

## SECTION 05 4000

### COLD-FORMED METAL FRAMING

This section includes editing notes to assist the user in editing the section to suit project requirements. These notes are included as hidden text, and can be revealed or hidden by one of the following methods:

Microsoft Word 2007: Click the Office button, select Word Options, select Display, then select or deselect the HIDDEN TEXT option.

Microsoft Word (earlier versions): From the pull-down menus select TOOLS, then OPTIONS. Under the tab labeled VIEW, select or deselect the HIDDEN TEXT option.

Corel WordPerfect: From the pull-down menus select VIEW, then select or deselect the HIDDEN TEXT option.

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes: Cold-formed metal framing for:
  - 1. Exterior load-bearing steel stud walls.
  - 2. Interior load-bearing steel stud walls.
  - 3. Exterior steel stud curtain walls
  - 4. Floor joists.
  - 5. Roof trusses.
  - 6. Roof rafters framing.
  - 7. Ceiling joist framing.
  - 8. Deflection Track.
  - 9. Bridging, bracing, clips, and accessories.
  - 10. ProX Header
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary work requirements.
  - 2. Section [05 1200 - Structural Steel Framing:] [\_\_ \_\_\_\_ - \_\_\_\_:] Structural steel framing systems.
  - 3. Section [05 4200 - Cold-Formed Metal Joist Framing:] [\_\_ \_\_\_\_ - \_\_\_\_:] Steel joist framing systems.
  - 4. Section [05 5000 - Metal Fabrications:] [\_\_ \_\_\_\_ - \_\_\_\_:] Steel sheet for shear walls.
  - 5. Section [06 1643 - Gypsum Sheathing:] [\_\_ \_\_\_\_ - \_\_\_\_:] Gypsum sheathing for shear walls.
  - 6. Section [09 2213 - Metal Furring:] [\_\_ \_\_\_\_ - \_\_\_\_:] Furring for interior [drywall] [and] [plaster].
  - 7. Section [09 2216 - Non-Structural Metal Framing:] [\_\_ \_\_\_\_ - \_\_\_\_:] Non-load bearing interior partition framing.
  - 8. Section [09 2300 - Gypsum Plastering:] [\_\_ \_\_\_\_ - \_\_\_\_:] Interior gypsum plastering.
  - 9. Section [09 2400 - Portland Cement Plastering:] [\_\_ \_\_\_\_ - \_\_\_\_:] Exterior [stucco] [and] [EIFS].
  - 10. Section [09 2900 - Gypsum Board:] [\_\_ \_\_\_\_ - \_\_\_\_:] Interior [gypsum board] [shaft walls] [and] [area separation walls].

##### 1.2 REFERENCES

- A. American Iron and Steel Institute (AISI): ([www.steel framing.org](http://www.steel framing.org))
  - 1. AISI/ S100-07/SI- 10 - North American Specification for the Design of Cold-Formed Steel Structural Members.
  - 2. AISI S110 -07 Standard for Seismic Design of Cold-Formed Steel Structural Systems.
  - 3. AISI/S200 - AISI Standard / Standard for Cold-Formed Steel Framing - General Provisions, 2007 Edition with Commentary.

4. AISI S201-07 - AISI Standard / North American Standard for Cold-Formed Steel Framing - Product Data, 2007 Edition.
  5. AISI /S210 -07 – AISI Standard / North American Standard for Cold-Formed Steel Framing – Floor and Roof System Design.
  6. AISI/S212-07 - AISI Standard / Standard for Cold-Formed Steel Framing - Header Design, 2007 Edition with Commentary.
  7. AISI/S213-07/-10 - AISI Standard / Standard for Cold-Formed Steel Framing - Design, 2007 Edition with Commentary.
  8. AISI/S211-07 - AISI Standard / Standard for Cold-Formed Steel Framing - Wall Stud Design, 2007 Edition with Commentary.
  9. AISI/S230 - 07 - AISI Standard / Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings, with Supplement 2, dated 2008
  10. AISI/S214 -07 - AISI Standard / Standard for Cold-Formed Steel Framing - Truss Design, with Supplement 2, dated 2008.
- B. ASTM International (ASTM):
1. A653/A653M-09 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
  2. A780-01(2006) - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
  3. C954-07 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
  4. C955-09 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.
  5. A1003/A1003M-08 - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
  6. C1007-08 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.
  7. C1513-04 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
- C. American Welding Society (AWS):
1. D1.1 - Structural Welding Code - Steel.
  2. D1.3 - Structural Welding Code - Sheet Steel.
- D. Certified Steel Stud Association (CSSA).

