SFIA
STEEL FRAMING INDUSTRY ASSOCIATION

SFIA 161:Beyond the Details: Avoiding Missteps in Cold-Formed Shaftwall Design

Presenter: Chuck Webb

Date: January 29, 2026

AIA
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Overview

- Welcome & housekeeping
- A word about SFIA
- Presentation
- Q&A

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Welcome & Housekeeping

- Thank you for attending our webinar today!
- Mics are muted. Please ask any questions in the chat or Questions windows.
- A PDF of the presentation and a Certificate of Attendance will be available in your Steel Framing Learning Portal account after the webinar.
- Please submit your AIA number to Meredith Perez in the chat or email it to Meredith@steelframing.org if you wish to have your learning units recorded.
- If you are a group viewing the presentation from a single computer, please email Meredith for the Group AIA attendance form so we can report LUs for everyone who attended. Meredith@steelframing.org

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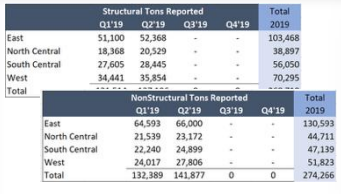
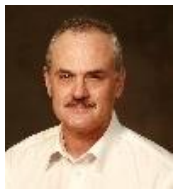


SFIA Staff



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RIB | SpecLink

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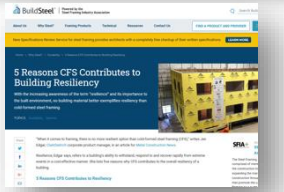

EPD VERIFIED

Codes & Standards

ANSI
American National Standards Institute

Advocacy

Certification

Introducing our Speaker!

CHUCK WEBB, TECHNICAL SALES MANAGER

Chuck Webb is a Technical Sales Manager for ClarkDietrich with over 20 years of experience in cold-formed framing design and technical sales support. He is a licensed professional and structural engineer in multiple states across the Southeast and Mid-Atlantic regions. His current responsibilities include the promotion and technical support for ClarkDietrich proprietary products in the Southeast and Mid-Atlantic regions. He works closely with design professionals and construction professionals to identify product opportunities and solutions.

Chuck serves on the Board of Directors for the Mid-Atlantic Steel Framing Alliance (MASFA). He earned his Bachelor of Science degree in Civil and Environmental Engineering from Georgia Institute of Technology.

Credit(s) earned on completion of this course will be reported to AIA CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

This course is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

_____

Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

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Course Description

Cold-formed steel and gypsum shaftwall assemblies are often detailed and expected to perform in applications exceeding the assembly limitations. What are those applications and what are the limitations to cold-formed shaftwall construction? This seminar will explore the profiles used in shaftwall construction, review industry standard details and best construction practices in shaftwall assemblies and discuss shaftwall product limitations. We will review common design practices that are problematic or challenging with the use of shaftwall framing components.

Learning Objectives

1. Recognize and understand the differences between the 3 shaftwall stud profiles – CT, CH and I studs.
2. Review industry standard details and best construction practices for shaftwall assemblies.
3. Understand the limitations in shaftwall construction.
4. Learn what solutions are available to fix misused shaftwall assemblies.

DISCLAIMER

This presentation is not intended to highlight specific shaftwall stud/track manufacturers, gypsum board manufacturers, or any proprietary product(s). Documents, photographs, and illustrations used herein are for educational purposes and not intended to support specific products and/or assemblies.

Presentation Outline

1. Shaftwall Stud and Track Profiles
2. Industry Standard Details and Best Construction Practices
3. Reference Code and Standards
4. Limitations in Shaftwall Construction
5. Common Misused Shaftwall Applications and Proposed Solutions

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Profiles, Common Details and Best Construction Practices

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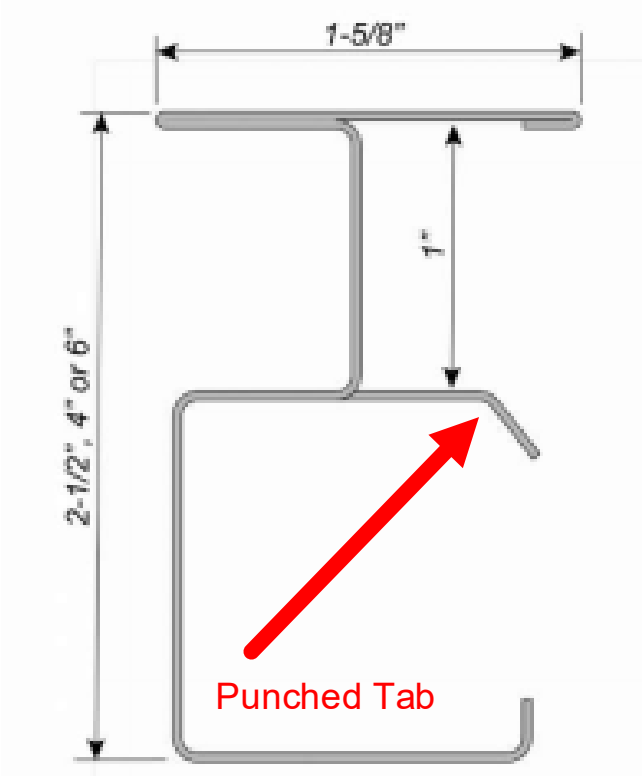
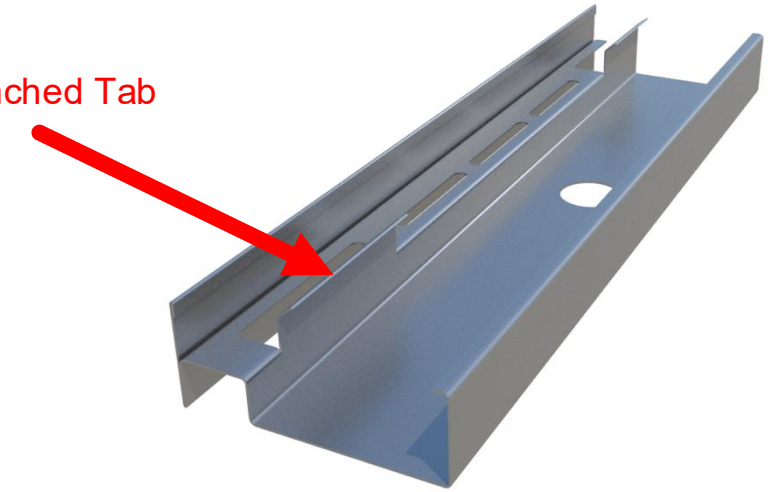
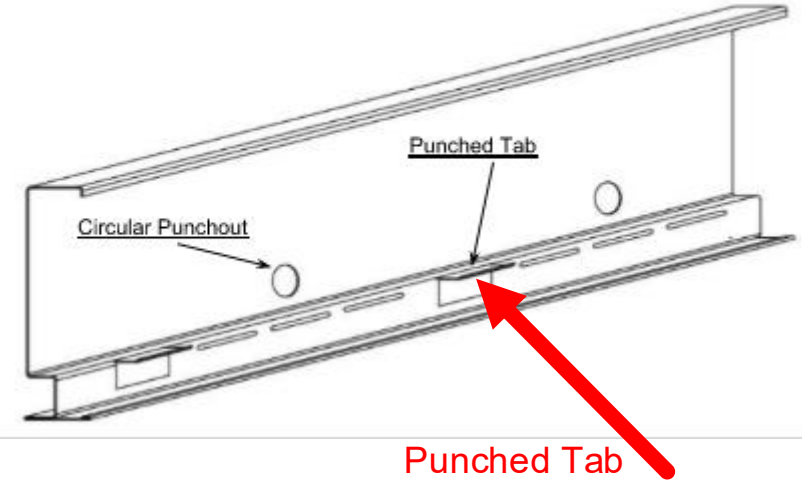
SHAFTWALL STUD PROFILE

CT PROFILE

- Width: 2-1/2”, 4” and 6”
- Thickness: Range from 18 MIL and 22 MIL (25 GA) to 33 MIL (20 GA) to 43 MIL (18 GA) max.
- Yield Strength: 33 ksi
- Consult manufacturer for available sizes and length limitations



