SECTION 054000 - COLD-FORMED METAL FRAMING

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
	* + 1. RELATED DOCUMENTS
				1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			2. SUMMARY
				1. Section Includes:

Load-bearing wall framing.

Exterior non-load-bearing wall framing.

Interior non-load-bearing wall framing.

Floor joist framing.

Roof rafter framing.

Ceiling joist framing.

Soffit framing.

* + - 1. PREINSTALLATION MEETINGS

Retain "Preinstallation Conference" Paragraph below if Work of this Section is extensive or complex enough to justify a conference.

* + - * 1. Preinstallation Conference: Conduct conference at Project site.

If needed, insert list of conference participants.

**<Insert participants>**.

* + - 1. SUBMITTALS
				1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: For the following:

Cold-formed steel framing materials.

Load-bearing wall framing.

Exterior non-load-bearing wall framing.

Interior non-load-bearing wall framing.

Vertical deflection clips.

Connection components

Single deflection track.

Double deflection track.

Drift clips.

Floor joist framing.

Roof-rafter framing.

Ceiling joist framing.

Soffit framing.

self-drilling screw fasteners.

Post-installed anchors.

Power-actuated anchors.

Sill sealer gasket.

Sill sealer gasket/termite barrier.

USE PARAGRAPH BELOW WITH EPD REQUIREMENT WHEN PROJECT ESTIMATE IS $1M OR MORE.

* + - * 1. Submit an Environmental Product Declaration (EPD) from the manufacturer for steel framing within this specification section, if available. A statement of the contractor’s good faith effort to obtain the EPD shall be provided if not available.

Manufacturer-provided EPDs must be Product Specific Type III (Third-Party Reviewed), in adherence with ISO 14025 *Environmental labels and declarations*, ISO 14044 *Environmental management – Life cycle assessment*, and ISO 21930 *Core rules for environmental product declarations of construction products and services.*

* + - * 1. Shop Drawings: Designate member sizes per Steel Stud Manufacturers Association (SSMA) standard conventions.

Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.

Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

Retain "Delegated-Design Submittal" Paragraph below if design services have been delegated to Contractor.

* + - * 1. Delegated-Design Submittal: Shop drawings and calculations for cold-formed steel framing indicated on Drawings to comply with design loads, include analysis data**[ signed and sealed by an engineer registered in New York State and responsible for their preparation]**.

Coordinate "Qualification Data" Paragraph below with qualification requirements in "Quality Assurance" Article.

* + - * 1. Qualification Data: For testing agency.

Retain "Welding certificates" Paragraph below if retaining "Welding Qualifications" Paragraph in "Quality Assurance" Article.

* + - * 1. Welding certificates.

Retain "Product Certificates" Paragraph below to require submittal of product certificates from manufacturers.

* + - * 1. Product Certificates: For each type of code-compliance certification for studs and tracks.
				2. Product Test Reports: For each listed product, for tests performed by **[manufacturer and witnessed by a qualified testing agency] [a qualified testing agency]**.

Steel sheet.

Expansion anchors.

Power-actuated anchors.

Mechanical fasteners.

Vertical deflection clips.

Horizontal drift deflection clips

Miscellaneous structural clips and accessories.

* + - * 1. Research Reports:

For nonstandard cold-formed steel framing **[post-installed anchors] [and] [power-actuated fasteners]**, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

For sill sealer gasket/termite barrier, showing compliance with ICC-ES AC380.

Design Consultant to review code references and verify that the referenced sections/tables are current. Note that code references shall be based on the current version of the Uniform Code.

Retain "Source quality-control reports" Paragraph below if Contractor is responsible for source quality-control testing and inspecting.

* + - * 1. Source quality-control reports.

Use subparagraph below for projects over $100,000. See Article 1.6. below.

Documentation to confirm compliance with General Conditions Article 25.4 Domestic Steel.

* + - 1. QUALITY ASSURANCE

Retain "Testing Agency Qualifications" Paragraph below if Contractor or manufacturer selects testing agency or if Contractor is required to provide services of a qualified testing agency in "Field Quality Control" Article.

* + - * 1. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

Usually retain "Product Tests" Paragraph below. Retain option if permitted. Insert option for testing ductility if required. See "Mill Certification" Paragraph in "Materials" Article in the Evaluations for more information.

* + - * 1. Product Tests: Mill certificates or data from a qualified independent testing agency**[, or in-house testing with calibrated test equipment,]** indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

Retain "Code-Compliance Certification of Studs and Tracks" Paragraph below for third-party verification that products meet the requirements of model codes and industry standards. Coordinate retained certification program(s) with the member companies in Part 2 "Manufacturers" Article below. See "Code-Compliance Certification Programs" Article in the Evaluations.

* + - * 1. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of **[the Certified Steel Stud Association] [the Steel Framing Industry Association] [or] [the Steel Stud Manufacturers Association]**.

Retain "Welding Qualifications" Paragraph below if shop or field welding is required. If retaining, also retain "Welding certificates" Paragraph in "Informational Submittals" Article.

* + - * 1. Welding Qualifications: Qualify procedures and personnel according to the following:

AWS D1.1, "Structural Welding Code - Steel."