### 1.3 SYSTEM DESCRIPTION

- A. Design Requirements:
1. Design steel in accordance with AISI S100-07 unless otherwise indicated.
  2. Design loads: As indicated on Drawings.
  3. Design framing systems to withstand design loads with maximum deflections of:
    - a. Exterior walls: Lateral deflection of  $[L/240.] [L/360.] [L/600.]$
    - b. Interior load-bearing walls: Lateral deflection of  $[L/240.] [L/360.] [L/600.]$
  4. Provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to ambient temperature range of 120 degrees F.
  5. Design framing system to accommodate deflection of primary building structure and construction tolerances.
  6. Design exterior non-load-bearing curtain wall framing to accommodate lateral deflection without regard to contribution of sheathing materials.

### 1.4 SUBMITTALS

- A. Submittals for Review:
1. Product Data: Manufacturer's product literature and data sheets and installation

- recommendations for specified products.
  - 2. Shop Drawings:
    - a. Show:
      - 1) Locations of framing members, wall framing sections and opening elevations.
      - 2) Sizes and spacing of framing members.
      - 3) Methods of fastening framing members to each other and to supporting systems.
      - 4) Details of vertical deflection connections to structures.
      - 5) Locations and spacing of lateral bracing and structural bracing systems.
      - 6) Accessory products required for complete installation.
    - b. Bear seal and signature of Registered Professional Engineer licensed in State in which project is located.
- B. Quality Control Submittals:
  - 1. Structural Calculations:
    - a. Submit calculations bearing seal and signature of Registered Professional Engineer licensed in State in which project is located, with minimum 5 years experience in work of this Section.
    - b. Include:
      - 1) Description of design criteria.
      - 2) Engineering analysis depicting stress and deflection requirements for each framing application.
      - 3) Selection of framing components, accessories, fasteners, and welded connection requirements.
  - 2. Certificates of Compliance:
    - a. Manufacturers certification that product comply with referenced codes and standards, and in accordance with AISI S100-07.
- C. Sustainable Design Submittals:
  - 1. Recycled Content: Certify recycled content of metal stud and track; indicate recycled content percent and whether pre-consumer or post-consumer.
  - 2. Regional Materials: Certify materials extracted, processed, and manufactured within 500 mile radius of Project site.

## 1.5 QUALITY ASSURANCE

- A. Perform work in accordance with:
  - 1. AISI/ General Provisions, S200-07
  - 2. AISI/ Product Data, S201-07
  - 3. AISI/ Floor and Roof System Design, S210-07
  - 4. AISI/ Wall Stud Design, S211-07
  - 5. AISI/ Header Design, S212-07
  - 6. AISI/ COFS/Lateral Design, S13-07
  - 7. AISI/ Truss Design, S214-07
  - 8. AISI NASPEC.
- B. Installer: Minimum [2] [ ] years experience in performing work of this Section on similar projects.
- C. Manufacturer:
  - 1. Current member of CSSA with current Quality Assurance Program.
  - 2. Provide full time quality control over fabrication and erection complying with applicable codes, ordinances, rules and regulations of government agencies having jurisdiction.
- D. Welding:
  - 1. Comply with AWS D1.1 and AWS D1.3.
  - 2. Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".
- E. Pre-Installation Conference:
  - 1. Convene at site [2] [ ] weeks prior to beginning work of this Section.

