PRESCRIPTIVE METHOD FOR RESIDENTIAL COLD-FORMED STEEL FRAMING

Second Edition

Prepared for

The U.S. Department of Housing
and Urban Development
Office of Policy Development and Research
Washington, DC

Co-Sponsored by
The American Iron and Steel Institute
Washington, DC

and

The National Association of Home Builders
Washington, DC

by

NAHB Research Center, Inc.
400 Prince George's Boulevard
Upper Marlboro, MD 20774-8731

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Disclaimer

While the material presented in this document has been prepared in accordance with recognized engineering principles and sound judgment, this document should not be used without first securing competent advice regarding its suitability for any specific application. **The use of this document is subject to approval by the local code authority**. Although the information in this document is believed to be accurate, neither the authors, nor reviewers, nor the U.S. Department of Housing and Urban Development of the U.S. Government, nor the American Iron and Steel Institute, nor the NAHB Research Center, nor any of their employees or representatives makes any warranty, guarantee, or representation, expressed or implied, with respect to the accuracy, effectiveness, or usefulness of any information, method, or material in this document, nor assumes any liability for the use of any information, methods, or materials disclosed herein, or for damages arising from such use.

Foreword

For centuries homebuilders in the United States have made wood their material of choice because of its satisfactory performance, abundant supply, and relatively low cost. However, recent increases and unpredictable fluctuations in the price of framing lumber, as well as concerns with its quality, are causing builders and other providers of affordable housing to seek alternative building products.

Use of cold-formed steel framing in the residential market has increased over the past several years. Its price stability; consistent quality; similarity to conventional framing; success in the commercial market; and resistance to fire, rot, and termites have attracted the attention of many builders and designers. But lack of prescriptive construction requirements has prevented this alternative material from gaining wider acceptance among homebuilders and code officials.

This second edition of the *Prescriptive Method for Residential Cold-Formed Steel Framing* is the result of a 4-year research and development program sponsored by the U.S. Department of Housing and Urban Development (HUD) through a cooperative agreement with the National Association of Home Builders (NAHB) and the American Iron and Steel Institute (AISI). The program was conducted by the NAHB Research Center with assistance from steering, advisory, and engineering committees. These committees represented the interests and expertise of steel manufacturers, steel producers, code officials, academics, researchers, professional engineers, and builders experienced in cold-formed steel framing.

By facilitating the construction of steel-framed housing, this report and the companion volume, *Commentary on the Prescriptive Method for Residential Cold-Formed Steel Framing,* expand housing affordability through competition from new methods and materials. It also provides cold-formed steel suppliers and consumers with standardized requirements for steel framing materials that will enhance market acceptance and promote consistent user application. Finally, the report provides code officials and inspectors with the guidance necessary to perform their duties in the home construction process when cold-formed steel is utilized.

Paul A. Leonard
Deputy Assistant Secretary for
Policy Development

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Executive Summary

The *Prescriptive Method for Residential Cold-Formed Steel Framing (Prescriptive Method)* was developed as a guideline for the construction of one- and two-family residential dwellings using cold-formed steel framing. It provides a complete prescriptive approach to build typical homes with cold-formed steel framing. This document standardizes the basic cold-formed steel members, provides labeling guidelines, and gives minimum corrosion protection requirements. It also includes floor joist span tables, ceiling joist span tables, rafters span tables, wall stud tables, wall bracing requirements, and connection requirements. The requirements are supplemented with construction details where required. A commentary is available under separate cover and serves the following purposes:

- λ documentation of rationale and decisions behind various provisions;
- λ guidance on the use of the provisions; and
- λ documentation of engineering calculations and judgments.

This second edition includes improvements upon the previous edition in the following areas:

- λ Added and revised definitions;
- λ Expanded hole (web penetration) sizes for floor joists;
- λ Revised hole (web penetration) spacing requirements for studs;
- λ Wall bracing requirements for high wind and seismic conditions, (See Commentary);
- λ Roof Uplift (tie-down) requirements;
- λ New wall stud tables for 50 ksi steels;
- λ New header table for bottom story of a two-story building with center load bearing beam;
- λ New floor and wall anchoring details;
- λ Added details for non-load bearing walls; and,
- λ Ceiling joist tables not requiring web stiffeners.

The *Prescriptive Method* is consistent with the intent of current U.S. building code provisions, engineering standards, and industry specifications, but it is not written as a regulatory document. To the greatest extent possible, the *Prescriptive Method* is written in a style to facilitate code adoption.

PRESCRIPTIVE METHOD FOR RESIDENTIAL COLD-FORMED STEEL FRAMING

INTRODUCTION

The *Prescriptive Method for Residential Cold-Formed Steel Framing (Prescriptive Method)* is provided as a guideline to facilitate the use of cold-formed steel framing in the construction of one- and two-family residential dwellings. The second edition of the *Prescriptive Method* expands on and enhances the requirements of the provisions of the first edition. It provides a complete prescriptive approach to build typical homes with cold-formed steel framing; therefore, engineering will not be necessary for most applications. The provisions in this document were developed by applying accepted engineering practices. It is intended to be compatible with building code provisions, but it is not written as a regulatory instrument. However, users of this document should verify its compliance with local code requirements. The user is advised to refer to the applicable building code requirements where the provisions of this document are not applicable or where engineered design is called out.

1.0 GENERAL

1.1 Purpose

The purpose of this document is to provide prescriptive requirements for the construction of residential buildings framed with cold-formed steel. These provisions include definitions, span tables, fastener schedules, and other related information appropriate for use by home builders, design professionals, and building code officials.

1.2 Approach

These requirements are based primarily on the American Iron and Steel Institute's (AISI) *Specification for the Design of Cold-Formed Steel Structural Members* [1] for member strength, the provisions for building loads from the American Society of Civil Engineers' (ASCE) *Minimum Design Loads for Buildings and Other Structures* [2], the *Standard Building Code* [3], the *Uniform Building Code* [4], and the *BOCA National Building Code* [5].

These provisions are intended to represent sound engineering and construction practice. This document is not intended to restrict the use of good judgment or exact engineering analysis of specific applications which may result in improved designs and economy. A commentary documenting the rationale for and the derivation of the requirements contained in this document is available under a separate cover [6].

1.3 Scope

These provisions apply to the construction of detached one- or two-family dwellings, townhouses, and other attached single-family dwellings not more than two stories in height using in-line framing practices. Steel-framed construction in accordance with this prescriptive method shall be limited by the applicability limits set forth in Table 1.1. The limitations are intended to define an appropriate use of this document for a majority of one- and two-family dwellings. Intermixing of these provisions with other construction materials, such as wood, in a single structure shall be in accordance with the applicable building code requirements for that material and the applicability limits set forth in Table 1.1.

Table 1.1
Applicability Limits

ATTRIBUTE	LIMITATION
General	
Building Dimension	Maximum width [1] is 36 feet (11 m) Maximum length [2] is 60 feet (18 m)
Number of Stories	2 story
Design Wind Speed	110 mph maximum (177 km/sec) fastest-mile wind speed [except as noted for wall bracing] [3]
Wind Exposure	Exposures C (open terrain) Exposures A/B (suburban/wooded)
Ground Snow Load	70 psf (3.35 kN/m^2) maximum ground snow load
Seismic Zone	Zone 4 maximum [except as noted for wall bracing] [3]
Floors	
Floor dead load	10 psf (0.48 kN/m^2) maximum
Floor live load First floor Second floor (sleeping rooms)	 40 psf (1.92 kN/m^2) maximum 30 psf (1.44 kN/m^2) maximum
Cantilever	24 inches (610 mm) maximum
Walls	
Wall dead load	10 psf (0.48 kN/m^2) maximum
Load bearing wall height	10 feet (3 m) maximum
Roofs	
Roof dead load	12 psf (0.48 kN/m^2) maximum total load [7 psf (0.34 kN/m^2) maximum for roof covering only]
Roof live load	70 psf (3.35 kN/m^2) maximum ground snow load
Ceiling dead load	5 psf (0.24 kN/m^2) maximum
Roof slope	3:12 to 12:12
Rake overhang	12 inches (305 mm) maximum
Soffit overhang	24 inches (610 mm) maximum
Attic live load (for attics with storage) Attic live load (for attics without storage)	20 psf (0.96 kN/m^2) maximum 10 psf (0.48 kN/m^2) maximum

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 mph = 1.61 km/hr = 0.447 m/sec, 1 foot = 0.3 m.

[1] Building width is in the direction of horizontal framing members supported by the wall studs.

[2] Building length is in the direction perpendicular to floor joists, ceiling joists, or roof trusses.

[3] See the Commentary for additional guidance on wall bracing requirements in high wind and seismic conditions [6].

1.4 Definitions

Accepted Engineering Practice: An engineering approach that conforms with accepted principles, tests, technical standards, and sound judgment.

Approved: Approval by a code official or design professional.

Attic: The enclosed space between the ceiling joists of the top floor and the roof rafters of a building not intended for occupancy, but sometimes used for storage.

Axial Load: The longitudinal force acting on a member. Examples are the gravity loads carried by columns or studs.

Blocking: Solid block or piece of material placed between structural members to provide lateral bracing as in bridging and/or edge support for sheathing.

Bridging: Cross bracing or blocking placed between joists to provide lateral support.

Buckling: A kink, wrinkle, bulge, or otherwise loss of the original shape of a member due to compressive, bending, bearing, or shear loads.

Ceiling Joist: A horizontal structural framing member which supports a ceiling and attic loads.

C-Shape: A basic cold-formed steel shape used for structural framing members (such as studs, joists, headers, beams, girders, and rafters). The name comes from the member' s "C" shaped cross-sectional configuration consisting of a web, flange and lip. It is also called a “C-section”. Figure 1.1 shows this cross-section and defines the different parts of the C-Shape. Web depth measurements are taken to the outside of the flanges. Flange width measurements also use outside dimensions.

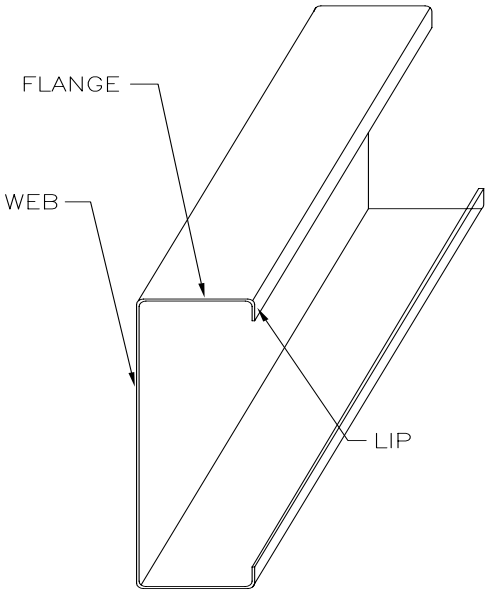

Figure 1.1 C-Shaped Member Configuration

Clip Angle: An L-shaped short piece of metal (normally with a 90 degree bend). It is typically used for connections.

Cold-forming: A process where light-gauge steel members are manufactured by (1) press-braking blanks sheared from sheets or cut length of coils or plates, or by (2) continuous roll forming of cold- or hot-rolled coils of sheet steel; both forming operations are performed at ambient room temperature, that is, without any addition of heat such as would be required for hot forming.

Cripple Stud: A stud that is placed between a header and a window sill (or jamb) or a window sill and a bottom track to provide a backing to attach finishing and sheathing material.

Design Professional: An architect or engineer, registered or licensed to practice professional architecture or engineering, as defined by the statutory requirements of the laws of the state in which a project is to be constructed.

Endwall: The exterior wall of a building which is perpendicular to the roof ridge and parallel to floor framing, roof rafters or trusses. Normally the shorter dimension of a rectangular building's footprint.

Facia: A track member applied to the rafter ends as an edge member for attachment of roof sheathing, exterior finishes, or gutter.

Flange: The part of a C-Shape or track that is perpendicular to the web.

Flat Strap: Sheet steel cut to a specified width without any bends. Typically used for bracing and transfer of loads by tension.

Floor Joist: A horizontal structural framing member that supports floor loads.

Header: A horizontal built-up structural framing member used over wall or roof openings to transfer loads above the opening to adjacent vertical framing members.

In-Line Framing: Framing method where all vertical and horizontal load carrying members are aligned. Refer to Figure 1.2.

Jack Stud: A vertical structural member that does not span the full height of the wall and provides bearing for headers. Sometimes referred to as trimmer studs.

King Stud: A vertical structural member that spans the full height of the wall and supports vertical loads and lateral loads. Usually located at both ends of a header adjacent to the jack studs.

Lip: The part of a C-Shape which extends from the flange at the open end. The lip increases the strength characteristics of the member and acts as a stiffener to the flange.

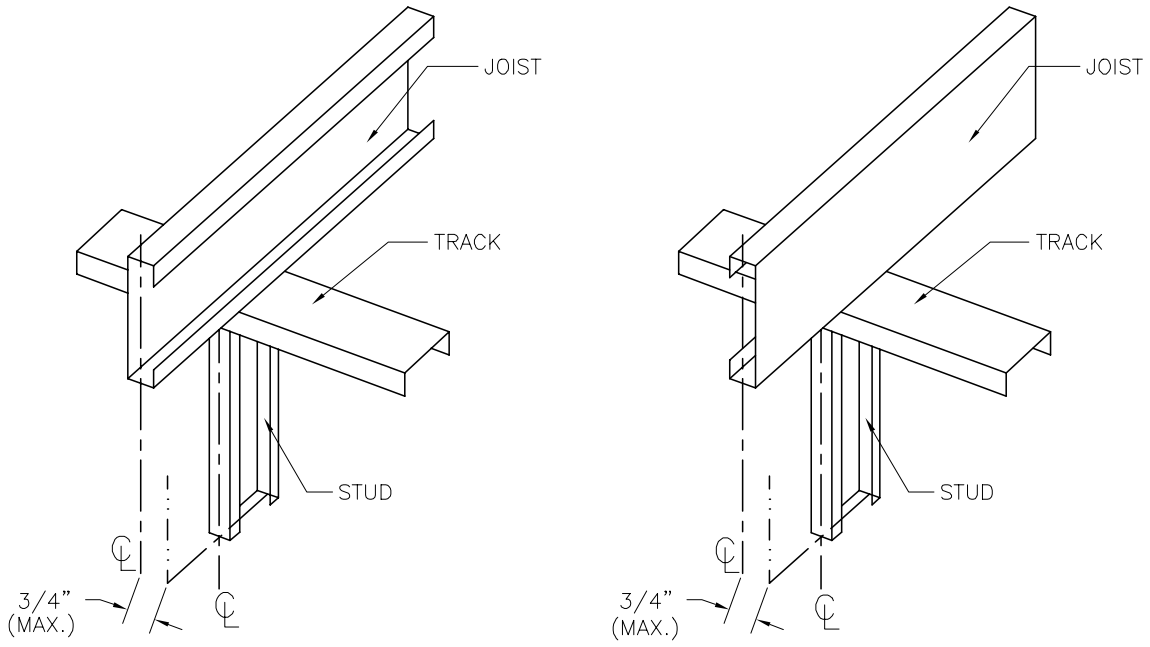

Figure 1.2 In-Line Framing Detail

Loads, Live and Dead: Dead loads are the weight of the walls, partitions, framing, floors, ceilings, roofs, and all other permanent construction entering into and becoming a part of a building. Live loads are transient and sustained loads usually created by people and furnishing, respectively.

Material Properties (steel): The chemical, mechanical, and physical properties of steel before or after the cold-forming process.

Material Thickness (steel): The base metal thickness excluding any protective coatings. Thickness is now commonly expressed in mils (1/1000 of an inch).

Metallic Coated Steel: Steel that has a metallic coating for protection against corrosion. The level of protection provided is measured by the weight of the metallic coating applied to the surface area of the steel. Typical metallic coatings are galvanizing, galvalume, or galfan which are zinc based.

Mil: A unit of measurement used in measuring the thickness of thin steel elements. One mil equals 1/1000 of an inch (e.g. 33 mil = 0.033 inch).

Multiple Span: The span made by a continuous member having intermediate supports.

Non-Load Bearing Walls (Non-structural walls): Refer to Walls.

Punchout (or hole) : An opening in the web of a steel framing member allowing for the installation of plumbing, electrical, and utilities. A punchout or hole may be made during the manufacturing process or in the field with a hand punch, hole saw, or other suitable tool.

Rafter: A structural framing member (usually sloped) which supports roof loads.

Rake Overhang: The horizontal projection of the roof measured from the outside face of a gable endwall to the outside edge of the roof.

Ridge: The horizontal line formed by the joining of the top edges of two sloping roof surfaces.

Seismic Zone: Seismic Zones designate areas with varying degrees of seismic risk and associated seismic design parameters (i.e. effective peak ground acceleration). Seismic Zones 1, 2, 3, and 4 correspond to effective peak ground acceleration of 0.1g, 0.2g, 0.3g, and 0.4g, respectively (1g is the acceleration of the earth' s gravity at sea level).

Shearwall: A vertical wall assembly capable of resisting lateral forces to prevent racking from wind or seismic loads acting parallel to the plane of the wall.

Sidewall: The exterior wall of a building parallel to the roof ridge which supports roof rafters or trusses.

Single Span: The span made by one continuous structural member without any intermediate supports.

Span: The clear horizontal distance between bearing supports.

Structural Sheathing: The covering (e.g. plywood or oriented strand board) used directly over structural members (e.g. studs or joists) to distribute loads, brace walls, and generally strengthen the assembly.

Stud: Vertical structural element of a wall assembly which supports vertical loads and/or transfers lateral loads.

Track: Used for applications such as top and bottom plate for walls and band or rim joists for flooring systems. A track has a web and two flanges, but no lips. Track web depth measurements are taken to the inside of the flanges. Refer to Figure 1.3.

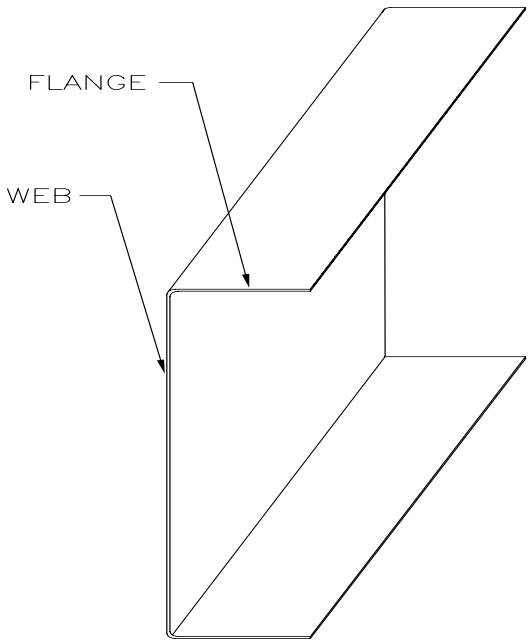

Figure 1.3 Track Section Configuration

Truss: An engineered structural component designed to efficiently carry its own weight and superimposed design loads. The truss members form a triangular structural framework.

Walls:

Structural or load bearing: Wall systems subject to loads that exceed the limits for a non-structural system (e.g. wall studs).

Non-Structural or non-load bearing: Wall systems that are limited to 10 psf (0.479 kN/m^2) maximum lateral (transverse) load and/or limited, exclusive of sheathing materials, to 100 pounds (450 N) per lineal foot (0.3 m) or 200 pounds (900 N) maximum superimposed vertical load per member (e.g. interior partitions).

Web: The part of a C-Shape or track that connects the two flanges.

Web Crippling: The localized permanent (inelastic) deformation of the web member subjected to concentrated load or reaction at bearing supports.

Web Stiffener: Additional material that is attached to the web to strengthen the member against web crippling. Also called a bearing stiffener.

Wind Exposure: Wind exposure is determined by site conditions that affect the actual wind speeds experienced at a given site. For the purpose of this document, Exposures A/B represent urban or suburban areas or wooded terrain and Exposure C represents open terrain with scattered obstructions.

***Wind Speed*:** Wind speed is the design wind speed related to winds that are expected to be exceeded once every 50 years at a given site (i.e. 50 year-return period). Wind speeds in this document are given in units of miles per hour (mph) by "fastest-mile" measurements.

Yield Strength: A characteristic of the basic strength of the steel material. It is the highest unit stress that the material can endure before permanent deformation occurs as measured by a tensile test in accordance with ASTM A 370 [7].

Figure 1.4 is provided as an overall view of residential steel framing and the basic components.

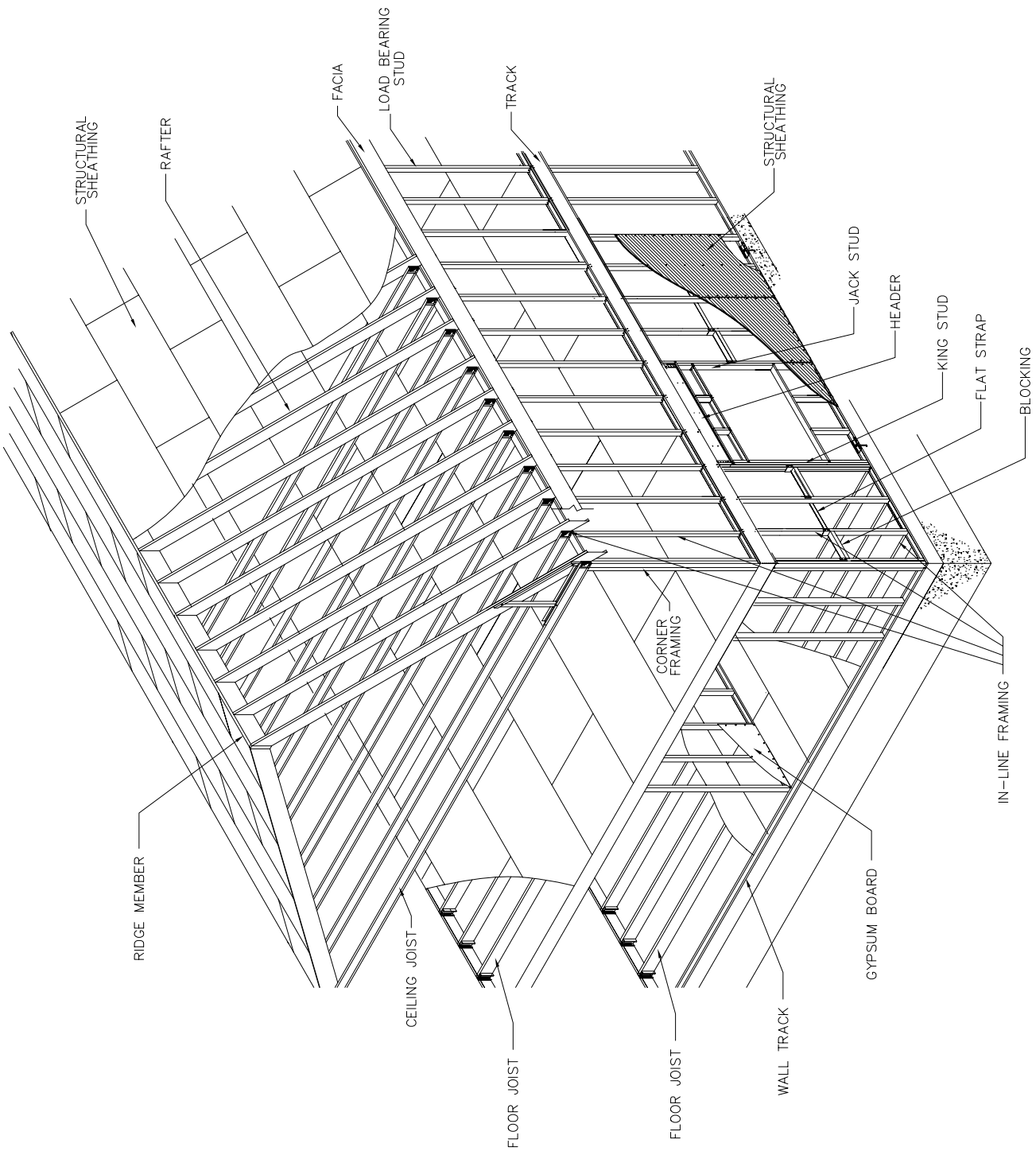

Figure 1.4 Schematic of Typical Steel Framed Building

2.0 MATERIALS, SHAPES, AND STANDARD SIZES

2.1 Types of Cold-Formed Steel

2.1.1 Structural Members

Load bearing steel framing members shall be cold-formed to shape from structural quality sheet steel complying with the requirements of one of the following:

1 ASTM A 653 [8]: Grades 33, 37, 40, & 50 (Class 1 and 3); or

2. ASTM A 792 [9]: Grades 33, 37, 40, & 50A; or

3. ASTM A 875 [10]: Grades 33, 37, 40, & 50 (Class 1 and 3); or

4. Steels that comply with ASTM A 653 [8], except for tensile and elongation requirements, shall be permitted provided the ratio of tensile strength to yield point is at least 1.08 and the total elongation is at least 10 percent for a two-inch gage length or 7 percent for an eight-inch gauge length.

2.1.2 Non-Structural Members

Non-structural members shall comply with ASTM C-645 [12] and Section 7.0.

2.2 Physical Dimensions

Cold-formed structural steel members shall comply with Figure 2.1 and the dimensional requirements specified in Table 2.1. In addition, tracks shall comply with Figure 2.2 and shall have a minimum of 1-1/4 inch (32 mm) flanges. Members with different geometrical shapes shall not be used with these provisions without the approval of a design professional. Dimensional Tolerances shall be in accordance with ASTM C955 [11] for load bearing members and ASTM C645 [12] for non-load bearing members.

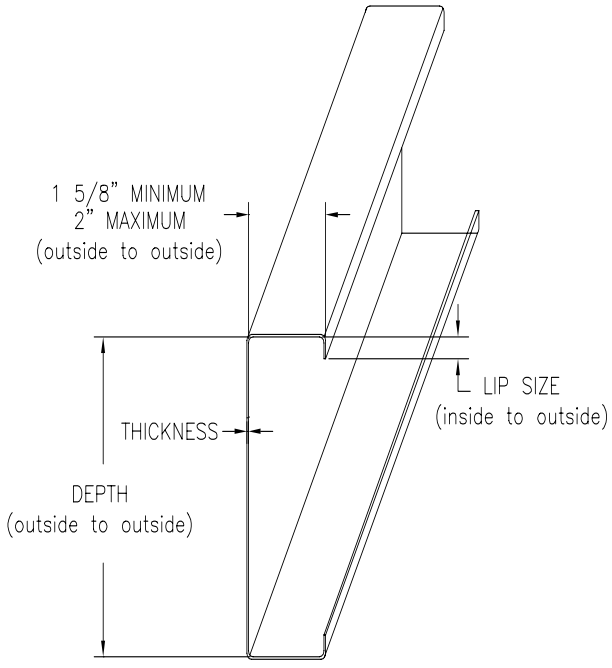

Figure 2.1 C-Shaped Member Dimensions

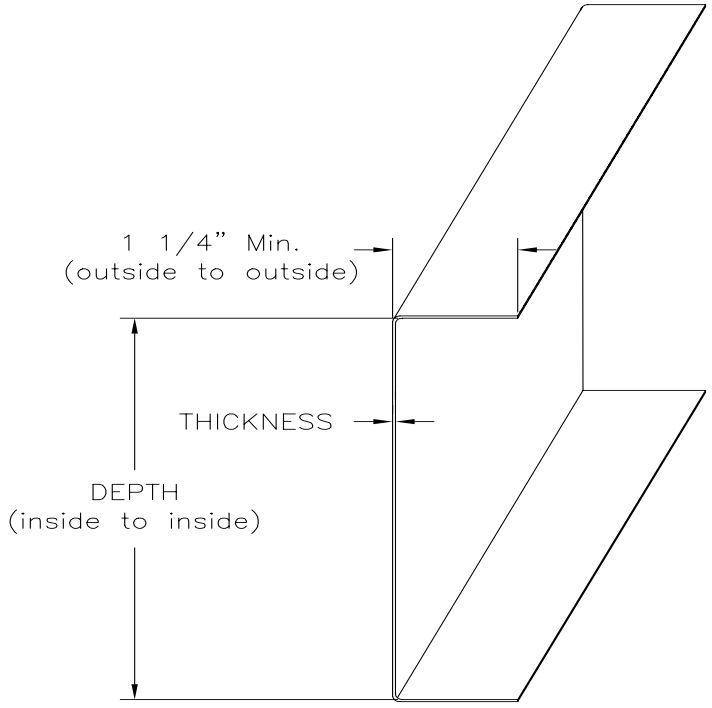

Figure 2.2 Track Section Dimensions

Table 2.1
Cold-Formed Steel Member Sizes

Nominal Member Size	Industry Designator[1]	Web Depth (inches)	Minimum Flange Width (inches)	Maximum Flange Width (inches)	Minimum Lip Size (inches)
2 x 4	350S162-t	3.5	1.625	2	0.5
2 x 6	550S162-t	5.5	1.625	2	0.5
2 x 8	800S162-t	8	1.625	2	0.5
2 x 10	1000S162-t	10	1.625	2	0.5
2 x 12	1200S162-t	12	1.625	2	0.5

For SI: 1 inch = 25.4 mm.

[1] "t" is the uncoated material thickness in mils. "S" indicates a C-Shaped member for stud and joist applications. Track sections shall use the designator "T" instead of "S".

2.3 Uncoated Material Thickness

The material thickness of steel framing members in their end-use shall meet or exceed the minimum (uncoated) thickness values given in Table 2.2.

