

## SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

## PART 1 - GENERAL

## 1.1 SUMMARY

## A. Section Includes: Curved Cold-Formed Steel Framing Products, including:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.
3. Custom curved metal framing for curved [walls,] [vaults,] [domes,] [arches,] [reflectors,] [and] [curved headers].
4. Hand formable metal framing for curved [walls,] [vaults,] [domes,] [arches,] [reflectors,] [and] [curved headers].

## B. Related Requirements:

1. Section 09 21 16 "Gypsum Board Shaft Wall Assemblies" for shaft wall metal framing.
2. Section 09 23 00 "Gypsum Plastering" for finishes applied to metal framing.
3. Section 09 26 13 "Gypsum Veneer Plastering" for finishes applied to metal framing.
4. Section 09 29 00 "Gypsum Board" for finishes applied to metal framing.
5. Section [ ] "[ ]" for interior finishes applied to metal framing.

## 1.2 DEFINITIONS

- A. Arch Assemblies: An assembly of curved and straight framing members including track or stud or both to form a curved-in-elevation framing member.
- B. Curved Headers: An assembly of curved framing members including track or stud or both to form a curved-in-plan framing member.

## 1.3 REFERENCE STANDARDS

## A. ASTM International:

1. ASTM A 653/A 653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM C 645 Standard Specification for Non-Structural Steel Framing Members.
3. ASTM C 754 Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
4. ASTM C 1002 - Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases.

## B. Green Seal:

1. GS GC-03 - Anti-Corrosive Paints.

- C. SSPC: The Society for Protective Coatings:
  - 1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
- D. Steel Stud Manufacturers Association:
  - 1. SSMA Product Technical Information.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** **[electronic meeting]** **[other mutually agreeable means]**.
- B. Conduct preinstallation meeting to verify project requirements **[and fabricator's installation instructions]**.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: Submit for each product and accessory. Indicate the following:
  - 1. Material.
  - 2. Finish.
  - 3. Size.
  - 4. Construction.
  - 5. Structural capacity.
- B. LEED Submittals:
  - 1. Credit MR 4 Recycled Content: Submit documentation of total recycled material content separated by postconsumer and preconsumer recycled content. Indicate cost of products having recycled content.
  - 2. Credit MR 5 Local and Regional Materials: Submit documentation indicating location where products were extracted, harvested or recovered, as well as manufactured. Indicate each distance of each location from project site in **miles (kilometers)**.
  - 3. Credit IEQ 4.1 Low Emitting Materials - Sealants and Adhesives: Submit documentation indicating VOC content for each sealant and adhesive.
  - 4. Credit IEQ 4.2 Low Emitting Materials - Paints and Coatings: Submit documentation indicating VOC content for each interior paint and coating.
- C. Shop Drawings:
  - 1. Submit **[2D dimensioned drawings]** **[3D model]** **[other media as appropriate]** with placement details. Include the following:
    - a. Framing layout, size, metal thickness **[and each factory fabricated panel]**.
    - b. Framing marks used to identify location of each framing member.
    - c. Fastening, welding, and anchorage details.
    - d. Framed openings.
    - e. Reinforcing, bridging, bracing, movement joints, and attachment to adjacent construction.

f. Connections to supporting structure.

- D. Delegated-Design Submittal: For cold-formed metal framing [**signed and sealed by professional engineer**].
1. Include shop drawings as specified in this section.
  2. Include structural design calculations.
  3. Indicate limiting heights for each stud type, spacing, deflection, and loading conditions.

## 1.6 INFORMATION SUBMITTALS

- A. Qualification Data: For installer, manufacturer, and fabricator.
- B. Product Certificates: For each type of listed product indicating materials and structural properties.
1. Anchors.
  2. Fasteners.
- C. Mill Certificates: For sheet steel used to manufacturer framing members including metal thickness, [coating type and thickness,] yield strength, and tensile strength.
- D. Product Test Reports: For representative curved framing member tests performed by a qualified independent testing agency.
1. Indicate allowable structural capacity of framing members used for structural design.
  2. Indicate restrictions on interpolation and extrapolation of testing results to other curved framing configurations.
- E. Manufacturer's Installation Instructions: For each product and accessory.
- F. Fabricator's Installation Instructions:
1. Parts listing (packing list).
  2. Framing documents showing stud and track name, orientation, and direction.
  3. Starting and ending coordinates for each component.