2. Attendance: [Owner,] [Architect,] [Contractor,] and framing system installer.
3. Review and discuss: Project requirements, substrate conditions, and manufacturer's installation instructions.

## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Store materials protected from exposure to rain, snow, and other harmful weather conditions, at temperature and humidity conditions at temperature and humidity conditions per ASTM C955.
- B. Handle products per AISI NASPEC.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: CEMCO Steel Framing Systems, City of Industry, CA, 800-775-2362  
[www.cemcosteel.com](http://www.cemcosteel.com).
- B. Substitutions: [Under provisions of Division 01.] [Not permitted.]

### 2.2 MATERIALS

- A. Galvanized Steel:
  1. Meet or exceed requirements of ASTM A1003/A1003M or ASTM A653/A653M.
  2. Coating class: [G60] [G90] per ASTM C955.
  3. Recycled content: Minimum [35] [ ] percent, with minimum [19.8] [ ] percent classified as post consumer and minimum [14.4] percent classified as pre-consumer.
- B. Stud Punch-Outs: minimum 10 inches between end of member and near edge of web punch-out and 24 inches on center thereafter, per ASTM C955.

### 2.3 COMPONENTS

- A. Manufactured from prime mill certified steel; re-rolled steel without mil certificate not acceptable.
- B. Cold-Formed Structural Studs: Galvanized steel C-studs complying with ASTM C955.
  1. Flange length: [1-5/8 inches; 162 flange.] [2 inches; 200 flange.] [2-1/2 inches; 250 flange.] [3 inch; 300 flange.]
  2. Web depth: [2-1/2 inches; 250 depth.] [3-1/2 inches; 350 depth.] [3-5/8 inches; 362 depth.] [4 inches; 400 depth.] [5-1/2 inches; 550 depth.] [6 inches; 600 depth.] [8 inches; 800 depth.] [10 inches; 1000 depth.] [12 inches; 1200 depth.] [As indicated on Drawings.]
  3. Minimum material thickness: [33, 43, 54, 68, 97 mil] [[20] [18] [16] [14] [12] gage.] [As required by design.]
  4. Minimum yield strength: [33 ksi.] [50 ksi.] [As required by design.]
- C. Structural Track: Cold-formed galvanized steel runner tracks complying with ASTM C955.
  1. Flange length: [1-1/4 inches; T125 flange.] [1-1/2 inches; T150 flange.] [2 inches; T200 flange.] [2-1/2 inches; T250 flange.] [3 inches; T300 flange.] [3-1/2 inches; T350 flange.]
  2. Web: [2-1/2 inches; 250 depth.] [3-1/2 inches; 350 depth.] [3-5/8 inches; 362 depth.] [4 inches; 400 depth.] [5-1/2 inches; 550 depth.] [6 inches; 600 depth.] [8 inches; depth.] [10 inches; 1000 depth.] [12 inches; 1200 depth.] [Track web size to match stud web size.]
  3. Minimum material thickness: [33, 43, 54, 68, 97 mil] [[20] [18] [16] [14] [12] gage.] [As required by design.] [As indicated on Drawings.] [Track thickness to match wall stud thickness.]
  4. Minimum yield strength: [33 ksi.] [50 ksi.] [As required by design.]
- D. Deflection Track: Cold-formed deep leg runner slip track.
  1. Leg length: [2 inches; T200 flange.] [2-1/2 inches; T250 flange.] [3 inches; T300 flange.] [3-1/2 inches; T350 flange.] [As required by design.]
  2. Web: Design to accommodate stud width for single track or interior track width for double track

- system.
  - 3. Minimum material thickness: [33, 43, 54, 68, 97 mil] [[20] [18] [16] [14] [12] gage.] [As required by design.]
  - 4. Minimum yield strength: [33 ksi.] [50 ksi.] [As required by design.]
- E. Slotted Track: Cold-formed slotted track - CST.
- 1. Leg length: 2-1/2 inches; T250 flange.
  - 2. Vertical slot: 1-1/2 inches long by 1/4 inch wide.
  - 3. Web: [2-1/2 inches; 250 depth.] [3-5/8 inches; 362 depth.] [4 inches; 400 depth.] [6 inches; 600 depth.] [8 inches; 800 depth.] [As indicated on Drawings.]
  - 4. Minimum material thickness: [33, 43, 54, 68 mil] [20] [18] [16] [14] gage.] [As required by design.]
  - 5. Minimum yield strength: [33 ksi.] [50 ksi.] [As required by design.]
- F. Exterior Slotted Track - EXT:
- 1. Leg length: 3-1/4 inches; T325 flange.
  - 2. Vertical slot: 1-1/2 inches long by 1/4 inch wide.
  - 3. Web: [2-1/2 inches; 250 depth.] [3-5/8 inches; 362 depth.] [4 inches; 400 depth.] [6 inches; 600 depth.] [8 inches; 800 depth.] [As indicated on Drawings.]
  - 4. Minimum material thickness: [33, 43, 54, 68 mil] [20] [18] [16] [14] gage.] [As required by design.]
  - 5. Minimum yield strength: [33 ksi.] [50 ksi.] [As required by design.]
- G. Standard Clip Angles:
- 1. Minimum thickness: [54, 68, 97 mil] [[16] [14] [12] gage.] [As required by design.]
  - 2. Minimum yield strength: 50 ksi.
- H. U-Channel (CRC Cold Rolled Channel): [150U50-54; 1-1/2 inches, 54 mil [16 gage.]] [075U50-54; 3/4 inch, 54 mil [16 gage.]] [As required by design.]
- I. Furring Channels: [087F125-33; 7/8 inch, 33 mil [20 gage.]] [087F125-43; 7/8 inch, 43 mil [18 gage.]] [087F125-54; 7/8 inch, 54 mil [16 gage.]] [150F125-33; 1-1/2 inches, 33 mil [20 gage.]] [150F125-43; 1-1/2 inches, 43 mil [18 gage.]] [150F125-54; 1-1/2 inches, 54 mil [16 gage.]] [As required by design.]
- J. ProX Header
- 1. Outer Member: ProX Outer
    - a. Flange Length: [ 4 1/4 inches; X425 flange].
    - b. Web Depth: [3 5/8 inches; 362 depth] [4 inches; 400 depth] [6 inches; 600 depth] [8 inches; 800 depth].
    - c. Minimum Material Thickness: [[33] [43][54][68] mils] [[20][18][16][14]gage] [ As required by Design]
    - d. Minimum yield strength: [33 ksi] [50ksi] [As required by Design]
  - 2. Inset Member: ProX Insert
    - a. Flange Length: [1 5/8 inches; XT162 flange].
    - b. Web Depth: [3 5/8 inches; 362 depth] [4 inches; 400 depth] [6 inches; 600 depth] [8 inches; 800 depth].
    - c. Minimum Material Thickness: [[33] [43][54][68] mils] [[20][18][16][14]gage] [ As required by Design]
    - Minimum yield strength: [33 ksi] [50ksi] [As required by Design]

## 2.4 ACCESSORIES

- A. Framing Accessories: As required for project, complying with ASTM C955.
- 1. Flat strapping for X-bracing.
  - 2. Flat strapping and bridging for lateral bracing.
  - 3. Gusset plates.
  - 4. Flat steel sheets.

- B. Shear Wall Panels: 5/8 inch thick Type X gypsum board or water resistant gypsum sheathing laminated to 22 gage galvanized steel sheet complying with ASTM A653/A653M, G40 galvanized coating; Intermat Sure-Board Series 200 Structural Panel, Series 200W Structural Panel or equivalent.
- C. Shear Wall Panels: 1/8 inch thick MDF wood base sheathing laminated to 22 gage galvanized steel sheet complying with ASTM A653/A653M, G40 galvanized coating; Intermat Sure-Board Series 200W Structural Panel or equivalent.
- D. Fasteners: Self-drilling, self-tapping screws complying with ASTM C1513.
- E. Touch-Up Paint: ASTM A780.