AWS D1.3, "Structural Welding Code - Sheet Steel."

Use paragraph below for projects over $100,000. Paragraph is taken from Article 25.4 of the General Conditions.

* + - * 1. If the value of the contract exceeds $100,000 all structural steel, reinforcing steel and other major steel items to be incorporated in the Work of this Contract shall be produced and made in whole or substantial part in the United States, its territories or possessions.

Consider retaining paragraph below if Project is limited to one- and two-family residential construction, framing is fully detailed, and this AISI document is acceptable to authorities having jurisdiction.

* + - * 1. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."
1. PRODUCTS

Manufacturers and products listed in SpecAgent and MasterWorks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications.

* + - 1. MANUFACTURERS
				1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

ClarkDietrich.

MarinoWARE.

Super Stud Building Products Inc.

The Steel Network, Inc.

Approved equivalent.

* + - 1. PERFORMANCE REQUIREMENTS

Retain "Delegated Design" and "Structural Performance" paragraphs below if Contractor is required to assume responsibility for design. Coordinate this article with other Part 2 articles, deleting prescriptive requirements, such as steel thickness and minimum yield strength unless imposing minimum design restrictions. Insert other performance and design criteria below to suit Project, or add them to Drawings.

* + - * 1. Delegated Design: Engage a qualified professional engineer, licensed and registered to practice in New York State, to design cold-formed steel framing.
				2. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.

Design Parameters and Loads: **[As indicated on Drawings] <Insert design loads>**.

Deflection Limits: Design framing systems to withstand**[ design loads]** without deflections greater than the following:

Component deflection limits in first seven subparagraphs below are examples only. Retain deflection limits in applicable subparagraphs, or insert other limits as appropriate for wall, floor, and ceiling finish materials.

Exterior Load-Bearing Wall Framing: Horizontal deflection of **[1/240] [1/360] [1/600] [1/720]** of the wall height.

Interior Load-Bearing Wall Framing: Horizontal deflection of **[1/240] [1/360]** of the wall height under a horizontal load of 5 lbf/sq. ft..

Exterior Non-Load-Bearing Framing: Horizontal deflection of **[1/240] [1/360] [1/600] [1/720]** of the wall height.

Interior Non-Load-Bearing Framing: Horizontal deflection of **[1/240] [1/360]** of the wall height under a horizontal load of 5 lbf/sq. ft..

Floor Joist Framing: Vertical deflection of **[1/360] [1/480]** for live loads and l/240 for total loads of the span.

Roof Rafter Framing: Vertical deflection of **[1/120] [1/240] [1/360]** of the horizontally projected span for live loads.

Ceiling Joist Framing: Vertical deflection of **[1/120] [1/240] [1/360]** of the span for live loads and 1/240 for total loads of the span.

Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.

Retain first subparagraph below for non-load-bearing and load-bearing walls if design responsibility for cold-formed framing is delegated to Contractor. Indicate locations on Drawings if different movement is anticipated for different building elements. If preferred, change deflection limits to ratios, such as L/300 for floors and L/200 for roofs.

Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

Upward and downward movement of **[1/2 inch] [3/4 inch] [1 inch] [1-1/2 inches]**.

Usually retain subparagraph below for exterior non-load-bearing wall framing, particularly for brick-veneer backup framing.

Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

Retain "Cold-Formed Steel Framing Standards" Paragraph below whether delegating design or prescriptively specifying cold-formed steel framing; revise to suit Project.

* + - * 1. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:

Retain subparagraphs below, as applicable, if Project includes floor and roof systems, wall studs, headers for load-bearing walls, or lateral design requirements.

Floor and Roof Systems: AISI S210.

Wall Studs: AISI S211.

Headers: AISI S212.

Lateral Design: AISI S213.

Retain "Fire-Resistance Ratings" Paragraph below only if products specified are part of a fire-resistance-rated assembly. Indicate rating, testing agency, and testing agency's design designation on Drawings.

* + - * 1. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

* + - 1. COLD-FORMED STEEL FRAMING MATERIALS

Retain this article to supplement specific framing articles that follow.

* + - * 1. Steel Sheet: ASTM A1003, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

Retain minimum grade requirements from options in "Grade" Subparagraph below. If more than one grade option is required, indicate location of each on Drawings.

Grade: **[ST33H] [ST50H] [As required by structural performance]**.

Minimum coating requirement for Structural Grade, Type H steel is G60 or equivalent. Retain first option in "Coating" Subparagraph below if ASTM A1003's designation of minimum coating thicknesses is required. This minimum coating designation assumes normal exposure conditions and construction practices. When more severe exposure conditions are probable, for example, in coastal areas, consider specifying a heavier coating. BIA recommends G90 coating for stud backup applications. Verify availability of heavier-coated steel. If more than one coating designation is required, indicate location of each on Drawings or by inserts.

Coating: **[G60, A60, AZ50, or GF30] [G90 or equivalent]**.

Retain "Steel Sheet for (Vertical Deflection) (Drift) Clips" Paragraph below if applicable.