## 1.7 QUALITY ASSURANCE

- A. Qualifications:
1. Installer Qualifications: Company experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
  2. Manufacturer Qualifications: Company experienced in manufacturing products specified in this section with capacity to produce and deliver required products without causing delay in work [**and current member of Steel Stud Manufacturers Association**].
  3. Fabricator Qualifications: Company experienced in [**curving**] [**and**] [**factory assembling**] metal framing for field erection with demonstrated ability to fabricate products within specified tolerances.

4. Professional Engineer Qualifications: Structural engineer experienced in design of Work specified as delegated design and licensed [at Project location] [in State of \_\_\_\_\_] and employed by [manufacturer] [or] [fabricator].

## 1.8 DELIVERY, STORAGE & HANDLING

### A. Delivery and Acceptance:

1. Verify components are bundled, banded and delivered in fabricator's packaging[, **unless factory fabricated as panels**].
2. Unpack and inspect metal products. Report damage and missing components immediately.

### B. Storage and Handling:

1. Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions instructed by the manufacturer.

### C. Packaging Waste Management:

1. Remove packaging materials from site and dispose of at appropriate recycling facilities.
2. Collect and separate for disposal [**wood spacers**] [**wood pallets**] [**metal strapping**] and other recyclable packaging materials.
3. Store collected packaging materials in [**appropriate onsite bins**] [\_\_\_\_\_] for recycling.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

#### A. Non-Structural Metal Framing Manufacturer List: Furnish products by one of the following:

1. Allsteel & Gypsum Products Inc.
2. California Expanded Metal Products Co.
3. ClarkWestern Building Systems Inc.
4. Consolidated Fabricators, Corp.
5. Craco Manufacturing, Inc.
6. Custom Stud, Inc.
7. Design Shapes in Steel.
8. Dietrich Industries, Inc.
9. Frametek Steel Products
10. Marino\Ware.
11. MBA Building Supplies, Inc.
12. Olmar Supply Inc.
13. Quail Run Building Materials, Inc.
14. SCAFCO Corporation
15. Southeastern Stud & Components, Inc.
16. Steel Construction Systems.
17. Steeler Inc.

18. Telling Industries, LLC.
19. The Formetal Co., Inc.
20. The Steel Network.
21. United Metal Products, Inc.
22. United Steel Manufacturing.
23. [\_\_\_\_\_].

## 2.2 PERFORMANCE / DESIGN CRITERIA

- A. Delegated Design: Engage a qualified professional engineer to design non-structural metal framing.
- B. Structural Performance: Provide non-structural metal framing capable of withstanding design loads and condition indicated below:
  1. Design Loads: Design and size partition components to withstand uniform lateral pressure acting normal to plane of partition with [1/360] [1/240] [1/120] maximum deflection.
    - a. Design Loads: Design pressures as indicated on Drawings.
    - b. Typical Partitions: [5] [7.5] [10] psf ([240] [360] [480] Pa) design pressure.
    - c. Partitions Enclosing [Elevator] [HVAC] Shafts: [5] [7.5] [10] psf ([240] [360] [480] Pa) design pressure.
    - d. [\_\_\_\_\_] Partitions: [5] [7.5] [10] psf ([240] [360] [480] Pa) design pressure.
  2. Seismic Loads: Design and size [partition] [and] [ceiling] components to withstand seismic loads and sway displacement as calculated in accordance with [applicable code] [and] [ASCE 7].
    - a. Seismic Design Category: [\_\_\_\_\_].
    - b. Seismic Relative Displacement: [\_\_\_\_\_].
    - c. Occupancy Category: [\_\_\_\_\_].
- C. Tolerances and Movement: Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
- D. Design Standards: Comply with the following.
  1. Framing Effective Structural Properties: ASTM C 645.
  2. Partition Framing Limiting Heights: ASTM C 754.
- E. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- F. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