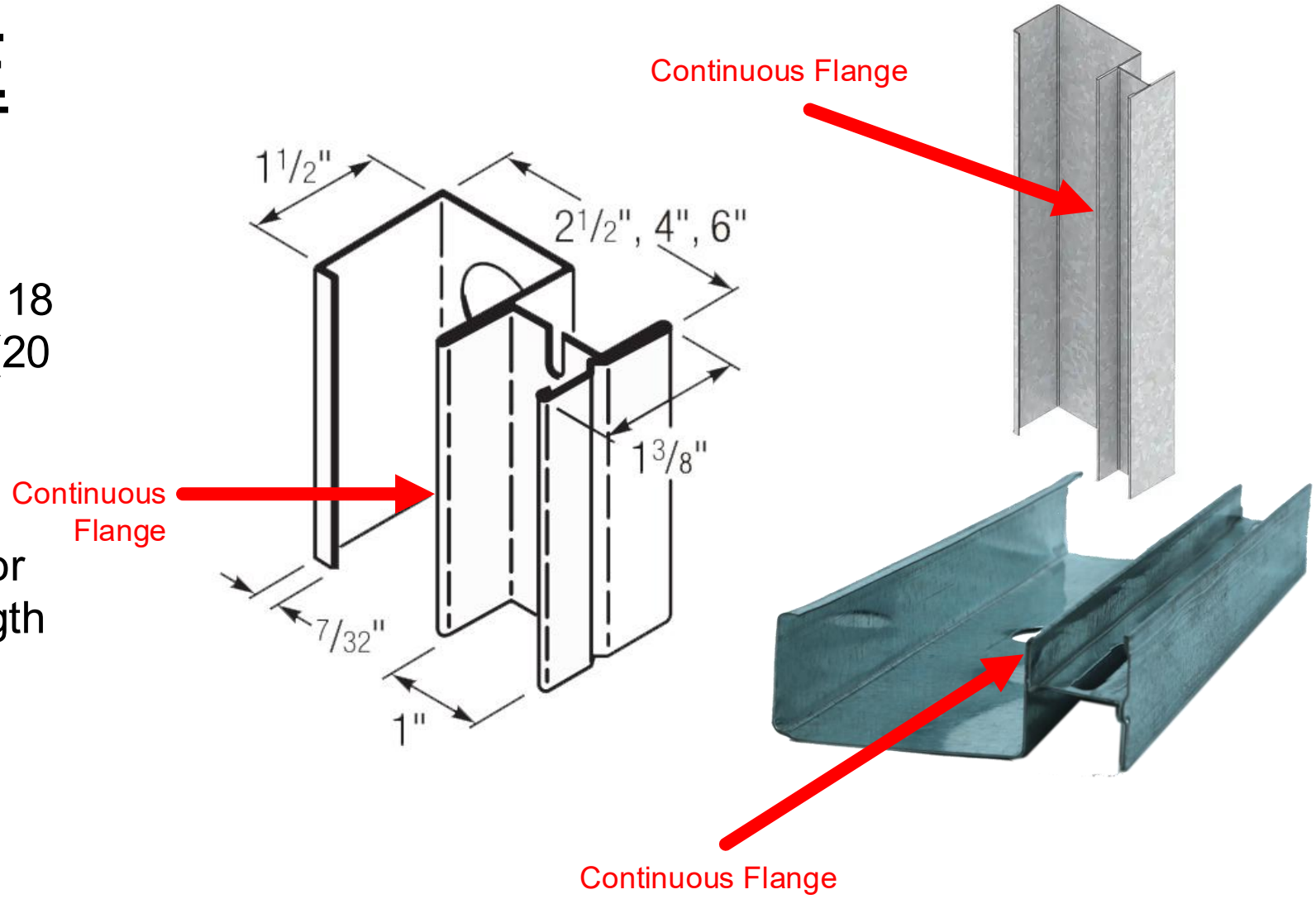




SHAFTWALL STUD PROFILE

CH PROFILE

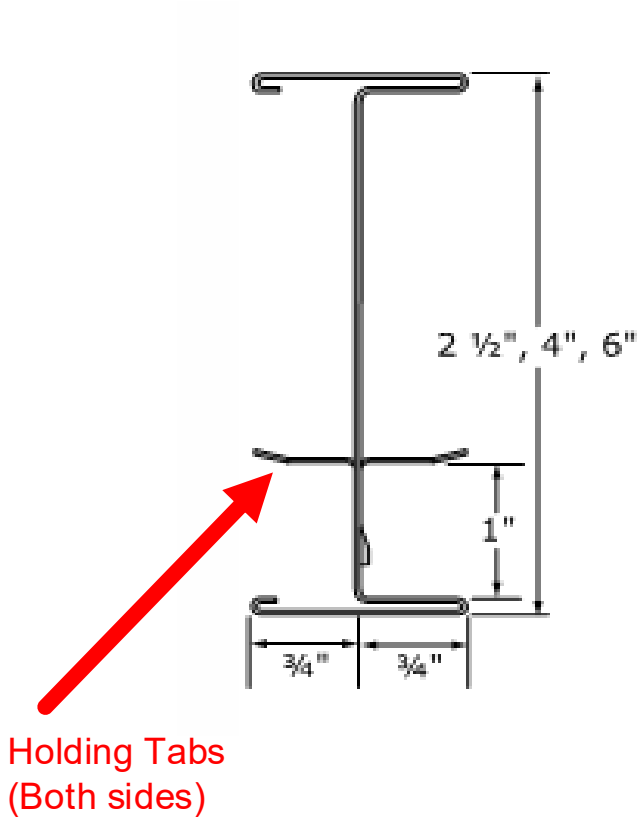
- Width: 2-1/2”, 4” and 6”
- Thickness: Range from 18 MIL (25 GA) to 34 MIL (20 GA) max.
- Yield Strength: 33 ksi
- Consult manufacturer for available sizes and length limitations

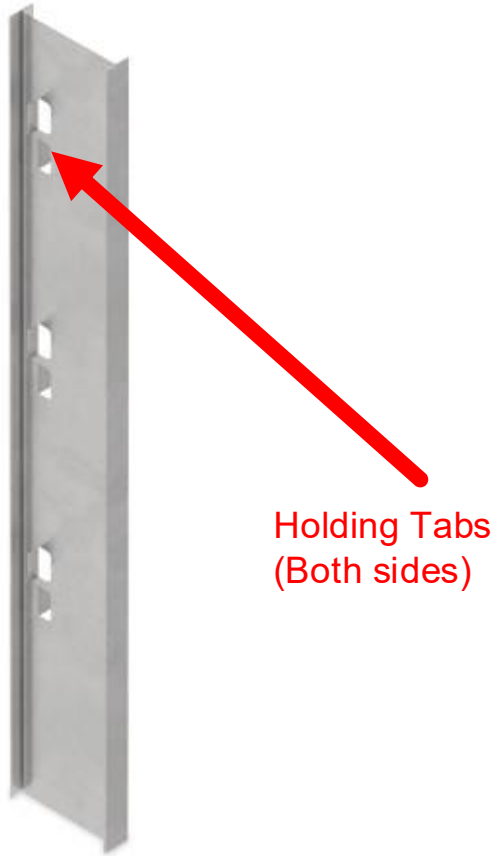


SHAFTWALL STUD PROFILE

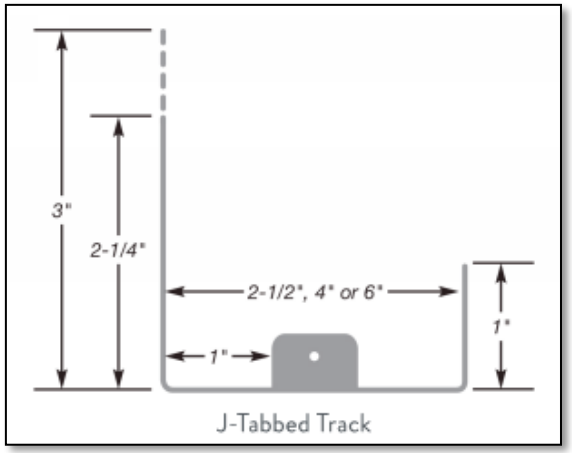
I PROFILE

- Width: 2-1/2”, 4” and 6”
- Thickness: Range from 33 MIL (20 GA) to 43 MIL (18 GA) max.
- Yield Strength: 57 ksi
- Consult manufacturer for available sizes and length limitations

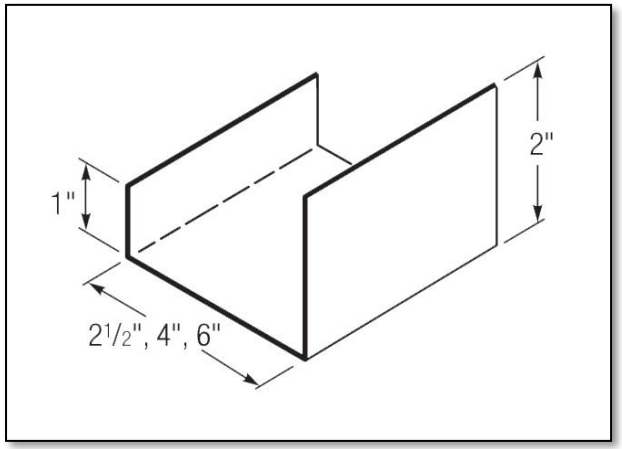




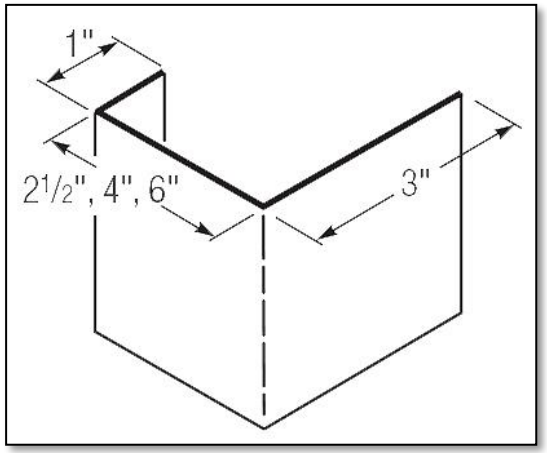
SHAFTWALL TRACK PROFILE



Tabbed J-Track



J-Runner

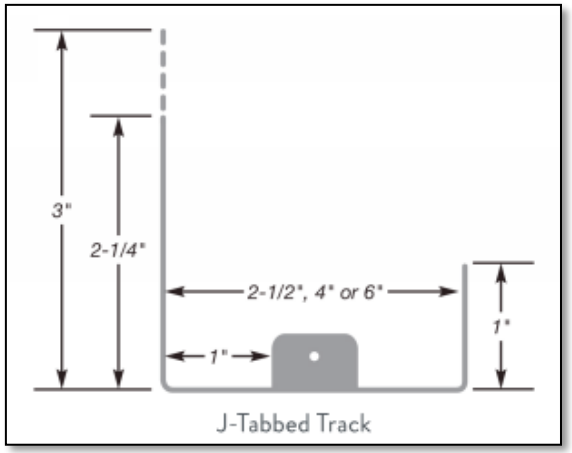


Jamb-Strut

Thicknesses range from 18 MIL and 22 MIL (25 GA) to 33 MIL (20 GA) to 43 MIL (18 GA)