* + - * 1. Steel Sheet for **[Vertical Deflection] [Drift]** Clips: ASTM A653, structural steel, zinc coated, of grade and coating as follows:

Grade: **[33] [50, Class 1] [As required by structural performance] <Insert grade>**.

Coating: **[G60] [G90]**.

* + - 1. LOAD-BEARING WALL FRAMING

Retain this article if load-bearing steel studs are required. Distinguish location of axial load-bearing framing from exterior non-load-bearing wall framing in paragraphs below or on Drawings. Indicate stud and track web depth on Drawings or insert in paragraphs below.

* + - * 1. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

Steel-thickness sequence in "Minimum Base-Metal Thickness" Subparagraph below corresponds to common thickness designators 33, 43, 54, 68, and 97 and obsolete 20-, 18-, 16-, 14-, and 12-gauge designations. If retaining different thicknesses for different components, indicate locations here or in framing articles below.

Minimum Base-Metal Thickness: **[0.0329 inch** **(20 ga)] [0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)]**.

Flange-width sequence in "Flange Width" Subparagraph below corresponds to common flange-width designators 137, 162, 200, and 250. Flange widths may vary with application. If sheathing or masonry ties are required, consider minimum flange width of 1-5/8 inches.

Flange Width: **[1-3/8 inches (137)] [1-5/8 inches (162)] [2 inches (200)] [2-1/2 inches (250)]**.

Retain "Section Properties" Subparagraph below if not delegating design responsibility to Contractor. If retaining, indicate whether design is based on gross or effective section properties.

Section Properties: **<Insert minimum allowable calculated section modulus, moment of inertia, and allowable moment>**.

* + - * 1. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:

Steel-thickness sequence in "Minimum Base-Metal Thickness" Subparagraph below corresponds to common thickness designators 33, 43, 54, 68, and 97 and obsolete 20-, 18-, 16-, 14-, and 12-gauge designations.

Minimum Base-Metal Thickness: **[0.0329 inch (20 ga)] [0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)] [Matching steel studs].**

**Flange Width: [1-1/4 inches (125)] <Insert dimension if manufacturer's standard width is insufficient>**.

* + - * 1. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:

Steel-thickness sequence in "Minimum Base-Metal Thickness" Subparagraph below corresponds to common thickness designators 33, 43, 54, 68, and 97 and obsolete 20-, 18-, 16-, 14-, and 12-gauge designations. If retaining different thicknesses for different locations, indicate locations here or in the framing articles below.

Minimum Base-Metal Thickness: **[0.0329 inch (20 ga)] [0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)]**.

Flange widths may vary with application; coordinate with wall width.

Flange Width: **[1-3/8 inches (137)] [1-5/8 inches (162)] [2 inches (200)] [2-1/2 inches (250)]**.

Retain "Section Properties" Subparagraph below if not delegating design responsibility to Contractor. If retaining, indicate whether design is based on gross or effective section properties.

Section Properties: **<Insert minimum allowable calculated section modulus, moment of inertia, and allowable moment>**.

* + - * 1. Steel Single- or Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths indicated, and as follows:

Steel-thickness sequence in "Minimum Base-Metal Thickness" Subparagraph below corresponds to common thickness designators 33, 43, 54, 68, and 97 and obsolete 20-, 18-, 16-, 14-, and 12-gauge designations. If retaining different thicknesses for different locations, indicate locations here or in framing articles below.

Minimum Base-Metal Thickness: **[0.0329 inch (20 ga)] [0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)]**.

First option in "Top Flange Width" Subparagraph below is minimum top flange width recognized by AISI S212. Coordinate with wall width.

Top Flange Width: **[1-1/2 inches (150)] [1-5/8 inches (162)] [2 inches (200)] [2-1/2 inches (250] <Insert dimension>**.

Retain "Section Properties" Subparagraph below if not delegating design responsibility to Contractor. If retaining, indicate whether design is based on gross or effective section properties.

Section Properties: **<Insert minimum allowable calculated section modulus, moment of inertia, and allowable moment>**.

* + - 1. EXTERIOR NON-LOAD-BEARING WALL FRAMING

Retain this article if exterior non-load-bearing wall framing, sometimes called "curtain-wall" framing by manufacturers, is required. Indicate stud and track web depth on Drawings or insert here.

* + - * 1. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

Steel-thickness sequence in "Minimum Base-Metal Thickness" Subparagraph below corresponds to common thickness designators 33, 43, 54, 68, and 97 and obsolete 20-, 18-, 16-, 14-, and 12-gauge designations.

Minimum Base-Metal Thickness: **[0.0329 inch (20 ga)] [0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)]**.

Flange-width sequence in "Flange Width" Subparagraph below corresponds to common flange-width designators 137, 162, 200, and 250. Flange widths may vary with application. If sheathing or masonry ties are required, consider minimum flange width of 1-5/8 inches.

Flange Width: **[1-3/8 inches (137)] [1-5/8 inches (162)] [2 inches (200)] [2-1/2 inches (250)]**.

Retain "Section Properties" Subparagraph below if not delegating design responsibility to Contractor. If retaining, indicate whether design is based on gross or effective section properties.

Section Properties: **<Insert minimum allowable calculated section modulus, moment of inertia, and allowable moment>**.

* + - * 1. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

Steel-thickness sequence in "Minimum Base-Metal Thickness" Subparagraph below corresponds to common thickness designators 33, 43, 54, 68, and 97 and obsolete 20-, 18-, 16-, 14-, and 12-gauge designations.

Minimum Base-Metal Thickness: **[0.0329 inch (20 ga)] [0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)] [Matching steel studs].**

Flange Width: **[1-1/4 inches (125)] <Insert dimension if manufacturer's standard width is insufficient>**.

Retain "Vertical Deflection Clips," "Single Deflection Track," or "Double Deflection Tracks" Paragraph below for components to cope with vertical deflection of the primary structure. If more than one type is required, indicate the location of each on Drawings or by inserts

Retain "Vertical Deflection Clips" Paragraph below if required; revise to add displacement if deflection of primary structure is not indicated or if "Performance Requirements" Article is deleted.

* + - * 1. Vertical Deflection Clips: Manufacturer's standard **[bypass] [head]** clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

ClarkDietrich.

MarinoWARE.

Simpson Strong-Tie Co., Inc.

The Steel Network, Inc.

Approved equivalent.

Retain "Single Deflection Track" Paragraph below if required. Revise description, as applicable, if limiting types of single-leg track.

* + - * 1. 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 loads and transfer them to the primary structure, and as follows:

Steel-thickness sequence in "Minimum Base-Metal Thickness" Subparagraph below corresponds to common thickness designators 43, 54, 68, and 97 and obsolete 18-, 16-, 14-, and 12-gauge designations. Deflection track flange is usually designed to be thicker than corresponding studs to resist transverse loading. Coordinate flange width with deflection of primary structure to ensure that structure does not bear on framing.

Minimum Base-Metal Thickness: **[0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)]**.

Flange Width: **[1 inch (100) plus the design gap for one-story structures] [and] [1 inch plus twice the design gap for other applications]**.

* + - * 1. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

Steel-thickness sequence in "Outer Track" Subparagraph below corresponds to common thickness designators 43, 54, 68, and 97 and obsolete 18-, 16-, 14-, and 12-gauge designations. Deflection track flange is usually designed to be thicker than corresponding studs to resist transverse loading. Coordinate flange width with deflection of primary structure to ensure that structure does not bear on framing.

Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

Minimum Base-Metal Thickness: **[0.0329 inch (20 ga)] [0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)]**.

Flange Width: **[1 inch (100) plus the design gap for one-story structures] [and] [1 inch plus twice the design gap for other applications]**.

Inner Track: Of web depth indicated, and as follows:

Minimum Base-Metal Thickness: **[0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)]**.

Flange Width: **<Insert dimension equal to sum of outer deflection track flange width plus 1 inch>**.

Retain "Drift Clips" Paragraph below if drift clips are required to accommodate horizontal and vertical deflection of the primary structure.

* + - * 1. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.
			1. INTERIOR NON-LOAD-BEARING WALL FRAMING

Retain this article if interior non-load-bearing wall framing that exceeds the height limitations of standard, nonstructural metal framing is required. Indicate stud and track web depth on Drawings or insert here.

* + - * 1. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

Steel-thickness sequence in "Minimum Base-Metal Thickness" Subparagraph below corresponds to common thickness designators 33, 43, 54, 68, and 97 and obsolete 20-, 18-, 16-, 14-, and 12-gauge designations.

Minimum Base-Metal Thickness: **[0.0329 inch (20 ga)] [0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)]**.

Flange-width sequence in "Flange Width" Subparagraph below corresponds to common flange-width designators 137, 162, 200, and 250. Flange widths may vary with application. If sheathing or masonry ties are required, consider minimum flange width of 1-5/8 inches.

Flange Width: **[1-3/8 inches (137)] [1-5/8 inches (162)] [2 inches (200)] [2-1/2 inches (250)] <Insert dimension>**.

Retain "Section Properties" Subparagraph below if not delegating design responsibility to Contractor. If retaining, indicate whether design is based on gross or effective section properties.

Section Properties: **<Insert minimum allowable calculated section modulus, moment of inertia, and allowable moment>**.

* + - * 1. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

Steel-thickness sequence in "Minimum Base-Metal Thickness" Subparagraph below corresponds to common thickness designators 33, 43, 54, 68, and 97 and obsolete 20-, 18-, 16-, 14-, and 12-gauge designations.

Minimum Base-Metal Thickness: **[0.0329 inch (20 ga)] [0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)] [Matching steel studs]**.

Flange Width: **[1-1/4 inches (125)] <Insert dimension if manufacturer's standard width is insufficient>**.

Retain "Vertical Deflection Clips," "Single Deflection Track," or "Double Deflection Tracks" Paragraph below for components to cope with vertical deflection of the primary structure. If more than one type is required, indicate the location of each on Drawings or by inserts

Retain "Vertical Deflection Clips" Paragraph below if required; revise to add displacement if deflection of primary structure is not indicated or if "Performance Requirements" Article is deleted.

* + - * 1. Vertical Deflection Clips: Manufacturer's standard **[bypass] [head]** clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

ClarkDietrich.

MarinoWARE.