## 2.3 NON-STRUCTURAL METAL FRAMING

- A. Steel Sheet: ASTM A 1003/A 1003M; Structural Grade, metallic coated:
- Grade: [**ST33 (ST230)**] [**As required by performance requirements**].
  - Coating: [**G40 (Z120)**] [**G60 (Z180)**].
- B. Studs and Tracks: ASTM C 645; steel sheet, formed to C-shape, solid web, smooth faces.
- Minimum Metal Thickness: [**As indicated on Drawings**] [**0.030 inch (0.76 mm)**] [**0.033 inch (0.84 mm)**].
  - Web Depth: [**As indicated on Drawings**] [**1-5/8 inches (41 mm)**] [**2-1/2 inches (64 mm)**] [**3-5/8 inches (92 mm)**] [**4 inches (102 mm)**] [**6 inches (152 mm)**].
- C. Dimpled Studs and Tracks: ASTM C 645; steel sheet, formed to C-shape, solid web, dimpled faces.
- Minimum Metal Thickness: [**As indicated on Drawings**] [**0.025 inch (0.64 mm)**].
  - Web Depth: [**As indicated on Drawings**] [**1-5/8 inches (41 mm)**] [**2-1/2 inches (64 mm)**] [**3-1/2 inches (89 mm)**] [**3-5/8 inches (92 mm)**] [**4 inches (102 mm)**] [**6 inches (152 mm)**].
- D. Deflection Track: As specified for tracks; to accommodate [\_\_\_\_\_] inches ([\_\_\_\_\_] mm) maximum deflection.
- Single Deflection Track: Extended flange width [**with slots**] [**without slots**] to retain studs at maximum and minimum deflection.
  - Double Deflection Track: Outer track with extended flange width to retain studs at maximum and minimum deflection and inner track with minimum **1 inch (25 mm)** flange width.
- E. Furring Channel: Hat shaped, as specified for studs and tracks.
- Channel Depth: [**As indicated on Drawings**] [**1-1/2 inches (38 mm)**] [**7/8 inches (22 mm)**].
- F. Bracing, Furring, Bridging: Formed sheet steel, [thickness determined by performance requirements] [**\_\_\_\_\_ inch ([\_\_\_\_\_] mm)**] thick.

## 2.4 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, **0.062-inch- (1.59-mm-)** diameter wire, or double strand of **0.048-inch- (1.21-mm-)** diameter wire.
- B. Hanger Attachments to Concrete: Corrosion resistant anchors or fasteners as required to suit application and to support imposed loads with minimum five times factor of safety.
- C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, **0.16 inch (4.12 mm)** in diameter.
- D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of **0.053 inch (1.34 mm)** and minimum **1/2-inch- (13-mm-)** wide flanges.

1. Depth: [**As indicated on Drawings**] [**2-1/2 inches (64 mm)**] [**2 inches (51 mm)**] [**1-1/2 inches (38 mm)**].

## 2.5 FABRICATION - CURVED COLD-FORMED METAL FRAMING

A. Fabricators: Furnish curved cold-formed metal framing fabricated by one of the following:

1. Radius Track Corporation: 3340 Winpark Drive, Minneapolis, MN 55427; Telephone: (888) 872-3487, (763) 795-8885; Fax: (763) 795-8884; E-mail: [info@radiustrack.com](mailto:info@radiustrack.com); website: [www.radiustrack.com](http://www.radiustrack.com).

B. Custom form components by computer-controlled bending, crimping, or rolling of metal framing and track to produce uniform curves indicated on Drawings or 3D models using uninterrupted, continuous metal profiles with structural capacity to meet performance requirements.