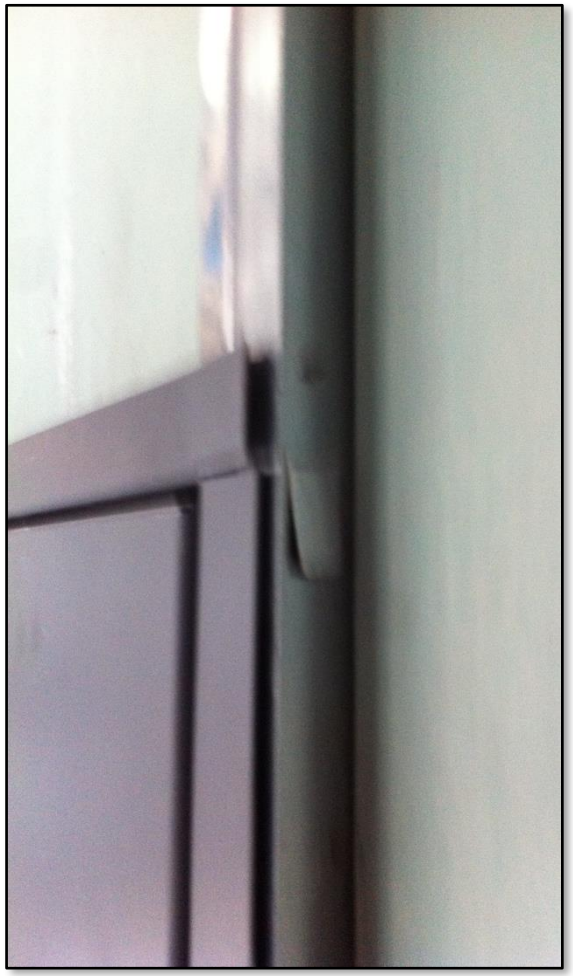
- Slight variation in thicknesses – see respective manufacturer for material thicknesses offered

SHAFTWALL TRACK PROFILE



Not Always Used as Bottom Track:

- Corners
- Headers
- Jambs



INSIDE CORNER

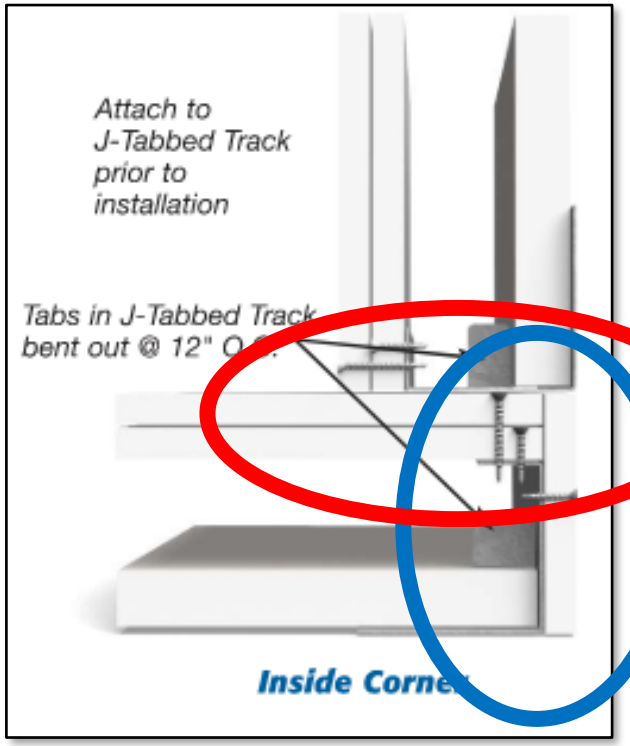


Image from ClarkDietrich

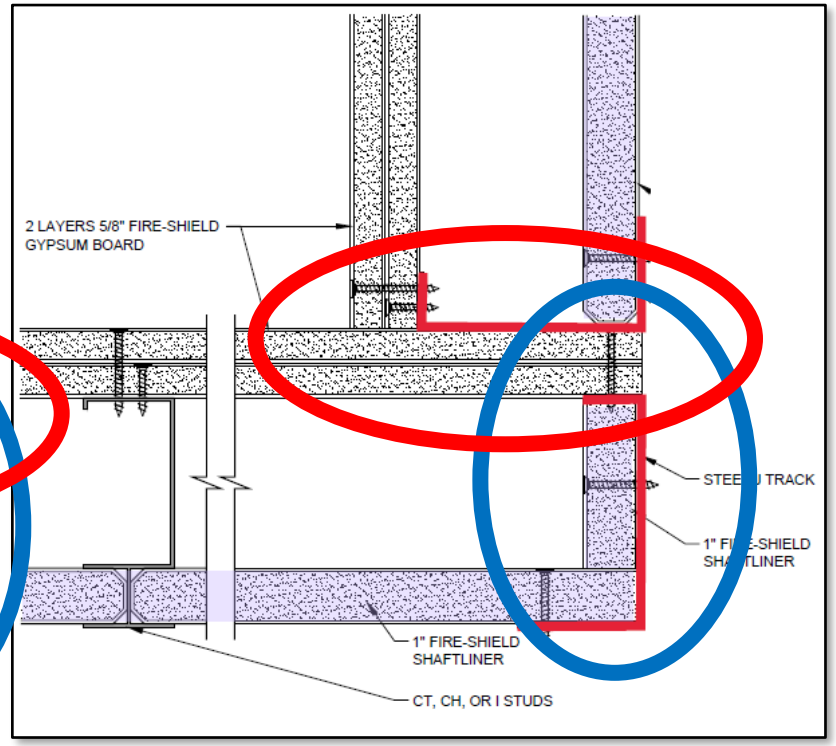


Image from National Gypsum Company

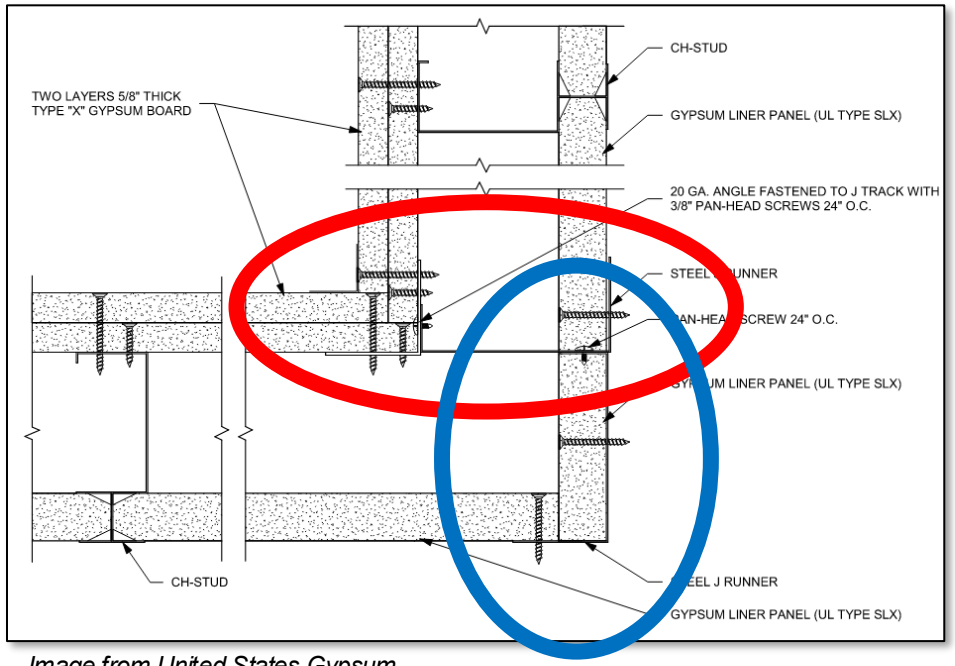


Image from United States Gypsum

NOTE: J-Runner/J-Track to be full length and one piece

OUTSIDE CORNER

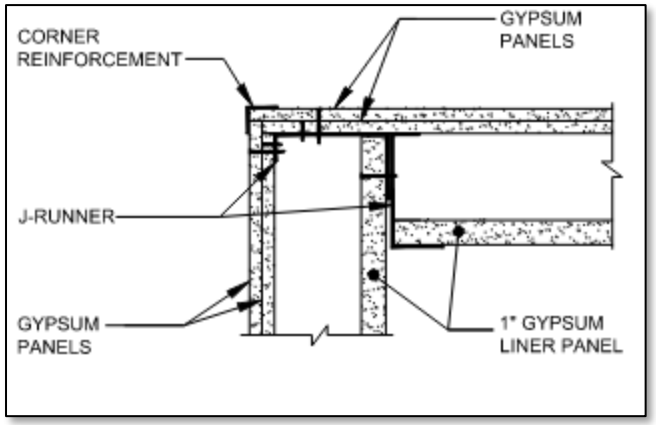


Image from CEMCO

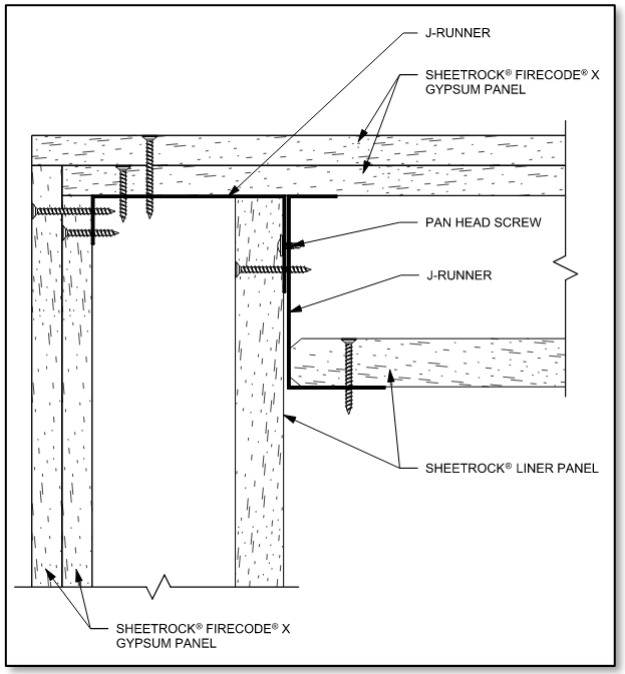


Image from United States Gypsum

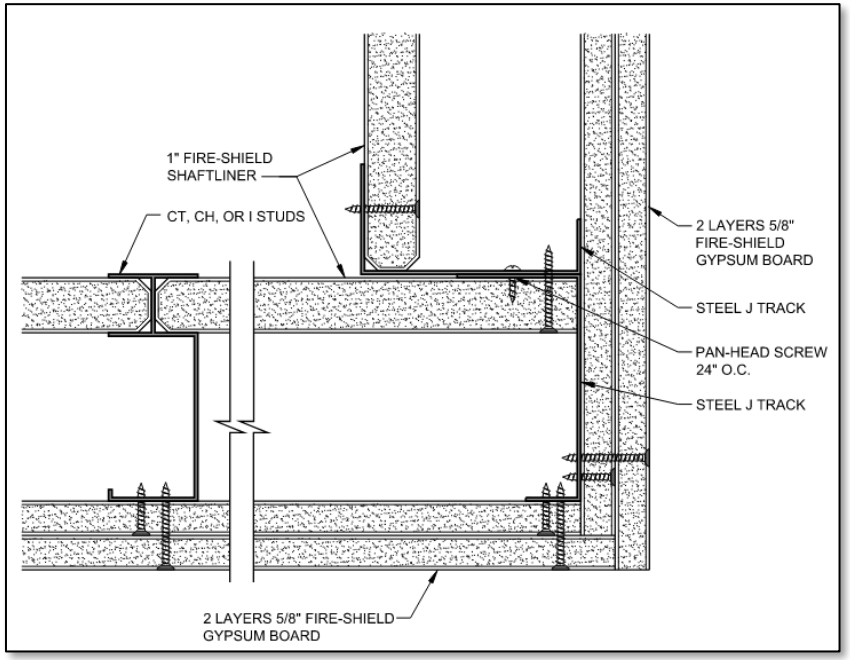
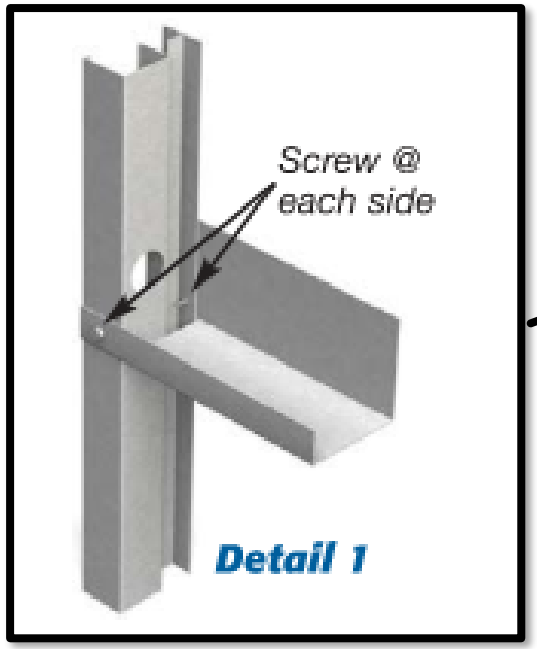
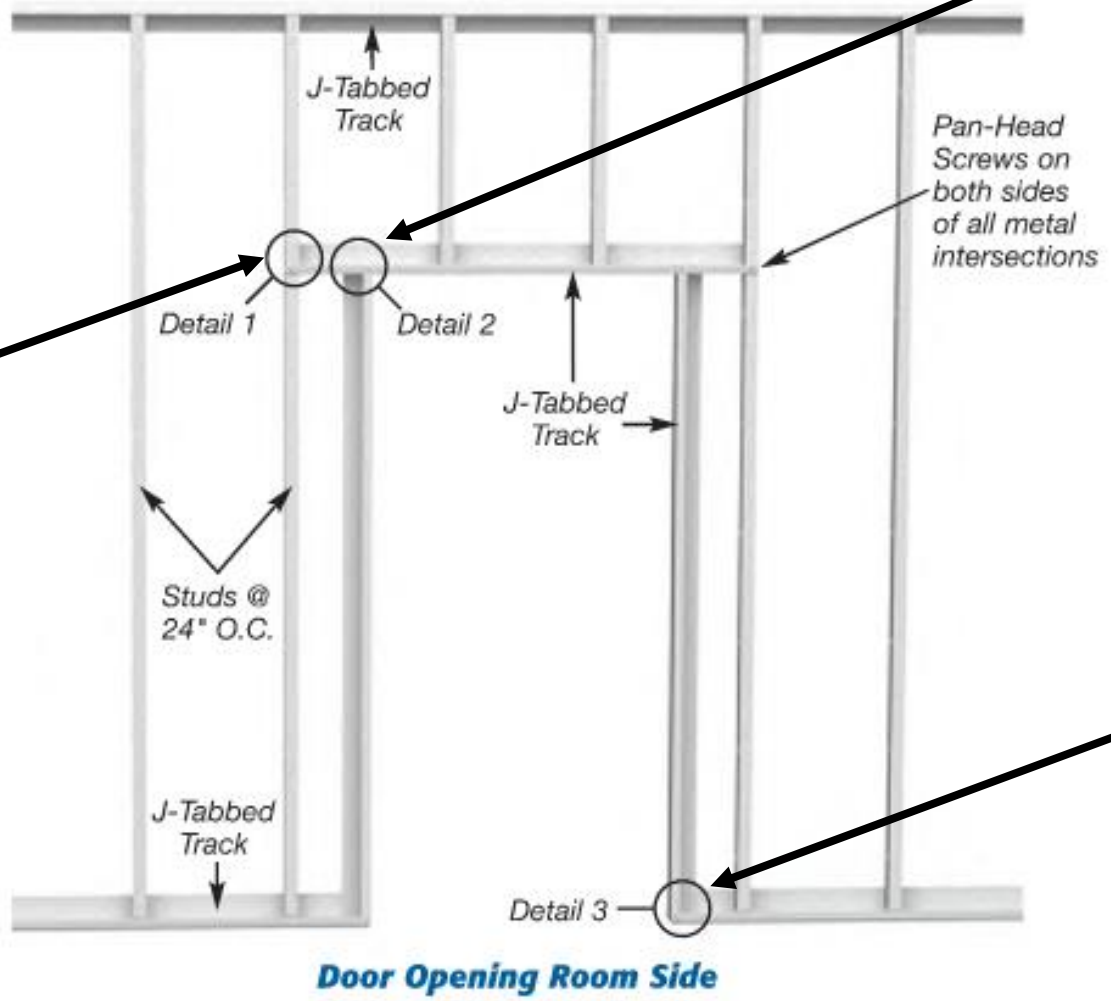


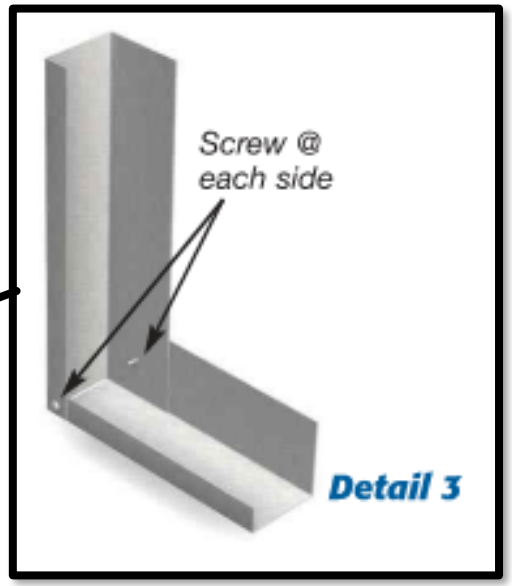
Image from National Gypsum Company

NOTE: J-Runner/J-Track to be full length and one piece

DOOR FRAMING







Images and Detailing from ClarkDietrich

ELEVATOR DOOR FRAMING

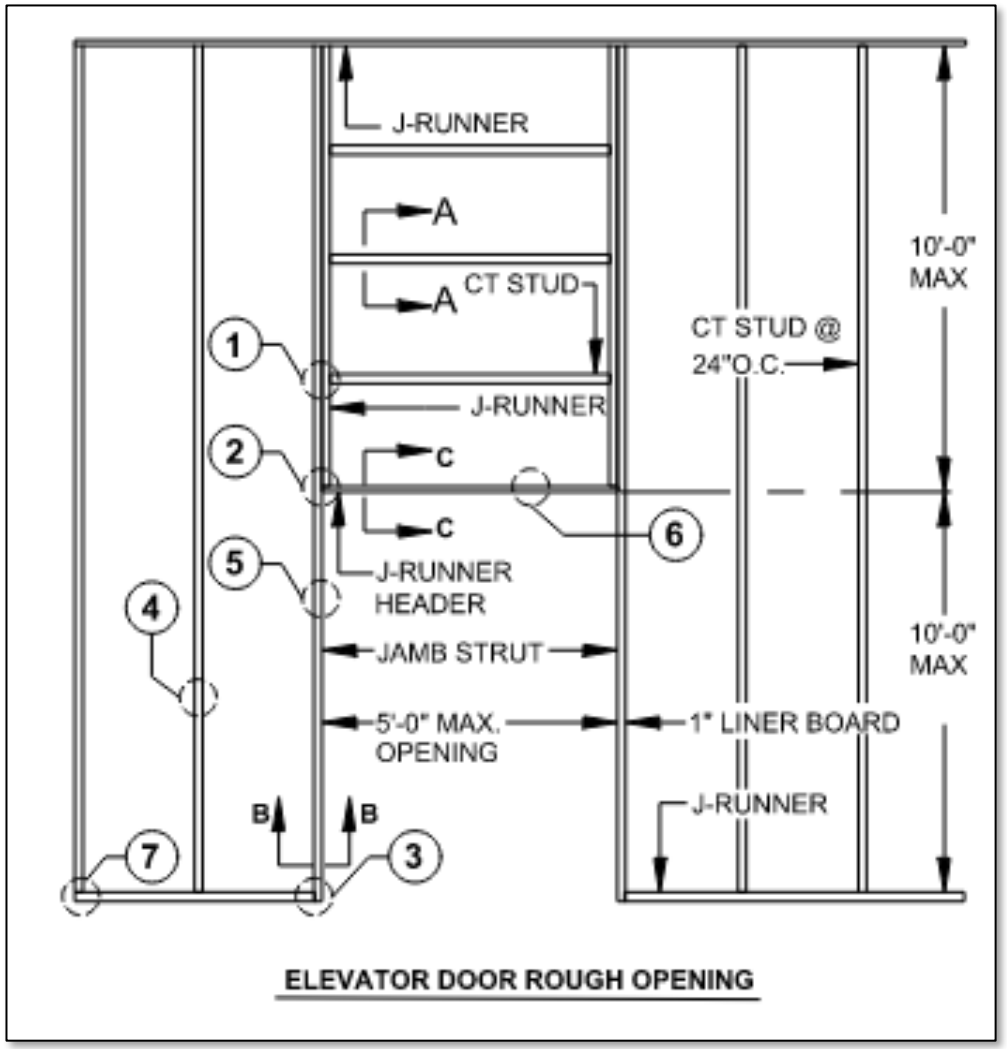


Image from CEMCO

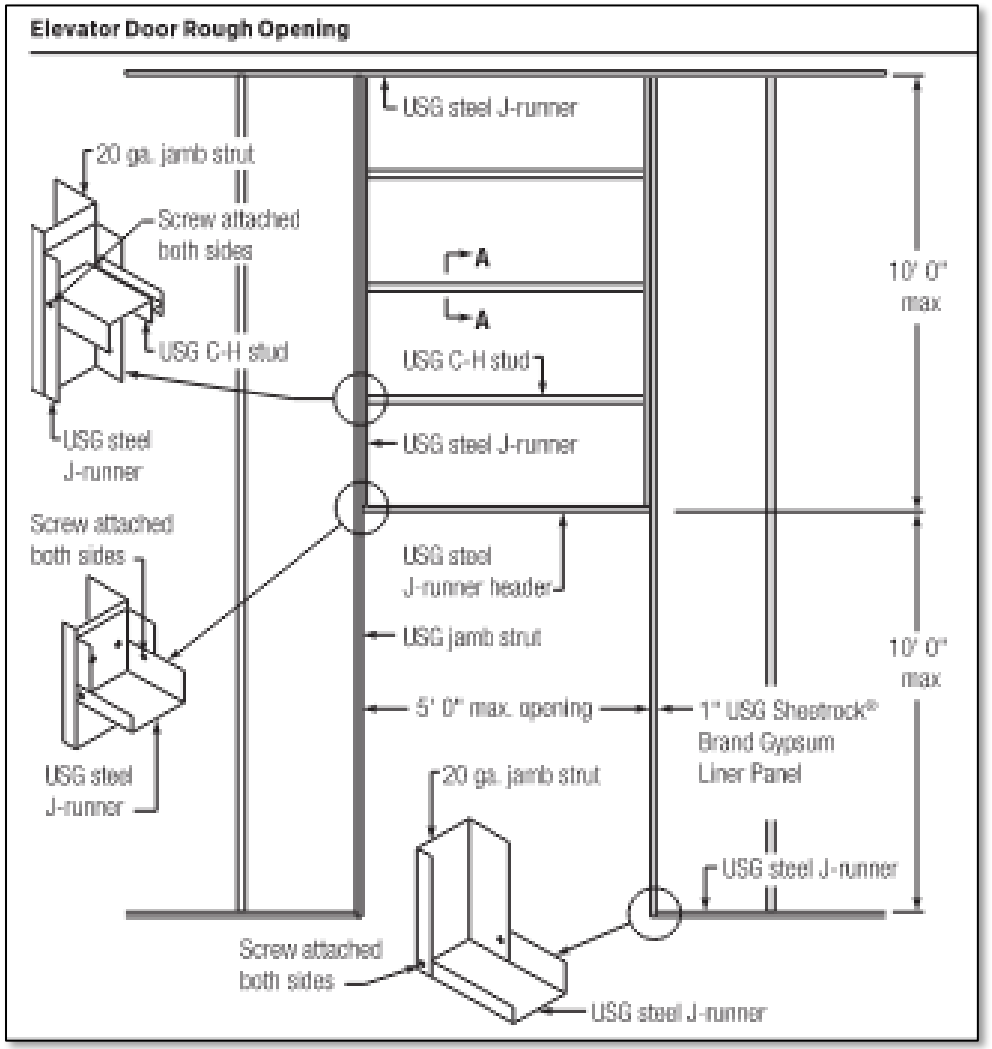
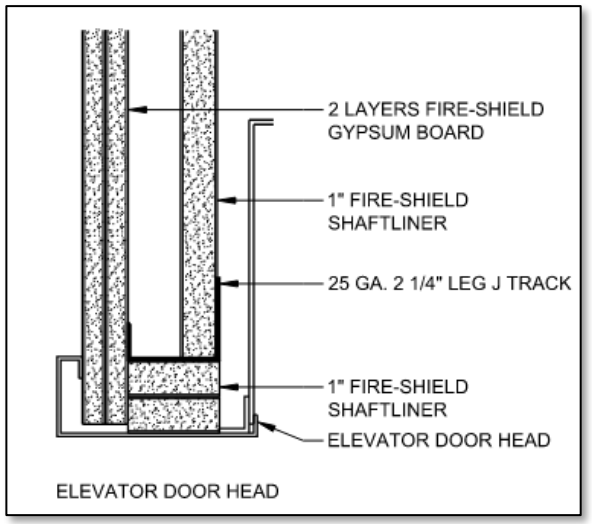
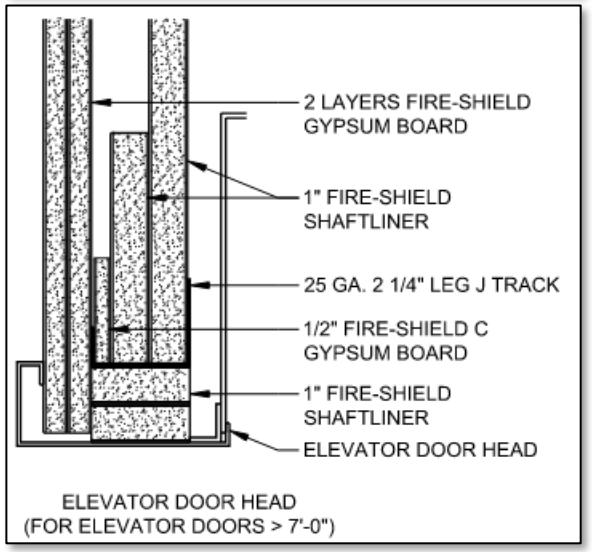