Simpson Strong-Tie Co., Inc.

The Steel Network, Inc.

Approved equivalent.

Retain "Single Deflection Track" Paragraph below if required. Revise description, as applicable, if limiting types of single-leg track.

* + - * 1. 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 loads and transfer them to the primary structure, and as follows:

Steel-thickness sequence in "Minimum Base-Metal Thickness" Subparagraph below corresponds to common thickness designators 43, 54, 68, and 97 and obsolete 18-, 16-, 14-, and 12-gauge designations. Deflection track flange is usually designed to be thicker than corresponding studs to resist transverse loading. Coordinate flange width with deflection of primary structure to ensure that structure does not bear on framing.

Minimum Base-Metal Thickness: **[0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)]**.

Flange Width: **[1 inch (100) plus the design gap for one-story structures] [and] [1 inch (100) plus twice the design gap for other applications]**.

* + - * 1. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

Steel-thickness sequence in "Outer Track" Subparagraph below corresponds to common thickness designators 43, 54, 68, and 97 and obsolete 18-, 16-, 14-, and 12-gauge designations. Deflection track flange is usually designed to be thicker than corresponding studs to resist transverse loading. Coordinate flange width with deflection of primary structure to ensure that structure does not bear on framing.

Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

Minimum Base-Metal Thickness: **[0.0329 inch (20 ga)] [0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)]**.

Flange Width: **[1 inch (100) plus the design gap for one-story structures] [and] [1 inch (100) plus twice the design gap for other applications]**.

Inner Track: Of web depth indicated, and as follows:

Minimum Base-Metal Thickness: **[0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)]**.

Flange Width: **<Insert dimension equal to sum of outer deflection track flange width plus 1 inch>**.

Retain "Drift Clips" Paragraph below if drift clips are required to accommodate horizontal and vertical deflection of the primary structure.

* + - * 1. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.
			1. FLOOR JOIST FRAMING

Retain this article if steel joists are required. If joist and joist-track depth are not indicated, revise paragraphs below and insert depth required.

* + - * 1. Steel Joists: Manufacturer's standard C-shaped steel joists, of web depths indicated, **[unpunched,] [punched with standard holes,] [punched with enlarged service holes,]** with stiffened flanges, and as follows:

Steel-thickness sequence in "Minimum Base-Metal Thickness" Subparagraph below corresponds to common thickness designators 33, 43, 54, 68, and 97 and obsolete 20-, 18-, 16-, 14-, and 12-gauge designations.

Minimum Base-Metal Thickness: **[0.0329 inch (20 ga)] [0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)]**.

Flange-width sequence in "Flange Width" Subparagraph below corresponds to common flange-width designators 162, 200, and 250. Flange widths may vary with application.

Flange Width: **[1-5/8 inches (162)] [2 inches (200)] [2-1/2 inches (250)]**, minimum.

Retain "Section Properties" Subparagraph below if not delegating design responsibility to Contractor. If retaining, indicate whether design is based on gross or effective section properties.

Section Properties: **<Insert minimum allowable calculated section modulus, moment of inertia, and allowable moment>**.

Revise "Steel Joist Track" Paragraph below to include descriptions of other related components, such as headers or other built-up members, at openings or other terminations.

* + - * 1. Steel Joist Track: Manufacturer's standard U-shaped steel joist track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

Steel-thickness sequence in "Minimum Base-Metal Thickness" Subparagraph below corresponds to common thickness designators 33, 43, 54, 68, and 97 and obsolete 20-, 18-, 16-, 14-, and 12-gauge designations.

Minimum Base-Metal Thickness: **[0.0329 inch (20 ga)] [0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)] [Matching steel joists]**.

Flange-width sequence in "Flange Width" Subparagraph below corresponds to common flange-width designators 125, 150, and 200. Flange widths may vary with application.

Flange Width: **[1-1/4 inches (125)] [1-1/2 inches (150)] [2 inches (200)]**, minimum.

* + - 1. ROOF-RAFTER FRAMING

Retain this article if steel rafters are required. If rafter web depth is not indicated, revise "Steel Rafters" Paragraph below and insert depth required.

* + - * 1. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

Steel-thickness sequence in "Minimum Base-Metal Thickness" Subparagraph below corresponds to common thickness designators 33, 43, 54, 68, and 97 and obsolete 20-, 18-, 16-, 14-, and 12-gauge designations.

Minimum Base-Metal Thickness: **[0.0329 inch (20 ga)] [0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)]**.

Flange-width sequence in "Flange Width" Subparagraph below corresponds to common flange-width designators 162, 200, and 250. Flange widths may vary with application.

Flange Width: **[1-5/8 inches (162)] [2 inches (200)] [2-1/2 inches (250)]**, minimum.

Retain "Section Properties" Subparagraph below if not delegating design responsibility to Contractor. If retaining, indicate whether design is based on gross or effective section properties.

Section Properties: **<Insert minimum allowable calculated section modulus, moment of inertia, and allowable moment>**.

* + - 1. CEILING JOIST FRAMING

Retain this article if steel joists are required. If joist and joist-track depth is not indicated, revise "Steel Ceiling Joists" Paragraph below and insert depth required.