1. Curve Type: [**Standard bend**] [**Curve - Leg in**] [**Curve - Leg out**] [**Curved angle - Leg in**] [**Curved angle - Leg out**] [**Custom as indicated on Drawings**].
2. Compound Shapes: Combinations of several of the above curves, including S-bends.
3. Fabricator to determine curve type to meet design intent.
4. Arc Radius: [\_\_\_\_\_] feet ([\_\_\_\_\_] mm).
5. Arc Length along Radius: [\_\_\_\_\_] feet ([\_\_\_\_\_] mm).
6. Cut Lengths:
  - a. Furnish as stock lengths to be field cut to length required.
  - b. Furnish shop cut to length required.
7. Splices:
  - a. Maximum Spacing: [**10 feet (3050 mm)**] [**20 feet (6100 mm)**] [**30 feet (9150 mm)**].
  - b. Splices not permitted.
8. Markings:
  - a. Factory mark curved components to correspond with packing list and assembly documents.
  - b. Factory mark track indicating stud locations.

C. Factory assemble the following custom curved framing assemblies to greatest extent possible:

D. Furnish custom curved framing assemblies for the following:

1. Complex Surfaces Framing Assembly: [**As indicated on Drawings**] [\_\_\_\_\_].
2. Non-Structural Dome Framing Assembly:
  - a. Diameter: [\_\_\_\_\_] feet ([\_\_\_\_\_] mm).
  - b. Height: [\_\_\_\_\_] feet ([\_\_\_\_\_] mm).
3. Non-Structural Curved-in-Plan Header:
  - a. Radius: [\_\_\_\_\_] feet ([\_\_\_\_\_] mm).

- b. Arc Length Along Radius: [\_\_\_\_\_] feet ([\_\_\_\_\_] mm).
  - 4. Non-Structural Curved-in-Elevation Arch Assembly:
    - a. Radius: [\_\_\_\_\_] feet ([\_\_\_\_\_] mm).
    - b. Arc Length Along Radius: [\_\_\_\_\_] feet ([\_\_\_\_\_] mm).
- E. Fabrication Tolerances:
  - 1. Radius: Plus or minus **1/8 inch in 16 feet (1:1536)**.
  - 2. Radius Uniformity: Plus or minus **1/16 in 32 inches (1:512)**.
  - 3. Arc Length: Plus or minus **1/8 inch (3 mm)**.
  - 4. Plane: Plus or minus **1/4 inch (6 mm)**.
  - 5. Tangent Points: **1/16 within 16 inches (1:256)**.
  - 6. Ellipses, Splines, and Other Multiple Radius Curves: Same as above for single radius curves.

## 2.6 ACCESSORIES

- A. Touch-Up Primer:
  - 1. Galvanized Surfaces: **[SSPC Paint 20] [ASTM A 780]**.
  - 2. Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with GS GC-03.
- B. Fasteners: ASTM C 1002, Type S, self-drilling, self-tapping screws, corrosion resistant treated.
- C. Anchors: [Power actuated,] [drilled expansion bolts,] [screws with sleeves,] [and] [\_\_\_\_\_].
- D. Welding Electrodes: AWS D1.1/D1.1M and AWS D1.3/D1.3M.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Site Verification of Conditions:
  - 1. Verify that site conditions are acceptable for installation.
  - 2. Correct unsatisfactory conditions prior to installation.

### 3.2 PREPARATION

- A. Coordinate installation of suspended assemblies with overhead structure and utilities to ensure suspension system anchors are spaced to ensure framing deflection does not exceed **[1/360] [1/240]** of span.