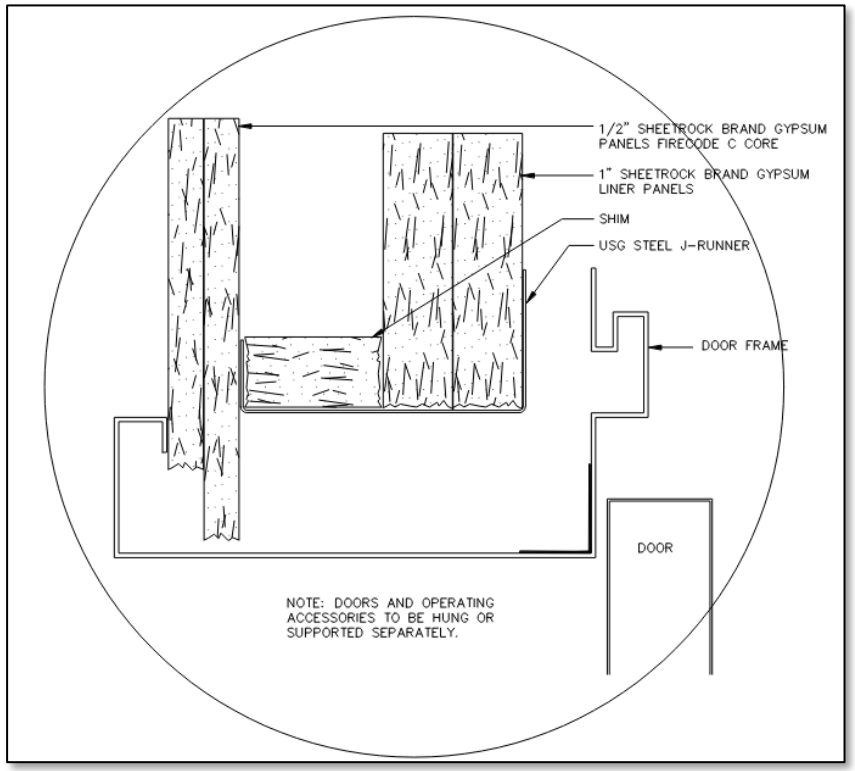
Image from United States Gypsum

JAMB/HEADER DETAILING





Images from National Gypsum Company



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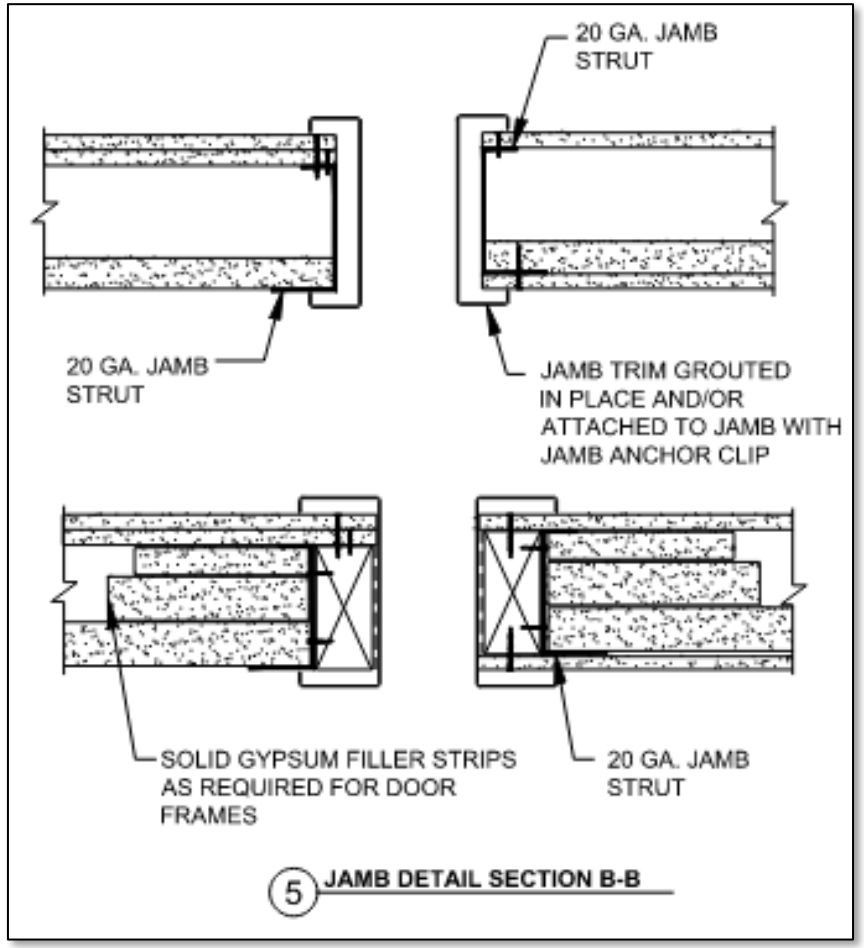

Image from CEMCO

Codes and Standards

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REFERENCE CODE & STANDARDS

2024 International Building Code – Chapter 7 – Fire and Smoke Protection Features

- ASTM E119 – *Standard Methods of Fire Tests of Building Construction and Materials*
- UL 263 – *Fire Tests of Building Construction and Materials*

2024 International Building Code – Chapter 25 – Gypsum Board, Gypsum Panel Products, and Plaster

- Table 2506.2 – Cold-formed steel studs and track, nonstructural → AISI S220
- Migrated from ASTM C645 to AISI S220 (Started with 2015 IBC)

American Iron and Steel Institute

REFERENCE CODE & STANDARDS

American Iron and Steel Institute

AISI S220 – North American Standard for Cold-Formed Steel Nonstructural Framing

- *Nonstructural Member* – A member in a steel-framed system that is not part of the gravity load-resisting system, lateral force-resisting system or building envelope.

AISI S220 – A1.2 Applicability

- Limited to a transverse (out-of-plane) load of not more than 10 lb/ft^2
  - Exception: Pressurized air plenums, ceilings and elevator shaft enclosures permitted to have not more than 15 lb/ft^2
- Limited to a superimposed axial load, exclusive of sheathing materials, of not more than 100 lb/ft **
- Limited to a superimposed axial load of not more than 200 lbs **

** 3rd Party Evaluation/Compliance reports will list superimposed vertical loading of zero pounds for shaftwall framing systems.

REFERENCE CODE & STANDARDS

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Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States
BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
Design Criteria and Allowable Variances

Design No. **U415**

July 31, 2025

Nonbearing Wall Ratings — 1, 2, 3 or 4 Hr
*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Feedback

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REFERENCE CODE & STANDARDS

Fire-resistance Ratings - ANSI/UL 263

Guide Information for Fire-resistance Ratings

Design Information Section

The Design Information Section supplements the individual published designs and is organized as follows:

I. INTRODUCTION

1. Rapid-rise Fire Test
2. Definitions

II. GENERAL

1. Metric Dimensions	12. Dampers
2. Loading of Test Specimens	13. Wood Structural Panels
3. Finish Ratings	14. Blanket Insulation
4. Nails and Screws	15. Sound Transmission Class (STC)
5. Interior and Exterior Applications	16. Impact Insulation Class (IIC)
6. Exposed Interior Finishes	17. Penetrations
7. Radiant Heating Cable and Panels	18. Curtain Wall/Floor Protection Systems
8. Coating Materials	19. Fire-resistant Joint Systems
9. Gypsum Board	20. Fire Doors, Frames and Hardware
10. Gypsum Board Joint Treatment (Taping)	21. Glazing, Wired Glass and Glass Blocks
11. Plaster	22. Exterior Wall Systems

III. FLOOR-CEILINGS AND ROOF-CEILINGS

1. Concrete	13. Enclosures for Fluorescent Recessed Luminaires (Troffers)
2. Fiber Reinforcement	14. Luminaires Certified for Fire Resistance
3. Steel Floor and Form Units	15. Restrained and Unrestrained Assemblies
4. Electrical Boxes for Concrete Floors	16. Air Ducts and Protection Systems
5. Nonmetallic Outlet Boxes for Ceilings	17. Blanket Insulation
6. Metallic Electrical Outlet Boxes	18. Wood Frame Construction
7. Steel Joists	19. Roof Coverings
8. Precast Concrete Units	20. Roof Insulation
9. Ceiling Control Joints	21. Uplift Resistance
10. Acoustical Materials	22. Steel Roof Deck Fasteners
11. Suspension Systems	23. Steel Floor Unit Fasteners
12. Fluorescent Recessed Luminaires (Troffers)	24. Use of Floor-Ceilings as Roof-Ceilings

IV. BEAMS

1. Beam Size	5. Unprotected Floors and Roofs
2. Composite and Noncomposite Beams	6. Adjustment of Thickness of Spray-applied Fire-resistive Materials for Restrained and Unrestrained Beams
3. Cavities	7. Restrained and Unrestrained Conditions
4. Beam Substitution	

V. COLUMNS

1. General
2. Alternate Limiting Temperature, Multi-Duration, Multi-Section Data

VI. WALLS AND PARTITIONS

1. Gypsum Board	8. Nonmetallic Electrical Outlet Boxes
2. Mineral Fiber Insulation	9. Metallic Electrical Outlet Boxes
3. Wood Stud Wall Assemblies	10. Exterior wall application
4. Steel Stud Wall Assemblies	11. Concrete Masonry Units
5. Steel Stud Metal Thickness	12. Gypsum Area Separation Wall Design
6. Wood Structural Panels	13. One-Sided Wall Assemblies
7. Gypsum Board Joint Treatment (Taping)	

https://iq.ulprospector.com/en/document?e=206790

REFERENCE CODE & STANDARDS

Guide Information – Fire-Resistance Ratings – ANSI/UL 263

I. INTRODUCTION
II. GENERAL
III. FLOOR-CEILINGS & ROOF-CEILINGS
IV. BEAMS
V. COLUMNS
VI. WALLS & PARTITIONS

**Applies to ALL fire ratings unless noted in individual designs

REFERENCE CODE & STANDARDS

VI. WALLS AND PARTITIONS

1. Gypsum Board
2. Mineral Fiber Insulation
3. Wood Stud Wall Assemblies
4. Steel Stud Wall Assemblies
5. Steel Stud Metal Thickness
6. Wood Structural Panels
7. Gypsum Board Joint Treatment (Taping)

4. Steel Stud Wall Assemblies:

- Dimensions of studs are minimums.
  - Includes web depth, flange width, lip length
- Thicknesses of studs are minimums (see also section 5)
- Yield strengths are minimum.
- Spacing is maximum.

All of the above are applicable **unless specified in individual designs**.

REFERENCE CODE & STANDARDS

For non-load-bearing studs:

Gauge	Color Code	Min Thickness Bare Metal, in.
25	None	0.0179
22	Black	0.0269
20	White	0.0329
18	None	0.0428
16	None	0.0538

https://iq.ulprospector.com/en/document?e=206790#SectionVIitem4

Applications

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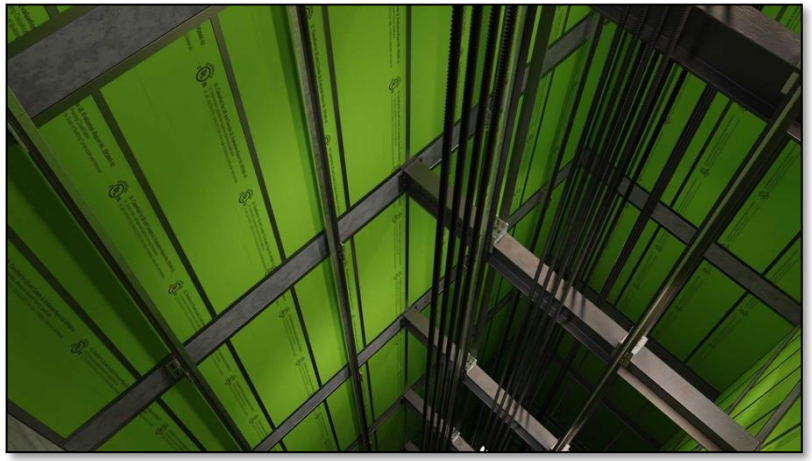
COMMON SHAFTWALL APPLICATIONS