* + - * 1. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, **[unpunched,] [punched with standard holes,] [punched with enlarged service holes,]** with stiffened flanges, and as follows:

Steel-thickness sequence in "Minimum Base-Metal Thickness" Subparagraph below corresponds to common thickness designators 33, 43, 54, 68, and 97 and obsolete 20-, 18-, 16-, 14-, and 12-gauge designations.

Minimum Base-Metal Thickness: **[0.0329 inch (20 ga)] [0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)]**.

Flange-width sequence in "Flange Width" Subparagraph below corresponds to common flange-width designators 162, 200, and 250. Flange widths may vary with application.

Flange Width: **[1-5/8 inches (162)] [2 inches (200)] [2-1/2 inches (250)]**, minimum.

Retain "Section Properties" Subparagraph below if not delegating design responsibility to Contractor. If retaining, indicate whether design is based on gross or effective section properties.

Section Properties: **<Insert minimum allowable calculated section modulus, moment of inertia, and allowable moment>**.

* + - 1. SOFFIT FRAMING

Retain this article if soffit framing is required. If soffit frame web depth is not indicated, revise "Exterior Soffit Frame" Paragraph below and insert depth required.

* + - * 1. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

Steel-thickness sequence in "Minimum Base-Metal Thickness" Subparagraph below corresponds to common thickness designators 33, 43, 54, 68, and 97 and obsolete 20-, 18-, 16-, 14-, and 12-gauge designations.

Minimum Base-Metal Thickness: **[0.0329 inch (20 ga)] [0.0428 inch (18 ga)] [0.0538 inch (16 ga)] [0.0677 inch (14 ga)] [0.0966 inch (12 ga)]**.

Flange-width sequence in "Flange Width" Subparagraph below corresponds to common flange-width designators 162, 200, and 250. Flange widths may vary with application.

Flange Width: **[1-5/8 inches (162)] [2 inches (200)] [2-1/2 inches (250)]**, minimum.

Retain "Section Properties" Subparagraph below if not delegating design responsibility to Contractor. If retaining, indicate whether design is based on gross or effective section properties.

Section Properties: **<Insert minimum allowable calculated section modulus, moment of inertia, and allowable moment>**.

* + - 1. FRAMING ACCESSORIES

Revise minimum yield strength of accessories as required.

* + - * 1. Fabricate steel-framing accessories from ASTM A1003, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
				2. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

Revise list below to suit Project.

Supplementary framing.

Bracing, bridging, and solid blocking.

Web stiffeners.

Anchor clips.

End clips.

Foundation clips.

Gusset plates.

Stud kickers and knee braces.

Joist hangers and end closures.

Hole-reinforcing plates.

Backer plates.

* + - 1. ANCHORS, CLIPS, AND FASTENERS

Retain "Steel Shapes and Clips" Paragraph below if rolled steel shapes and clips are required and are not specified in another Section.

* + - * 1. Steel Shapes and Clips: ASTM A36, zinc coated by hot-dip process according to ASTM A123.

Retain grade of anchor bolt, head type, and type of protective coating from "Anchor Bolts" Paragraph below. Revise if using high-strength, low-alloy anchor bolts.

* + - * 1. Anchor Bolts: ASTM F1554, **[Grade 36] [Grade 55]**, threaded carbon-steel **[hex-headed bolts,] [headless, hooked bolts,] [headless bolts, with encased end threaded,]** carbon-steel nuts, and flat, hardened-steel washers; zinc coated by **[hot-dip process according to ASTM A153, Class C] [mechanically deposition according to ASTM B695, Class 50]**.

UNIFORM CODE-ES AC01 and UNIFORM CODE-ES AC193 are for expansion anchors in masonry and mechanical anchors in concrete respectively, and UNIFORM CODE-ES AC58 and UNIFORM CODE-ES AC308 are for adhesive anchors in masonry and concrete. Do not use expansion-type anchors where expansion can cause damage to the substrate material.

* + - * 1. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on **[ICC-ES AC01] [ICC-ES AC193] [ICC-ES AC58] [or] [ICC-ES AC308]** as appropriate for the substrate.

Uses: Securing cold-formed steel framing to structure.

Retain "Type" Subparagraph below to restrict type of anchor if required.

Type: Torque-controlled expansion anchor or torque-controlled adhesive anchor.

Material in "Material for Interior Locations" Subparagraph below protects against corrosion in an indoor atmosphere.

Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.

Alloy Group 1 (A1) refers to Type 304 and similar alloys, and Alloy Group 2 (A4) refers to Type 316 and similar alloys.

Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy **[Group 1] [Group 2]** stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

Retain "Power-Actuated Anchors" Paragraph below if power-actuated fasteners are acceptable. Verify with Director’s Representative.

* + - * 1. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
				2. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

* + - * 1. Welding Electrodes: Comply with AWS standards.
			1. MISCELLANEOUS MATERIALS
				1. Galvanizing Repair Paint: **[ASTM A780] [MIL-P-21035B] [or] [SSPC-Paint 20]**.

Retain "Cement Grout" or "Nonmetallic, Nonshrink Grout" Paragraph below if concrete or masonry substrates require leveling before setting track or prefabricated assemblies.

* + - * 1. Cement Grout: Portland cement, ASTM C150, Type I; and clean, natural sand, ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
				2. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107, and with a fluid consistency and 30-minute working time.
				3. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.
				4. Sill Sealer Gasket: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.
				5. Sill Sealer Gasket/Termite Barrier: Minimum 68-mil nominal thickness, self-adhering sheet consisting of 64 mils of rubberized asphalt laminated on one side to a 4-mil- thick, polyethylene-film reinforcement, and with release liner on adhesive side**[; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction]**.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Polyguard Products, Inc.

Approved equivalent.

Physical Properties:

Peel Adhesion: 17.0 lb/in of width when tested in accordance with ASTM D412.

Low-Temperature Flexibility: Pass at minus 25 deg FASTM D146.

Water Vapor Permeance: 0.05 perm maximum when tested in accordance with ASTM E96, Method B.

Resistance to Termite Penetration: Comply with ICC-ES AC380.

* + - 1. FABRICATION

Retain this article for examples of shop or field fabrication, including panelized load-bearing and non-load-bearing walls.

* + - * 1. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

Fabricate framing assemblies using jigs or templates.

Cut framing members by sawing or shearing; do not torch cut in the field.

Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.

Retain subparagraph below if fabricated assemblies include other materials; revise to suit Project.

Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

* + - * 1. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.

Revise "Tolerances" Paragraph below to suit Project.

* + - * 1. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:

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 finishing materials.

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

1. EXECUTION
	* + 1. EXAMINATION
				1. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
				2. Proceed with installation only after unsatisfactory conditions have been corrected.
			2. PREPARATION

Retain first two paragraphs below if sprayed fire-resistive materials are required.

* + - * 1. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
				2. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.

Retain first paragraph below if bottom track of load-bearing walls requires a uniform-bearing surface on concrete or masonry construction.

* + - * 1. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.

Retain one of two paragraphs below if sealing the gap between framing and concrete or masonry construction.

* + - * 1. Install sill sealer gasket at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.
				2. Install sill sealer gasket/termite barrier in accordance with manufacturer's written instructions at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.
			1. INSTALLATION, GENERAL

Retain this article with each specific framing classification in installation articles below.

* + - * 1. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
				2. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.

Retain first paragraph below for shop- or field-fabricated wall panels.

* + - * 1. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

* + - * 1. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

Cut framing members by sawing or shearing; do not torch cut in the field.

Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.

* + - * 1. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
				2. Install temporary bracing and supports to secure framing and support loads equal 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.

Include details on Drawings showing expansion-joint construction and locations.

* + - * 1. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

Retain first paragraph below if insulation within framing assemblies is required.

* + - * 1. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
				2. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
			1. INSTALLATION OF LOAD-BEARING WALL FRAMING

If this article is required, retain with "Installation, General" Article.

* + - * 1. 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:

Retain option in "Anchor Spacing" Subparagraph below to suit requirements and type of anchor.

Anchor Spacing: **[24 inches] [32 inches] [To match stud spacing] [As shown on Shop Drawings]**.

* + - * 1. Squarely seat studs against top and bottom tracks, with gap not exceeding 1/8 inch 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:

Stud Spacing: **[12 inches] [16 inches] [19.2 inches] [24 inches] [As indicated on Drawings]**.

* + - * 1. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.
				2. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
				3. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.
				4. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure.
				5. Install headers over wall openings wider than stud spacing. Locate headers above openings. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

Frame wall openings with not less than a double stud at each jamb of frame. Fasten jamb members together to uniformly distribute loads.

Install 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.

* + - * 1. 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.

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.

* + - * 1. Install horizontal bridging in stud system, spaced vertically **[48 inches] [as indicated on Drawings] [as indicated on Shop Drawings]**. Fasten at each stud intersection.

Retain type of bridging required from three subparagraphs below or revise to suit Project. Insert locations if more than one type of bridging is required. Insert minimum size of flat steel strap, such as 1-1/2 (150) by 0.0329 inch(20 ga), if default size is required.

Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches deep.

Strap 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.

Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

Retain first paragraph below if required. Description below usually applies to shear walls. Revise bracing type and reinforcement at terminations to suit Project. Insert track reinforcing or gusset plate requirements to Drawings if applicable, particularly for shear walls. If sheathing provides bracing to one or both stud flanges, revise to suit Project.

* + - * 1. 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.
				2. 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.
			1. INSTALLATION OF EXTERIOR NONLOADBEARING WALL FRAMING
				1. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

Retain fastening of studs to top track only if required. Do not fasten studs to deflection track, such as in infill wall framing.

* + - * 1. Fasten both flanges of studs to[ top and] bottom track unless otherwise indicated. Space studs as follows:

Stud Spacing: **[12 inches] [16 inches] [19.2 inches] [24 inches] [As indicated on Drawings]**.

* + - * 1. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

Indicate isolation details on Drawings or insert detailed description here.

* + - * 1. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

Retain one of first two subparagraphs below if using deflection track with infill wall framing. Delete both subparagraphs and retain third if deflection clips are required for bypassing or infill wall framing. Vertical deflection clips are used if wall is stick built or panelized. Single deflection track is used if stud wall is stick built; double deflection track is used with wall panels. Drift clips may be used in seismic areas.

Install single deep-leg deflection tracks and anchor to building structure.

Install double deep-leg deflection tracks and anchor outer track to building structure.

Connect vertical deflection clips to **[bypassing] [infill]** studs and anchor to building structure.

Connect drift clips to cold-formed steel framing and anchor to building structure.

* + - * 1. Install horizontal bridging in wall studs, spaced vertically in rows indicated**[ on Shop Drawings]** but not more than 48 inches apart. Fasten at each stud intersection.

Retain type of bridging required from three subparagraphs below or revise to suit Project. Insert locations if more than one type of bridging is required. Insert minimum size of flat steel strap, such as 1-1/2(150) by 0.0329 inch(20 ga), if default size is required.

Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.

Strap 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.

Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

Retain "Top Bridging for Single Deflection Track" Subparagraph below if required.

* + - * 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within **[12 inches] [18 inches]** of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

Install solid blocking at **[96-inch centers] [centers indicated] [centers indicated on Shop Drawings]**.

* + - * 1. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.
			1. INSTALLATION OF INTERIOR NONLOADBEARING WALL FRAMING

If this article is required for non-load-bearing wall framing that exceeds the height limitations of standard, nonstructural metal framing, retain with "Installation, General" Article.

* + - * 1. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

Retain fastening of studs to top track only if required. Do not fasten studs to deflection track.

* + - * 1. Fasten both flanges of studs to**[ top and]** bottom track unless otherwise indicated. Space studs as follows:

Stud Spacing: **[12 inches] [16 inches] [19.2 inches] [24 inches] [As indicated on Drawings]**.

* + - * 1. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

Indicate isolation details on Drawings or insert detailed description here.

* + - * 1. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

Retain one of first two subparagraphs below if using deflection track. Delete both subparagraphs and retain third if deflection clips are required. Vertical deflection clips are used if wall is stick built or panelized. Single deflection track is used if stud wall is stick built; double deflection track is used with wall panels. Drift clips may be used in seismic areas.

Install single deep-leg deflection tracks and anchor to building structure.

Install double deep-leg deflection tracks and anchor outer track to building structure.

Connect vertical deflection clips to studs and anchor to building structure.

Connect drift clips to cold-formed steel metal framing and anchor to building structure.

* + - * 1. Install horizontal bridging in wall studs, spaced vertically in rows indicated**[ on Shop Drawings]** but not more than 48 inches apart. Fasten at each stud intersection.

Retain type of bridging required from three subparagraphs below or revise to suit Project. Insert locations if more than one type of bridging is required. Insert minimum size of flat steel strap, such as 1-1/2 (150) by 0.0329 inch (20 ga), if default size is required.

Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.

Strap 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.

Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

Retain "Top Bridging for Single Deflection Track" Subparagraph below if required.

* + - * 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within **[12 inches] [18 inches]** of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

Install solid blocking at **[96-inch centers] [centers indicated] [centers indicated on Shop Drawings]**.

* + - * 1. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.
			1. INSTALLATION OF JOIST FRAMING
				1. 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].
				2. 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.

Revise minimum end bearing in first subparagraph below if joists bearing on flange of joist track are acceptable. Web stiffeners will usually be required to reinforce the joist web.

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

Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections.

* + - * 1. Space joists not more than 2 inches from abutting walls, and as follows:

Joist Spacing: **[12 inches] [16 inches] [19.2 inches] [24 inches] [As indicated on Drawings]**.

* + - * 1. Frame openings with built-up joist headers, consisting of joist and joist track or another combination of connected joists if indicated.

Retain first paragraph below if joist reinforcement is required.

* + - * 1. 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.

Install web stiffeners to transfer axial loads of walls above.

* + - * 1. Install bridging at intervals indicated**[ on Shop Drawings]**. Fasten bridging at each joist intersection as follows:

Retain type of bridging required from two subparagraphs below or revise to suit Project. Insert locations if more than one type of bridging is required. Insert minimum size of flat steel strap, such as 1-1/2 (150) by 0.0329 inch(20 ga), if default size is required. Revise if also fastening flat steel strap bridging to top flange of joists.

Joist-Track Solid Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.

Combination 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.

* + - * 1. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
				2. 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.

Insert additional article titles here if other framing classifications warrant more detailed installation requirements than those in "Installation, General" Article.

* + - 1. <Insert requirements>
			2. INSTALLATION TOLERANCES

Revise paragraph below to suit Project. Coordinate with limitations of subsequent finish materials.

* + - * 1. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

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.

* + - 1. REPAIR

Retain "Galvanizing Repairs" Paragraph below if applicable.

* + - * 1. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.
			1. FIELD QUALITY CONTROL
				1. Special Inspections: Director’s Representative will engage a special inspector and a qualified testing agency to perform tests and inspections in accordance with the requirements of BDC 406 Summary of Special Inspections and BDC 406.1 Statement of Special Inspections and as directed by the Code Compliance Manager.
				2. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
				3. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
			2. PROTECTION
				1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000