## 2.5 FABRICATION

- A. Framing components may be preassembled into panels prior to erection.
- B. Fabricate panels square, with components attached to prevent racking and minimize distortion during lifting and transport.
- C. Cut framing components square for attachment to perpendicular members or as required for angular fit against abutting members.

Plumb, align, and securely attach studs to flanges of both upper and lower runners, except that for interior, non-load bearing walls where studs do need to be attached to upper or lower runners.

- D. In doubled jamb studs and doubled headers not accessible for insulating, provide insulation equal to thicknesses specified elsewhere.
- E. Splices in members other than top and bottom runner track not permitted.
- F. Provide temporary bracing required until erection is completed.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Inspect supporting substrates and structures for proper conditions for installation and performance of cold-formed structural framing.

Verify that attachment surfaces are plumb, level, and in proper alignment to accept cold-formed structural framing.

### 3.2 INSTALLATION - NON-AXIAL LOAD-BEARING CURTAIN WALLS

- A. Securely anchor runners to supporting structure as indicated on Drawings.
- B. Stud Spacing: [[12] [16] [24] inches on center.] [As required by design.]
- C. Install jack studs or cripples below window sills, above window and door heads, and elsewhere to furnish support.
- D. Provide lateral bracing by use of gypsum board, gypsum sheathing, steel sheets, or by horizontal straps or cold-rolled channels; conform to AISI S100-07 NAS.

- E. Make provisions for vertical movement where indicated on Drawings.
- F. Perform handling and lifting of prefabricated panels in manner to prevent distortion in members.

## INSTALLATION - AXIAL LOAD-BEARING WALLS

Securely anchor runners to supporting structure as shown on Drawings.

Edit the following to suit project requirements.

- G. Stud Spacing: [[12] [16] [24] inches on center.] [As required by design.]
- H. Provide complete, uniform and level bearing support at bottom runner per ASTM C1007.
- I. Include headers and supporting studs at wall openings as shown on Drawings.
- J. Provide shear wall structural panel or diagonally braced stud walls as indicated on Drawings at locations designated as shear walls for frame stability and lateral load resistance. Position additional studs when necessary or as indicated on Drawings to resist vertical components.
- K. Splices in axially loaded studs not permitted.

### 3.3 INSTALLATION - JOISTS

- A. Joist Spacing: [[12] [16] [24] inches on center.] [As required by design.]
- B. Align joist bearing at foundation walls by means of shims or non-setting grout.
- C. Locate joists or load distribution member directly over bearing studs at top of bearing walls.
- D. Provide web stiffeners at reaction points or points of concentrated loads or where indicated on Drawings.
- E. Install joist bridging where indicated on Drawings.
- F. Install additional joists under parallel partitions when partition length exceeds one-half joist span and around floor and roof openings that interrupt one or more spanning members, unless otherwise indicated.
- G. Install end blocking where joist ends are not otherwise restrained from rotation.

### 3.4 INSTALLATION - TRUSSES

- A. Truss Spacing: [[12] [16] [24] inches on center.] [As required by design.]
- B. Install trusses in accordance with Code requirements and truss manufacturer's instructions.
- C. Install roof bracing in accordance with truss design.
- D. Install trusses with plane of truss webs plumb and parallel to each other, aligned, and accurately positioned.
- E. Install each truss directly over bearing stud or load distribution member designed for this purpose.

- F. Install lateral supports as required by manufacturer's design.
- G. Immediately after installation, install bridging and permanently brace trusses per truss design.
- H. Install approved uplift connectors to connect individual truss to wall studs as required by design.

END OF SECTION