Table 2.2
Minimum Thickness of Cold-Formed Steel Members

Designation (mils)	Minimum Steel Thickness (inches)	Reference Gauge Number
18	0.018	25
27	0.027	22
33	0.033	20
43	0.043	18
54	0.054	16
68	0.068	14
97	0.097	12

For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm.

2.4 Bend Radius

The maximum bend radius shall be the greater of 3/32 inch (2.4 mm) or two times the material thickness (2t).

2.5 Yield Strength

The yield strength of steel shall be determined in accordance with ASTM A370 [7]. Unless otherwise specified as 50 ksi (345 MPa), the minimum yield strength (or yield point) of cold-formed steel for C-Shapes, tracks, flat straps, and other members shall be 33 ksi (228 MPa).

2.6 Corrosion Protection

Cold-formed structural steel framing members identified in accordance with this document shall have a minimum metallic coating complying with Table 2.3.

Table 2.3
Minimum Coating Requirements

Steel Component	Reference ASTM Standard		
	A653 / A 653M [8]	**A 792 / A 792M [9]**	**A 875 / A 875M [10]**
Structural	G60	AZ50	GF60
Non-structural	G40	AZ50	GF45

Other approved metallic coatings shall be permitted provided the alternate coatings can be demonstrated to have a corrosion resistance that is equal to or greater than the corresponding hot-dipped galvanized coatings (i.e. G40 and G60) and provide protection at cut edges, scratches, etc., by cathodic or sacrificial protection.

The minimum coating designations shown in Table 2.3 assume normal exposure conditions and construction practices. Cold formed steel members used in buildings located in harsh environments (e.g. coastal areas) may require greater corrosion protection (e.g. G90).

Steel framing members shall be located within the building envelope and adequately shielded from direct contact with moisture from the ground or the outdoor climate.

2.6.1 Compatibility With Other Metals

Copper materials shall not be used in direct contact with metallic coated steel members or components. Metallic coated steel shall not be embedded in concrete, unless approved for that purpose.

2.7 Web Holes

Holes in webs (or punchouts) of floor and ceiling joists shall comply with the requirements of Figure 2.3 and Table 2.4. Holes in webs of studs, headers, rafters, and other structural steel members shall comply with the requirements of Figure 2.4 and Table 2.5. Holes shall be permitted only along the centerline of the web of the framing member. Holes with minimum edge (or end) distances violating the values shown in Tables 2.4 or 2.5 shall be patched in accordance with Section 2.8.

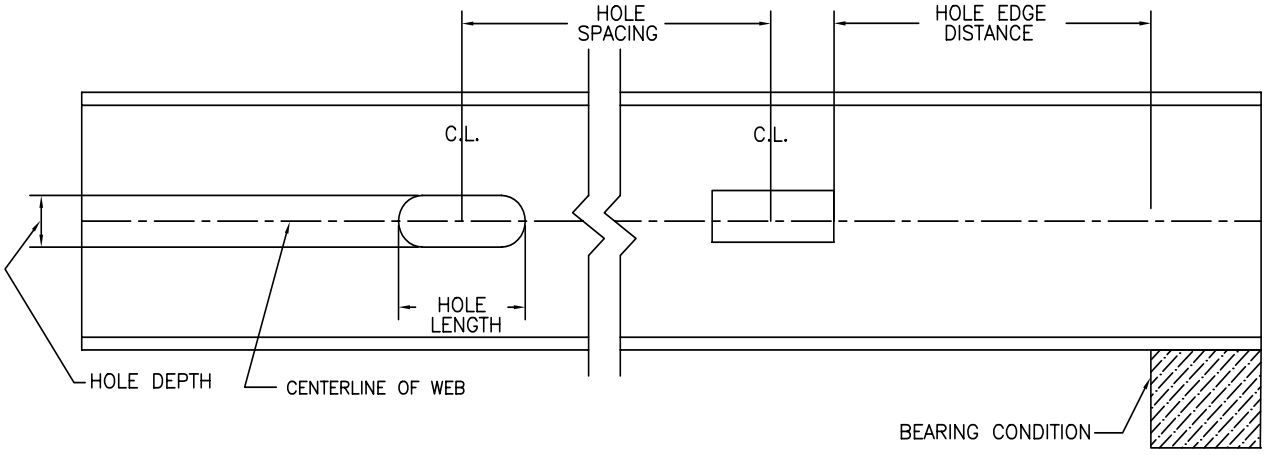

Figure 2.3 Floor and Ceiling Joist Web Holes

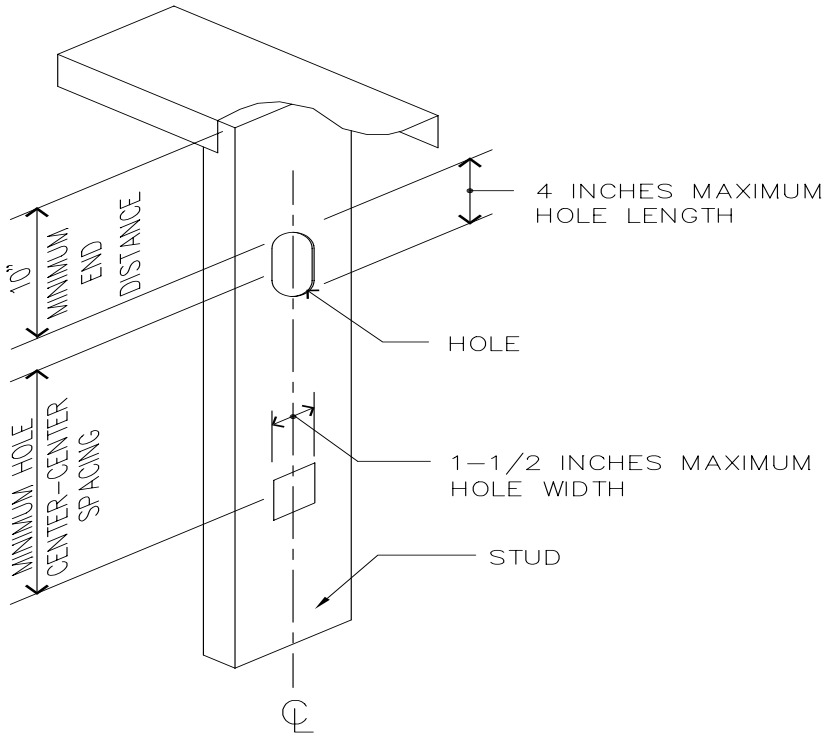

Figure 2.4 Holes in Studs and Other Structural Members

Table 2.4
Maximum Hole Dimensions and Spacing in Floor & Ceiling Joist Webs

Nominal Member Size	Maximum Hole Depth [1] (inches)	Maximum Hole Length [2] (inches)	Minimum Hole Spacing [3] (inches)	Minimum Edge Distance [4] (inches)
2 x 6 x 33	2	5.25	16.5	3
2 x 6 x 43				
2 x 6 x 54				
2 x 6 x 68				
2 x 6 x 97				
2 x 8 x 33	1.5	4	24	10
2 x 8 x 43	3	6	24	3.5
2 x 8 x 54				
2 x 8 x 68				
2 x 8 x 97				
2 x 10 x 43	1.5	4	24	10
2 x 10 x 54	4	6	24	3.5
2 x 10 x 68				
2 x 10 x 97				
2 x 12 x 43	1.5	4	24	10
2 x 12 x 54				
2 x 12 x 68	4.75	6	24	3.5
2 x 12 x 97				

For SI: 1 inch = 25.4 mm

1 The dimension of the hole measured across the depth of the joist web.
2 The dimension of the hole measured along the length of the joist.
3 Spacing is the center-to-center distance between holes.
4 Edge distance is measured from the edge of the hole to the edge of bearing support.

Table 2.5
Maximum Hole Dimensions and Spacing for Structural Members
Other Than Floor & Ceiling Joists

Nominal Member Size	Maximum Hole Depth [1] (inches)	Maximum Hole Length [2] (inches)	Minimum Hole Spacing [3] (inches)	Minimum End Distance [4] (inches)
2 x 4 x 33	1.5	4	7	10
2 x 4 x 43				
2 x 4 x 54				
2 x 4 x 68				
2 x 4 x 97				
2 x 6 x 33	1.5	4	11	10
2 x 6 x 43				
2 x 6 x 54				
2 x 6 x 68				
2 x 6 x 97				
2 x 8 x 33	1.5	4	16	10
2 x 8 x 43				
2 x 8 x 54				
2 x 8 x 68				
2 x 8 x 97				
2 x 10 x 43	1.5	4	20	10
2 x 10 x 54				
2 x 10 x 68				
2 x 10 x 97				
2 x 12 x 43	1.5	4	24	10
2 x 12 x 54				
2 x 12 x 68				
2 x 12 x 97				

For SI: 1 inch = 25.4 mm

1 The dimension of the hole measured across the depth of the member.
2 The dimension of the hole measured along the length of the member.
3 Spacing is the center-to-center distance between holes.
4 End distance is measured from the edge of the hole to the end of the member.

2.8 Cutting, Notching, and Hole Patching

Flanges and lips of joists, studs, headers, rafters, ceiling joists, and other structural members shall not be cut or notched. Web holes violating the minimum edge (or end) distance, maximum hole depth, maximum hole length, or minimum spacing requirements set forth in Tables 2.4 and 2.5 shall be patched with a solid steel plate, stud, joist, or track section in accordance with Figures 2.5 or 2.6. The steel patch shall be of a thickness equivalent to or greater than the receiving member and shall extend a minimum of 1-inch (25 mm) beyond all edges of the hole. The steel patch shall be fastened to the web of the receiving member with #8 screws (minimum) spaced no greater than 1-inch (25 mm) center-to-center along the edges of the patch with minimum edge distance of 1/2 inch (13 mm).

Structural members shall be replaced when web holes exceed the following size limits:

a. the depth of the hole, measured across the web, exceeds half the depth of the web; and,

b. the length of the hole measured along the web, exceeds 6 inches (152 mm) or the depth of the web, whichever is greater.

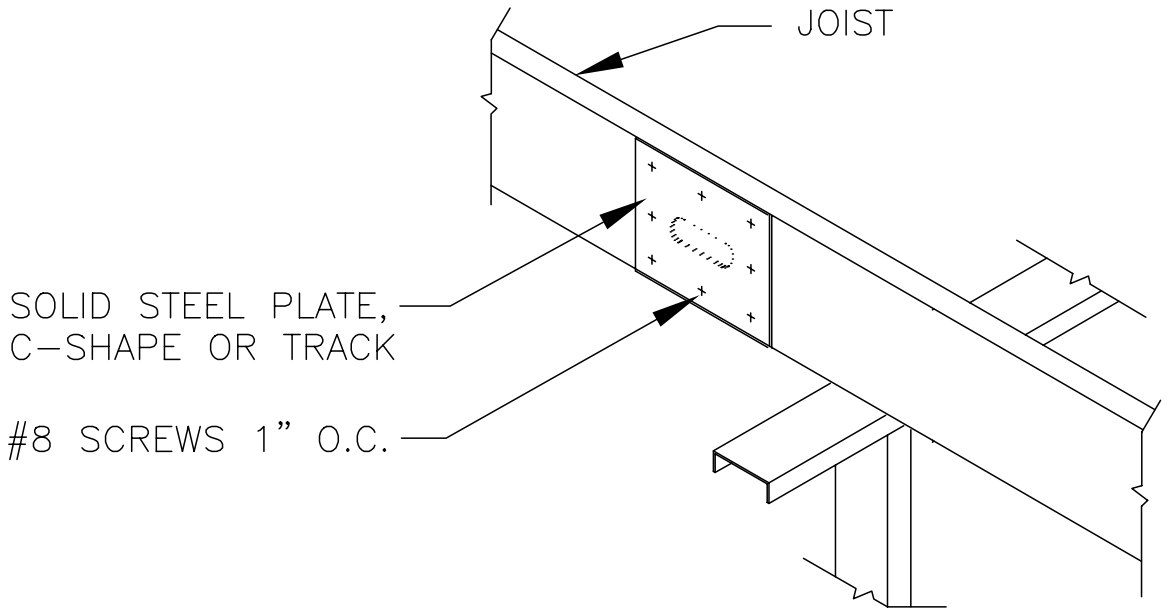

Figure 2.5 Joist Web Hole Patch

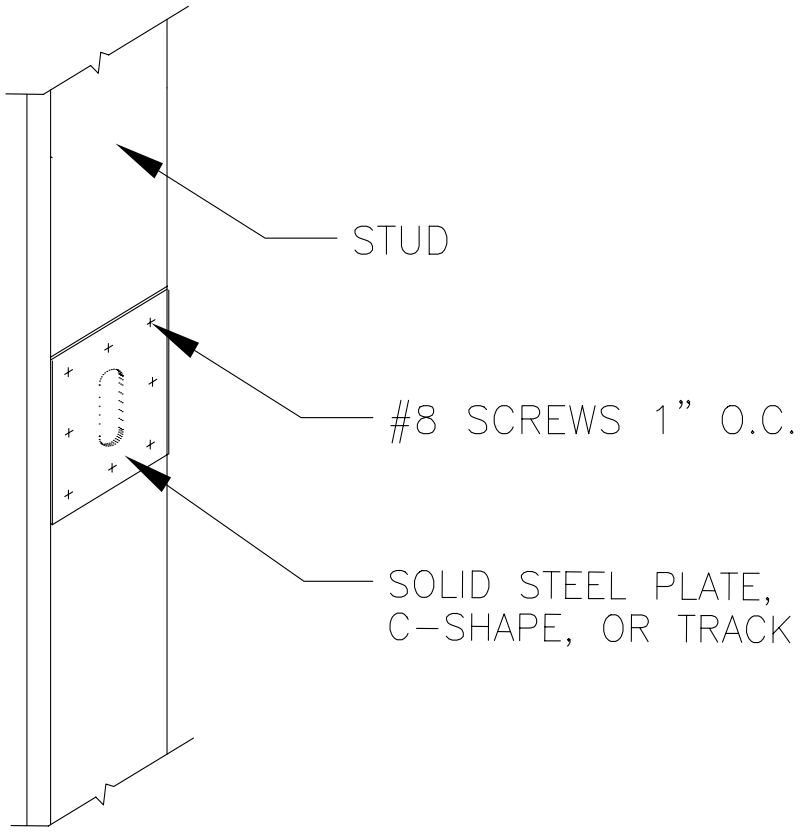

Figure 2.6 Stud Web Hole Patch

2.9 Bearing Stiffeners

A bearing stiffener (also referred to as web stiffener) shall be fabricated from a minimum 33 mil (0.836 mm) C-Shaped member or 43 mil (1.09 mm) track section. Each stiffener shall be fastened to the web of the member it is stiffening with a minimum of four #8 screws equally spaced as shown in Figure 2.7. Bearing stiffeners shall extend across the depth of the web and shall be installed on one side of the member.

2.10 Clip Angles

Clip angles shall be a minimum of 2 inches x 2 inches by 33 mil (51 mm x 51 mm x 0.84 mm), unless otherwise noted. All clip angle materials shall comply with Sections 2.1.1, 2.5, and 2.6.

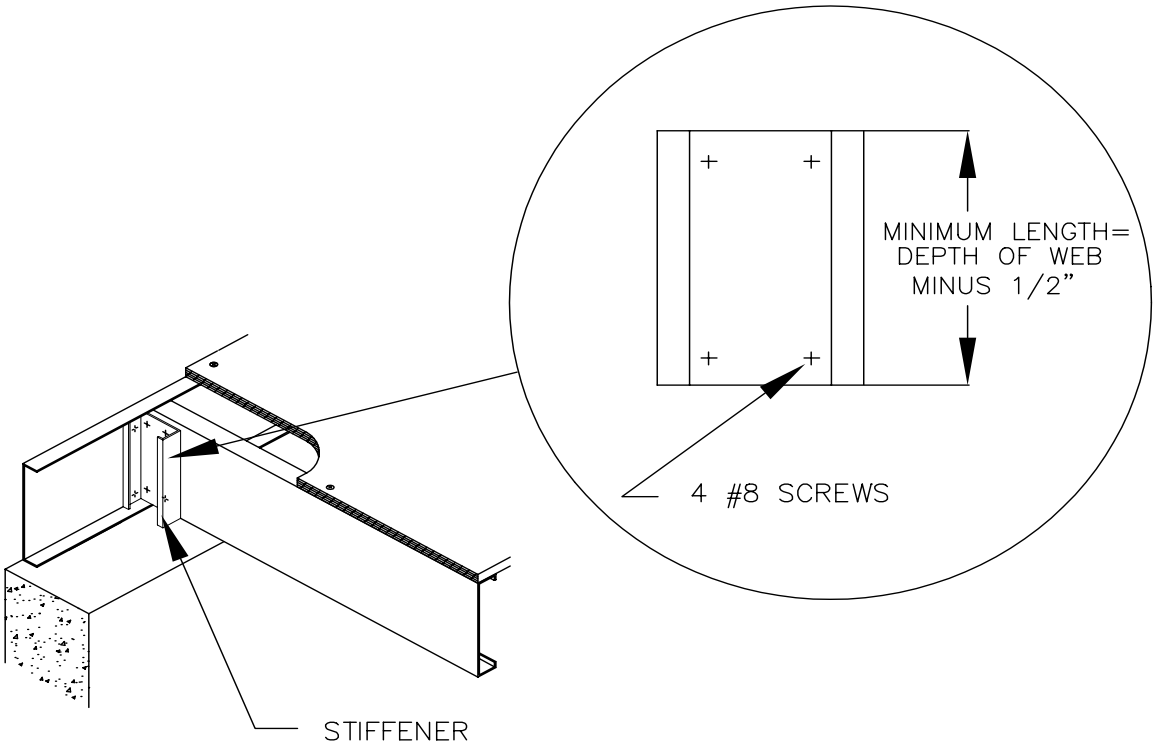

Figure 2.7 Bearing Stiffener

2.11 Fasteners

Fasteners shall comply with Sections 2.11.1 and 2.11.2. Other fastening techniques, such as the use of pneumatically driven fasteners, powder actuated fasteners, crimping, clinching, or welding, shall be permitted when approved.

2.11.1 Screws

For all connections, screws shall extend through the steel a minimum of three exposed threads. Screws shall penetrate individual components of connections without causing permanent separation between the components. Screws shall be installed in a manner such that the threads and/or holes are not stripped. All self-drilling tapping screws, on exterior building surfaces, shall have a Type II coating in accordance with ASTM B633 [13] or equivalent corrosion protection.

Screws for steel-to-steel connections shall be installed with a minimum edge distance and center to center spacing of 1/2 inch (13 mm), and shall be self-drilling tapping in compliance with SAE J78 [14]. The minimum screw size for steel to steel connections shall comply with Table 2.6.

Structural sheathing shall be attached to steel framing (i.e. studs and joists) with minimum #8 self-drilling tapping screws in compliance with SAE J78 [14]. Screws attaching structural sheathing to steel joists and wall framing shall have a minimum head diameter of 0.292 inch (7 mm) with countersunk heads, shall be installed with a minimum edge distance of 3/8 inch (9 mm) and shall

comply with Table 2.6. Gypsum board shall be attached to steel joists or steel wall framing with minimum #6 screws conforming to ASTM C 954 [15] and shall be installed in accordance with the applicable building code requirements for interior wall and ceiling finishes.

Table 2.6
Minimum Screw Sizes For Steel-to-Steel
and Structural Floor Sheathing-to-Steel Connections

Point Style	Minimum Screw Size	Total Thickness of Steel [1] (inches)
2	# 8	0.100 max.
2	# 10	0.110 max.
2	# 12	0.140 max.
3	# 8	0.140 max.
3	# 10	0.175 max.
3	# 12	0.210 max.

For SI: 1 inch = 25.4 mm.

[1] The combined thickness of all connected steel members.

2.11.2 Bolts

Bolts shall meet or exceed the requirements of ASTM A307 [16]. Bolts shall be installed with nuts and washers. Center-to-center spacing of bolt holes connecting sheet metal material to concrete shall be a minimum of three bolt diameters. Distance from the center of the bolt hole to the edge of the connecting member shall not be less than one and one-half bolt diameters.

3.0 LABELLING

Load-bearing steel framing members shall have a legible label, stamp, stencil, or embossment, spaced at a minimum of 48 inches on center along the length of the member, with the following minimum information:

a. Manufacturer' s identification;
b. Minimum uncoated steel thickness in decimal inches (example 0.043 in.);
c. Minimum coating designation; and,
d. Minimum yield strength in kips per square inch (ksi).

An example of an acceptable label : ABC 0.043 G60 33 ksi

4.0 FOUNDATION

The building foundation shall comply with the applicable building code. Steel framing shall be attached to the foundation structure according to the requirements of Sections 5 and 6 of this document. Foundation anchor bolts shall be located not more than 12 inches (305 mm) from corners or the termination of bottom tracks (e.g. at door openings or corners).

5.0 STEEL FLOOR FRAMING

5.1 Floor Construction

Cold-formed steel framing members shall comply with the provisions of Section 2.0. Steel floors shall be constructed in accordance with this section and Figure 5.1.

5.1.1 Applicability Limits

The applicability limits of Section 1.3 and Table 1.1 shall apply.

5.1.2 In-Line Framing.

Load bearing steel floor framing, wall framing, and ceiling/roof framing shall be constructed in-line with the vertical load bearing members (i.e. studs) located below. A maximum tolerance of 3/4 inch (19 mm) between the centerlines of the in-line members shall be permitted in accordance with Figure 1.2.

5.2 Floor to Foundation or Bearing Wall Connection

Cold-formed steel floor framing shall be anchored to foundations, wood sills, or load bearing walls in accordance with Table 5.1 and Figures 5.1 through 5.10. Fastening of steel joists to other framing members shall be in accordance with Table 5.2.

5.3 Allowable Joist Spans

The clear span of cold-formed steel floor joists shall not exceed the limits set forth in Table 5.3 for single spans and Table 5.4 for multiple spans. When continuous joist members are used for multiple spans, the interior bearing supports shall be located within two feet (0.6 m) of mid-span of the steel joists, and the individual spans shall not exceed the applicable spans in the table. Floor joists shall have a bearing support length of not less than 1.5 inches (38 mm) for exterior wall supports and 3.5 inches (89 mm) for interior wall supports. Bearing stiffeners shall be installed at each joist bearing location in accordance with Section 2.9. The thickness of joist tracks shall be a minimum of 33 mils (0.84 mm) thick except when used as part of floor header or trimmer in accordance with Section 5.7.

5.4 Joist Bracing

The top flanges of floor joists shall be laterally braced by the application of floor fastened to the joists in accordance with Table 5.2. Floor joists with spans that exceed 12 feet (3.7 m) shall have the bottom flanges laterally braced in accordance with one of the following:

1. Gypsum board installed with minimum #6 screws in accordance with the

applicable building code, or

2. Continuous steel strapping installed in accordance with Figure 5.1 and 5.2. Steel straps shall be at least 1-1/2 inches (38 mm) in width and 33 mils (0.84 mm) in thickness. Straps shall be fastened to the bottom flange of each joist with at least one #8 screw and shall be fastened to blocking with at least two #8 screws. Blocking or bridging (X-bracing) shall be installed between joists at a maximum spacing of 12 feet (3.7m) measured along the continuous strapping (perpendicular to the joist run). Blocking or bridging shall also be located at the termination of all straps.

5.5 Floor Cantilevers

Floor cantilevers for the second floor of a two-story building or the first floor of a one-story building shall not exceed 24 inches (610 mm) as illustrated in Figure 5.1. Cantilevers shall support interior floor loading only. Cantilevers, not exceeding 24 inches (610 mm) and supporting one floor and roof (first floor of a two story building), shall be permitted provided that all cantilevered joists are doubled (nested or back-to-back). The doubled cantilevered joists shall extend a minimum of 6 feet (1.8 m) toward the inside and shall be fastened with a minimum of two #8 screws spaced at 24 inches (610 mm) on center through the webs (for back-to-back) or flanges (for nested joists). Approved design is required for cantilevered areas supporting uniform live loads greater than 40 psf (1.92 kN/m^2).

5.6 Splicing

Joists and other structural members shall not be spliced without an approved design. Splicing of tracks shall conform with Figure 5.11.

5.7 Framing of Floor Openings

Openings in floors shall be framed with header and trimmer joists. Header joist spans shall not exceed 8 feet (2.4 m) in length. Header and trimmer joists shall be fabricated from joist and track sections, which shall be of a minimum size and thickness as the adjacent floor joists and shall be installed in accordance with Figures 5.1, 5.12, and 5.13. Each header joist shall be connected to trimmer joists with a minimum of four 2 inch x 2 inch (51 mm x 51 mm) clip angles. Each clip angle shall be fastened to both the header and trimmer joists with four #8 screws evenly spaced on each leg of the clip angle. The clip angles shall have a thickness not less than that of the floor joist.

5.8 Floor Trusses

Cold-formed steel floor trusses shall be designed, braced, and installed in accordance with an approved design. Truss members shall not be notched, cut, or altered in any manner unless by an approved design. All trusses shall be aligned with load carrying members (i.e. studs) in the wall. Refer to AISI publication RG-9518 [17] "*Design Guide For Cold-Formed Steel Trusses*" for additional guidance.

