SECTION 05 40 00

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section describes the requirements for furnishing and installing the following:

1. Exterior load-bearing and non-load-bearing steel walls at Parking Structure elevator override and stairs.

2. Steel joists.

B. Related Sections:

1. Metal fabrications are specified in Section 05 50 00.

2. Gypsum sheathing is specified in Section 06 16 43.

3. Non-structural metal framing is specified in Section 09 22 16.

1.02 PERFORMANCE REQUIREMENTS

A. Structural Performance: Engineer, fabricate, and erect cold-formed metal framing to withstand design loads within limits and under conditions required.

1. Design Loads: 30-psf.

2. Design framing systems to withstand design loads without deflections greater than the following:

a. Exterior Framing Systems: Lateral deflection of 1/360 of the wall height.

b. Floor Joists: Vertical deflection of 1/360 of the span.

3. Design framing systems to 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 subjected to a maximum ambient temperature change of 120-deg. F.

4. Design framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.

B. Design exterior wall framing to accommodate lateral deflection without regard to contribution of sheathing materials.

C. Engage a fabricator who assumes responsibility for engineering cold-formed metal framing by employing professional engineer to prepare design calculations, shop drawings, and other structural data.

1.03 SUBMITTALS

A. Product Data: Manufacturer's product information and installation instructions for each item of metal framing and accessories.

B. Shop Drawings: Show layout, spacing, sizes, thicknesses, and types of cold-formed metal framing, fabrication, fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment of other work.

1.04 QUALITY ASSURANCE

A. Cold-formed metal framing shall comply with California Building Code (CBC) Section 2210.

B. Installer Qualifications: Engage an experienced installer who has completed cold-formed metal framing similar in material, design, and extent to that required.

C. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code - Steel" and AWS D1.3 "Structural Welding Code - Sheet Steel".

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved.

D. Fire-Test-Response Characteristics: Where fire-resistance-rated assemblies are required, provide cold-formed metal framing identical to that tested as part of an assembly for fire resistance in accordance with ASTM E119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: As required by design designations in UL "Fire Resistance Directory".

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect metal framing units from rusting and damage.

B. Deliver to Project site in manufacturer's unopened containers or bundles, identified with name, brand, type and grade.

C. Store off ground in a dry ventilated space or protect with suitable waterproof covering.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

A. Angeles Metal Products, CEMCO, Steel Stud Manufacturer’s Association, Consolidated Fabricator’s Corp., Design Shapes in Steel, Dietrich Industries, Inc., The Steel Network, Inc., Western Metal Lath or approved equal.

2.02 MATERIALS

A. Galvanized Steel Sheet: Mill certified steel conforming to ASTM A653, G60 coating designation.

1. Steel shall have not less than 60-percent post-consumer recycled content.

2. 18-gauge and Lighter; ASTM A653, minimum yield strength 33,000-psi.

3. 16-Gauge and Heavier: ASTM A653, minimum yield strength 50,000-psi

2.02 WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs with lipped flanges.

1. Design Uncoated-Steel Thickness: As required to comply with specified deflection criteria.

2. Flange Width: 1-5/8-inches.

3. Web: Punched.

B. Steel Track: Manufacturer's standard U-shaped steel track, unpunched, with straight flanges.

1. Design Uncoated-Steel Thickness: 16-gauge.

2. Flange Width: Manufacturer's standard deep flange.

C. Deflection Track/Compensating Channels: Unpunched, deep leg tracks with straight flanges.

1. Design Uncoated Steel Thickness: 12-gauge.

2. Flange Width: 2-1/2-inch deep flange.

2.03 JOIST FRAMING

A. Steel Joists: Manufacturer's standard C-shaped steel joists, unpunched, with lipped flanges.

1. Design Uncoated-Steel Thickness: As required to comply with specified deflection criteria based on joist depth and spans required.

2. Flange Width: 1-5/8-inch minimum.

B. Steel Joist Track: Manufacturer's standard U-shaped steel joist track, unpunched, with straight flanges.

1. Design Uncoated-Steel Thickness: 16-gauge.

2. Flange Width: 1-5/8-inch minimum.

2.04 FRAMING ACCESSORIES

A. Fabricate steel framing accessories of the same material and finish used for framing members.

2.05 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A36, zinc coated by the hot-dip process according to ASTM A123.

B. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure.

C. Powder-Actuated Anchors: Tempered steel pins with corrosion-resistant plating or coating. ICC Evaluation Service approved.

1. Anchors for Concrete: Minimum 0.145-inch diameter x 1-1/4-inch long pin with premounted 15-mm diameter washer. Hilti X-DNI 32 P8S15 or approved equal.

2. Anchors to Structural Steel: Minimum 0.177-inch diameter shank x ¾-inch long. Hilti “EDS heavy Duty Pins” or approved equal.

D. Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws. Low profile head when used beneath sheathing.

E. Welding Electrodes: Comply with AWS standards.

2.06 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 94-percent zinc dust by content.

B. Non-metallic, Non-shrink Grout: Premixed, non-metallic, non-corrosive, non-staining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C1107, with fluid consistency and a 30-minute working time.

2.07 FABRICATION

A. General: Cold-formed metal framing may be shop- or field-fabricated at Developer Design/Builder’s option. Shop or field fabrication shall comply with the specified requirements.

B. Fabricate cold-formed metal framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations.

1. Fabricate framing assemblies in jig templates.

2. Cut framing members by sawing or shearing; do not torch cut.

3. Fasten cold-formed metal framing members by welding or screw fastening as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install according to cold-formed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening in accordance with manufacturer's recommendations.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or distortion.

C. Fabrication Tolerances: Fabricate assemblies to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8-inch in 10-feet.

1. Spacing: 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 finish materials.

2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8-inch.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements, including installation tolerances and other conditions affecting performance of cold-formed metal framing. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Before sprayed-on fireproofing is applied, attach continuous angles, supplementary framing, or tracks to structural members to receive sprayed-on fireproofing.

B. After sprayed-on fireproofing has been applied, remove only as much fireproofing as required to complete installation without reducing thickness of fireproofing.

C. Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

3.03 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation or it may be field assembled.

B. Install cold-formed metal framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations.

1. Cut framing members by sawing or shearing, no not torch cut.

2. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install according to manufacturer's instructions with screws penetrating joined members by not less than 3 exposed screw threads.

C. Install framing members in one-piece lengths.

D. Provide temporary bracing and leave in place until framing is permanently stabilized.

E. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

F. Erection Tolerances: Install cold-formed metal framing to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8-inch in 10-feet.

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.

3.04 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 24-inches on center for powder-driven anchors, 32-inches on center for expansion anchors.

1. Depth of penetration of mechanical and powder-actuated fasteners into post-tensioned concrete is limited. Obtain allowable depth of penetration of fasteners into post-tensioned concrete from Project structural engineer prior to installation. If greater fastener penetration is required, take precautions to avoid cutting tendons by first locating and marking tendons in areas being penetrated by mechanical and powder-actuated fasteners.

B. Securely seat studs against webs of top and bottom tracks. Fasten both flanges to studs at top and bottom track.

C. Set studs plumb, except as required for diagonal bracing for nonplumb walls or warped surfaces.

D. Align studs vertically where wall framing continuity is interrupted by floor framing. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Anchor studs abutting structural columns or walls to supporting structure.

F. Install headers over wall openings wider than the stud spacing. Locate headers above openings. Fabricate headers of compound shapes, 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.

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.

G. Install supplementary framing, blocking, and bracing in stud framing to support fixtures, equipment, services, casework, furnishings, and similar work requiring attachment to framing.

H. Install horizontal bridging in stud system, spaced in rows not more than 48-inches apart. Fasten at each stud intersection.

I. 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.

3.05 FABRICATED WALL PANEL INSTALLATION

A. Install fabricated wall panels and securely anchor to supporting structure.

B. Erection Tolerances: Bolt or weld wall panels at horizontal and vertical junctures to produce flush, even, true to line joints.

1. Maximum variation in plane and true position between prefabricated assemblies shall not exceed 1/16-inch.

3.06 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 spacing recommended by manufacturer.

B. Install joists bearing on supporting framing, level, straight, and plumb, adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.

1. Install joists over supporting framing with a minimum end bearing of 1-1/2-inches.

2. Reinforce ends of joists with web stiffeners, end clips, joist hangers, steel clip angles, steel stud sections, or as recommended by manufacturer.

C. Space joists not more than 2-inches from abutting walls.

D. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists.

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 by other method recommended by joist manufacturer.

F. Install bridging at each end of joists and at intervals recommended by manufacturer. Fasten at each joist intersection.

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 joint framing assembly.

3.07 FIELD QUALITY CONTROL

A. Testing Agency: A qualified independent testing agency employed and paid for by the County will perform field quality control inspection and testing.

B. Field and shop welds will be subject to inspection and testing.

C. Testing agency will report test results in writing to the Developer Design/Builder and County.

D. Remove and replace work that does not comply with specified requirements.

E. Additional testing will be performed to determine compliance of corrected work with specified requirements.

3.08 REPAIRS AND PROTECTION

A. Galvanizing Repair: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A780.

B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer to ensure that cold formed metal framing is without damage or deterioration at time of Substantial Completion.

3.09 WASTE MANAGEMENT

A. Comply with requirements specified in Section 01 74 19.

B. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION