  - 1. Grade: As required by structural performance.
  - 2. Coating: G60, A60, AZ50, or GF30.
  - 3. The following standards will be used for thickness in accordance with the recommendations of SSMA:
    - a. 18 mil (25 gage)
    - b. 30 mil (20 gage)
    - c. 33 mil (20 gage structural)
    - d. 54 mil (16 gage)
    - e. 68 mil (14 gage)
    - f. 97 mil (12 gage)

### 2.2 LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: as indicated on the drawings.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and same minimum base-metal thickness as steel studs.

- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, punched, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: as indicated on the drawings.
  - 2. Flange Width: 1-3/8 inches unless indicated otherwise on the drawings.

## 2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: as indicated on the drawings
  - 2. Flange Width: 1-3/8 inches unless indicated otherwise on the drawings.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and same minimum base-metal thickness as steel studs.
- C. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads.

## 2.4 FLOOR JOIST FRAMING

- A. Steel Joists: Manufacturer's standard C-shaped steel joists, of web depths indicated, punched, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: as indicated on the drawings
  - 2. Flange Width: 1-5/8 inches unless indicated otherwise on the drawings.
- B. Steel Joist Track: Manufacturer's standard U-shaped steel joist track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: Matching steel joists.
  - 2. Flange Width: 1-5/8 inches unless indicated otherwise.

## 2.5 ROOF TRUSSES

- A. Roof Truss Members: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges.

## 2.6 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members, unless otherwise indicated.

- B. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- C. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel headless, hooked bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- D. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- E. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- F. Interior wall Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
- G. Exterior wall mechanical fasteners: Stainless steel self-tapping drill screws.
  - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

## 2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or ASTM A 780.
- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Shims: Load bearing, high-density multimonomer plastic, nonleaching.
- D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

### 3.2 INSTALLATION, GENERAL

- A. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- B. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
- C. Install framing members in one-piece lengths.
- D. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- E. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- F. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- G. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- H. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
  - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

### 3.3 LOAD-BEARING WALL INSTALLATION

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
  - 1. Anchor Spacing: To match stud spacing.
- B. Squarely seat studs against top and bottom tracks with tight fit between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
  - 1. Stud Spacing: 16 inches or as indicated.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.

- D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- E. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.
- F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.
- G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
  - 1. Frame wall openings with not less than a double stud at each jamb of frame and indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
  - 2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
  - 1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
- I. Install horizontal bridging in stud system, spaced as indicated. Fasten at each stud intersection.
  - 1. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
- J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.
- K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.
- L. Provide solid block framing at 12 foot vertical maximum.

### 3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches or as indicated.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
  1. Install single deflection tracks and anchor to building structure.
  2. Install double deflection tracks and anchor outer track to building structure.
- E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
  1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
    - a. Install solid blocking at centers indicated.
  2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
  3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
  4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable curtain-wall-framing system.
- G. Provide solid block framing at 12 foot vertical centers, maximum.

### 3.5 JOIST INSTALLATION

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.
- B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
  1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
  2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.
- C. Space joists not more than 2 inches from abutting walls, and as follows:

1. Joist Spacing: 16 inches or as indicated.
- D. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.
- E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on Shop Drawings.
  1. Install web stiffeners to transfer axial loads of walls above.
- F. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as follows:
  1. Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
  2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.
- G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
- H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

### 3.6 TRUSS INSTALLATION

- A. Install, bridge, and brace trusses according to Shop Drawings and requirements in this Section.
- B. Truss Spacing: 24 inches or as indicated.
- C. Do not alter, cut, or remove framing members or connections of trusses.
- D. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacings indicated.
- E. Erect trusses without damaging framing members or connections.
- F. Align webs of bottom chords and load-bearing studs or continuously reinforce track to transfer loads to structure. Anchor trusses securely at all bearing points.
- G. Install continuous bridging and permanently brace trusses as indicated on Shop Drawings and designed according to LGSEA's Technical Note 551e, "Design Guide for Permanent Bracing of Cold-Formed Steel Trusses."



### 3.7 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Owner.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### 3.8 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

**END OF SECTION 05 40 00**