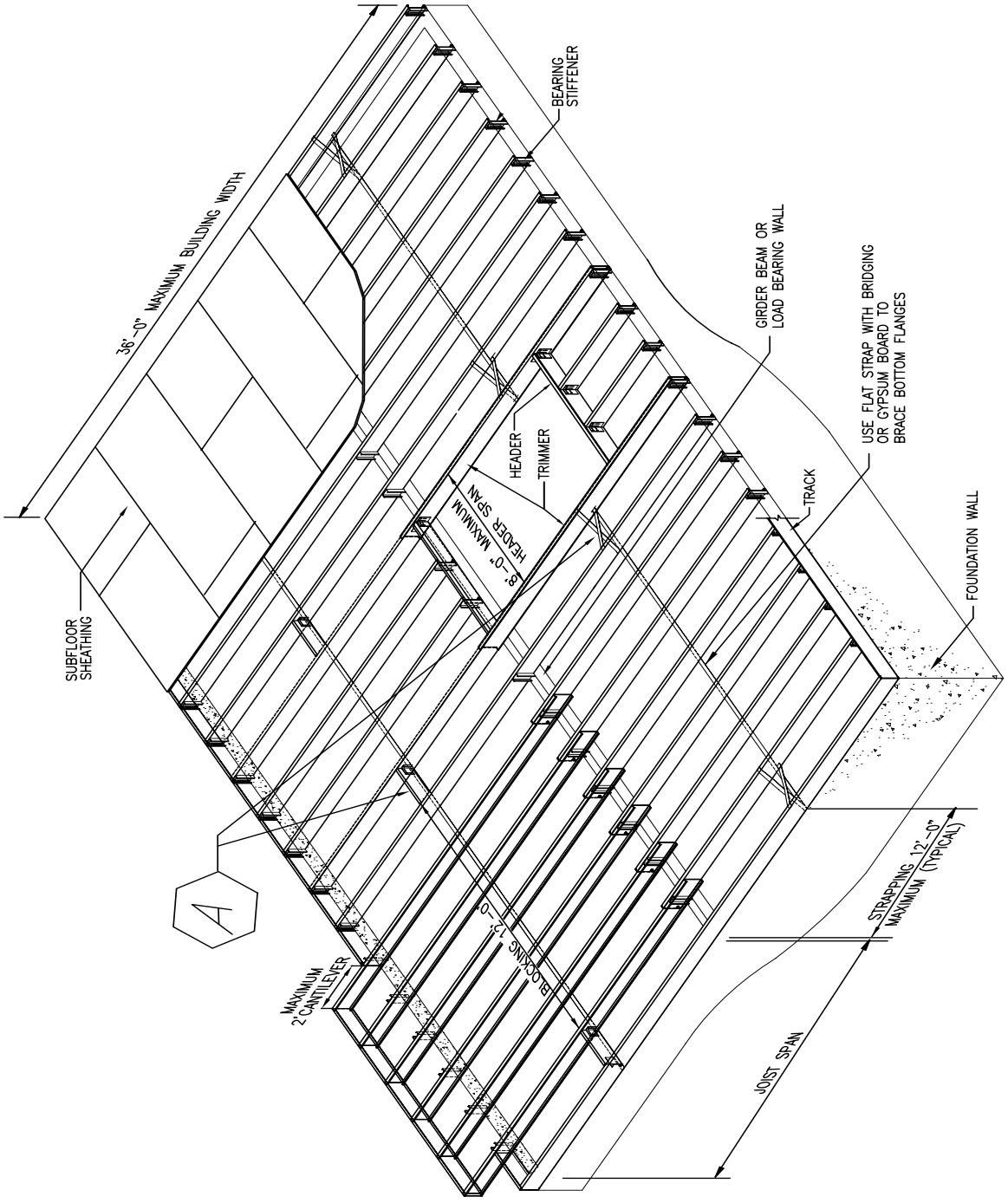

Figure 5.1 Steel Floor Construction

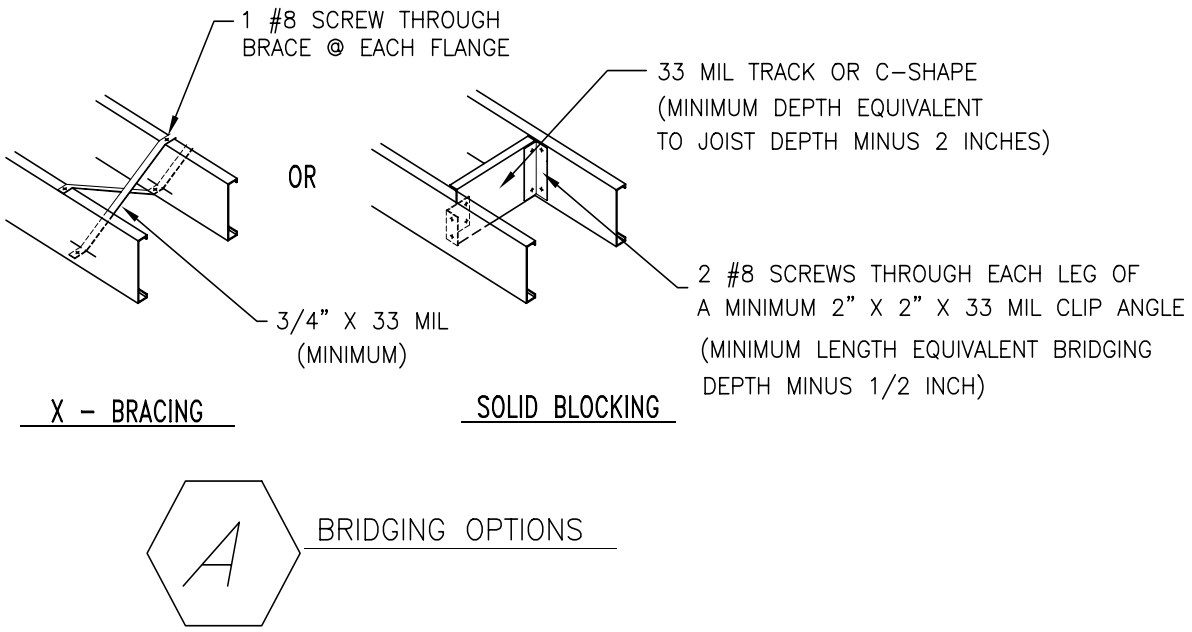

Figure 5.1 (cont'd) Steel Floor Construction

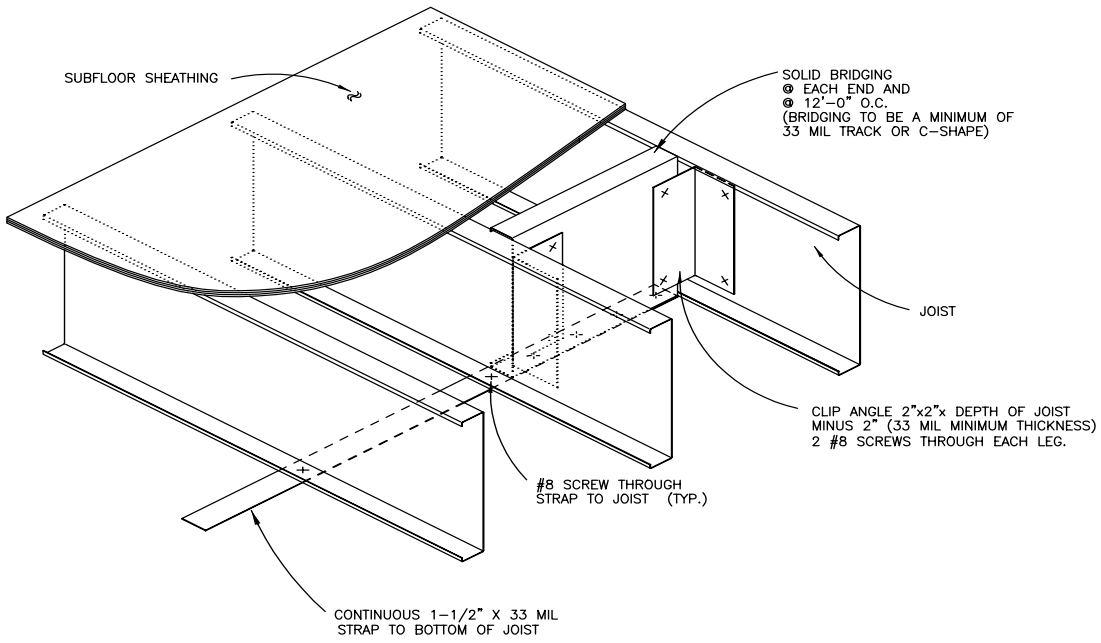

Figure 5.2 Steel Floor Bracing

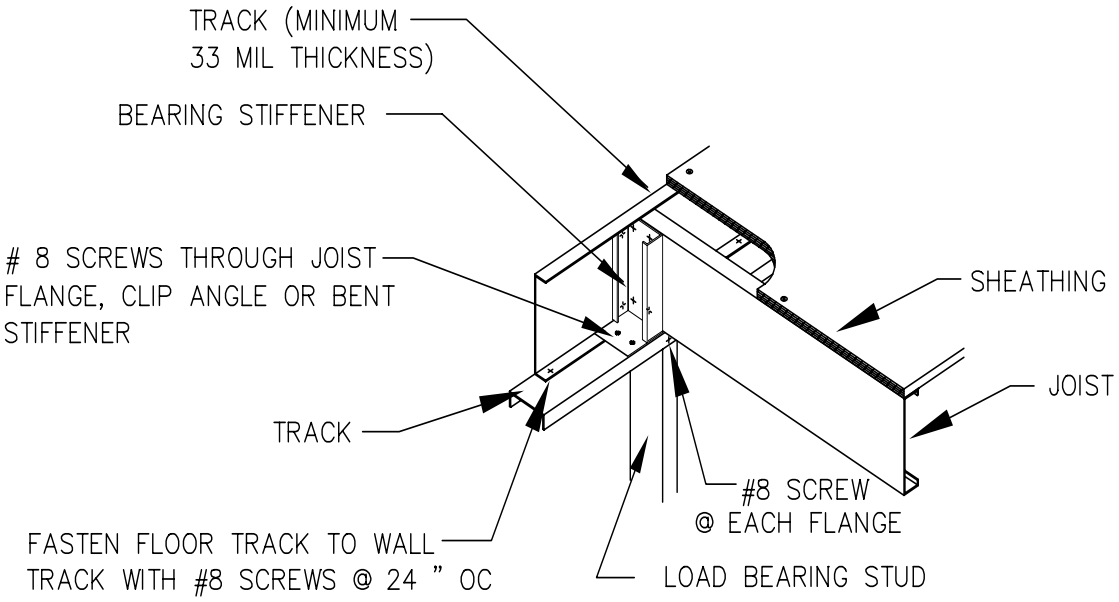

Figure 5.3 Floor to Exterior Load Bearing Wall Connection

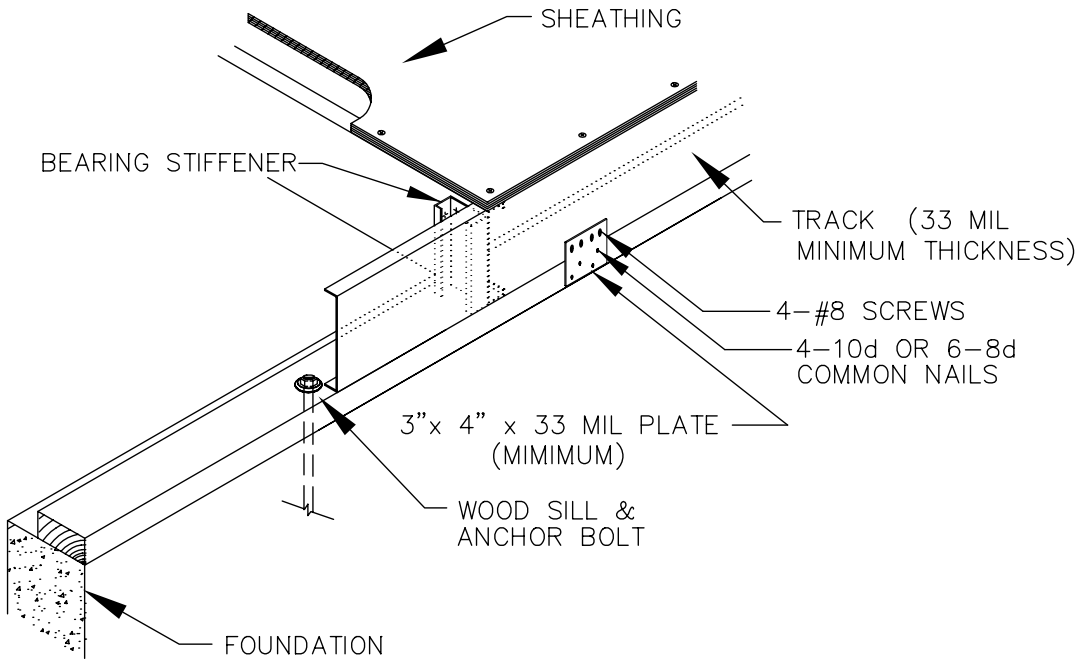

Figure 5.4 Floor to Wood Sill Connection

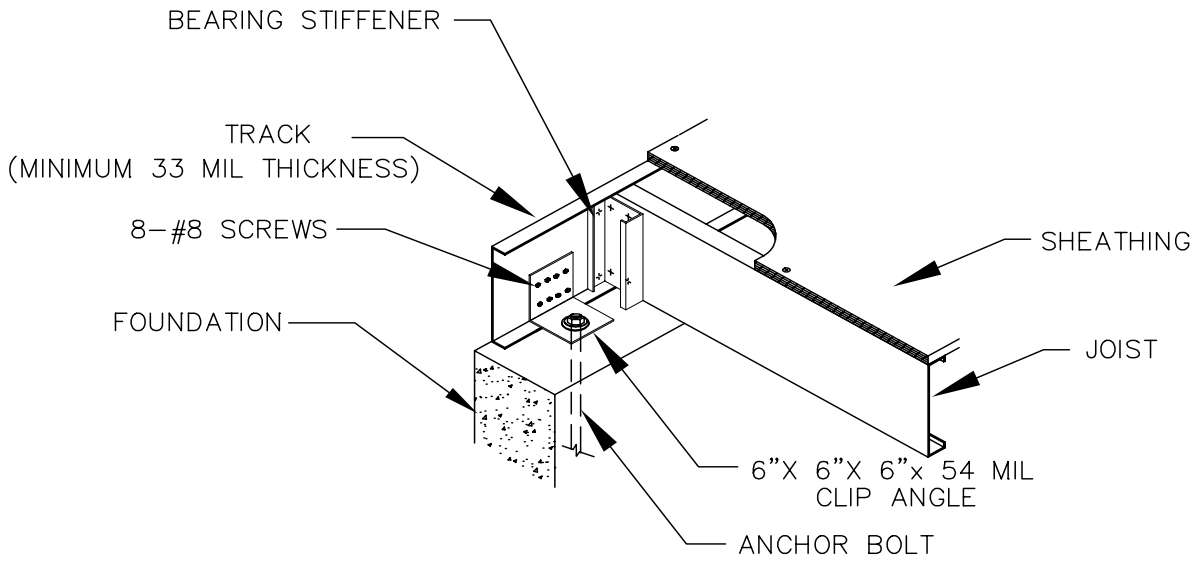

Figure 5.5 Floor to Foundation Connection

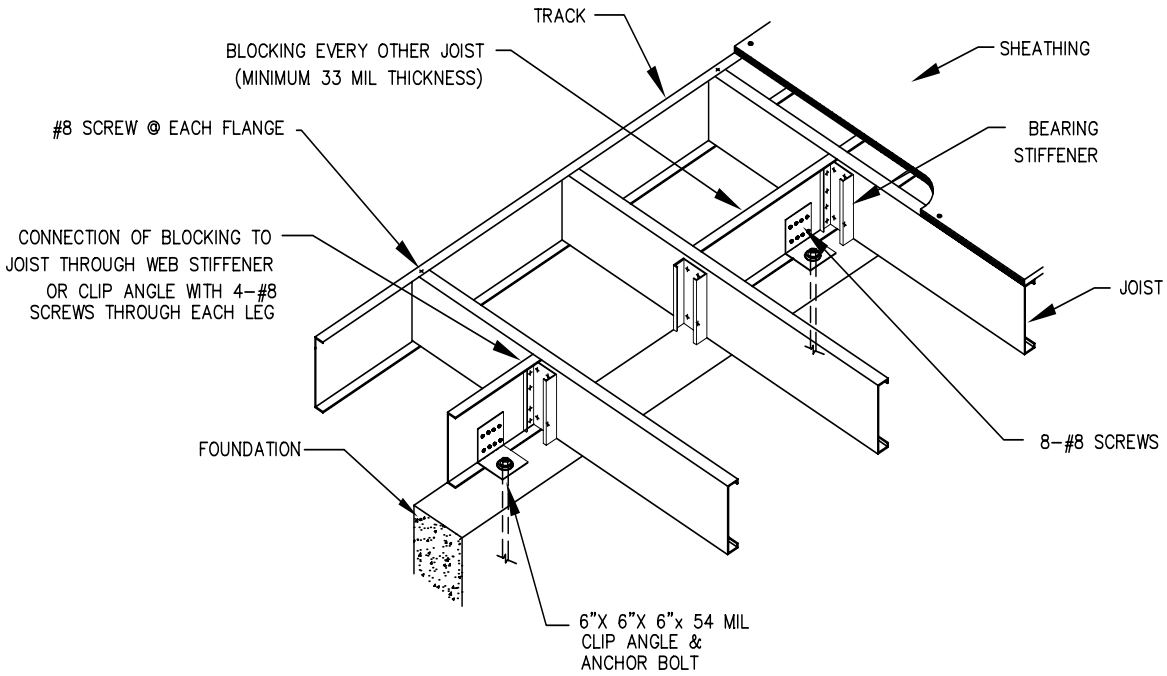

Figure 5.6 Cantilevered Floor to Foundation Connection

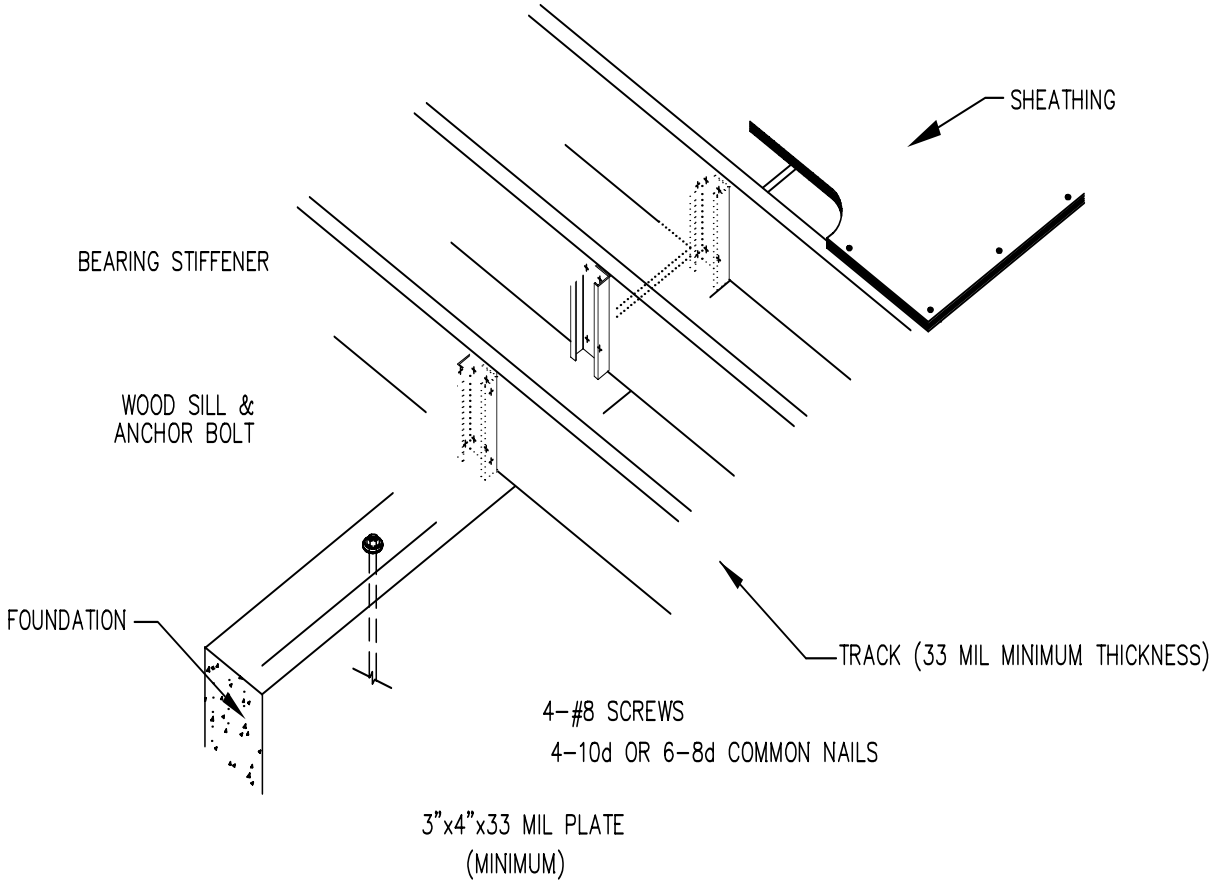

Figure 5.7 Cantilevered Floor to Wood Sill Connection

Table 5.1
Floor to Foundation or Bearing Wall Connection Requirements

Framing Condition	Wind Speed (mph), Exposure, and Seismic Zones [1,2]		
	Up to 90 A/B or 70 C or Seismic Zones 0, 1, 2, & 3	**Up to 110 A/B or 90 C or Seismic Zone 4**	**Up to 110 C**
Floor joist to wall track of exterior steel load bearing wall per Figure 5.3	2 - #8 screws	3- #8 screws	4- #8 screws
Joist track or end joist to bearing wall top track per Figure 5.3	1- #8 screw at 24" o.c	1- #8 screw at 24" o.c.	1- #8 screw at 12" o.c.
Floor joist track or end joist to wood sill per Figure 5.4	Steel plate spaced at 4' o.c. with 4-No. 8 screws and 4-10d or 6-8d common nails	Steel plate spaced at 2' o.c. with 4-No. 8 screws and 4-10d or 6-8d common nails	Steel plate spaced at 1' o.c. with 4-No. 8 screws and 4-10d or 6-8d common nails
Floor joist track or end joist to foundation per Figure 5.5	1/2" minimum diameter anchor bolt and clip angle spaced at 6' o.c. with 8- #8 screws	1/2" minimum diameter anchor bolt and clip angle spaced at 4' o.c. with 8- #8 screws	1/2" minimum diameter anchor bolt and clip angle spaced at 2' o.c. with 8- #8 screws
Cantilevered joist to foundation per Figure 5.6	1/2" minimum diameter anchor bolt and clip angle spaced at 6' o.c. with 8- #8 screws	1/2" minimum diameter anchor bolt and clip angle spaced at 4' o.c. with 8- #8 screws	1/2" minimum diameter anchor bolt and clip angle spaced at 2' o.c. with 8- #8 screws
Cantilevered joist to wood sill per Figure 5.7	Steel plate spaced at 4' o.c. with 4-No. 8 screws and 4-10d or 6-8d common nails	Steel plate spaced at 2' o.c. with 4-No. 8 screws and 4-10d or 6-8d common nails	Steel plate spaced at 1' o.c. with 4-No. 8 screws and 4-10d or 6-8d common nails
Cantilevered joist to wall track per Figure 5.8	1/2" minimum diameter anchor bolt and clip angle spaced at 6' o.c. with 8- #8 screws	1/2" minimum diameter anchor bolt and clip angle spaced at 4' o.c. with 8- #8 screws	1/2" minimum diameter anchor bolt and clip angle spaced at 2' o.c. with 8- #8 screws

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 mph = 1.61 km/hr, 1 foot = 0.3m.

[1] Use the highest of the wind speed and exposure or the seismic requirements for a given site.
[2] All screw sizes shown are minimum

Table 5.2
Floor Fastening Schedule[1]

Description of Building Elements	Number and Size of Fasteners	Spacing of Fasteners
Floor joist to track of an interior load bearing wall per Figures 5.9 and 5.10	2 - #8 screws	Each joist
Floor joist to track at end of joist	2- #8 screws	One per flange or two per bearing stiffener
Subfloor sheathing to floor joists	#8 screws[2]	6 inches on center on edges and 10 inches on center at intermediate supports

For SI: 1 inch = 25.4 mm

1 All screw sizes shown are minimum.
2 Head styles shall be bugle-head, flat-head, or similar with a minimum head diameter of 0.29 inch (7 mm).

Table 5.3
Allowable Spans For Cold-Formed Steel Floor Joists[1,2,3,4]
Single Span
33 ksi Steel

Nominal Joist Size [5]	30 psf Live Load			40 psf Live Load		
	Spacing (inches)			Spacing (inches)		
	12	16	24	12	16	24
2 x 6 x 33	11' -7"	10' -7"	9' -1"	10' -7"	9' -7"	8' -1"
2 x 6 x 43	12' -8"	11' -6"	10' -0"	11' -6"	10' -5"	9' -1"
2 x 6 x 54	13' -7"	12' -4"	10' -9"	12' -4"	11' -2"	9' -9"
2 x 6 x 68	14' -6"	13' -2"	11' -6"	13' -2"	12' -0"	10' -6"
2 x 6 x 97	16' -1"	14' -7"	12' -9"	14' -7"	13' -3"	11' -7"
2 x 8 x 33	15' -8"	13' -3"	8' -10"	14' -0"	10' -7"	7' -1"
2 x 8 x 43	17' -1"	15' -6"	13' -7"	15' -6"	14' -1"	12' -3"
2 x 8 x 54	18' -4"	16' -8"	14' -7"	16' -8"	15' -2"	13' -3"
2 x 8 x 68	19' -8"	17' -11"	15' -7"	17' -11"	16' -3"	14' -2"
2 x 8 x 97	21' -10"	19' -10"	17' -4"	19' -10"	18' -0"	15' -9"
2 x 10 x 43	20' -6"	18' -8"	15' -3"	18' -8"	16' -8"	13' -1"
2 x 10 x 54	22' -1"	20' -1"	17' -6"	20' -1"	18' -3"	15' -11"
2 x 10 x 68	23' -8"	21' -6"	18' -10"	21' -6"	19' -7"	17' -1"
2 x 10 x 97	26' -4"	23' -11"	20' -11"	23' -11"	21' -9"	19' -0"
2 x 12 x 43	23' -5"	20' -3"	14' -1"	20' -11"	16' -10"	11' -3"
2 x 12 x 54	25' -9"	23' -4"	19' -7"	23' -4"	21' -3"	17' -6"
2 x 12 x 68	27' -8"	25' -1"	21' -11"	25' -1"	22' -10"	19' -11"
2 x 12 x 97	30' -9"	27' -11"	24' -5"	27' -11"	25' -4"	22' -2"

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 foot = 0.3m.

1 Table provides the maximum clear span in feet and inches.
2 Bearing stiffeners shall be installed at all support points and concentrated loads.
3 Deflection criteria: L/480 for live loads; L/240 for total loads.
4 Floor dead load = 10 psf (0.479 kN/m^2)
5 For actual size refer to Table 2.1.

Table 5.4
Allowable Spans For Cold-Formed Steel Floor Joists[1,2,3,4,5,6]
Multiple Spans
33 ksi Steel

Nominal Joist Size [7]	30 psf Live Load			40 psf Live Load		
	Spacing (inches)			Spacing (inches)		
	12	16	24	12	16	24
2 x 6 x 33	12' -10"	10' -6"	7' -10"	11' -0"	9' -0"	6' -7"
2 x 6 x 43	15' -8"	13' -6"	11' -0"	14' -0"	12' -1"	9' -10"
2 x 6 x 54	17' -7"	15' -3"	12' -5"	15' -9"	13' -8"	11' -2"
2 x 6 x 68	19' -6"	17' -2"	14' -0"	17' -8"	15' -4"	12' -6"
2 x 6 x 97	21' -7"	19' -7"	16' -8"	19' -7"	17' -10"	14' -11"
2 x 8 x 33	12' -9"	10' -2"	7' -1"	10' -9"	8' -6"	5' -8"
2 x 8 x 43	19' -5"	16' -8"	12' -6"	17' -5"	14' -3"	10' -8"
2 x 8 x 54	23' -0"	19' -11"	16' -3"	20' -6"	17' -9"	14' -6"
2 x 8 x 68	25' -10"	22' -5"	18' -3"	23' -2"	20' -0"	16' -4"
2 x 8 x 97	29' -4"	26' -7"	21' -11"	26' -7"	24' -0"	19' -7"
2 x 10 x 43	20' -3"	16' -5"	12' -1"	17' -3"	13' -11"	10' -2"
2 x 10 x 54	25' -6"	22' -1"	18' -0"	22' -10"	19' -9"	15' -6"
2 x 10 x 68	30' -6"	26' -5"	21' -7"	27' -4"	23' -8"	19' -3"
2 x 10 x 97	35' -4"	31' -9"	25' -11"	32' -1"	28' -5"	23' -2"
2 x 12 x 43	19' -8"	15' -9"	11' -3"	16' -7"	13' -3"	9' -0"
2 x 12 x 54	27' -8"	23' -9"	17' -10"	24' -9"	20' -4"	15' -2"
2 x 12 x 68	32' -7"	28' -3"	23' -0"	29' -2"	25' -3"	20' -7"
2 x 12 x 97	41' -3"	36' -7"	29' -10"	37' -5"	32' -9"	26' -9"

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 foot = 0.3m.

1 Table provides the maximum clear span in feet and inches to either side of the interior support.
2 Interior bearing supports for multiple span joists shall consist of structural (bearing) walls or beams.
3 Bearing stiffeners shall be installed at all support points and concentrated loads.
4 Deflection criteria: L/480 for live loads; L/240 for total loads.
5 Floor dead load = 10 psf (0.479 kN/m^2)
6 Interior supports shall be located within two feet (610 mm) of mid span provided that each of the resulting spans does not exceed the appropriate maximum span shown in the table above.
7 For actual size refer to Table 2.1.

6.0 STRUCTURAL STEEL WALL FRAMING

6.1 Wall Construction

Cold-formed steel structural walls shall be constructed in accordance with this section and Figure 6.1. Cold-formed steel framing members shall comply with the provisions of Section 2.0.

6.1.1 Applicability Limits

The applicability limits of section 1.3 and Table 1.1 shall apply.

6.1.1 In-Line Framing

Load bearing steel stud (interior and exterior) walls shall be located directly in-line with joists, trusses or rafters supported above with a maximum tolerance of 3/4-inch (19 mm) between their centerlines in accordance with Figure 1.2. Interior load bearing steel walls shall be supported on foundations or shall be located directly above a load bearing wall or floor girder.

6.2 Wall to Foundation or Floor Connection

Steel-framed walls shall be anchored to foundations or floors in accordance with Table 6.1 and Figures 6.2 and 6.3. Uplift connectors shall be provided in accordance with Section 6.10.

6.3 Load Bearing Walls

Load bearing walls shall be constructed in accordance with Figure 6.1. Steel studs shall be selected from Tables 6.2 through 6.7 for steels with minimum yield strength of 33 ksi (228 MPa) or Tables 6.8 through 6.13 for steels with minimum yield strength of 50 ksi (228 MPa). Fastening requirements shall be in accordance with Section 2.11 and Table 6.14. Tracks shall have a minimum steel thickness equivalent to or greater than the wall studs. Exterior walls with a minimum of 1/2-inch (13 mm) gypsum board installed in accordance with Table 6.14 on the interior surface and wood structural sheathing panels of minimum 7/16-inch (11 mm) thick oriented strand board or 15/32-inch (12 mm) thick plywood installed in accordance with Section 6.8.2 on the outside surface shall be permitted to use the next thinner stud size, from Tables 6.2 through 6.7, but not less than 33 mils (0.84 mm). Interior load bearing walls with a minimum of 1/2-inch (13 mm) gypsum board installed in accordance with Table 6.14 on both sides of the wall shall be permitted to use the next thinner stud from Tables 6.2 through 6.7, but not less than 33 mils (0.84 mm). Stud thickness for walls supporting one floor, roof and ceiling are based on a second floor live load of 30 psf (1.44 kN/m^2). Second floor live loads of 40 psf (1.92 kN/m^2) shall be permitted provided that the next higher snow load category is used to select the stud size from Tables 6.2 through 6.13.

6.4 Stud Bracing

The flanges of load bearing steel studs shall be laterally braced in accordance with one of the following methods:

1. Gypsum board or structural sheathing on both sides of load bearing walls installed in accordance with Table 6.14 and Figure 6.4.

2. Horizontal steel strapping shall be installed in accordance with Figure 6.5 on both sides at mid-height for 8-foot (2.4 m) walls, and third-heights for 9- and 10-foot (2.7 and 3.0 m) walls. Horizontal steel straps shall be at least 1-1/2 inches in width and 33 mils in thickness (38 mm x 0.84 mm). Straps shall be attached to the flanges of studs with at least one #8 screw. In-line blocking shall be installed between studs at the termination of all straps and at 12-foot (37 m) intervals along the strap; straps shall be fastened to the blocking with at least two #8 screws.

3. A combination of methods 1 and 2 in accordance with Figure 6.5.

Adequate temporary or permanent stud bracing shall be provided to resist loads during construction.

6.5 Splicing

Studs and other structural members shall not be spliced without an approved design. Splicing of tracks shall conform with Figure 6.7.

6.6 Corner Framing

Corner studs and the top track shall be installed in accordance with Figure 6.8. Other approved corner framing details shall be permitted.