### 3.3 INSTALLATION



- A. Install in accordance with ASTM C754, manufacturer's instructions [ **and approved shop drawings**].
- B. Install top and bottom track, in position and alignment required to produce completed framing configuration indicated on Drawings. Anchor track to substrate at maximum **24 inches (610 mm)** on center.
- C. Position studs in tracks, spaced maximum [**12 inches (305 mm)**] [**16 inches (406 mm)**] [**24 inches (610 mm)**] on center.
- D. Locate studs maximum **2 inches (51 mm)** from door frames and abutting construction.
- E. Extend studs minimum **6 inches (152 mm)** above ceilings, unless otherwise specified or otherwise indicated on Drawings.
- F. Extend stud framing to ceiling only. Attach ceiling track securely to [**acoustic ceiling track**] [**ceiling framing**] [**as shown on Drawings**].
- G. Extend stud framing through the ceiling to the structure above for fire rated partitions, acoustically rated partitions, and other partitions indicated on Drawings.
  - 1. Provide deep leg deflection track as top track.
  - 2. Maintain clearance under structural building members to avoid deflection transfer to studs.
  - 3. Brace studs within 12 inches of top track.
  - 4. Do not fasten studs to top track.
- H. Use double studs on both sides of openings in partitions.
- I. Install horizontal track as header above openings in partitions. Install studs from header to top track.
- J. Screw-attach framing components at intersections.
- K. Blocking: Screw blocking to studs in accordance with manufacturers instructions. Install blocking for support of [**plumbing fixtures,**] [**toilet partitions,**] [**wall cabinets,**] [**toilet accessories,**] [**hardware,**] [**handrails,**] [**grab bars,**] and other fittings and fixtures supported by gypsum board partitions.
- L. Curved Walls:
  - 1. Install top and bottom track, in position and alignment required to produce completed framing configuration indicated on Drawings. Anchor track to substrate at maximum **24 inches (610 mm)** on center.
  - 2. Position studs in tracks, spaced maximum [**12 inches (310 mm)**] [**16 inches (406 mm)**] [**24 inches (610 mm)**] on center.
  - 3. Locate studs maximum **2 inches (50.4 mm)** from door frames and abutting construction.
  - 4. Fasten stud framing to both flanges of top and bottom tracks. Do not fasten stud framing to single deflection track.
- M. Vaults:

1. Install straight track at spring line on both sides of vault.
2. Install curved stud framing spanning width of vault.
3. Install curved framing components spanning width of vault.
4. Stud Framing:
  - a. Space studs at maximum [**8 inches (203 mm)**] [**12 inches (305 mm)**] [**16 inches (406 mm)**] [**24 inches (610 mm)**] [] inches ( mm)] on center.
5. Studs and Supplemental Framing:
  - a. Space studs at maximum [**32 inches (813 mm)**] [**48 inches (1220 mm)**] [] inches ( mm)] on center.
  - b. Install hat channels longitudinally, spaced maximum [**12 inches (305 mm)**] [**16 inches (406 mm)**] [**24 inches (610 mm)**] [] inches ( mm)] on center.
6. Screw-attach framing components at intersections.

N. Domes:

1. Install curved track at base of dome to receive stud ribs and curved track headers.
2. Install stud ribs and other components in accordance with fabricator's instructions.
3. Space studs at maximum [**16 inches (406 mm)**] [**24 inches (610 mm)**] [] inches ( mm)] on center.
4. Screw-attach framing components at intersections.
5. Depending on the type of installation, the dome must be adequately supported by the suspension system or the base of dome must be restrained by a structural tension ring to resist the outward force exerted by the dome.

O. Arches:

1. Install stud and track framing assembled into curved-in-elevation, arch assemblies as indicated on [**Drawings**] [**shop drawings**].
2. Space studs at maximum [**16 inches (406.4 mm)**] [**24 inches (610 mm)**] [] inches ( mm)] on center along length of arch assemblies.
3. Screw-attach framing components at intersections, both sides.

### 3.4 CLEANING

- A. On completion and verification of installation, remove surplus materials, rubbish, tools and equipment.
- B. Waste Management:
  1. Collect cold-formed metal framing surplus, scrap, and waste.
  2. Clean collected materials of dirt, debris and other surface contamination.
  3. Store collected materials in [**appropriate onsite bins**] [] for recycling.

END OF SECTION