6.7 Headers

Headers shall be installed above wall openings in all exterior walls and interior load bearing walls in accordance with Figures 6.9 and 6.10 and Tables 6.15 through 6.17. Header spans for house widths between those tabulated may be determined by interpolation. Headers shall be formed from two, equal sized C-shaped members in a back-to-back or box-type configuration. Steel tracks used to form the headers shall be of a minimum thickness of 33 mils (0.84 mm). The number of jack and king studs, installed on each side of the header, shall comply with Table 6.18. Jack, king, and cripple studs shall be of the same dimension and thickness as the adjacent wall studs. Headers shall be connected to king studs in accordance with Table 6.19. One-half of the total number of screws shall be applied to the header and one half to the king stud by use of C-shaped or track member in accordance with Figure 6.9 for box-type headers or a minimum 2-inch x 2-inch (51 mm x 51 mm) clip angle in accordance with Figure 6.10 for back-to-back headers. The clip angle, track, or C-shape shall extend the depth of the header minus 1/2-inch (13 mm) and shall have a minimum thickness not less than the wall studs. Jack

and king studs shall be interconnected with structural sheathing in accordance with Figures 6.9 and 6.10. Headers are not required for openings in interior non-load bearing walls.

6.8 Wall Bracing

Exterior steel-framed walls shall be braced with diagonal steel straps or structural sheathing in accordance with Sections 6.8.1 or 6.8.2.

6.8.1 Strap Bracing (X-brace)

Diagonal steel straps or "X-braces" and their connections shall be designed and installed in accordance with an approved design.

6.8.2 Structural Sheathing

Structural sheathing shall be installed on all exterior wall surfaces in accordance with Figure 6.1 and Section 6.8.3. Structural sheathing panels shall consist of minimum 7/16-inch (11 mm) thick oriented strand board or 15/32-inch (12 mm) thick plywood. Full height structural sheathing shall extend from the bottom to the top of the wall without interruption by openings.

The minimum length of full height sheathing along exterior wall lines shall be determined in accordance with Table 6.20. The minimum percentage of full-height sheathing shall include only those sheathed wall sections between openings, which are a minimum of 48 inches (1.1 m) wide. The minimum percentage of full-height structural sheathing shall be multiplied by 1.10 for 9 foot (2.7m) high walls and multiplied by 1.20 for 10 foot (3.0 m) high walls. In addition, structural sheathing shall be:

1. installed with the long dimension parallel to the stud framing (i.e. vertical orientation) and shall cover the full vertical height of wall; and,

2. applied to each end (corners) of each of the exterior walls with a minimum 48 inch (1.2 m) wide panel.

In conditions where design wind speeds are in excess of 90 mph (144 km/hr) Exposure C or 100 mph (160 km/hr) Exposure A/B and in seismic Zone 3 or greater, the amount and type of structural sheathing shall be determined by accepted engineering practices. Additional guidance on wall bracing design and requirements for high wind and seismic conditions is found in the *Commentary* [6].

6.8.3 Structural Sheathing Fastening

All edges and interior areas of structural sheathing panels shall be fastened to framing members and tracks in accordance with Figure 6.11 and Table 6.14. The panels shall be installed with the long dimension parallel to the stud framing and shall extend the full vertical height of the wall.

6.9 Hold-down Requirements

In conditions where wind speeds are in excess of 90 mph (144 km/hr) Exposure C or 100 mph (160 km/hr) Exposure A/B, and in Seismic Zones 3 and 4, hold-down brackets shall be provided in accordance with an approved design.

6.10 Wind Uplift

In high wind conditions, an approved uplift connector (i.e. strap or bracket) shall be used to attach individual wall studs and king studs to floor joist tracks or directly to foundations below the wall in accordance with Figure 6.1 and Table 6.1. The wind uplift requirements only apply to walls directly connected to the roof, not to lower story walls of two-story construction. Uplift requirements for roof-to-wall connections are provided in Section 8.9.

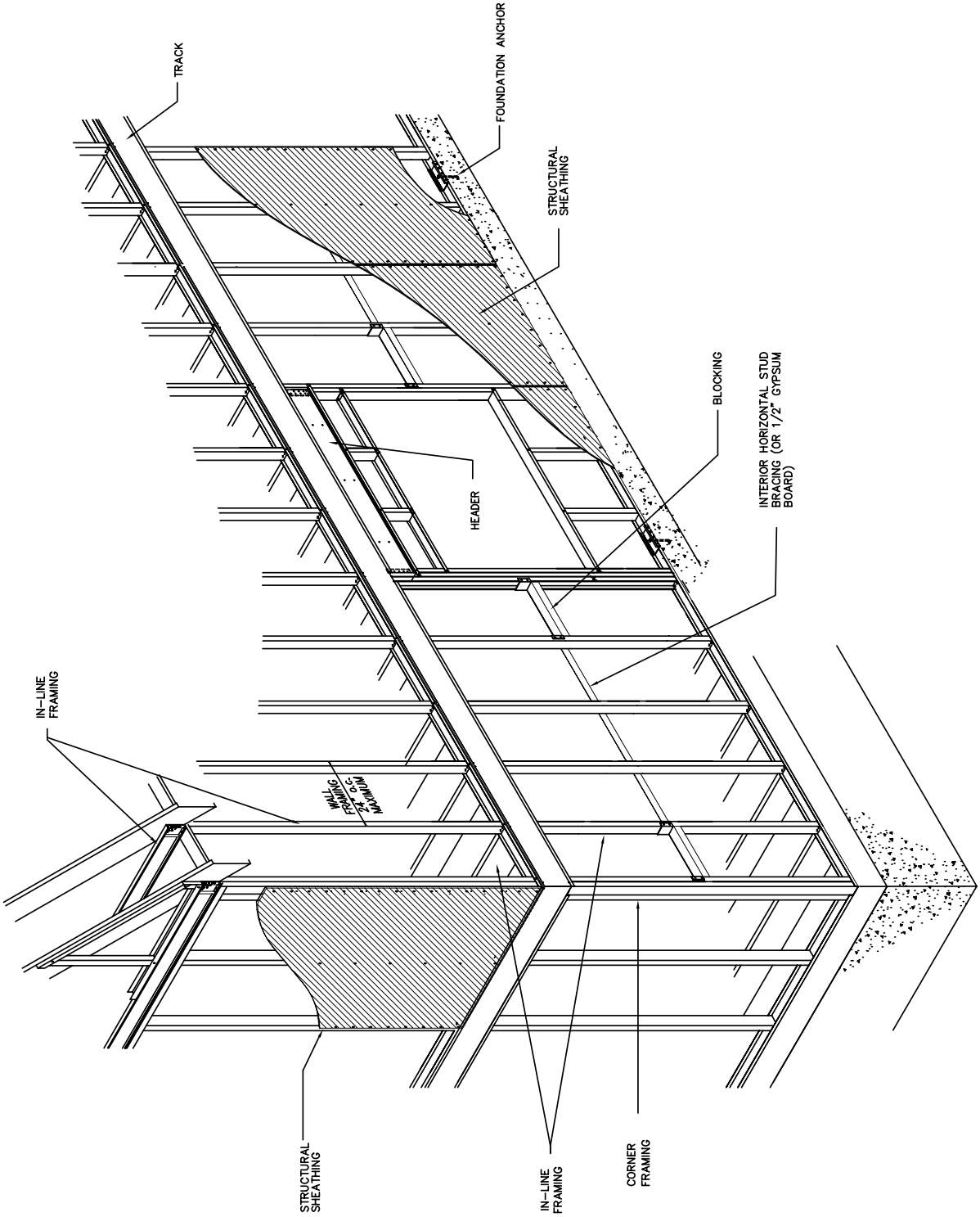

Figure 6.1 Steel Wall Construction

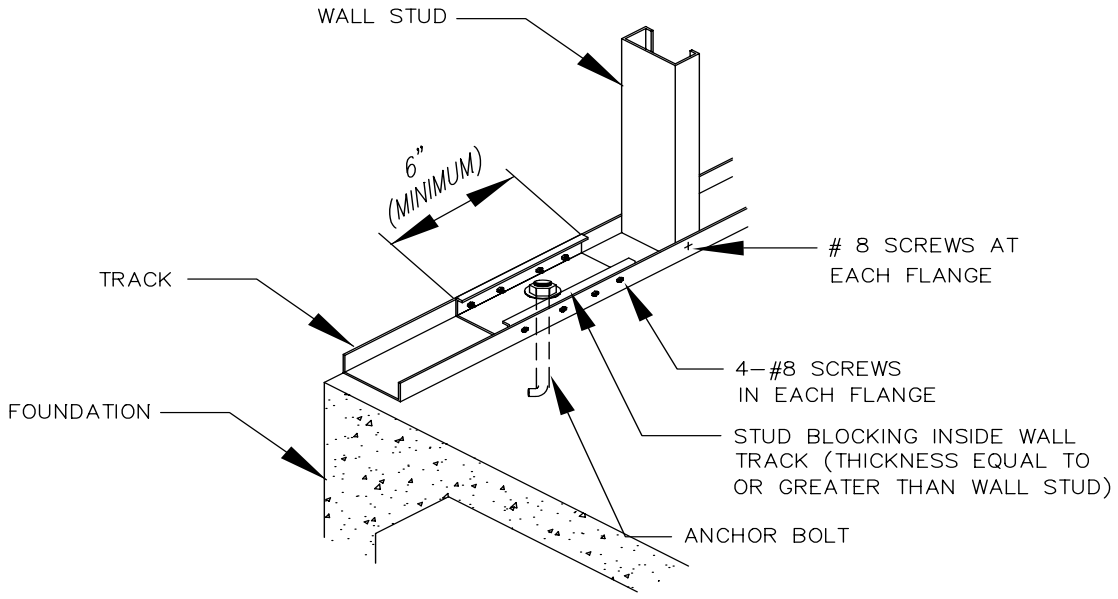

Figure 6.2 Wall to Foundation Connection

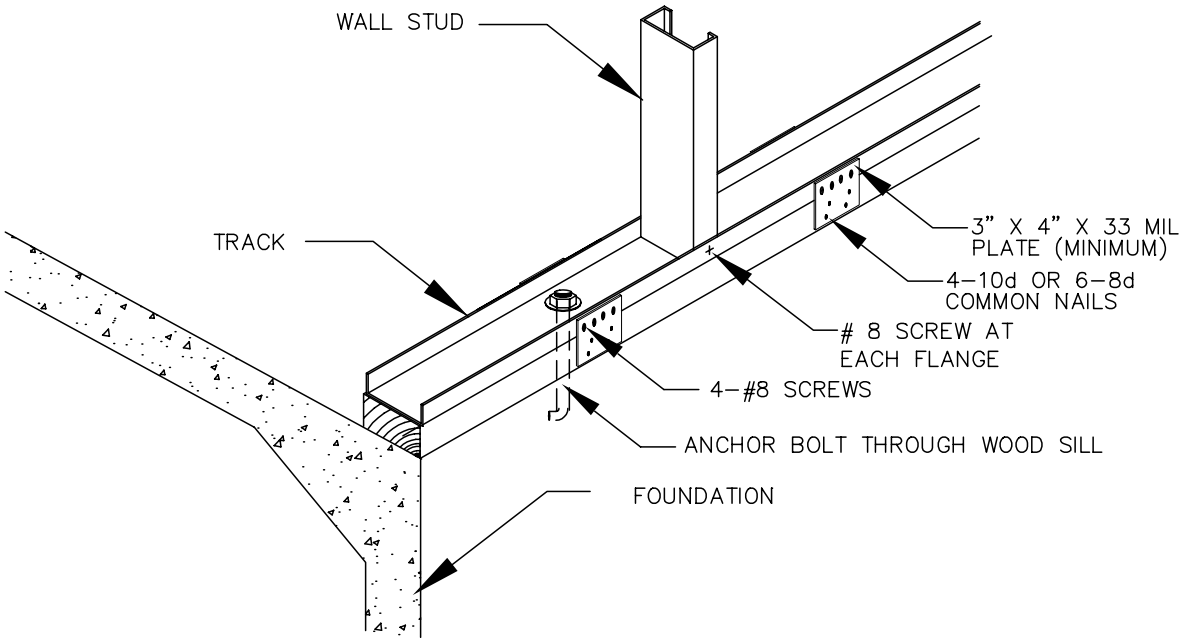

Figure 6.3 Wall to Wood Sill Connection

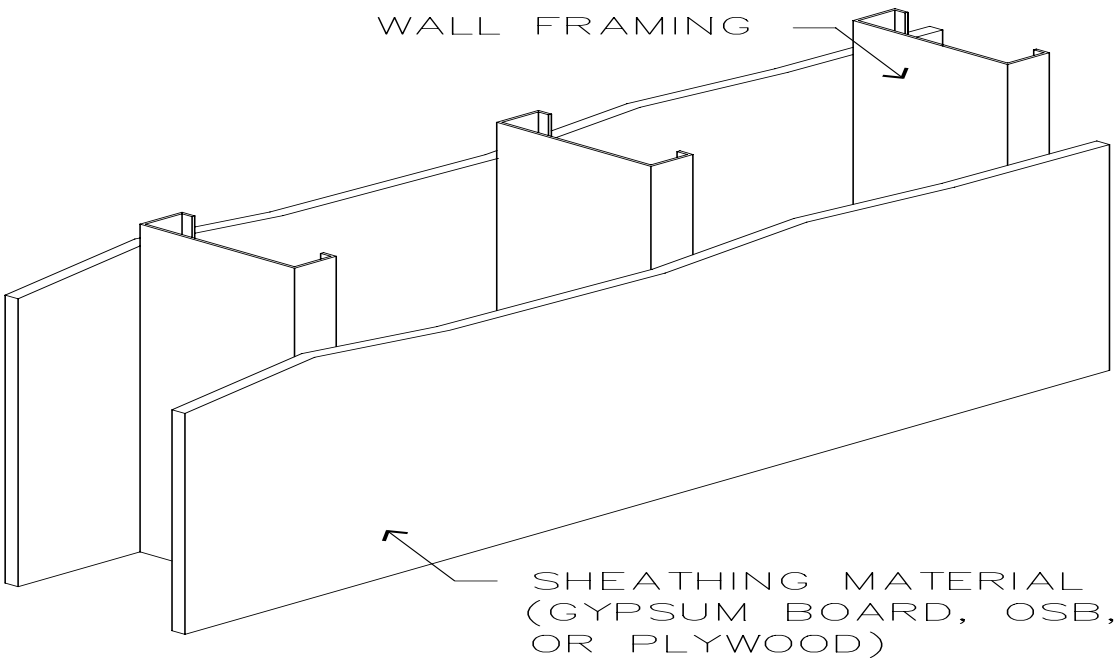

Figure 6.4 Stud Bracing with Sheathing Material Only

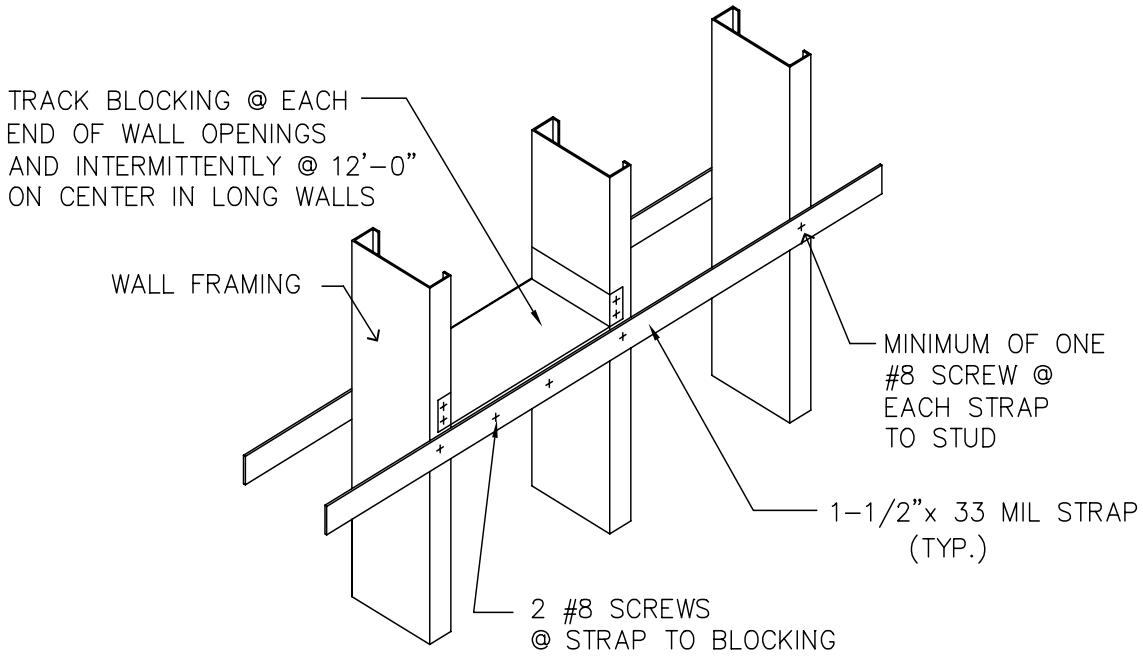

Figure 6.5 Stud Bracing with Strapping Only

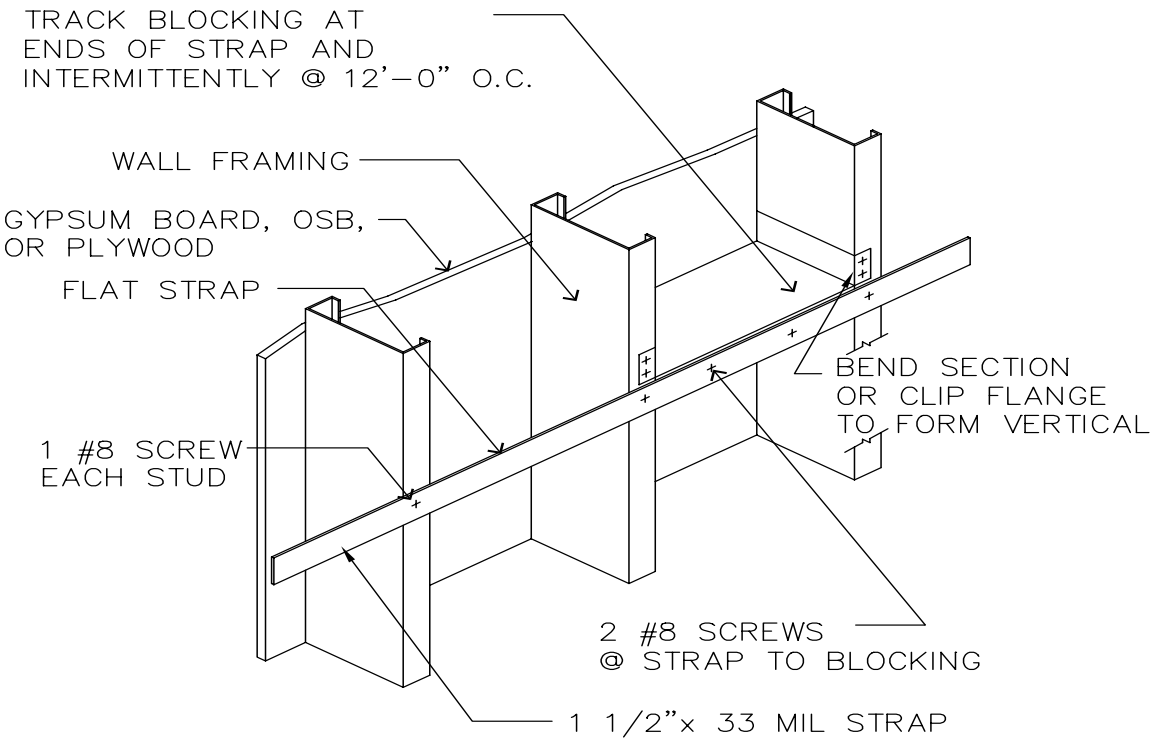

Figure 6.6 Stud Bracing with Strapping and Sheathing Material

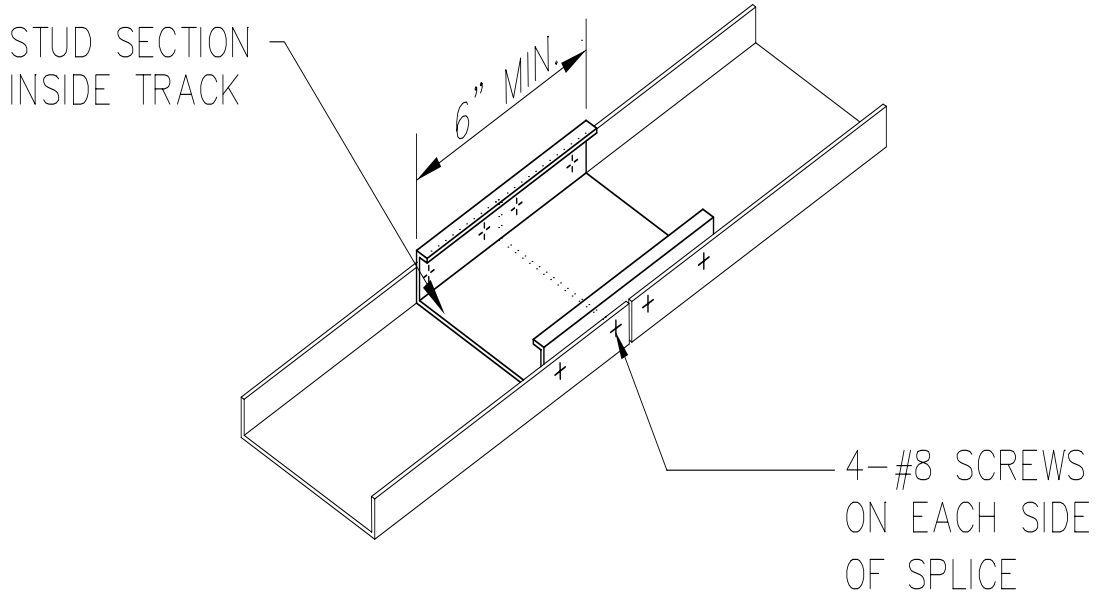

Figure 6.7 Track Splice

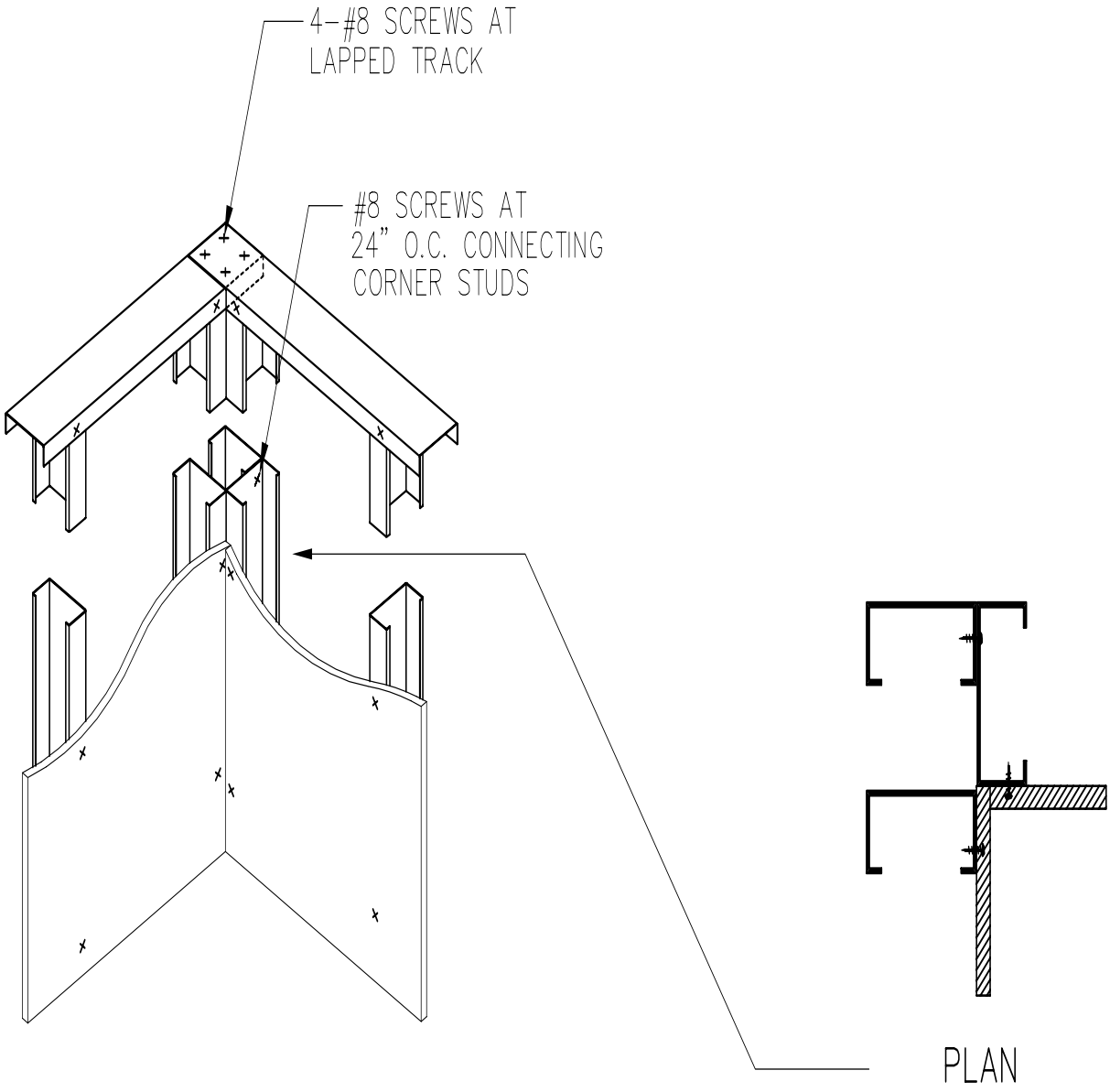

Figure 6.8 Corner Framing

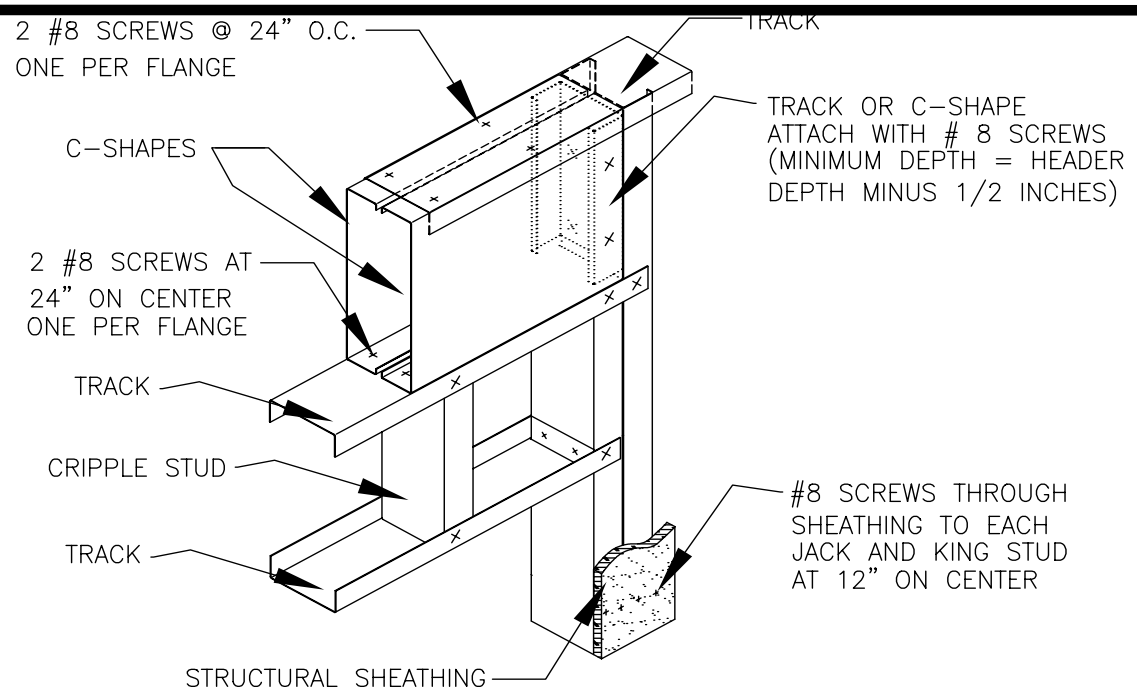

Figure 6.9 Box-Beam Header Detail

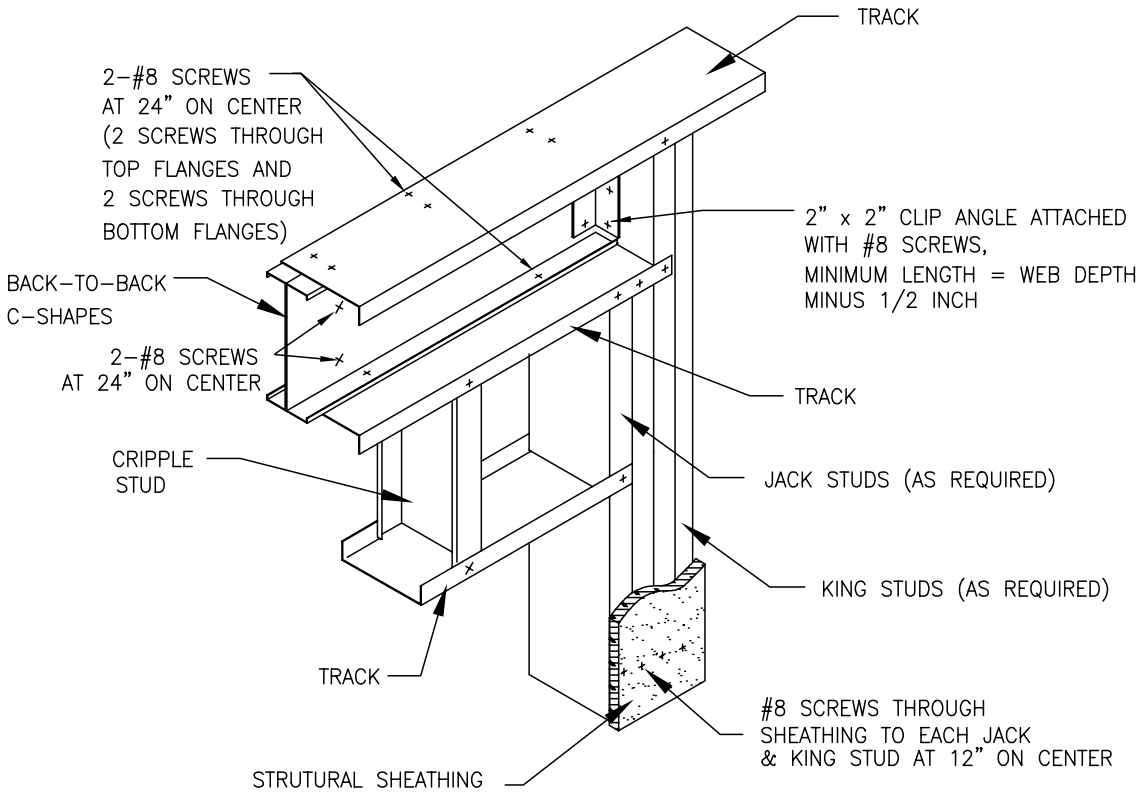

Figure 6.10 Back-to-Back Header Detail

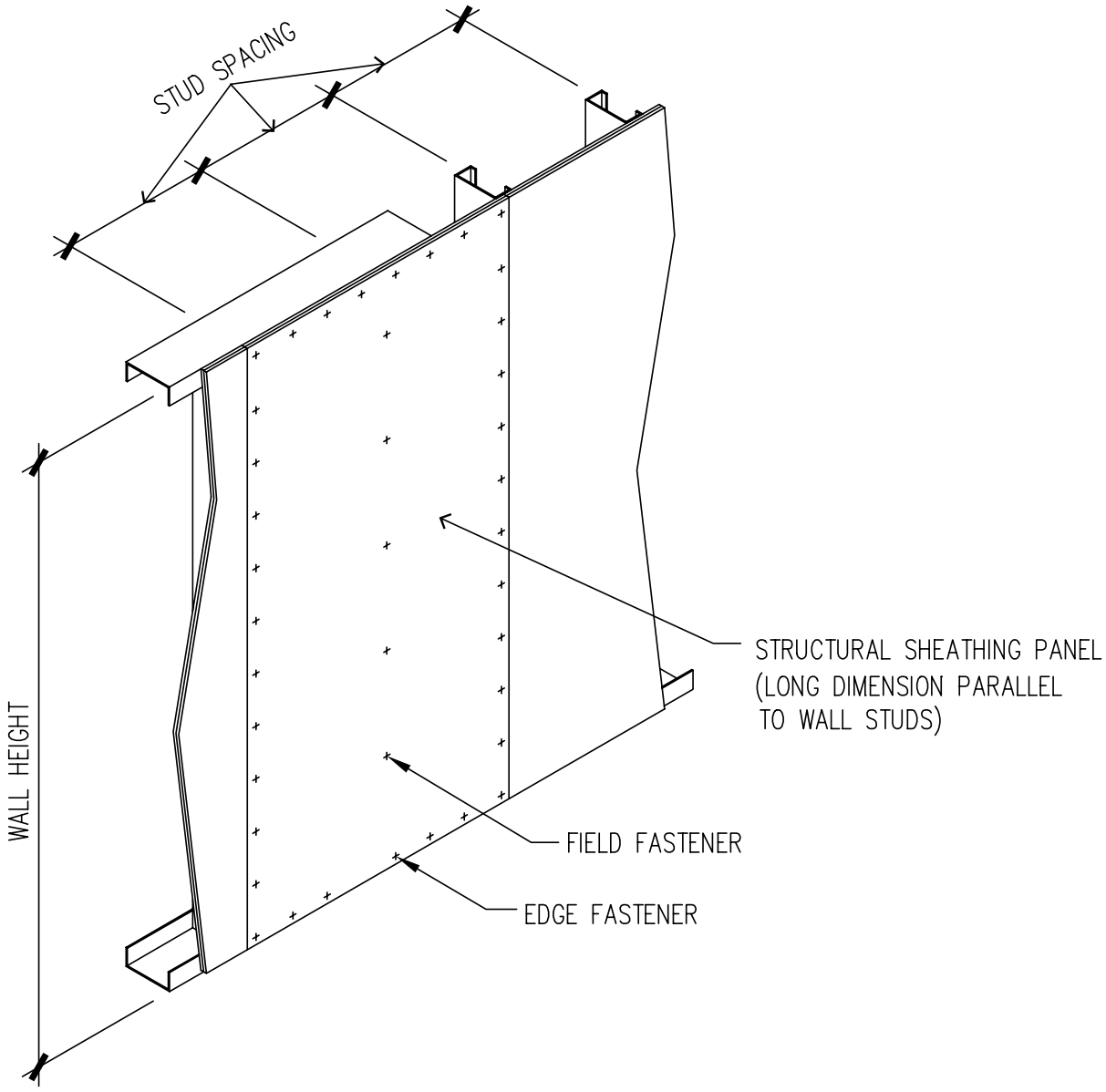

Figure 6.11 Structural Sheathing Fastening Pattern

Table 6.1
Wall to Foundation or Floor Connection Requirements

Framing Condition	Wind Speed (mph), Exposure, & Seismic Zones[1,2,3]			
	Up to 70 A/B or Seismic Zones 0, 1, 2	**Up to 90 A/B 70 C or Seismic Zone 3**	**Up to 110 A/B or 90 C or Seismic Zone 4**	**Up to 110 C**
Wall bottom track to floor joist or track	1 - #8 screw at 12" oc	1 - #8 screw at 12" oc	2 - #8 screw at 12" oc	2 - #8 screw at 12" oc
Wall bottom track to foundation per Figure 6.2	1/2" minimum diameter anchor bolt at 6' oc	1/2" minimum diameter anchor bolt at 4' oc	1/2" minimum diameter anchor bolt at 4' oc	1/2" minimum diameter anchor bolt at 4' oc
Wall bottom track to wood sill per Figure 6.3	Steel plate spaced at 4' oc, with 4 - #8 screws and 4 - 10d or 6 - 8d common nails	Steel plate spaced at 3' oc, with 4 - #8 screws and 4 - 10d or 6 - 8d common nails	Steel plate spaced at 2' oc, with 4 - #8 screws and 4 - 10d or 6 - 8d common nails	Steel plate spaced at 2' oc, with 4 - #8 screws and 4 - 10d or 6 - 8d common nails
Wind uplift connector capacity [3]	N/R	N/R	50 lbs. per foot of wall length	200 lbs. per foot of wall length

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 mph = 1.61 km/hr, 1 foot = 0.3 m, 1 lb. = 4.4 N.

1 Use the greater of the wind speed and exposure or the seismic requirements for a given site.

2 All screw sizes shown are minimum.

3 N/R = uplift connector not required. For 16-inch (406 mm) and 24-inch (610 mm) stud spacing, the uplift load shall be multiplied by 1.3 and 2.0, respectively. Uplift connectors are in addition to other connection requirements and shall be applied in accordance with Section 6.10.

Table 6.2
Steel Stud Thickness for 8' Walls Supporting Roof and Ceiling Only
(One Story or Second Floor of a Two Story Building)
33 ksi Steel

Wind Speed		Member Size[3]	Member Spacing (inches)	Stud Thickness (mils)[1,2]															
				Building Width (feet)[4,5]															
				24				28				32				36			
Exp. A/B	Exp. C			Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)			
				20	30	50	70	20	30	50	70	20	30	50	70	20	30	50	70
70 mph		2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
80 mph	70 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	43	33	33	43	43
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
90 mph	80 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	33	43	43	43	43	43	43	43
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
100 mph	90 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	43	43	43	43	43	43	43	54	43	43	54	54	43	43	54	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
110 mph	100 mph	2x4	16	33	33	43	43	33	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	68	54	54	68	68	54	54	68	68
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	43	33	33	33	43	33	33	43	43
	110 mph	2x4	16	43	43	43	43	43	43	43	43	43	43	43	54	43	43	43	54
			24	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	97
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 mph = 1.61 km/hr, 1 foot = 0.3 m.

1 Deflection criteria: L/240

2 Design load assumptions: Roof dead load is 12 psf (0.575 kN/m^2)
Attic live load is 10 psf (0.479 kN/m^2)

3 For actual sizes of members, refer to Table 2.1.

4 Building width is in the direction of horizontal framing members supported by the wall studs.

5 Exterior load bearing walls with a minimum of 1/2 inch (13 mm) gypsum board on the inside and 7/16 inch (11 mm) OSB or plywood on the outside, and interior load bearing walls with a minimum of 1/2 inch (13 mm) gypsum board on both sides may use the next thinner stud but not less than 33 mils (0.84 mm)

Table 6.3
Steel Stud Thickness for 8' Walls Supporting One Floor, Roof and Ceiling
(First Story of a Two Story Building)
33 ksi Steel

Wind Exposure		Member Size[3]	Member Spacing (inches)	Required Stud Thickness (mils)[1,2]															
				Building Width (feet)[4,5,6]															
				24				28				32				36			
Exp. A/B	Exp. C			Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)			
				20	30	50	70	20	30	50	70	20	30	50	70	20	30	50	70
70 mph		2x4	16	33	33	33	33	33	33	33	33	33	33	33	43	33	33	33	43
			24	43	43	43	43	43	43	43	43	43	43	43	54	43	43	54	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	43	33	33	43	43	33	43	43	54
80 mph	70 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	43	33	33	43	43
			24	43	43	43	54	43	43	54	54	54	54	54	54	54	54	54	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
			24	33	33	33	33	33	33	33	43	33	33	43	43	43	43	43	54
90 mph	80 mph	2x4	16	33	33	33	33	33	33	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	54	54	54	54	68	54	54	68	68
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	43	43	43	43	43	43	43	43	43	54
100 mph	90 mph	2x4	16	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	54
			24	54	54	54	68	54	68	68	68	68	68	68	68	68	68	68	68
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	43	43	43	43	43	43	43	43	43	43	43	43	43	43	54
110 mph	100 mph	2x4	16	43	43	43	54	43	54	54	54	54	54	54	54	54	54	54	54
			24	68	68	68	68	68	68	97	97	97	97	97	97	97	97	97	97
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
			24	43	43	43	43	43	43	43	54	43	43	54	54	54	54	54	54
	110 mph	2x4	16	54	54	54	54	54	54	54	54	54	54	54	68	54	54	68	68
			24	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97
		2x6	16	33	33	33	33	33	33	33	43	33	33	43	43	43	43	43	43
			24	43	43	54	54	54	54	54	54	54	54	54	54	54	54	54	54

For SI:1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 mph = 1.61 km/hr, 1 foot = 0.3 m.

1 Deflection criteria: L/240

2 Design load assumptions:
Second floor dead load is 10 psf (0.48 kN/m^2) Attic live load is 10 psf (0.48kN/m^2)
Second floor live load is 30 psf (1.44 kN/m^2) Roof dead load is 12 psf (0.58 kN/m^2)

3 For actual sizes of members, refer to Table 2.1.

4 Building width is in the direction of horizontal framing members supported by the wall studs.

5 Exterior load bearing walls with a minimum of 1/2 inch (13 mm) gypsum board on the inside and 7/16 inch (11 mm) OSB or plywood on the outside, and interior load bearing walls with a minimum of 1/2 inch (13 mm) gypsum board on both sides may use the next thinner stud but not less than 33 mils (0.84 mm).

6 For second story floors with 40 psf live load, select the stud size from the next higher ground snow load column.

Table 6.4
Steel Stud Thickness for 9' Walls Supporting Roof and Ceiling Only
(One Story or Second Floor of a Two Story Building)
33 ksi Steel

Wind Exposure		Member Size[3]	Member Spacing (inches)	Required Stud Thickness (mils)[1,2]															
				Building Width (feet)[4,5]															
				24				28				32				36			
Exp. A/B	Exp. C			Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)			
				20	30	50	70	20	30	50	70	20	30	50	70	20	30	50	70
70 mph		2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
80 mph	70 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	33	43	43	43	43	43	43	43
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
90 mph	80 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	43	43	43	43	43	43	43	43	43	43	43	54	43	43	43	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
100 mph	90 mph	2x4	16	33	33	33	33	33	33	33	43	33	33	43	43	33	33	43	43
			24	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	68
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
110 mph	100 mph	2x4	16	43	43	43	43	43	43	43	43	43	43	43	54	43	43	43	54
			24	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	97
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
	110 mph	2x4	16	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
			24	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	43	43	43	43	43	43	43	43	43	43	43	54	43	43	43	54

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 mph = 1.61 km/hr, 1 foot = 0.3 m.

1 Deflection criteria: L/240

2 Design load assumptions: Roof dead load is 12 psf (0.575 kN/m^2)
Attic live load is 10 psf (0.479 kN/m^2)

3 For actual sizes of members, refer to Table 2.1.

4 Building width is in the direction of horizontal framing members supported by the wall studs.

5 Exterior load bearing walls with a minimum of 1/2 inch (13 mm) gypsum board on the inside and 7/16 inch (11 mm) OSB or plywood on the outside, and interior load bearing walls with a minimum of 1/2 inch (13 mm) gypsum board on both sides may use the next thinner stud but not less than 33 mils (0.84 mm).

Table 6.5
Steel Stud Thickness for 9' Walls Supporting One Floor, Roof and Ceiling
(First Story of a Two Story Building)
33 ksi Steel

Wind Exposure		Member Size[3]	Member Spacing (inches)	Required Stud Thickness (mils)[1,2]															
				Building Width (feet)[4,5]															
				24				28				32				36			
Exp. A/B	Exp. C			Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)			
				20	30	50	70	20	30	50	70	20	30	50	70	20	30	50	70
70 mph		2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
			24	43	43	43	43	43	43	43	54	43	43	54	54	54	54	54	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	43	33	33	43	43	33	33	43	43
80 mph	70 mph	2x4	16	33	33	33	33	33	33	33	43	33	43	43	43	43	43	43	43
			24	43	54	54	54	54	54	54	54	54	54	54	54	54	54	68	68
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	43	33	33	43	43	43	43	43	43
90 mph	80 mph	2x4	16	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	54	54	54	54	54	54	54	68	68
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	43	43	43	43	43	43	43	43	43	43	43	54
100 mph	90 mph	2x4	16	43	43	43	43	43	43	43	54	43	43	54	54	54	54	54	54
			24	68	68	68	68	68	68	68	68	68	68	68	97	68	68	97	97
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	43	43	43	43	43	43	43	43	43	43	43	54	43	43	54	54
110 mph	100 mph	2x4	16	54	54	54	54	54	54	54	54	54	54	54	68	54	54	68	68
			24	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97
		2x6	16	33	33	33	33	33	33	33	43	33	33	43	43	33	43	43	43
			24	43	43	54	54	54	54	54	54	54	54	54	54	54	54	54	54
	110 mph	2x4	16	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68
			24	97	97	97	97	97	97	97	--	97	97	--	--	--	--	--	--
		2x6	16	33	33	43	43	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	54	54	54	54	68	54	54	68	68

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 mph = 1.61 km/hr, 1 foot = 0.3 m.

1 Deflection criteria: L/240

2 Design load assumptions:
Second floor dead load is 10 psf (0.48 kN/m^2) Attic live load is 10 psf (0.48 kN/m^2)
Second floor live load is 30 psf (1.44 kN/m^2) Roof dead load is 12 psf (0.58 kN/m^2)

3 For actual sizes of members, refer to Table 2.1.

4 Building width is in the direction of horizontal framing members supported by the wall studs.

5 Exterior load bearing walls with a minimum of 1/2 inch (13 mm) gypsum board on the inside and 7/16 inch (11 mm) OSB or plywood on the outside, and interior load bearing walls with a minimum of 1/2 inch (13 mm) gypsum board on both sides may use the next thinner stud but not less than 33 mils (0.84 mm).

6 For second story floors with 40 psf live load, select the stud size from the next higher ground snow load column.

Table 6.6
Steel Stud Thickness for 10' Walls Supporting Roof and Ceiling Only
(One Story or Second Floor of a Two Story Building)
33 ksi Steel

Wind Exposure		Member Size[3]	Member Spacing (inches)	Required Stud Thickness (mils)[1,2]															
				Building Width (feet)[4,5]															
				24				28				32				36			
Exp. A/B	Exp. C			Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)			
				20	30	50	70	20	30	50	70	20	30	50	70	20	30	50	70
70 mph		2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	43	43	33	33	43	43	33	43	43	43
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
80 mph	70 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	43	43	43	43	43	43	43	54	43	43	43	54	43	43	54	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
90 mph	80 mph	2x4	16	33	33	33	43	33	33	43	43	33	33	43	43	33	33	43	43
			24	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	68
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
100 mph	90 mph	2x4	16	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	54
			24	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	33	43	43	43	43	43	43	43
110 mph	100 mph	2x4	16	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	68
			24	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	43	43	43	43	43	43	43	54	43	43	54	54	43	43	54	54
	110 mph	2x4	16	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68
			24	97	97	97	--	97	97	--	--	97	97	--	--	97	--	--	--
		2x6	16	33	33	33	43	33	33	43	43	33	33	43	43	33	43	43	43
			24	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	68

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 mph = 1.61 km/hr, 1 foot = 0.3 m.

1 Deflection criteria: L/240

2 Design load assumptions: Roof dead load is 12 psf (0.58 kN/m^2)
Attic live load is 10 psf (0.48 kN/m^2)

3 For actual sizes of members, refer to Table 2.1.

4 Building width is in the direction of horizontal framing members supported by the wall studs.

5 Exterior load bearing walls with a minimum of 1/2 inch (13 mm) gypsum board on the inside and 7/16 inch (11 mm) OSB or plywood on the outside, and interior load bearing walls with a minimum of 1/2 inch (13 mm) gypsum board on both sides may use the next thinner stud but not less than 33 mils (0.84 mm).

Table 6.7
Steel Stud Thickness for 10' Walls Supporting One Floor, Roof and Ceiling
(First Story of a Two Story Building)
33 ksi Steel

Wind Exposure		Member Size[3]	Member Spacing (inches)	Required Stud Thickness (mils)[1,2]															
				Building Width (feet)[4,5,6]															
				24				28				32				36			
Exp. A/B	Exp. C			Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)			
				20	30	50	70	20	30	50	70	20	30	50	70	20	30	50	70
70 mph		2x4	16	33	33	33	43	33	33	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	54	54	54	54	68	54	54	68	68
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	43	33	33	43	43	43	43	43	54
80 mph	70 mph	2x4	16	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	54
			24	54	54	68	68	68	68	68	68	68	68	68	68	68	68	68	97
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	43	43	43	43	43	43	43	43	43	43	43	54
90 mph	80 mph	2x4	16	43	43	43	43	43	43	54	54	43	54	54	54	54	54	54	54
			24	68	68	68	68	68	68	68	97	68	68	97	97	97	97	97	97
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	43	43	43	43	43	43	43	43	43	43	43	54	43	43	54	54
100 mph	90 mph	2x4	16	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
			24	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	43	33	33	43	43
			24	43	43	43	54	43	54	54	54	54	54	54	54	54	54	54	54
110 mph	100 mph	2x4	16	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	97
			24	97	97	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2x6	16	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	68	54	68	68	68	68	68	68	68
	110 mph	2x4	16	68	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97
			24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
		2x6	16	43	43	43	43	43	43	43	43	43	43	43	54	43	43	54	54
			24	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	97

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 mph = 1.61 km/hr, 1 foot = 0.3 m.

1 Deflection criteria: L/240

2 Design load assumptions:
Second floor dead load is 10 psf (0.48 kN/m^2) Roof dead load is 12 psf (0.58 kN/m^2)
Second floor live load is 30 psf (1.44 kN/m^2) Attic live load is 10 psf (0.48 kN/m^2)

3 For actual sizes of members, refer to Table 2.1.

4 Building width is in the direction of horizontal framing members supported by the wall studs.

5 Exterior load bearing walls with a minimum of 1/2 inch (13 mm) gypsum board on the inside and 7/16 inch (11 mm) OSB or plywood on the outside, and interior load bearing walls with a minimum of 1/2 inch (13 mm) gypsum board on both sides may use the next thinner stud but not less than 33 mils (0.84 mm).

6 For second story floors with 40 psf live load, select the stud size from the next higher ground snow load column.

Table 6.8
Steel Stud Thickness for 8' Walls Supporting Roof and Ceiling Only
(One Story or Second Floor of a Two Story Building)
50 ksi Steel

Wind Speed		Member Size[3]	Member Spacing (inches)	Stud Thickness (mils)[1,2]															
				Building Width (feet)[4]															
				24				28				32				36			
Exp. A/B	Exp. C			Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)			
				20	30	50	70	20	30	50	70	20	30	50	70	20	30	50	70
70 mph		2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
80 mph	70 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
90 mph	80 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
100 mph	90 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	43	43	33	33	43	43	33	43	43	43
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
110 mph	100 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	43	43	43	43	43	43	43	43	43	43	43	54	43	43	43	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
	110 mph	2x4	16	33	33	33	33	33	33	33	43	33	33	43	43	33	33	43	43
			24	43	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 mph = 1.61 km/hr, 1 foot = 0.3 m.

1 Deflection criteria: L/240

2 Design load assumptions: Roof dead load is 12 psf (0.575 kN/m^2)
Attic live load is 10 psf (0.479 kN/m^2)

3 For actual sizes of members, refer to Table 2.1.

4 Building width is in the direction of horizontal framing members supported by the wall studs.

Table 6.9
Steel Stud Thickness for 8' Walls Supporting One Floor, Roof and Ceiling
(First Story of a Two Story Building)
50 ksi Steel

Wind Exposure		Member Size[3]	Member Spacing (inches)	Required Stud Thickness (mils)[1,2]															
				Building Width (feet)[4]															
				24				28				32				36			
Exp. A/B	Exp. C			Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)			
				20	30	50	70	20	30	50	70	20	30	50	70	20	30	50	70
70 mph		2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
			24	33	33	33	43	33	33	43	43	43	43	43	43	43	43	43	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	43	33	33	43	43
80 mph	70 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
			24	33	43	43	43	43	43	43	43	43	43	43	43	43	33	33	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
			24	33	33	33	33	33	33	33	33	33	33	33	43	33	33	43	43
90 mph	80 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
			24	43	43	43	43	43	43	43	43	43	43	54	54	43	54	54	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	43	33	33	43	43
100 mph	90 mph	2x4	16	33	33	33	33	33	33	33	43	33	33	43	43	33	43	43	43
			24	43	43	43	54	43	54	54	54	54	54	54	54	54	54	54	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	43	33	33	43	43
110 mph	100 mph	2x4	16	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	68	54	54	68	68	68	68	68	68
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
			24	33	33	33	43	33	43	43	43	43	43	43	43	43	43	43	43
	110 mph	2x4	16	43	43	43	43	43	43	43	43	43	43	43	54	43	43	54	54
			24	54	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 mph = 1.61 km/hr, 1 foot = 0.3 m.

1 Deflection criteria: L/240

2 Design load assumptions:
Second floor dead load is 10 psf (0.48 kN/m^2) Attic live load is 10 psf (0.48 kN/m^2)
Second floor live load is 30 psf (1.44 kN/m^2) Roof dead load is 12 psf (0.575 kN/m^2)

3 For actual sizes of members, refer to Table 2.1

4 Building width is in the direction of horizontal framing members supported by the wall studs.

Table 6.1
Steel Stud Thickness for 9' Walls Supporting Roof and Ceiling Only
(One Story or Second Floor of a Two Story Building)
50 ksi Steel

Wind Exposure		Member Size[3]	Member Spacing (inches)	Required Stud Thickness (mils)[1,2]															
				Building Width (feet)[4]															
				24				28				32				36			
Exp. A/B	Exp. C			Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)			
				20	30	50	70	20	30	50	70	20	30	50	70	20	30	50	70
70 mph		2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
80 mph	70 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
90 mph	80 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	43	33	33	33	43	33	33	43	43
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
100 mph	90 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
110 mph	100 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	43	33	33	43	43
			24	43	43	54	54	43	54	54	54	54	54	54	54	54	54	54	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
	110 mph	2x4	16	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	54	54	54	54	68	54	54	54	68
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	43	33	33	43	43	33	33	43	43

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 mph = 1.61 km/hr, 1 foot = 0.3 m.

1 Deflection criteria: L/240

2 Design load assumptions: Roof dead load is 12 psf (0.575 kN/m^2)
Attic live load is 10 psf (0.479 kN/m^2)

3 For actual sizes of members, refer to Table 2.1.

4 Building width is in the direction of horizontal framing members supported by the wall studs.

Table 6.11
Steel Stud Thickness for 9' Walls Supporting One Floor, Roof and Ceiling
(First Story of a Two Story Building)
50 ksi Steel

Wind Exposure		Member Size[3]	Member Spacing (inches)	Required Stud Thickness (mils)[1,2]															
				Building Width (feet)[4]															
				24				28				32				36			
Exp. A/B	Exp. C			Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)			
				20	30	50	70	20	30	50	70	20	30	50	70	20	30	50	70
70 mph		2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	43	43	43	43	43	43	43	43	43	43	43
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
80 mph	70 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	43	43	43	43	43	43	43	43	43	43	43	43	43	43	54	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
90 mph	80 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	43	33	33	33	43	43
			24	43	43	43	43	43	43	43	54	43	54	54	54	54	54	54	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
100 mph	90 mph	2x4	16	33	33	33	43	33	33	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	68
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	43	33	33	43	43	43	43	43	43
110 mph	100 mph	2x4	16	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	54
			24	54	54	68	68	68	68	68	68	68	68	68	68	68	68	68	68
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
	110 mph	2x4	16	43	43	43	54	43	43	54	54	54	54	54	54	54	54	54	54
			24	68	68	68	68	68	68	68	68	68	68	97	97	68	97	97	97
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	54

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 mph = 1.61 km/hr, 1 foot = 0.3 m.

1 Deflection criteria: L/240

2 Design load assumptions:
Second floor dead load is 10 psf (0.48 kN/m^2) Attic live load is 10 psf (0.48 kN/m^2)
Second floor live load is 30 psf (1.44 kN/m^2) Roof dead load is 12 psf (0.575 kN/m^2)

3 For actual sizes of members, refer to Table 2.1.

4 Building width is in the direction of horizontal framing members supported by the wall studs.

Table 6.12
Steel Stud Thickness for 10' Walls Supporting Roof and Ceiling Only
(One Story or Second Floor of a Two Story Building)
50 ksi Steel

Wind Exposure		Member Size[3]	Member Spacing (inches)	Required Stud Thickness (mils)[1,2]															
				Building Width (feet)[4]															
				24				28				32				36			
Exp. A/B	Exp. C			Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)			
				20	30	50	70	20	30	50	70	20	30	50	70	20	30	50	70
70 mph		2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
80 mph	70 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	43	43	33	33	43	43
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
90 mph	80 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
100 mph	90 mph	2x4	16	33	33	33	33	33	33	33	33	33	33	33	43	33	33	33	43
			24	43	43	54	54	43	43	54	54	43	54	54	54	54	54	54	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
110 mph	100 mph	2x4	16	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	68	54	54	68	68	54	54	68	68	54	68	68	68
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	43	43	33	33	43	43	33	43	43	43
	110 mph	2x4	16	43	43	54	54	43	43	54	54	43	54	54	54	54	54	54	54
			24	68	68	68	68	68	68	68	97	68	68	68	97	68	68	97	97
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 mph = 1.61 km/hr, 1 foot = 0.3 m.

1 Deflection criteria: L/240

2 Design load assumptions: Roof dead load is 12 psf (0.575 kN/m^2)
Attic live load is 10 psf (0.479 kN/m^2)

3 For actual sizes of members, refer to Table 2.1.

4 Building width is in the direction of horizontal framing members supported by the wall studs.

Table 6.13
Steel Stud Thickness for 10' Walls Supporting One Floor, Roof and Ceiling
(First Story of a Two Story Building)
50 ksi Steel

Wind Exposure		Member Size[3]	Member Spacing (inches)	Required Stud Thickness (mils)[1,2]															
				Building Width (feet)[4]															
				24				28				32				36			
Exp. A/B	Exp. C			Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)			
				20	30	50	70	20	30	50	70	20	30	50	70	20	30	50	70
70 mph		2x4	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
			24	43	43	43	43	43	43	43	43	43	43	54	54	43	54	54	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	43	33	33	33	43
80 mph	70 mph	2x4	16	33	33	33	33	33	33	33	43	33	33	43	43	43	43	43	43
			24	43	43	54	54	54	54	54	54	54	54	54	54	54	54	54	54
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	43	33	33	43	43
90 mph	80 mph	2x4	16	33	33	43	43	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	54	54	54	68	68	54	68	68	68
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	43	33	43	43	43	43	43	43	43
100 mph	90 mph	2x4	16	43	43	43	43	43	43	43	43	43	43	43	54	43	43	54	54
			24	54	54	68	68	68	68	68	68	68	68	68	68	68	68	68	97
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
110 mph	100 mph	2x4	16	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
			24	68	68	97	97	97	97	97	97	97	97	97	97	97	97	97	97
		2x6	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	43
			24	43	43	43	43	43	43	43	43	43	43	43	54	43	43	54	54
	110 mph	2x4	16	54	54	54	54	54	54	54	54	54	54	68	68	54	68	68	68
			24	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97
		2x6	16	33	33	33	33	33	33	43	43	33	43	43	43	43	43	43	43
			24	43	43	54	54	54	54	54	54	54	54	54	54	54	54	54	54

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 mph = 1.61 km/hr, 1 foot = 0.3 m.

1 Deflection criteria: L/240

2 Design load assumptions:
Second floor dead load is 10 psf (0.48 kN/m^2) Attic live load is 10 psf (0.48 kN/m^2)
Second floor live load is 30 psf (1.44 kN/m^2) Roof dead load is 12 psf (0.575 kN/m^2)

3 For actual sizes of members, refer to Table 2.1.

4 Building width is in the direction of horizontal framing members supported by the wall studs.

Table 6.14
Wall Fastening Schedule

Connection	Number & Type of Fasteners	Spacing of Fasteners
Stud to top or bottom track	2 # 8 screws	Each end of stud, one per flange
Structural sheathing (oriented strand board or plywood) to framing	# 8 screws[1]	6" on edges 12" on intermediate supports
1/2" Gypsum board to framing	# 6 screws	12" oc.

For SI: 1 inch = 25.4 mm

[1] Head styles shall be bugle-head, flat-head, or similar head with a minimum head diameter of 0.29 inches (8 mm).

Table 6.15a
Allowable Header Spans for
Headers Supporting Roof and Ceiling Only[1,2]
33 ksi

Nominal Size[3]	20 psf Ground Snow Load				30 psf Ground Snow Load			
	Building Width[4]				Building Width[4]			
	24'	28'	32'	36'	24'	28'	32'	36'
2-2 x 4 x 33	3' -11'	3' -8"	3' -5"	3' -3"	3' -8"	3' -5"	3' -2"	2' -10"
2-2 x 4 x 43	4' -9"	4' -5"	4' -2"	4' -0"	4' -5"	4' -2"	3' -11'	3' -9"
2-2 x 4 x 54	5' -4"	5' -0"	4' -9"	4' -6"	5' -0"	4' -8"	4' -5"	4' -2"
2-2 x 4 x 68	6' -0"	5' -7"	5' -3"	5' -0"	5' -7"	5' -3	4' -11'	4' -8"
2-2x 4 x 97	7' -1"	6' -8"	6' -3"	5' -11'	6' -8"	6' -2"	5' -10'	5' -7"
2-2x 6 x 33	3' -11'	3' -5"	3' -0"	2' -9"	3' -5"	3' -0"	2' -8"	2' -5"
2-2 x 6 x 43	6' -5"	6' -0"	5' -8"	5' -5"	6' -0"	5' -8"	5' -4"	5' -0"
2-2x 6 x 54	7' -3"	6' -10'	6' -5"	6' -1"	6' -9"	6' -4"	6' -0"	5' -8"
2-2 x 6 x 68	8' -2"	7' -8"	7' -2"	6' -10'	7' -7"	7' -2"	6' -9"	6' -4"
2-2 x 6 x 97	9' -9"	9' -1"	8' -7"	8' -2"	9' -1"	8' -6"	8' -0"	7' -7"
2-2 x 8 x 33	3' -0"	2' -8"	2' -4"	2' -1"	2' -7"	2' -3"	--	--
2-2 x 8 x 43	6' -8"	5' -10'	5' -2"	4' -8"	5' -10'	5' -1"	4' -6"	4' -1"
2-2x 8 x 54	9' -6"	8' -10'	8' -4"	7' -11'	8' -10'	8' -3"	7' -9"	7' -5"
2-2 x 8 x 68	10' -8'	10' -0'	9' -5"	8' -11'	9' -11'	9' -4"	8' -9"	8' -4"
2-2 x 8 x 97	12' -10	11' -11	11' -3'	10' -8'	11' -11	11' -2'	10' -6'	10' -0"
2-2 x 10 x 43	5' -7"	4' -10'	4' -4"	3' -11'	4' -10'	4' -3"	3' -9"	3' -5"
2-2 x 10 x 54	10' -6'	9' -8"	8' -7"	7' -9"	9' -8"	8' -5"	7' -6"	6' -9"
2-2 x 10 x 68	12-7"	11' -9'	11' -1'	10' -6'	11' -9'	10' -12	10' -4'	9' -10"
2-2 x 10 x 97	15' -2'	14' -2'	13' -4'	12' -8'	14' -1'	13' -2'	12' -5'	11' -10'
2-2 x 12 x 43	4' -9"	4' -2"	3' -8"	3' -4"	4' -2"	3' -8"	3' -3"	2' -11"
2-2 x 12 x 54	9' -6"	8' -3"	7' -4"	6' -7"	8' -3"	7' -3"	6' -5"	5' -9"
2-2 x 12 x 68	13' -5'	12' -7'	11' -10	11' -3'	12' -6'	11' -9'	11' -1'	10' -6"
2-2 x 12 x 97	17' -5'	16' -3'	15' -4'	14' -7'	16' -3'	15' -2'	14' -4'	13' -7"

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 foot = 0.3 m.

1 Deflection criteria: L/360 for live loads, L/240 for total loads.

2 Design load assumptions:
Roof dead load is 7 psf (0.335 kN/m^2)
Ceiling dead load is 5 psf (0.24 kN/m^2)
Attic live load is 10 psf (0.479 kN/m^2)

3 Refer to Table 2.1 for actual size.

4 Building width is in the direction of horizontal framing members supported by the header.

Table 6.15b
Allowable Header Spans for
Headers Supporting Roof and Ceiling Only[1,2]
33 ksi

Nominal Member Size[3]	50 psf Ground Snow Load				70 psf Ground Snow Load			
	Building Width[4]				Building Width[4]			
	24'	28'	32'	36'	24'	28'	32'	36'
2-2 x 4 x 33	3' -0"	2' -7"	2' -4"	2' -1"	2' -4"	2' -1"	--	--
2-2 x 4 x 43	3' -10"	3' -7"	3' -4"	3' -2"	3' -5"	3' -2"	3' -0"	2' -9"
2-2 x 4 x 54	4' -3"	4' -0"	3' -9"	3' -7"	3' -10"	3' -7"	3' -4"	3' -2"
2-2 x 4 x 68	4' -10"	4' -6"	4' -3"	4' -0"	4' -3"	4' -0"	3' -9"	3' -7"
2-2x 4 x 97	5' -8"	5' -4"	5' -0"	4' -9"	5' -1"	4' -9"	4' -5"	4' -3"
2-2x 6 x 33	2' -6"	2' -2"	--	--	--	--		
2-2 x 6 x 43	5' -2"	4' -10"	4' -4"	3' -11"	4' -5"	3' -10"	3' -5"	3' -1"
2-2x 6 x 54	5' -10"	5' -5"	5' -1"	4' -10"	5' -2"	4' -10"	4' -7"	4' -4"
2-2 x 6 x 68	6' -6"	6' -1"	5' -9"	5' -6"	5' -10"	5' -5"	5' -1"	4' -10"
2-2 x 6 x 97	7' -10"	7' -3"	6' -10"	6' -5"	6' -11"	6' -6"	6' -1"	5' -9"
2-2 x 8 x 33	--	--	--	--	--	--	--	--
2-2 x 8 x 43	4' -3"	3' -9"	3' -4"	3' -0"	3' -4"	2' -11"	2' -7"	2' -4"
2-2x 8 x 54	7' -7"	7' -1"	6' -7"	5' -11"	6' -9"	5' -10"	5' -3"	4' -8"
2-2 x 8 x 68	8' -6"	8' -0"	7' -6"	7' -2"	7' -7"	7' -1"	6' -8"	6' -4"
2-2 x 8 x 97	10' -3"	9' -7"	9' -0"	8' -7"	9' -1"	8' -6"	8' -0"	7' -7"
2-2 x 10 x 43	3' -7"	3' -1"	2' -9"	2' -6"	2' -10"	2' -6"	2' -2"	--
2-2 x 10 x 54	7' -1"	6' -2"	5' -6"	4' -11"	5' -7"	4' -11"	4' -4"	3' -11"
2-2 x 10 x 68	10' -1"	9' -5"	8' -10"	8' -5"	8' -11"	8' -4"	7' -11"	7' -6"
2-2 x 10 x 97	12' -1"	11' -4"	10' -8"	10' -1"	10' -9"	10' -1"	9' -6"	9' -0"
2-2 x 12 x 43	3' -1"	2' -8"	2' -4"	2' -2"	2' -5"	2' -1"	--	--
2-2 x 12 x 54	6' -1"	5' -4"	4' -9"	4' -3"	4' -10"	4' -2"	3' -9"	3' -4"
2-2 x 12 x 68	10' -9"	10' -1"	9' -6"	8' -6"	9' -7"	8' -5"	7' -6"	6' -9"
2-2 x 12 x 97	13' -11	13' -0"	12' -3"	11' -8"	12' -5"	11' -7"	10' -11"	10' -4"

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 foot = 0.3 m.

1 Deflection criteria: L/360 for live loads, L/240 for total loads.

2 Design load assumptions:
Roof dead load is 7 psf (0.335 kN/m^2)
Ceiling dead load is 5 psf (0.24 kN/m^2)
Attic live load is 10 psf (0.479 kN/m^2)

3 Refer to Table 2.1 for actual size

4 Building width is in the direction of horizontal framing members supported by the header.

Table 6.16a
Allowable Header Spans for
Headers Supporting One Floor, Roof and Ceiling[1,2]
33 ksi

Nominal Member Size[3]	20 psf Ground Snow Load				30 psf Ground Snow Load			
	Building Width[4]				Building Width[4]			
	24'	28'	32'	36'	24'	28'	32'	36'
2-2 x 4 x 33	2' -3"	--	--	--	2' -2"	--	--	--
2-2 x 4 x 43	3' -4"	3' -1"	2' -11'	2' -9"	3' -3"	3' -1"	2' -11'	2' -8"
2-2 x 4 x 54	3' -9"	3' -6"	3' -4"	3' -2"	3' -8"	3' -6"	3' -3"	3' -1"
2-2 x 4 x 68	4' -2"	3' -11'	3' -9"	3' -6"	4' -1"	4' -0"	3' -8"	3' -6"
2-2x 4 x 97	4' -11'	4' -8"	4' -5"	4' -2"	4' -11'	4' -7"	4' -4"	4' -2"
2-2x 6 x 33	--	--	--	--	--	--	--	--
2-2 x 6 x 43	4' -2"	3' -9"	3' -4"	3' -0"	4' -1"	3' -8"	3' -3"	3' -0"
2-2x 6 x 54	5' -1"	4' -9"	4' -6"	4' -3"	5' -0"	4' -8"	4' -5"	4' -3"
2-2 x 6 x 68	5' -8"	5' -4"	5' -1"	4' -10'	5' -7"	5' -3"	5' -0"	4' -9"
2-2 x 6 x 97	6' -9"	6' -4"	6' -0"	5' -9"	6' -8"	6' -4"	6' -0"	5' -8"
2-2 x 8 x 33	--	--	--	--	--	--	--	--
2-2 x 8 x 43	3' -3"	2' -10'	2' -7"	2' -4"	3' -2"	2' -9"	2' -6"	2' -3"
2-2x 8 x 54	6' -5"	5' -8"	5' -1"	4' -7"	6' -3"	5' -7"	5' -0"	4' -6"
2-2 x 8 x 68	7' -5"	7' -0"	6' -7"	6' -4"	7' -4"	6' -11'	6' -6"	6' -3"
2-2 x 8 x 97	8' -11'	8' -4"	7' -11'	7' -7"	8' -9"	8' -3"	7' -10'	7' -5"
2-2 x 10 x 43	2' -8"	2' -5"	2' -2"	2' -0"	2' -8"	2' -4"	2' -1"	2' -0"
2-2 x 10 x 54	5' -4"	4' -9"	4' -3"	3' -10'	5' -3"	4' -8"	4' -2"	3' -9"
2-2 x 10 x 68	8' -9"	8' -3"	7' -10'	7' -5"	8' -8"	8' -2"	7' -8"	7' -4"
2-2 x 10 x 97	10' -6'	9' -11'	9' -4"	8' -11'	10' -5'	9' -9"	9' -3"	8' -10'
2-2 x 12 x 43	2' -4"	2' -1"	--	--	2' -3"	--	--	--
2-2 x 12 x 54	4' -7"	4' -1"	3' -8"	3' -4"	4' -6"	4' -0"	3' -7"	3' -3"
2-2 x 12 x 68	9' -3"	8' -2"	7' -4"	6' -8"	9' -0"	8' -0"	7' -2"	6' -6"
2-2 x 12 x 97	12' -1'	11' -5'	10' -9'	10' -3'	12' -0'	11' -3'	10' -8'	10' -2'

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 foot = 0.3 m.

1 Deflection criteria: L/360 for live loads, L/240 for total loads.

2 Design load assumptions: Roof dead load is 7 psf (0.335 kN/m^2)
Ceiling dead load is 5 psf (0.24 kN/m^2)
Attic live load is 10 psf (0.479 kN/m^2)
Second floor live load is 30 psf (1.437 kN/m^2)
Second floor dead load is 10 psf (0.479 kN/m^2)
Second floor wall dead load is 10 psf (0.479 kN/m^2)

3 Refer to Table 2.1 for actual size.

4 Building width is in the direction of horizontal framing members supported by the header.

Table 6.16b
Allowable Header Spans for
Headers Supporting One Floor, Roof and Ceiling [1,2]
33 ksi

Nominal Member Size[3]	50 psf Ground Snow Load				70 psf Ground Snow Load			
	Building Width[4]				Building Width[4]			
	24'	28'	32'	36'	24'	28'	32'	36'
2-2 x 4 x 33	-	-	-	-	-	-	-	-
2-2 x 4 x 43	3' -1"	2' -11'	2' -8"	2' -5"	2' -10'	2' -6"	2' -3"	2' -1"
2-2 x 4 x 54	3' -6"	3' -3"	3' -1"	3' -0"	3' -3"	3' -0"	2' -10'	2' -9"
2-2 x 4 x 68	3' -11'	3' -8"	3' -6"	3' -4"	3' -7"	3' -5"	3' -2"	3' -1"
2-2x 4 x 97	4' -8"	4' -4"	4' -2"	3' -11'	4' -3"	4' -0"	3' -10'	3' -7"
2-2x 6 x 33	-	-	-	-	-	-	-	-
2-2 x 6 x 43	3' -8"	3' -3"	2' -11'	2' -8"	3' -2"	2' -9"	2' -6"	2' -3"
2-2x 6 x 54	4' -9"	4' -6"	4' -3"	4' -0"	4' -4"	4' -1"	3' -11'	3' -8"
2-2 x 6 x 68	5' -4"	5' -0"	4' -9"	4' -6"	4' -11'	4' -7"	4' -4"	4' -2"
2-2 x 6 x 97	6' -4"	6' -0"	5' -8"	5' -5"	5' -10'	5' -6"	5' -3"	4' -11'
2-2 x 8 x 33	--	--	--	--	--	--	--	--
2-2 x 8 x 43	2' -10'	2' -6"	2' -3"	--	2' -5"	2' -2"	--	--
2-2x 8 x 54	5' -8"	5' -0"	4' -6"	4' -1"	4' -10'	4' -3"	3' -10'	3' -5"
2-2 x 8 x 68	7' -0"	6' -7"	6' -2"	5' -11'	6' -5"	6' -0"	5' -8"	5' -5"
2-2 x 8 x 97	8' -4"	7' -10'	7' -5"	7' -1"	7' -8"	7' -3"	6' -10'	6' -6"
2-2 x 10 x 43	2' -4"	2' -1"	--	--	--	--	--	--
2-2 x 10 x 54	4' -9"	4' -2"	3' -9"	3' -5"	4' -0"	3' -6"	3' -2"	2' -10'
2-2 x 10 x 68	8' -3"	7' -9"	7' -4"	6' -10'	7' -7"	7' -1"	6' -5"	5' -9"
2-2 x 10 x 97	9' -10'	9' -3"	8' -9"	8' -4"	9' -1"	8' -7"	8' -1"	7' -8"
2-2 x 12 x 43	--	--	--	--	--	--	--	--
2-2 x 12 x 54	4' -0"	3' -7"	3' -2"	2' -11'	3' -5"	3' -0"	2' -9"	2' -5"
2-2 x 12 x 68	8' -2"	7' -2"	6' -5"	5' -10'	6' -11'	6' -1"	5' -6"	4' -11'
2-2 x 12 x 97	11' -4'	10' -8'	10' -1'	9' -8"	10' -6'	9' -0"	9' -4"	8' -10'

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 foot = 0.3 m.

1 Deflection criteria: L/360 for live loads, L/240 for total loads.

2 Design load assumptions: Roof dead load is 7 psf (0.335 kN/m^2)
Ceiling dead load is 5 psf (0.24 kN/m^2)
Attic live load is 10 psf (0.479 kN/m^2)
Second floor live load is 30 psf (1.437 kN/m^2)
Second floor dead load is 10 psf (0.479 kN/m^2)
Second floor wall dead load is 10 psf (0.479 kN/m^2)

3 Refer to Table 2.1 for actual size.

4 Building width is in the direction of horizontal framing members supported by the header.

Table 6.17a
Allowable Header Spans for
Headers Supporting One Floor, Roof and Ceiling[1,2]
First story of a two-story building with center load bearing Beam
33 ksi

Nominal Member Size[3]	20 psf Ground Snow Load				30 psf Ground Snow Load			
	Building Width[4]				Building Width[4]			
	24'	28'	32'	36'	24'	28'	32'	36'
2-2 x 4 x 33	2' -10'	2' -6"	2' -3"	-	2' -7"	2' -3"	-	-
2-2 x 4 x 43	3' -9"	3' -6"	3' -4"	3' -2'	3' -7"	3' -4"	3' -2"	3' -0"
2-2 x 4 x 54	4' -2"	4' -0"	3' -9"	3' -7'	4' -0"	3' -9"	3' -7"	3' -5"
2-2 x 4 x 68	4' -8"	4' -5"	4' -2"	4' -0'	4' -6"	4' -2"	4' -0"	3' -10"
2-2x 4 x 97	5' -6"	5' -3"	5' -0"	4' -9'	5' -3"	5' -0"	4' -9"	4' -6"
2-2x 6 x 33	2' -5"	2' -2"	-	-	2' -2"	-	-	-
2-2 x 6 x 43	3' -6"	5' -1"	4' -9"	4' -3'	4' -10'	4' -3"	3' -10"	3' -6"
2-2x 6 x 54	5' -8"	5' -4"	5' -1"	4' -10	5' -5"	5' -1"	4' -10"	4' -7"
2-2 x 6 x 68	6' -5"	6' -0"	5' -9"	5' -6'	6' -1"	5' -9"	5' -5"	5' -2"
2-2 x 6 x 97	7' -8"	7' -2"	6' -10	6' -6'	7' -3"	6' -10"	6' -6"	6' -2"
2-2 x 8 x 33	-	-	-	-	-	-	-	-
2-2 x 8 x 43	4' -2"	3' -8"	3' -3"	3' -0'	3' -8"	3' -3"	2' -11"	2' -8"
2-2x 8 x 54	7' -5"	7' -0"	6' -6"	6' -0'	7' -1"	6' -6"	5' -10"	5' -4"
2-2 x 8 x 68	8' -4"	7' -11'	7' -6"	7' -1'	7' -11'	7' -6"	7' -1"	6' -9"
2-2 x 8 x 97	10' -0'	9' -9"	9' -0"	8' -6'	9' -6"	9' -0"	8' -6"	8' -1"
2-2 x 10 x 43	3' -5"	3' -0"	2' -9"	2' -6'	3' -1"	2' -9"	2' -6"	2' -3"
2-2 x 10 x 54	6' -10'	6' -0"	5' -6"	5' -0'	6' -2"	5' -5"	4' -11"	4' -5"
2-2 x 10 x 68	9' -10'	9' -4"	8' -10	8' -5'	9' -4"	8' -10"	8' -4"	8' -0"
2-2 x 10 x 97	11' -10	11' -2'	10' -7	10' -1	11' -3'	10' -7"	10' -1"	9' -7"
2-2 x 12 x 43	2' -11'	2' -7"	2' -4"	2' -1'	2' -8"	2' -4"	-	-
2-2 x 12 x 54	5' -10'	5' -2"	4' -8"	4' -3'	5' -3"	4' -8"	4' -2"	3' -10"
2-2 x 12 x 68	10' -6'	10' -0'	9' -5"	8' -6'	9' -12'	9' -5"	8' -5"	7' -8"
2-2 x 12 x 97	13' -8'	12' -10	12' -2	11' -8	13' -0'	12' 2"	11' -7"	11' -1"

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 foot = 0.3 m.

1 Deflection criteria: L/360 for live loads, L/240 for total loads.

2 Design load assumptions: Roof dead load is 7 psf (0.335 kN/m^2)
Ceiling dead load is 5 psf (0.24 kN/m^2)
Attic live load is 10 psf (0.479 kN/m^2)
Second floor live load is 30 psf (1.437 kN/m^2)
Second floor dead load is 10 psf (0.479 kN/m^2)
Second floor wall dead load is 10 psf (0.479 kN/m^2)

3 Refer to Table 2.1 for actual size.

4 Building width is in the direction of horizontal framing members supported by the header.

Table 6.17b
Allowable Header Spans for
Headers Supporting One Floor, Roof and Ceiling [1,2]
First story of a two-story building with center load bearing Beam
33 ksi

Nominal Member Size [3]	50 psf Ground Snow Load				70 psf Ground Snow Load			
	Building Width [4]				Building Width [4]			
	24'	28'	32'	36'	24'	28'	32'	36'
2-2 x 4 x 33	2' -2"	-	-	-	-	-	-	-
2-2 x 4 x 43	3' -3"	3' -1"	2' -11"	2' -8"	3' -0"	2' -9"	2' -6"	2' -3"
2-2 x 4 x 54	3' -8"	3' -5"	3' -3"	3' -1"	3' -5"	3' -2"	3' -0"	2' -10"
2-2 x 4 x 68	4' -1"	3' -10"	3' -8"	3' -6"	3' -9"	3' -7"	3' -4"	3' -2"
2-2x 4 x 97	4' -10"	4' -7"	4' -4"	4' -1"	4' -6"	4' -3"	4' -0"	3' -10"
2-2x 6 x 33	-	-	-	-	-	-	-	-
2-2 x 6 x 43	4' -0"	3' -7"	3' -2"	2' -11"	3' -5"	3' -1"	2' -9"	2' -6"
2-2x 6 x 54	4' -11"	4' -8"	4' -5"	4' -2"	4' -7"	4' -4"	4' -1"	3' -11"
2-2 x 6 x 68	5' -7"	5' -3"	4' -11"	4' -9"	5' -2"	4' -10"	4' -7"	4' -4"
2-2 x 6 x 97	6' -8"	6' -3"	5' -11"	5' -7"	6' -2"	5' -9"	5' -6"	5' -2"
2-2 x 8 x 33	-	-	-	-	-	-	-	-
2-2 x 8 x 43	3' -1"	2' -9"	2' -5"	2' -3"	2' -8"	2' -4"	-	-
2-2x 8 x 54	6' -2"	5' -5"	4' -11"	4' -5"	5' -3"	4' -8"	4' -2"	3' -9"
2-2 x 8 x 68	7' -3"	6' -10"	6' -6"	6' -2"	6' -9"	6' -4"	6' -0"	5' -8"
2-2 x 8 x 97	8' -8"	8' -2"	7' -9"	7' -5"	8' -1"	7' -7"	7' -2"	6' -10"
2-2 x 10 x 43	2' -7"	2' -3"	2' -1"	-	2' -3"	-	-	-
2-2 x 10 x 54	5' -1"	4' -6"	4' -1"	3' -8"	4' -5"	3' -11"	3' -6"	3' -2"
2-2 x 10 x 68	8' -7"	8' -1"	7' -8"	7' -3"	7' -11"	7' -6"	7' -0"	6' -4"
2-2 x 10 x 97	10' -3"	9' -8"	9' -2"	8' -9"	9' -6"	9' -0"	8' -6"	8' -1"
2-2 x 12 x 43	2' -3"	-	-	-	-	-	-	-
2-2 x 12 x 54	4' -5"	3' -11"	3' -6"	3' -2"	3' -9"	3' -4"	3' -0"	2' -8"
2-2 x 12 x 68	8' -10"	7' -10"	7' -0"	6' -4"	7' -7"	6' -9"	6' -0"	5' -5"
2-2 x 12 x 97	11' -10	11' -2"	10' -7"	10' -1"	11' -0"	10' -4"	9' -9"	9' -4"

For SI: 1 inch = 25.4 mm, 1 psf = 0.0479 kN/m^2, 1 foot = 0.3 m.

[1] Deflection criteria: L/360 for live loads, L/240 for total loads.

[2] Design load assumptions: Roof dead load is 7 psf (0.335 kN/m^2)
Ceiling dead load is 5 psf (0.24 kN/m^2)
Attic live load is 10 psf (0.479 kN/m^2)
Second floor live load is 30 psf (1.437 kN/m^2)
Second floor dead load is 10 psf (0.479 kN/m^2)
Second floor wall dead load is 10 psf (0.479 kN/m^2)

[3] Refer to Table 2.1 for actual size.

[4] Building width is in the direction of horizontal framing members supported by the header.

Table 6.18
Total Number of Jack and King Studs Required at Each End of an Opening

Size of Opening	24" o.c. Stud Spacing		16" o.c. Stud Spacing	
	No. of Jack Studs	No. of King Studs	No. of Jack Studs	No. of King Studs
Up to 3' -6"	1	1	1	1
> 3' -6" to 5' -0"	1	2	1	2
> 5' -0" to 5' -6"	1	2	2	2
> 5' -6" to 8' -0"	1	2	2	2
> 8' -0" to 10' -6"	2	2	2	3
> 10' -6" to 12' -0"	2	2	3	3
> 12' -0" to 13' -0"	2	3	3	3
> 13' -0" to 14' -0"	2	3	3	4
> 14' -0" to 16' -0"	2	3	3	4
> 16' -0" to 18' -0"	3	3	4	4

For SI: 1 inch = 25.4 mm, 1 foot = 0.3 m.

Table 6.19
Number of Screws Required for Header to King Stud Connection

Header Span	Wind Speed (mph), Exposure & Seismic Zones [1,2,3]			
	Up to 70 A/B or Zones 0, 1, 2,3 or 4	Up to 90 A/B or 70 C	Up to 100 A/B or 90C	Up to 110 C
≤ 4'	4 - #8 screws	4 - #8 screws	6 - #8 screws	8 - #8 screws
> 4' to 8'	4 - #8 screws	4 - #8 screws	8 - #8 screws	12 - #8 screws
> 8' to 12'	4 - #8 screws	6 - #8 screws	10 - #8 screws	16 - #8 screws
> 12' to 16'	4 - #8 screws	8 - #8 screws	12 - #8 screws	20 - #8 screws

For SI: 1 inch = 25.4 mm, 1 foot = 0.3 m, 1 mph = 1.61 km/hr.

1 For headers located on the first floor of a two-story building, the total number of screws may be reduced by 2 screws, but the total number of screws shall be no less than 4.

2 For roof slopes of 6:12 or greater, the required number of screws may be reduced by 1/2, but the total number of screws shall be no less than 4.

3 All screw sizes shown are minimums.

Table 6.20
Minimum Percentage of Full Height
Structural Sheathing Along Exterior Wall Lines[1,2,3,4]

Wall Condition	Roof Slope	Wind Speed (mph) and Exposure			
		Up To 70 C or 90 A/B or Seismic Zones 0, 1, & 2		Up To 90 C or 100 A/B	
		Endwall	Sidewall	Endwall	Sidewall
One-Story or Second Floor of Two-Story Construction	3:12	30%	30%	30%	30%
	6:12	30%	30%	40%	30%
	9:12	45%	30%	75%	50%
	12:12	60%	40%	100%	70%
First Floor of Two-Story Construction	3:12	50%	35%	80%	55%
	6:12	55%	40%	90%	60%
	9:12	75%	50%	Design Required	
	12:12	95%	65%		

For SI: 1 mph = 49 m/sec, 1 inch = 25.4 mm, 1 foot = 304.8 mm

1 Sidewalls shall be those walls parallel to the ridge and endwalls shall be those walls perpendicular to the ridge. If sidewalls are shorter in length than endwalls, then the higher percentage value shall be used for both walls.

2 Linear interpolation shall be permitted for values of the roof slope and wind speeds other than shown.

3 A 48-inch-wide (1219 mm) panel of structural sheathing shall be located at each end of a wall or as near thereto as possible. Individual segments of wall (i.e. between openings) with full-height sheathing shall be at least 48 inches (1219 mm) in length to count toward the length of full-height sheathing required by the tabulated percentages.

4 Percentages are given as percentages of the total wall length. For example, a 48-foot (14.6 m) long wall that requires 30% of full-height sheathing would result in 0.30x48 = 14.4 feet (4.4 m) of wall with full-height sheathing. In addition to the remainder of the wall without openings, areas above or below openings would also be sheathed.

7.0 NON-STRUCTURAL WALLS

7.1 Non-Load Bearing Studs

Non-load bearing steel framing shall comply with ASTM C 645 [11] and shall have a minimum base metal thickness of 18 mils (0.45 mm).

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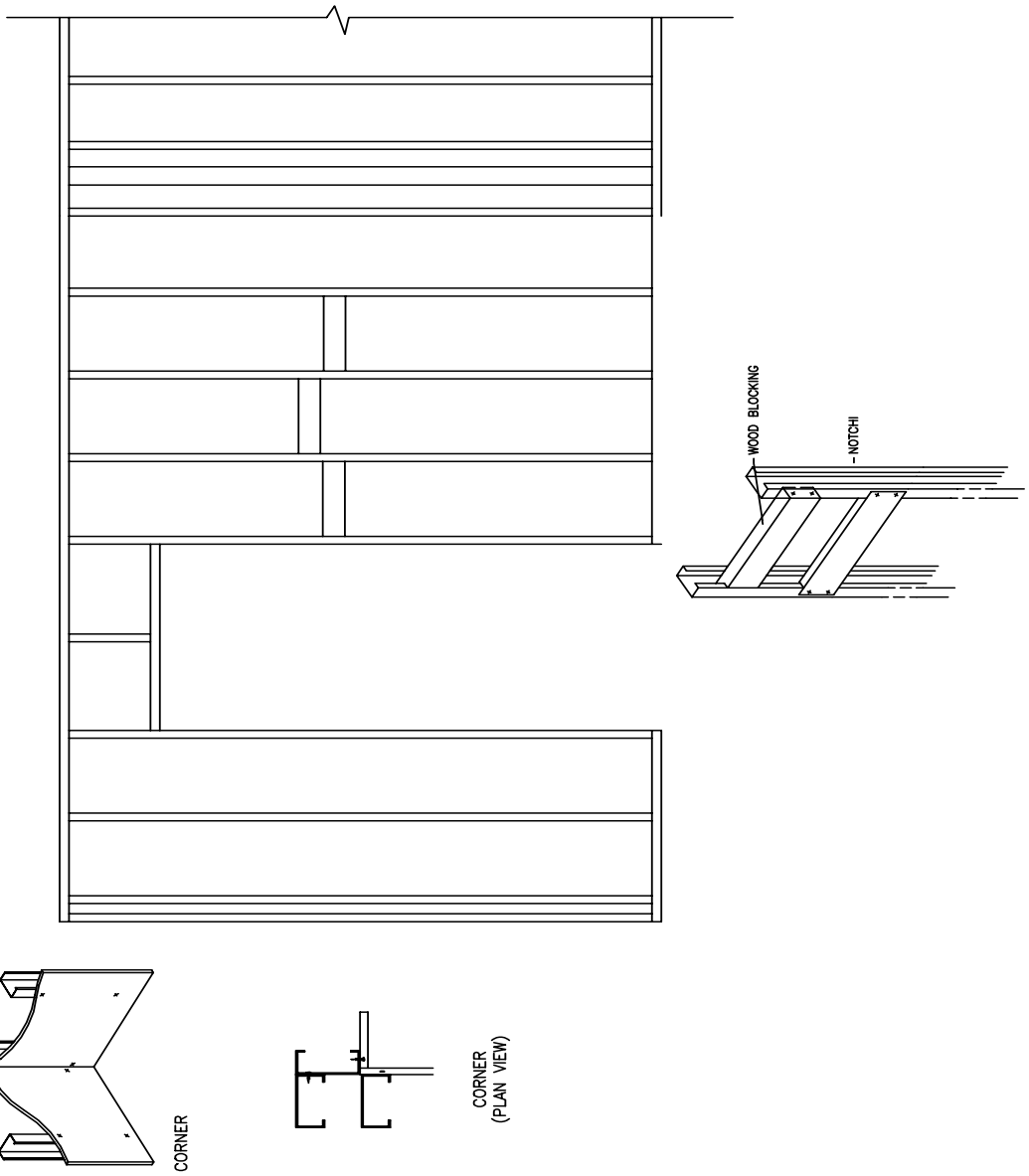
7.2 Construction Details

Figure 7.1 is provided for informational purposes only. Alternate framing details may be used when appropriate.



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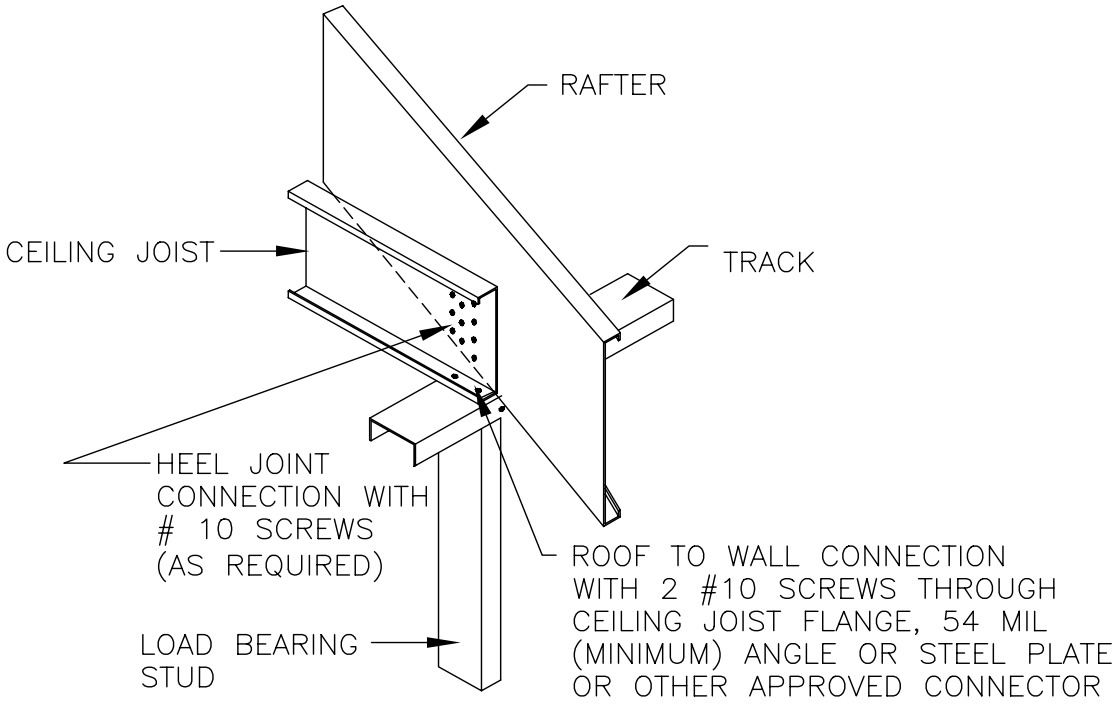

Figure 8.2 Heel Joint Connection

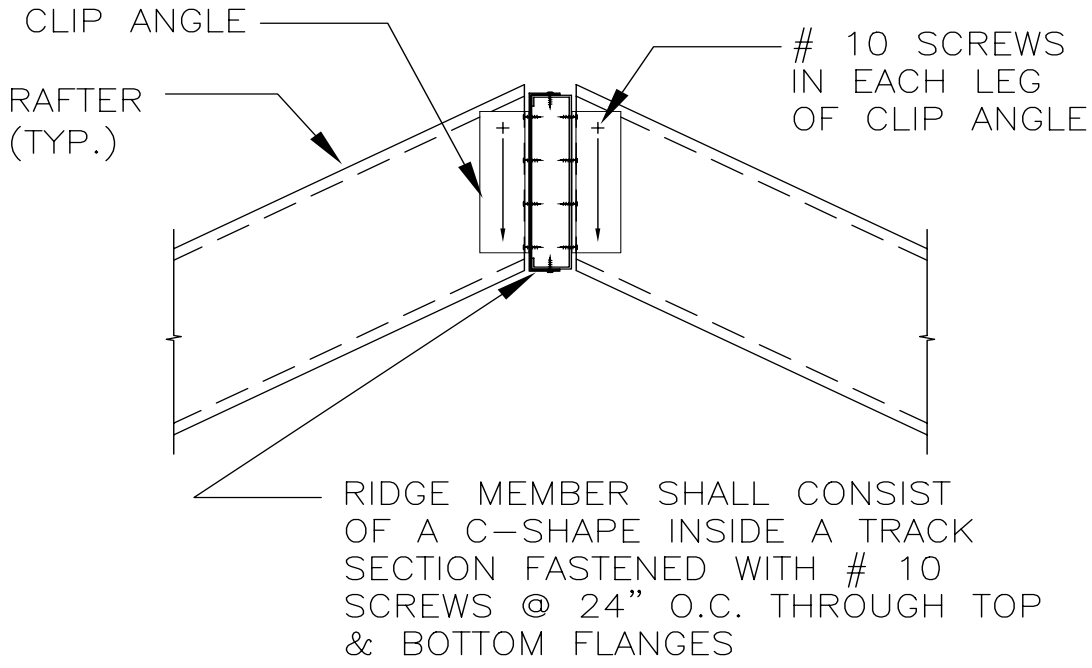

Figure 8.3 Ridge Member Connection

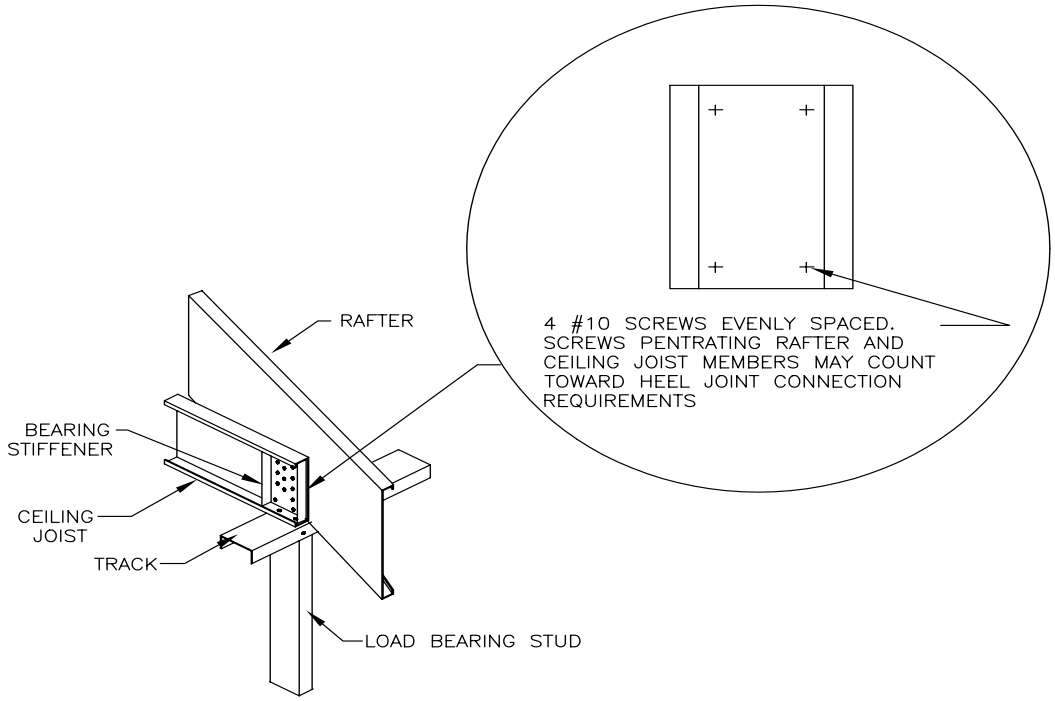

Figure 8.4 Bearing Stiffener

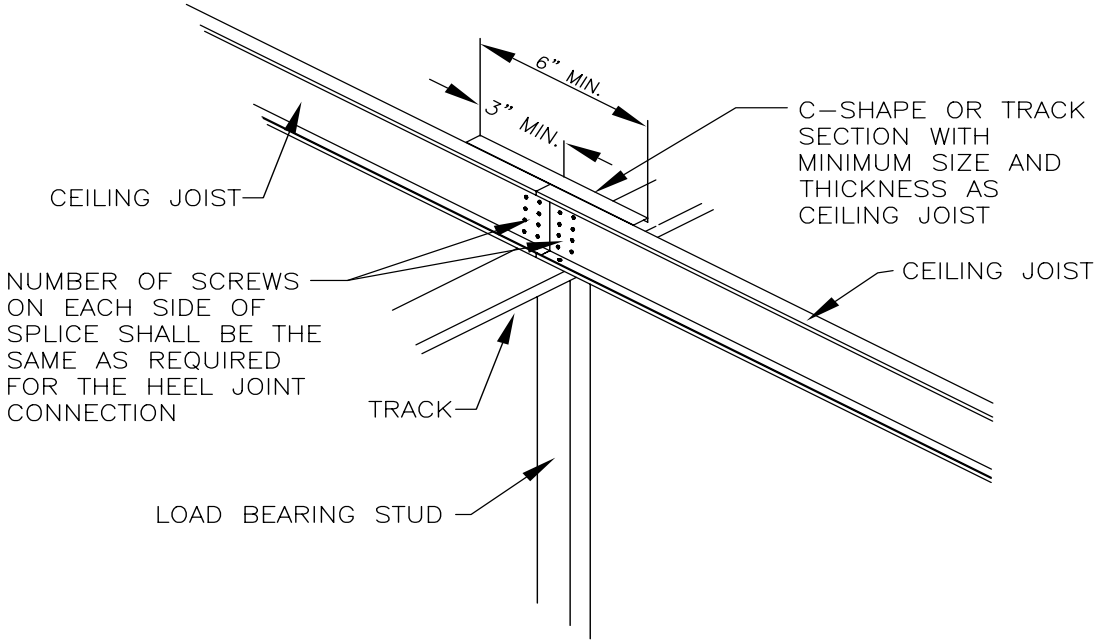

Figure 8.5 Spliced Ceiling Joists

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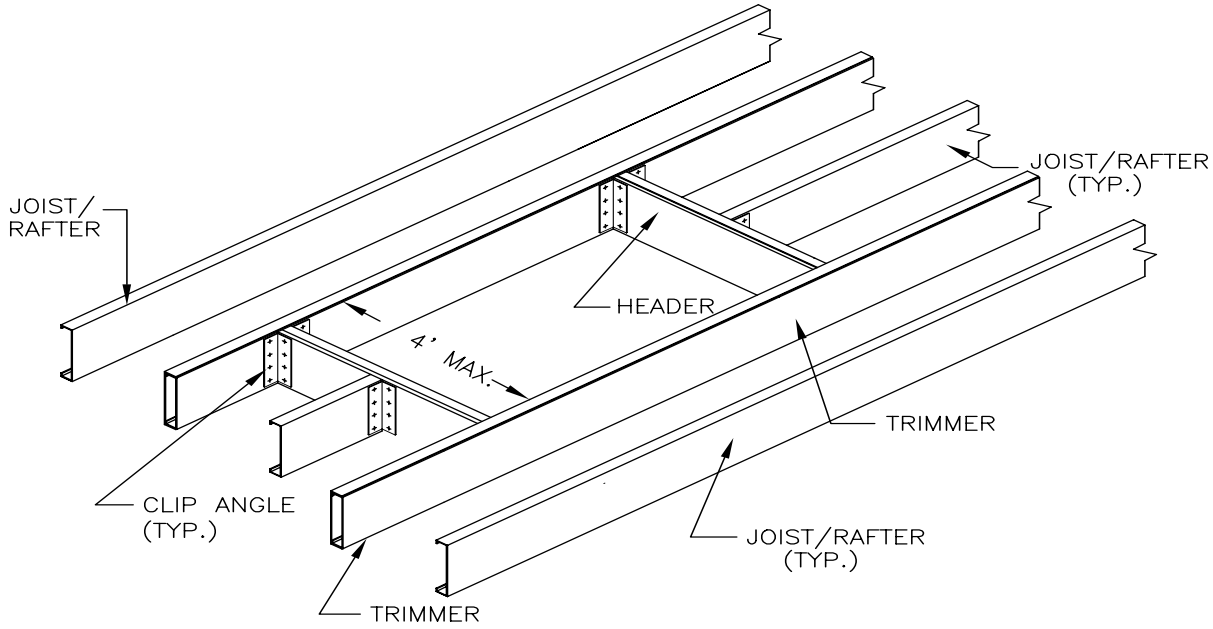

Figure 8.6 Roof or Ceiling Opening

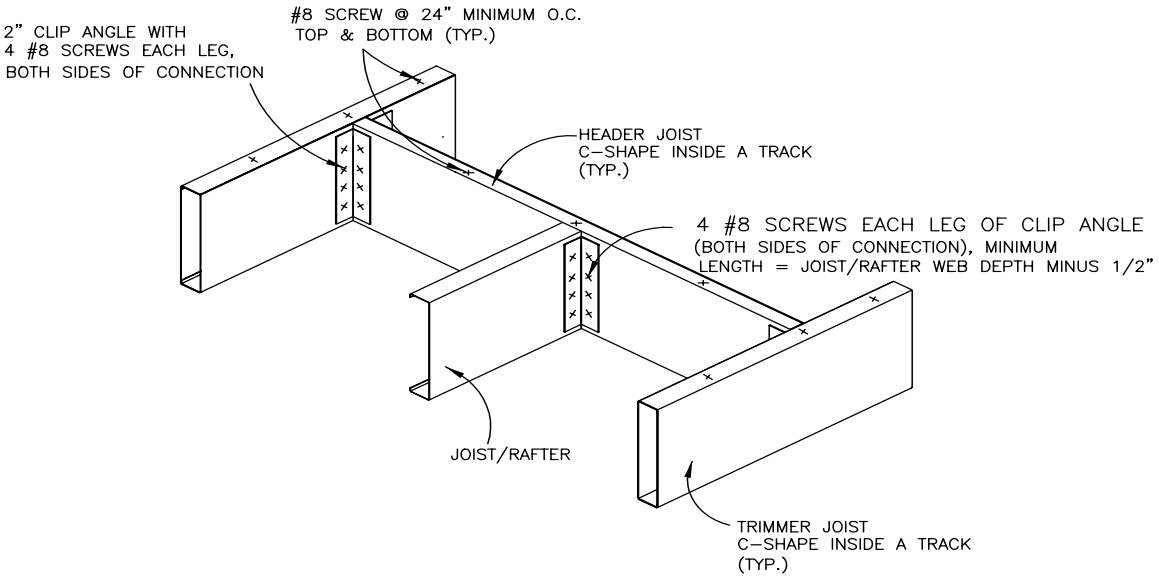

Figure 8.7 Header to Trimmer Detail

Table 8.1
Roof Framing Fastening Schedule

Description of Building Elements	Number and Size of Fasteners	Number and Spacing of Fasteners
Ceiling joist to top track of load bearing wall[1]	2 - No. 10 screws	Each joist
Roof sheathing (oriented strand board or plywood) to rafters	No. 8 screws	6" o.c. on edges and 12" o.c. at interior supports. (6" o.c. at gable end truss)
Truss to bearing wall [1]	2 - No. 10 screws	Each truss
Gable end truss to endwall top track	No. 10 screws	12" oc.
Rafter to ceiling joist or ridge member	Minimum No. 10 screws	See Tables 8.2 and 8.3

For SI: 1 inch = 25.4 mm, 1 foot = 0.3 m, 1 psf = 0.0479 kN/m^2.

[1] Screws shall be applied through the flanges of the truss or ceiling joist or a 54 mil clip angle shall be used with 2 # 10 screws in each leg. See Section 8.10 for additional requirements to resist uplift forces.

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Table 8.2
Number of Screws Required For Ceiling Joist to Rafter Connections[1]

Roof Slope	Building Width (feet)															
	24'				28'				32'				36'			
	Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)				Ground Snow Load (psf)			
	20	30	50	70	20	30	50	70	20	30	50	70	20	30	50	70
3/12	5	6	9	12	6	7	10	13	7	8	12	15	8	9	13	17
4/12	4	5	7	9	5	6	8	10	6	6	9	12	6	7	10	13
5/12	4	4	6	7	4	5	7	9	5	5	8	10	5	6	9	11
6/12	3	4	5	7	4	4	6	8	4	5	7	9	4	5	7	10
7/12	3	3	5	6	3	4	5	7	4	4	6	8	4	5	7	9
8/12	3	3	4	5	3	3	5	6	3	4	5	7	4	4	6	8
9/12	2	3	4	5	3	3	4	6	3	4	5	6	3	4	6	7
10/12	2	3	4	5	3	3	4	5	3	3	5	6	3	4	5	7
11/12	2	3	4	4	3	3	4	5	3	3	5	6	3	4	5	6
12/12	2	3	3	4	2	3	4	5	3	3	4	6	3	4	5	6

For SI: 1 inch = 25.4 mm, 1 foot = 0.3 m, 1 psf = 0.0479 kN/m^2.

[1] Screws shall be # 10 minimum.

Table 8.3
Number of Screws Required at Each Leg of Clip Angle
For Rafter to Ridge Member Connection[1]

Building Width (feet)	Ground Snow Load (psf)			
	0 to 20	21 to 30	31 to 50	51 to 70
24	2	3	4	4
28	2	3	4	5
32	3	3	4	5
36	3	4	5	6

For SI: 1 foot = 0.3 m, 1 psf = 0.0479 kN/m^2.

[1] Screws shall be #10 minimum.

Table 8.4
Allowable Spans For Cold-Formed Steel Ceiling Joists (33 ksi)
Single Spans With Bearing Stiffeners
10 Lbs. per Sq. Ft. Live Load (No Attic Storage) [1,2,3]

Nominal Joist Size [4]	Lateral Support of Top (Compression) Flange					
	Unbraced		Mid-Span Bracing		Third-Point	
	Spacing (inches)		Spacing (inches)		Spacing (inches)	
	16	24	16	24	16	24
2 x 4 x 33	9' -2"	8' -3"	11' -9"	10' -1"	11' -9"	10' -4"
2 x 4 x 43	9' -11"	8' -10"	12' -10"	11' -2"	12' -10"	11' -2"
2 x 4 x 54	10' -8"	9' -6"	13' -9"	12' -0"	13' -9"	12' -0"
2 x 4 x 68	11' -7"	10' -4"	14' -8"	12' -10"	14' -8"	12' -10"
2 x 4 x 97	13' -7"	12' -0"	16' -2"	14' -1"	16' -2"	14' -1"
2 x 6 x 33	10' -5"	9' -5"	14' -5"	12' -8"	16' -4"	13' -10"
2 x 6 x 43	11' -2"	10' -1"	15' -7"	13' -10"	18' -0"	15' -5"
2 x 6 x 54	12' -0"	10' -9"	16' -7"	14' -9"	19' -5"	16' -8"
2 x 6 x 68	12' -11"	11' -7"	17' -8"	15' -10"	20' -11"	18' -1"
2 x 6 x 97	14' -11"	13' -2"	19' -10"	17' -8"	23' -2"	20' -3"
2 x 8 x 33	11' -8"	10' -6"	16' -5"	14' -9"	19' -5"	16' -7"
2 x 8 x 43	12' -6"	11' -3"	17' -6"	15' -10"	21' -2"	18' -7"
2 x 8 x 54	13' -4"	11' -11"	18' -7"	16' -9"	22' -7"	20' -0"
2 x 8 x 68	14' -3"	12' -9"	19' -8"	17' -8"	23' -11"	21' -4"
2 x 8 x 97	16' -2"	14' -5"	21' -10"	19' -6"	26' -3"	23' -6"
2 x 10 x 43	13' -4"	12' -1"	18' -9"	16' -11"	22' -11"	20' -6"
2 x 10 x 54	14' -2"	12' -9"	19' -10"	17' -10"	24' -2"	21' -9"
2 x 10 x 68	15' -2"	13' -7"	21' -0"	18' -11"	25' -6"	23' -0"
2 x 10 x 97	17' -1"	15' -2"	23' -2"	20' -9"	27' -11"	25' -1"
2 x 12 x 43	14' -1"	12' -8"	19' -10"	17' -11"	24' -3"	21' -6"
2 x 12 x 54	15' -0"	13' -5"	20' -11"	18' -11"	25' -7"	23' -1"
2 x 12 x 68	15' -11"	14' -4"	22' -2"	19' -11"	27' -0"	24' -4"
2 x 12 x 97	17' -10"	15' -11"	24' -4"	21' -10"	29' -4"	26' -5"

For SI: 1 inch = 25.4 mm, 1 foot = 0.3 m, 1 psf = 0.0479 kN/m^2.

1 Bearing stiffeners shall be installed at all bearing and concentrated load locations.
2 Deflection criteria: L/240 for total loads.
3 Ceiling dead load = 5 psf (0.24 kN/m^2)
4 Refer to Table 2.1 for actual size.

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Table 8.5
Allowable Spans For Cold-Formed Steel Ceiling Joists (33 ksi)
Two Equal Spans With Bearing Stiffeners
10 Lbs. per Sq. Ft. Live Load (No Attic Storage) [1,2,3,4,5]

Nominal Joist Size [6]	Lateral Support of Top (Compression Flange)					
	Unbraced		Mid-Span Bracing		Third-Point Bracing	
	Spacing (inches)		Spacing (inches)		Spacing (inches)	
	16	24	16	24	16	24
2 x 4 x 33	12' -4"	10' -11"	13' -5"	10' -11"	13' -5"	10' -11"
2 x 4 x 43	13' -6"	12' -1"	16' -4"	13' -4"	16' -4"	13' -4"
2 x 4 x 54	14' -9"	13' -1"	18' -4"	15' -0"	18' -4"	15' -0"
2 x 4 x 68	16' -4"	14' -5"	19' -8"	16' -9"	19' -8"	16' -9"
2 x 4 x 97	19' -6"	17' -2"	21' -8"	18' -11"	21' -8"	18' -11"
2 x 6 x 33	14' -0"	12' -7"	18' -2"	14' -10"	18' -2"	14' -10"
2 x 6 x 43	15' -2"	13' -7"	20' -11"	18' -1"	22' -1"	18' -1"
2 x 6 x 54	16' -5"	14' -8"	22' -5"	19' -5"	24' -11"	20' -4"
2 x 6 x 68	17' -11"	15' -11"	24' -1"	21' -5"	28' -0"	22' -10"
2 x 6 x 97	21' -2"	18' -8"	27' -7"	24' -5"	31' -1"	27' -2"
2 x 8 x 33	15' -7"	14' -1"	21' -3"	15' -10"	21' -3"	15' -10"
2 x 8 x 43	16' -10"	15' -1"	23' -6"	21' -2"	27' -6"	22' -5"
2 x 8 x 54	18' -1"	16' -2"	24' -11"	22' -5"	30' -2"	26' -6"
2 x 8 x 68	19' -7"	17' -6"	26' -8"	23-' 11"	32' -2"	28' -7"
2 x 8 x 97	22' -10"	20' -2"	30' -2"	26' -10"	35' -10"	31' -11"
2 x 10 x 43	17' -11"	16' -2"	25' -1"	22' -7"	30' -6"	24' -9"
2 x 10 x 54	19' -3"	17' -3"	26' -7"	23' -11"	32-' 4"	29' -1"
2 x 10 x 68	20' -9"	18' -6"	28' -5"	25' -6"	34' -4"	30' -10"
2 x 10 x 97	23' -11"	21' -2"	31' -10"	28' -4"	38' -0"	34' -0"
2 x 12 x 43	18' -11"	17' -0"	26' -6"	23' -10"	32' -4"	24' -5"
2 x 12 x 54	20' -2"	18' -1"	28' -1"	25' -3"	34' -2"	30' -9"
2 x 12 x 68	21' -9"	19' -5"	29' -10"	26' -10"	36' -2"	32' -7"
2 x 12 x 97	24' -10"	22' -1"	33' -4"	29' -9"	39' -10"	35' -8"

For SI: 1 inch = 25.4 mm, 1 foot = 0.3 m, 1 psf = 0.0479 kN/m^2.

1 Table provides the maximum ceiling joist span in feet and inches to either side of the interior support.

2 Bearing stiffeners shall be installed at all bearing and concentrated load locations.

3 Deflection criteria: L/240 for total loads.

4 Ceiling dead load = 5 psf (0.24 kN/m^2)

5 Interior supports for multiple span joists shall consist of structural walls or beams. Interior supports shall be located within 2 feet (610 mm) of mid span provided that each of the resulting spans do not exceed the maximum applicable span shown in the table above.

6 Refer to Table 2.1 for actual sizes.

Table 8.6
Allowable Spans For Cold-Formed Steel Ceiling Joists (33 ksi)
Single Spans With Bearing Stiffeners
20 Lbs. per Sq. Ft. Live Load (Limited Attic Storage) [1,2,3]

Nominal Joist Size [4]	Lateral Support of Top (Compression Flange)					
	Unbraced		Mid-Span Bracing		Third-Point Bracing	
	Spacing (inches)		Spacing (inches)		Spacing (inches)	
	16	24	16	24	16	24
2 x 4 x 33	8' -0"	7' -0"	9' -8"	8' -1"	9' -11"	8' -3"
2 x 4 x 43	8' -8"	7' -8"	10' -9"	9' -1"	10' -10"	9' -5"
2 x 4 x 54	9' -3"	8' -3"	11' -7"	9' -11"	11' -7"	10' -1"
2 x 4 x 68	10' -0"	8' -11"	12' -5"	10' -10"	12' -5"	10' -10"
2 x 4 x 97	11' -7"	10' -3"	13' -7"	11' -11"	13' -7"	11' -11"
2 x 6 x 33	9' -2"	8' -3"	12' -2"	10' -5"	13' -3"	11' -0"
2 x 6 x 43	9' -10"	8' -10"	13' -4"	11' -6"	14' -9"	12' -5"
2 x 6 x 54	10' -5"	9' -5"	14' -4"	12' -6"	16' -1"	13' -7"
2 x 6 x 68	11' -3"	10' -0"	15' -4"	13' -5"	17' -5"	14' -10"
2 x 6 x 97	12' -9"	11' -4"	17' -1"	15' -1"	19' -7"	16' -9
2 x 8 x 33	10' -3"	9' -3"	14' -4"	12' -5"	15' -11"	13' -4"
2 x 8 x 43	10' -11"	9' -10"	15' -5"	13' -8"	17' -11"	15' -5"
2 x 8 x 54	11' -8"	10' -6"	16' -3"	14' -7"	19' -3"	16' -8"
2 x 8 x 68	12' -5"	11' -2"	17' -3"	15' -6"	20' -7"	18' -0"
2 x 8 x 97	13' -11"	12' -5"	18' -7"	17' -0"	22' -9"	20' -1"
2 x 10 x 43	11' -9"	10' -7"	16' -6"	14' -10"	19' -10"	17' -1"
2 x 10 x 54	12' -5"	11' -2"	17' -5"	15' -8"	21' -1"	18' -7"
2 x 10 x 68	13' -3"	11' -10"	18' -5"	16' -7"	22' -4"	19' -11"
2 x 10 x 97	14' -9"	13' -2"	20' -2"	18' -1"	24' -4"	21' -10"
2 x 12 x 43	12' -5"	11' -2"	17' -5"	15' -8"	20' -9"	18' -0"
2 x 12 x 54	13' -1"	11' -9"	18' -5"	16' -7"	22' -5"	20' -1"
2 x 12 x 68	13' -11"	12' -6"	19' -5"	17' -6"	23' -8"	21' -3"
2 x 12 x 97	15' -5"	13' -10"	21' -2"	19' -0"	25' -8"	23' -1"

For SI: 1 inch = 25.4 mm, 1 foot = 0.3 m, 1 psf = 0.0479 kN/m^2.

1 Bearing stiffeners shall be installed at all bearing and concentrated load locations.
2 Deflection criteria: L/240 for total loads.
3 Ceiling dead load = 5 psf (0.24 kN/m^2)
4 Refer to Table 2.1 for actual size.

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Table 8.7
Allowable Spans For Cold-Formed Steel Ceiling Joists (33 ksi)
Two Equal Spans With Bearing Stiffeners
20 Lbs. per Sq. Ft. Live Load (Limited Attic Storage) [1,2,3,4,5]

Nominal Joist Size [6]	Lateral Support of Top (Compression Flange)					
	Unbraced		Mid-Span Bracing		Third-Point	
	Spacing (inches)		Spacing (inches)		Spacing (inches)	
	16	24	16	24	16	24
2 x 4 x 33	10' -5"	8' -6"	10' -5"	8' -6"	10' -5"	8' -6"
2 x 4 x 43	11' -8"	10' -4"	12' -8"	10' -4"	12' -8"	10' -4"
2 x 4 x 54	12' -9"	11' -3"	14' -3"	11' -7"	14' -3"	11' -7"
2 x 4 x 68	14' -0"	12' -4"	15' -11"	13' -0"	15' -11"	13' -0"
2 x 4 x 97	16' -7"	14' -5"	18' -3"	15' -5"	18' -3"	15' -5"
2 x 6 x 33	12' -3"	11' -0"	14' -1"	11' -0"	14' -1"	11' -0"
2 x 6 x 43	13' -3"	11' -10"	17' -2"	14' -0"	17' -2"	14' -0"
2 x 6 x 54	14' -3"	12' -9"	19' -2"	15' -9"	19' -4"	15' -9"
2 x 6 x 68	15' -6"	13' -9"	20' -9"	17' -8"	21' -8"	17' -8"
2 x 6 x 97	18' -0"	15' -11"	23' -7"	20' -6"	25' -11"	21' -1"
2 x 8 x 33	13' -8"	10' -9"	14' -8"	10' -9"	14' -8"	10' -9"
2 x 8 x 43	14' -9"	13' -3"	20' -6"	17-5"	21' -3"	17' -5"
2 x 8 x 54	15' -9"	14' -1"	21' -10"	19' -6"	25' -2"	20' -6"
2 x 8 x 68	17' -0"	15' -2"	23' -3"	20' -10"	27' -8"	23' -2"
2 x 8 x 97	19' -6"	17' -3"	26' -0"	23' -2"	30' -11"	27' -0"
2 x 10 x 43	15' -9"	14' -2"	22' -0"	17' -3"	23' -0"	17' -3"
2 x 10 x 54	16' -9"	15' -0"	23' -4"	21' -0"	27' -11"	22' -10"
2 x 10 x 68	18' -0"	16' -1"	24' -9"	22' -3"	30' -0"	26' -7"
2 x 10 x 97	20' -6"	18' -2"	27' -6"	24' -7"	33' -0"	29' -6"
2 x 12 x 43	16' -7"	14' -11"	22' -7"	16' -7"	22' -7"	16' -7"
2 x 12 x 54	17' -7"	15' -10"	24' -7"	22' -2"	30' -0"	24' -9"
2 x 12 x 68	18' -10"	16' -11"	26' -1"	23' -5"	31' -8"	28' -5"
2 x 12 x 97	21' -5"	19' -0"	28' -10"	25' -10"	34' -8"	34' -1"

For SI: 1 inch = 25.4 mm, 1 foot = 0.3 m, 1 psf = 0.0479 kN/m^2.

1 Table provides the maximum ceiling joist span in feet and inches to either side of the interior support.

2 Bearing stiffeners shall be installed at all bearing and concentrated load locations.

3 Deflection criteria: L/240 for total loads.

4 Ceiling dead load = 5 psf (0.24 kN/m^2)

5 Interior supports for multiple span joists shall consist of structural walls or beams. Interior supports shall be unocated within 2 feet (610 mm) of mid span provided that each of the resulting spans do not exceed the maximum applicable span shown in the table above.

6 Refer to Table 2.1 for actual sizes.

Table 8.8
Allowable Spans For Cold-Formed Steel Ceiling Joists (33 ksi)
Single Spans Without Bearing Stiffeners
10 Lbs. per Sq. Ft. Live Load (No Attic Storage) [1,2]

Nominal Joist Size [3]	Lateral Support of Top (Compression) Flange					
	Unbraced		Mid-Span Bracing		Third-Point	
	Spacing (inches)		Spacing (inches)		Spacing (inches)	
	16	24	16	24	16	24
2 x 4 x 33	9'-2"	8'-3"	11'-9"	10'-0"	11'-9"	10'-0"
2 x 4 x 43	9'-11"	8'-10"	12'-10"	11'-2"	12'-0"	11'-2"
2 x 4 x 54	10'-8"	9'-6"	13'-9"	12'-0"	13'-9"	12'-0"
2 x 4 x 68	11'-7"	10'-4"	14'-8"	12'-10"	14'-8"	12'-10"
2 x 4 x 97	13'-7"	12'-0"	16'-2"	14'-1"	16'-2"	14'-1"
2 x 6 x 33	10'-5"	9'-5"	14'-5"	10'-0"	15'-1"	10'-0"
2 x 6 x 43	11'-2"	10'-1"	15'-7"	13'-10"	18'-0"	15'-5"
2 x 6 x 54	12'-0"	10'-9"	16'-7"	14'-9"	19'-5"	16'-8"
2 x 6 x 68	12'-11"	11'-7"	17'-8"	15'-10"	20'-11"	18'-1"
2 x 6 x 97	14'-11"	13'-2"	19'-10"	17'-8"	23'-2"	20'-3"
2 x 8 x 33	-	-	-	-	-	-
2 x 8 x 43	12'-6"	11'-3"	17'-6"	15'-10"	21'-2"	17'-9"
2 x 8 x 54	13'-4"	11'-11"	18'-7"	16'-9"	22'-7"	20'-0"
2 x 8 x 68	14'-3"	12'-9"	19'-8"	17'-8"	23'-11"	21'-4"
2 x 8 x 97	16'-2"	14'-5"	21'-10"	19'-6"	26'-3"	23'-6"
2 x 10 x 43	-	-	-	-	-	
2 x 10 x 54	14'-2"	12'-9"	19'-10"	17'-10"	24'-2"	21'-9"
2 x 10 x 68	15'-2"	13'-7"	21'-0"	18'-11"	25'-6"	23'-0"
2 x 10 x 97	17'-1"	15'-2"	23'-2"	20'-9"	27'-11"	25'-1"
2 x 12 x 43	-	-	-	-	-	-
2 x 12 x 54	-	-	-	-	-	-
2 x 12 x 68	15'-11"	14'-4"	22'-2"	19'-11"	27'-0"	24'-4"
2 x 12 x 97	17'-10"	15'-11"	24'-4"	21'-10"	29'-4"	26'-5"

For SI: 1 inch = 25.4 mm, 1 foot = 0.3 m, 1 psf = 0.0479 kN/m^2.

1 Deflection criteria: L/240 for total loads.
2 Ceiling dead load = 5 psf (0.24 kN/m^2)
3 Refer to Table 2.1 for actual size.

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Table 8.9
Allowable Spans For Cold-Formed Steel Ceiling Joists (33 ksi)
Two Equal Spans Without Bearing Stiffeners
10 Lbs. per Sq. Ft. Live Load (No Attic Storage) [1,2,3,4]

Nominal Joist Size [5]	Lateral Support of Top (Compression Flange)					
	Unbraced		Mid-Span Bracing		Third-Point Bracing	
	Spacing (inches)		Spacing (inches)		Spacing (inches)	
	16	24	16	24	16	24
2 x 4 x 33	11'-6"	8'-9"	11'-6"	8'-9"	11'-6"	8'-9"
2 x 4 x 43	13'-6"	11'-8"	15'-2"	11'-8"	15'-2"	11'-8"
2 x 4 x 54	14'-9"	13'-1"	18'-2"	14'-2"	18'-2"	14'-2"
2 x 4 x 68	16'-4"	14'-5"	19'-8"	16'-7"	19'-8"	16'-7"
2 x 4 x 97	19'-6"	17'-2"	21'-8"	18'-11"	21'-8"	18'-11"
2 x 6 x 33	13'-8"	10'-1"	13'-8"	10'-1"	13'-8"	10'-1"
2 x 6 x 43	15'-2"	13'-7"	18'-8"	14'-0"	18'-8"	14'-0"
2 x 6 x 54	16'-5"	14'-8"	22'-5"	17'-6"	22'-11"	17'-6"
2 x 6 x 68	17'-11"	15'-11"	24'-1"	21'-5"	27'-9"	21'-7"
2 x 6 x 97	21'-2"	18'-8"	27'-7"	24'-5"	31'-1"	27'-2"
2 x 8 x 33	-	-	-	-	-	-
2 x 8 x 43	16'-10"	15'-1"	20'-7"	15'-3"	20'-7"	15'-3"
2 x 8 x 54	18'-1"	16'-2"	24'-11"	20'-3"	26'-11"	20'-3"
2 x 8 x 68	19'-7"	17'-6"	26'-8"	23'-11"	32'-2"	25'-11"
2 x 8 x 97	22'-10"	20'-2"	30'-2"	26'-10"	35'-10"	31'-11"
2 x 10 x 43	-	-	-	-	-	
2 x 10 x 54	19'-3"	17'-3"	26'-7"	20'-11"	28'-1"	20'-11"
2 x 10 x 68	20'-9"	18'-6"	28'-5"	25'-6"	34'-4"	28'-5"
2 x 10 x 97	23'-11"	21'-2"	31'-10"	28'-4"	38'-0"	34'-0"
2 x 12 x 43	-	-	-	-	-	-
2 x 12 x 54	-	-	-	-	-	-
2 x 12 x 68	21'-9"	19'-5"	29'-10"	26'-10"	36'-2"	29'-0"
2 x 12 x 97	24'-10"	22'-1"	33'-4"	29'-9"	39'-10"	35'-8"

For SI: 1 inch = 25.4 mm, 1 foot = 0.3 m, 1 psf = 0.0479 kN/m^2.

1 Table provides the maximum ceiling joist span in feet and inches to either side of the interior support.

2 Deflection criteria: L/240 for total loads.

3 Ceiling dead load = 5 psf (0.24 kN/m^2)

5 Interior supports for multiple span joists shall consist of structural walls or beams. Interior supports shall be located within 2 feet (610 mm) of mid span provided that each of the resulting spans do not exceed the maximum applicable span shown in the table above.

5 Refer to Table 2.1 for actual sizes.

Table 8.10
Allowable Spans For Cold-Formed Steel Ceiling Joists (33 ksi)
Single Spans Without Bearing Stiffeners
20 Lbs. per Sq. Ft. Live Load (Limited Attic Storage) [1,2]

Nominal Joist Size [3]	Lateral Support of Top (Compression Flange)					
	Unbraced		Mid-Span Bracing		Third-Point Bracing	
	Spacing (inches)		Spacing (inches)		Spacing (inches)	
	16	24	16	24	16	24
2 x 4 x 33	8' -0"	6' -0"	9' -0"	6' -0"	9' -0"	6' -0"
2 x 4 x 43	8' -8"	7' -8"	10' -9"	9' -1"	10' -10"	9' -5"
2 x 4 x 54	9' -3"	8' -3"	11' -7"	9' -11"	11' -7"	10' -1"
2 x 4 x 68	10' -0"	8' -11"	12' -5"	10' -10"	12' -5"	10' -10"
2 x 4 x 97	11' -7"	10' -3"	13' -7"	11' -11"	13' -7"	11' -11"
2 x 6 x 33	9' -0"	6' -0"	9' -0"	6' -0"	9' -0"	6' -0"
2 x 6 x 43	9' -10"	8' -10"	13' -4"	11' -6"	14' -9"	11' -8"
2 x 6 x 54	10' -5"	9' -5"	14' -4"	12' -6"	16' -1"	13' -7"
2 x 6 x 68	11' -3"	10' -0"	15' -4"	13' -5"	17' -5"	14' -10"
2 x 6 x 97	12' -9"	11' -4"	17' -1"	15' -1"	19' -7"	16' -9
2 x 8 x 33	-	-	-	-	-	-
2 x 8 x 43	10' -11"	9' -0"	14' -7"	10' -0"	16' -0"	10' -8"
2 x 8 x 54	11' -8"	10' -6"	16' -3"	14' -7"	19' -3"	16' -8"
2 x 8 x 68	12' -5"	11' -2"	17' -3"	15' -6"	20' -7"	18' -0"
2 x 8 x 97	13' -11"	12' -5"	18' -11"	17' -0"	22' -9"	20' -1"
2 x 10 x 43	-	-	-	-	-	-
2 x 10 x 54	12' -5"	11' -2"	17' -5"	15' -8"	21' -1"	16' -9"
2 x 10 x 68	13' -3"	11' -10"	18' -5"	16' -7"	22' -4"	19' -11"
2 x 10 x 97	14' -9"	13' -2"	20' -2"	18' -1"	24' -4"	21' -10"
2 x 12 x 43	-	-	-	-	-	-
2 x 12 x 54	-	-	-	-	-	-
2 x 12 x 68	13' -11"	12' -6"	19' -5"	17' -6"	23' -8"	21' -3"
2 x 12 x 97	15' -5"	13' -10"	21' -2"	19' -0"	25' -8"	23' -1"

For SI: 1 inch = 25.4 mm, 1 foot = 0.3 m, 1 psf = 0.0479 kN/m^2.

1 Deflection criteria: L/240 for total loads.
2 Ceiling dead load = 5 psf (0.24 kN/m^2)
3 Refer to Table 2.1 for actual size.

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Table 8.11
Allowable Spans For Cold-Formed Steel Ceiling Joists (33 ksi)
Two Equal Spans Without Bearing Stiffeners
20 Lbs. per Sq. Ft. Live Load (Limited Attic Storage) [1,2,3,4]

Nominal Joist Size [5]	Lateral Support of Top (Compression Flange)					
	Unbraced		Mid-Span Bracing		Third-Point Bracing	
	Spacing (inches)		Spacing (inches)		Spacing (inches)	
	16	24	16	24	16	24
2 x 4 x 33	8' -1"	6' -0"	8' -1"	6' -0"	8' -1"	6' -0"
2 x 4 x 43	10' -10"	8' -3"	10' -10"	8' -3"	10' -10"	8' -3"
2 x 4 x 54	12' -9"	10' -2"	13' -3"	10' -2"	13' -3"	10' -2"
2 x 4 x 68	14' -0"	12' -4"	15' -9"	12' -5"	15' -9"	12' -5"
2 x 4 x 97	16' -7"	14' -5"	18' -3"	15' -2"	18' -3"	15' -2"
2 x 6 x 33	9' -3"	6' -9"	9' -3"	6' -9"	9' -3"	6' -9"
2 x 6 x 43	13' -0"	9' -8"	13' -0"	9' -8"	13' -0"	9' -8"
2 x 6 x 54	14' -3"	12' -4"	16' -4"	12' -4"	16' -4"	12' -4"
2 x 6 x 68	15' -6"	13' -9"	20' -3"	15' -7"	20' -3"	15' -7"
2 x 6 x 97	18' -0"	15' -11"	23' -7"	20' -6"	25' -10"	21' -0"
2 x 8 x 33	-	-	-	-	-	-
2 x 8 x 43	14' -0"	10' -2"	14' -0"	10' -2"	14' -0"	10' -2"
2 x 8 x 54	15' -9"	13' -10"	18' -9"	13' -10"	18' -9"	13' -10"
2 x 8 x 68	17' -0"	15' -2"	23' -3"	18' -3"	24' -2"	18' -3"
2 x 8 x 97	19' -6"	17' -3"	26' -0"	23' -2"	30' -11"	25' -11"
2 x 10 x 43	-	-	-	-	-	-
2 x 10 x 54	16' -9"	14' -1"	19' -4"	14' -1"	19' -4"	14' -1"
2 x 10 x 68	18' -0"	16' -1"	24' -9"	19' -8"	26' -4"	19' -8"
2 x 10 x 97	20' -6"	18' -2"	27' -6"	24' -7"	33' -0"	29' -0"
2 x 12 x 43	-	-	-	-	-	-
2 x 12 x 54	-	-	-	-	-	-
2 x 12 x 68	18' -10"	16' -11"	26' -1"	19' -10"	26' -1"	19' -10"
2 x 12 x 97	21' -5"	19' -0"	28' -10"	25' -10"	34' -8"	31' -1"

For SI: 1inch = 25.4 mm, 1 foot = 0.3 m, 1 psf = 0.0479 kN/m^2.

1 Table provides the maximum ceiling joist span in feet and inches to either side of the the interior support.

2 Deflection criteria: L/240 for total loads.

3 Ceiling dead load = 5 psf (0.24 kN/m^2)

5 Interior supports for multiple span joists shall consist of structural walls or beams. Interior supports shall be located within 2 feet (610 mm) of mid span provided that each of the resulting spans do not exceed the maximum applicable span shown in the table above.

5 Refer to Table 2.1 for actual sizes.

Table 8.12
Allowable Horizontal Rafter Spans[1,2,3]
33 ksi

Nominal Joist Size [4]	Ground Snow Loads							
	20 psf Ground		30 psf Ground		50 psf Ground		70 psf Ground	
	Spacing (inches)		Spacing (inches)		Spacing (inches)		Spacing (inches)	
	16	24	16	24	16	24	16	24
2 x 6 x 33	12' -8"	10' -4"	11' -9"	9' -7"	9' -11"	8' -1"	8' -10"	7' -2"
2 x 6 x 43	15' -5"	12' -7"	14' -3"	11' -8"	12' -1"	9' -10"	10' -8"	8' -9"
2 x 6 x 54	13' -0"	14' -2"	16' -1"	13' -1"	13' -8"	11' -2"	12' -1"	9' -10"
2 x 6 x 68	18' -1"	15' -10"	17' -3"	14' -9"	15' -4"	12' -6"	13' -6"	11' -1"
2 x 6 x 97	20' -1"	17' -6"	19' -1"	16' -8"	17' -1"	14'	15' -7"	13' -2"
2 x 8 x 33	15' -5"	11' -5"	14' -4"	9' -10"	10' -7"	7' -1"	8' -3"	5' -6"
2 x 8 x 43	19' -1"	15' -7'	17' -9"	14' -6"	15' -1"	12' -3"	13' -3"	10' -9"
2 x 8 x 54	22' -7"	18' -5"	21' -0"	17' -1"	17' -9"	14' -6"	15' -9"	12-10"
2 x 8 x 68	24' -7"	20' -9"	23' -4"	19' -3"	20' -0"	16' -4"	17' -8"	14' -5"
2 x 8 x 97	27' -3"	23' -9"	26' -0"	22' -8"	23' -3"	19' -7"	21' -3"	17' -4"
2 x 10 x 43	21' -2"	17' -3"	19' -8"	16' -0"	16' -8"	13' -1"	14' -9"	10' -3"
2 x 10 x 54	25' -1"	20' -6"	23' -3"	19' -0"	19' -9"	16' -1"	17' -5"	14' -3"
2 x 10 x 68	29' -6"	24' -6"	27' -9"	22' -9"	23' -8"	19' -3"	21' -0"	17' -1"
2 x 10 x 97	32' -0"	28' -8"	31' -3"	27' -3"	28' -0"	23' -2"	25' -1"	20' -6"
2 x 12 x 43	23' -0"	18' -2"	21' -4"	15' -7"	16' -9"	11' -3"	13' -2"	8' -9"
2 x 12 x 54	27' -3"	22' -3"	25' -3"	20' -7"	21' -5"	17' -6"	18' -11	15' -5"
2 x 12 x 68	32' -1"	26' -2"	29' -9"	24' -3"	25' -3"	20' -7"	22' -4"	18' -2"
2 x 12 x 97	38' -4"	33' -6"	36' -6"	31' -6"	32' -8"	26' -9"	29' -0"	23' -7"

For SI: 1 inch = 25.4 mm, 1 foot = 0.3 m, 1 psf = 0.0479 kN/m^2.

1 Table provides the maximum horizontal rafter span in feet and inches for slopes from 3:12 to 12:12.
2 Deflection criteria: L/240 for live loads and L/180 for total loads.
3 Roof dead load = 12 psf (0.575 kN/m^2)
4 Refer to Table 2.1 for actual member size.

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Table 8.13
Wind Speed to Equivalent Snow Load Conversion [1]

Roof Slope	Equivalent Ground Snow Load (psf)				
	Wind Speed (mph) Exposure C				
	70	**80**	**90**	**100**	**110**
3 / 12	20	20	20	30	50
4 / 12	20	20	30	50	50
5 / 12	20	20	30	50	50
6 / 12	20	20	30	50	70
7 / 12	30	30	50	70	70
8 / 12	30	30	50	70	
9 / 12	30	50	50	70	
10 / 12	30	50	50	Design Required	
11 / 12	30	50	70		
12 / 12	50	50	70		
	Wind Speed (mph) Exposure B				
	70	**80**	**90**	**100**	**110**
3 / 12	20	20	20	30	50
4 / 12	20	20	20	30	50
5 / 12	20	20	20	30	50
6 / 12	20	20	20	50	50
7 / 12	20	30	30	5 0	70
8 / 12	20	30	50	50	70
9 / 12	30	30	50	70	70
10 / 12	30	30	50	70	Design
11 / 12	30	50	50	70	Required
12 / 12	30	50	50		

For SI: 1 mph = 1.61 km/hr, 1 psf = 0.0479 kN/m^2.

[1] Exposure C category shall be used if site wind exposure is unknown.

Table 8.14
Uplift Loads on Roof-to-Wall Connections
for Selection of Roof Tie-Downs (lbs/ft)[1,2,3]

Wind Speed (mph) and Exposure Category			
Up to 70 C or 90 A/B	**90 C or 110 A/B**	**100 C**	**110 C**
N/R	100 lbs/ft.	200 lbs/ft.	300 lbs/ft.

For SI: 1 inch = 25.4 mm, 1 lb. = 4.4 N.

1 N/R = uplift connector not required.
2 For 16-inch (406 mm) and 24-inch (610 mm) rafter spacing, the uplift load shall be multiplied by 1.3 and 2.0, respectively.
3 Uplift connectors shall be provided in addition to other fastening requirements.

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9.0 MECHANICAL, UTILITIES, AND INSULATION

9.1 Plumbing

Plumbing shall comply with the applicable plumbing code. Copper and plastic pipes shall be separated from the steel framing by non-conductive grommets or other approved methods. A list of the appropriate types of plastic insulators and grommets for web holes which are pre-punched is generally available from the steel supplier.

9.2 Electrical Systems

Electrical system installation shall comply with the latest edition of the National Electric Code. Snap-in plastic insulators, grommets, conduit, or other approved wire protection methods shall be used to protect the plastic sheathing on electrical cables when passing through holes in steel framing members (i.e. punchouts in studs and joists).

9.3 HVAC Systems and Duct Work

HVAC installation shall comply with the applicable mechanical code and energy code.

9.4 Insulation

Insulation of steel frame exterior walls, floors, and roofs shall comply with the applicable energy code. All types of insulation are compatible with steel framing (e.g. batt insulation, spray-applied foam, foam plastic board, etc.). In many climates, a layer of exterior foam sheathing is required to meet energy code. Suggested insulation R-values for walls in various areas of the country can be found in AISI publication #RG-9405 *Thermal Design Guide for Exterior Walls* [18].

10.0 GENERAL CONSTRUCTION GUIDELINES

- Each stud, joist, and track member shall bear the Manufacturer's name, logo or initials, base metal thickness (uncoa
- All structural members shall be aligned vertically (in-line framing) to transfer all loads to the foundation.
- Track members shall not be used individually for any load carrying applications without an approved design
- Studs, tracks, and other steel members should be in good condition. Bent, warped, split, or otherwise damaged members shall be replaced.

- Bearing surfaces for joists, rafters, and trusses shall be uniform and level.

- All load bearing studs, including king and jack studs, shall be seated in the tracks with a maximum gap of 1/8 inch (0.32 mm) between the end of the stud and the web of the track.

- Adequate temporary construction bracing of wall, floor, and roof framing shall be provided until permanent bracing has been installed.

- Any corrections which involve cutting, drilling, or relocation of any truss member or component shall not be made without notifying the truss manufacturer of the need for and extent of the modifications. All major corrections, cutting, or drilling of truss members without the approval of a qualified design professional shall be prohibited.

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11.0 REFERENCES

[1] *Specification For The Design Of Cold Formed Steel Structural Members* (August 19, 1986 Edition with December 11, 1989 Addendum). American Iron and Steel Institute (AISI), Washington, DC. 1989.

[2] *Minimum Design Load for Buildings and Other Structures (*ASCE 7-93). American Society of Civil Engineers, New York, NY. 1993.

[3] *Standard Building Code*. Southern Building Code Congress International, Inc. (SBCCI). Birmingham, Alabama. 1994.

[4] *Uniform Building Code*. International Conference of Building Officials (ICBO). Whittier, California. 1994.

[5] *The BOCA National Building Code.* Building Officials & Code Administrators International, Inc. (BOCA). Country Club Hills, Illinois. 1993.

[6] *Commentary on the Prescriptive Method for Residential Cold-Formed Steel Framing*. Second Edition. Prepared for the US Department of HUD by the National Association of Home Builders Research Center. Upper Marlboro, Maryland. July 1997.

[7] ASTM A 370- 96 *Standard Test Methods and Definitions for Mechanical Testing of Steel Products,* American Society for Testing and Materials (ASTM), West Conshohocken, PA. 1996.

[8] ASTM A 653 / A 653M - 1996 *Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process*, American Society for Testing and Materials (ASTM), West Conshohocken, PA. 1996.

[9] ASTM A 792 / A 792M *Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process*, American Society for Testing and Materials (ASTM), West Conshohocken, PA. 1996.

[10] ASTM A 875 / A 875M *Standard Specification for Steel Sheet, Zinc-5% Aluminum Alloy Metallic-Coated by the Hot-Dip Process*, American Society for Testing and Materials (ASTM), West Conshohocken, PA. 1996.

[11] ASTM C 955-96a *Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Board and Metal Plaster Bases*, American Society for Testing and Materials (ASTM), West Conshohocken, PA. 1996.

[12] ASTM C 645 - 96a *Standard Specification for Nonstructural Steel Framing Members*, American Society for Testing and Materials (ASTM), West Conshohocken, PA. 1996.

[13] ASTM B633 -85 e1 *Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel*, American Society for Testing and Materials (ASTM), West Conshohocken, PA. 1994.

[14] SAE J-78-1979, *Steel Self Drilling Tapping Screws,* Society of Automotive Engineers, 1979.

[15] ASTM C 954-96ae1 *Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness*, American Society for Testing and Materials (ASTM), West Conshohocken, PA. 1996.

[16] ASTM Standard A 307 - 94 *Standard Specification for Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength*, American Society for Testing and Materials (ASTM), ASTM, West Conshohocken, PA. 1994.

[17] AISI Publication RG-9518, *Design Guide For Cold-Formed Steel Trusses,* American Iron and Steel Institute (AISI), Washington DC. December 1995.

[18] AISI Publication RG-9405, *Thermal Design Guide For Exterior Walls*, American Iron and Steel Institute (AISI), Washington DC. December 1995.