Elevator Shaftwalls



Corridor Ceilings

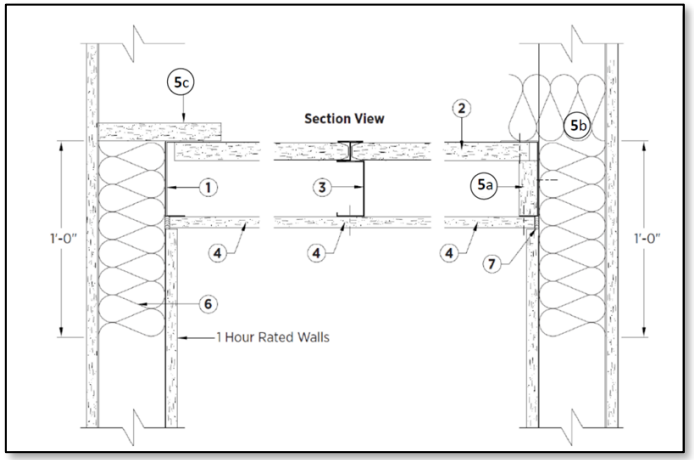
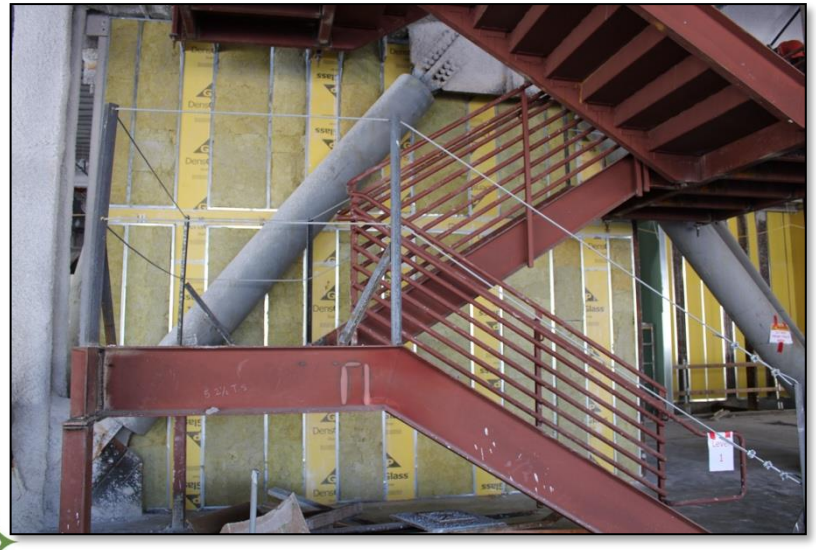


Image from United States Gypsum – CCRR-0502

Stairwalls



Duct Enclosures

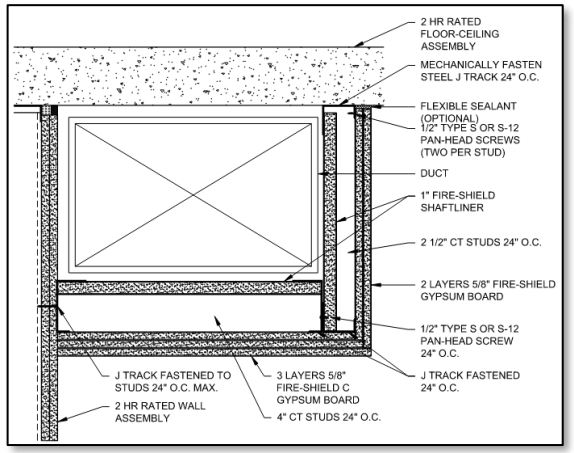


Image from National Gypsum Company

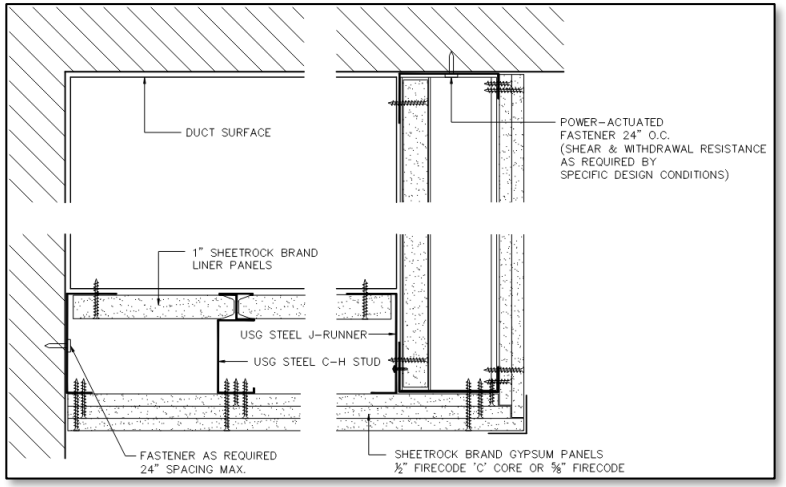


Image from United States Gypsum

ELEVATOR SHAFTWALL

1-Hr and 2-Hr Assemblies

- 1” liner panels on shaft side
- One or two layers 5/8” Type X or 1/2” Type C gypsum board

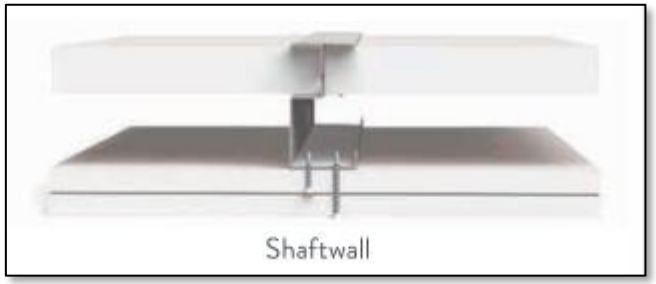
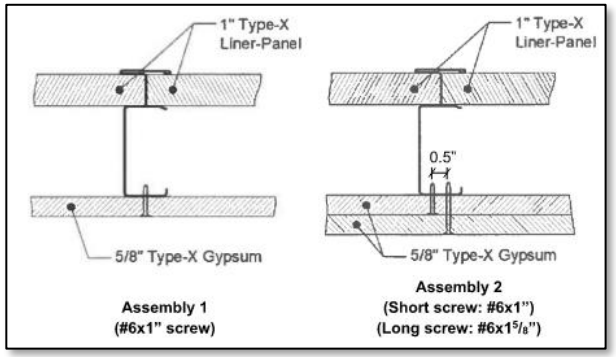


Image from ClarkDietrich – ICC-ES ESR-5050

Image from CEMCO – ICC-ES ESR-4934



Recommended Elevator Shaft Pressure Load		
Elevator velocity ft./min.	**One or two elevators per shaft**	**Three or more elevators per shaft**
0 to 180	5.0 psf	5.0 psf
180 to 700	7.5 psf	5.0 psf
700 to 1,600	10.0 psf	7.5 psf
1,600 to 2,000	15.0 psf[a]	7.5 psf

Note
(a) Single-cab, high-speed elevator shafts may require special design considerations.

Image from Unites States Gypsum Shaft Wall Systems Catalog

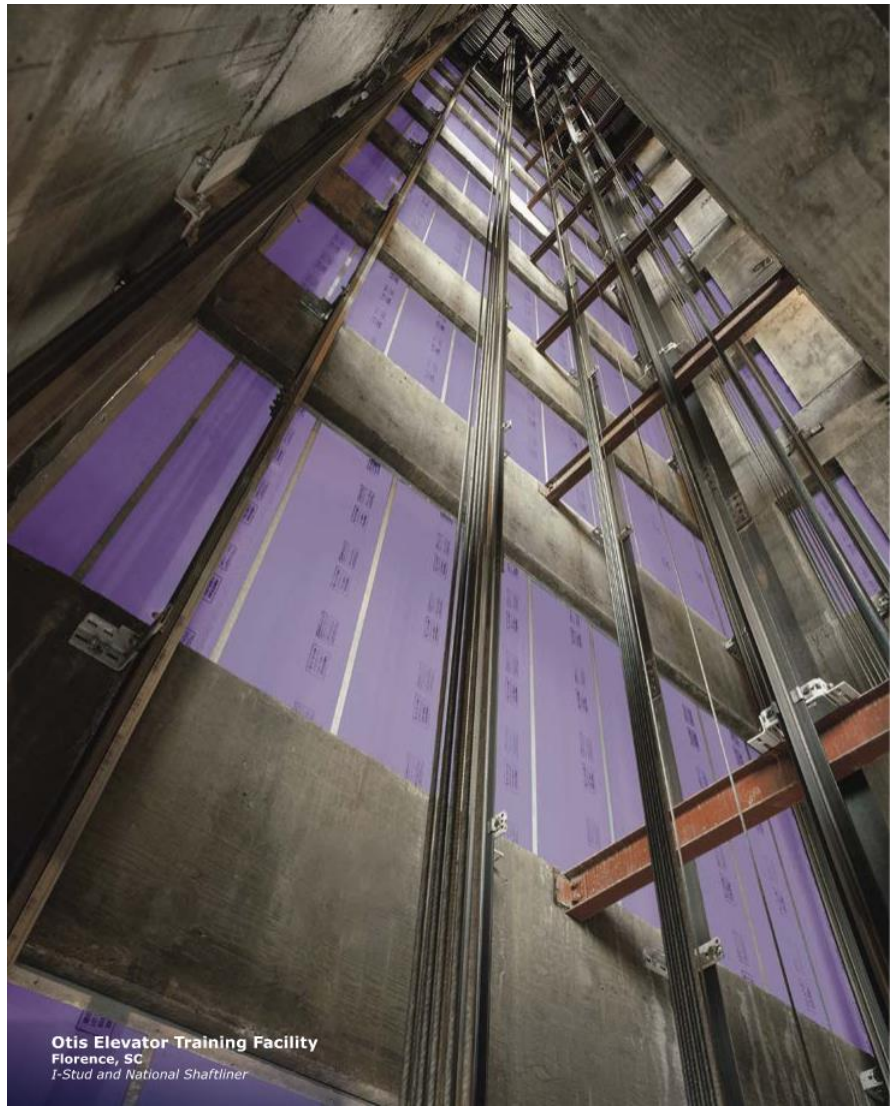


Image from CONFAB – I-Stud Shaftwall System Catalog

STAIRWALL

1-Hr and 2-Hr Assemblies

- 1” liner panel on one side
- Two layers 5/8” Type X or 1/2” Type C gypsum board – one on each side

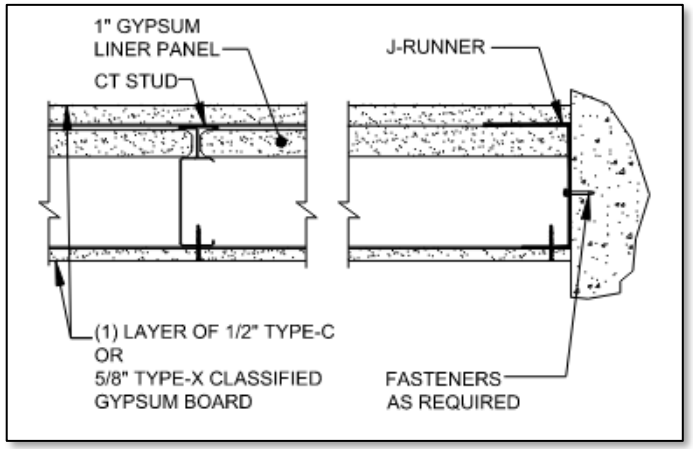
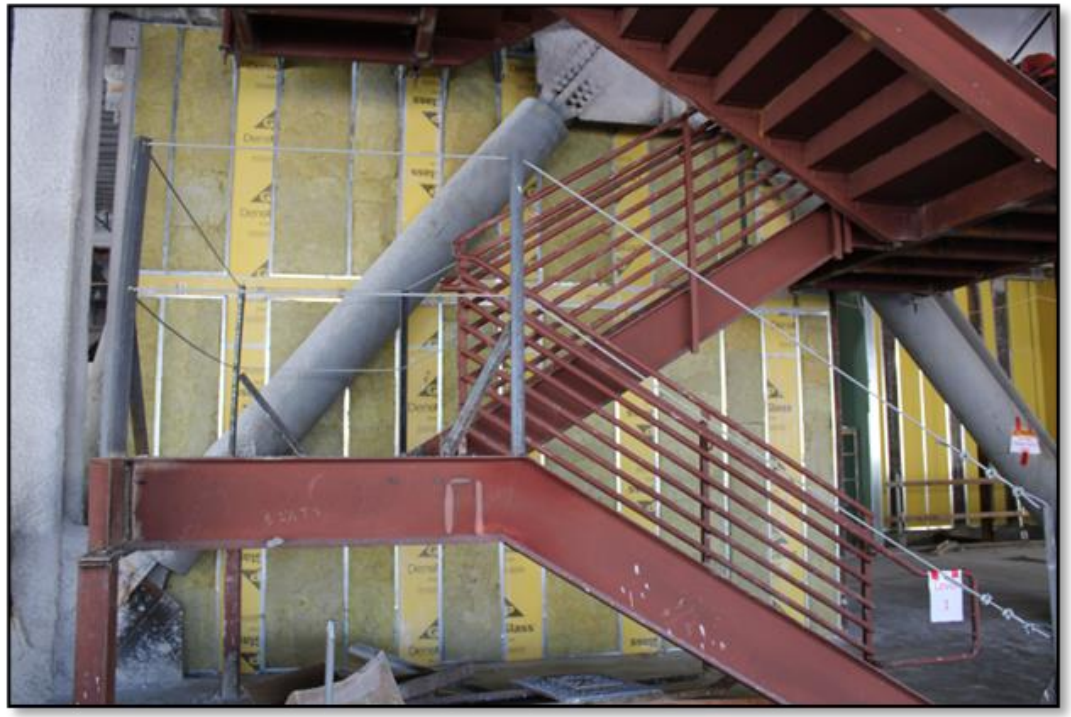


Image from CEMCO



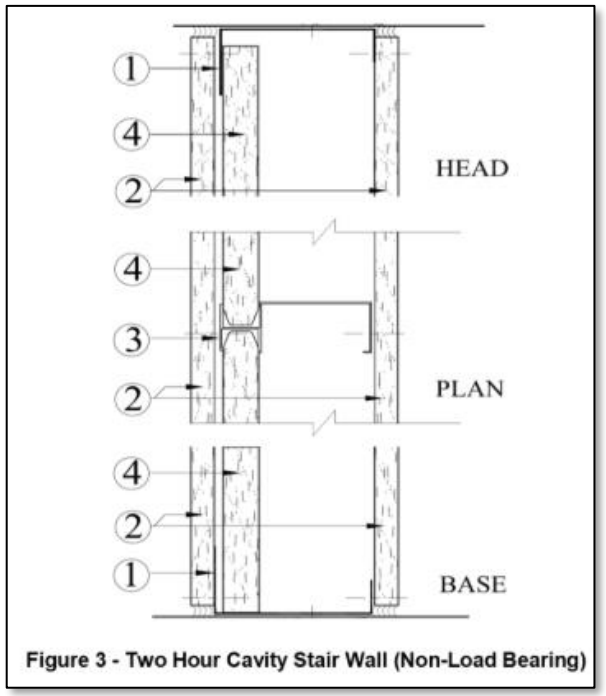


Figure 3 - Two Hour Cavity Stair Wall (Non-Load Bearing)

Image from United States Gypsum – CCRR-0502

SHAFTWALL SYSTEM EXAMPLES

2. **Steel Studs —**

Systems A, B, E, G and I

"I" -shaped studs fabricated from min 25 MSG galv steel, min 2-1/2 in. deep, 1-1/2 in. wide. Studs contain 3/4 in. wide by 2-1/4 in. high holding tabs spaced 2-3/4 in. OC. Cut to lengths 5/8 in. less than floor-to-ceiling height and spaced 24 in.

Systems C, D, F, H and J

"C-T" -shaped studs, min 2-1/2 in. deep, 1-1/2 in. wide, fabricated from min 25 MSG galv steel. Cut to lengths 5/8 in. less than floor-to-ceiling height and spaced 24 in. or

"C-H" - shaped studs, min 2-1/2 in. deep, fabricated from min 25 MSG galv steel. Cut to lengths 5/8 in. less than floor-to-ceiling height and spaced 24 in. OC.

2. **Steel Studs —** "C-H" - shaped studs, min 2-1/2 in. deep (min 4 in. deep when System C is used), fabricated from min 25 MSG (min 20 MSG when Items 2D, 4A, 4B, 4C, 4D or 7 is used) galv steel. Cut to lengths 3/8 to 1/2 in. less than floor-to-ceiling height and spaced 24 in. or 600 mm OC (max 16 in. OC when Items 4A, 4B, 4C, or 4D are used).

2J. **Steel Studs** — (Not Shown) — "C-T" shaped studs, min. 2-1/2 in. deep (min. 4 in. deep when System C is used), fabricated from min. 25 MSG (min. 20 MSG when Items 2D, 4A, 4B, 4C, 4D, or 7 is used) galv. steel. Cut to lengths 3/8 to 1/2 in. less than floor-to-ceiling height and spaced 24 in. or 600 mm OC (max. 16 in. OC when Items 4A, 4B, 4C, or 4D are used).

2K. **Steel Studs** — As an alternate to Item 2, for use with Item 1A — "I"-shaped studs fabricated from min. 25 MSG galv. steel (min 20 MSG when Item 4A, 4B, 4C, 4D, or 7 are used), min. 2-1/2 in. deep, 1-1/2 in. wide. Studs contain 3/4 in. wide by 2-1/4 in. high holding tabs spaced 2-3/4 in. OC. Cut to lengths 5/8 in. less than floor-to-ceiling height and spaced 24 in.

SHAFTWALL SYSTEM EXAMPLES

2. **Steel Studs** — "C-H" - shaped studs, min 2-1/2 in. deep (min 4 in. deep when System C is used), fabricated from min 25 MSG (min 20 MSG when Items 2D, 4A, 4B, 4C, 4D or 7 is used) galv steel. Cut to lengths 3/8 to 1/2 in. less than floor-to-ceiling height and spaced 24 in. or 600 mm OC (max 16 in. OC when Items 4A, 4B, 4C, or 4D are used).

2J. **Steel Studs** — (Not Shown) — "C-T" shaped studs, min. 2-1/2 in. deep (min. 4 in. deep when System C is used), fabricated from min. 25 MSG (min. 20 MSG when Items 2D, 4A, 4B, 4C, 4D, or 7 is used) galv. steel. Cut to lengths 3/8 to 1/2 in. less than floor-to-ceiling height and spaced 24 in. or 600 mm OC (max. 16 in. OC when Items 4A, 4B, 4C, or 4D are used).

2K. **Steel Studs** — As an alternate to Item 2, for use with Item 1A — "I"-shaped studs fabricated from min. 25 MSG galv. steel (min 20 MSG when Item 4A, 4B, 4C, 4D, or 7 are used), min. 2-1/2 in. deep, 1-1/2 in. wide. Studs contain 3/4 in. wide by 2-1/4 in. high holding tabs spaced 2-3/4 in. OC. Cut to lengths 5/8 in. less than floor-to-ceiling height and spaced 24 in.

Items 4A, 4B, 4C and 4D in UL U415 are lead backed gypsum panels

Item 7 is cementitious backer units

- Min stud thickness increases
- Stud maximum spacing reduction

** Read and understand the test reports for correct application**

SHAFTWALL SYSTEM EXAMPLES

3. **Gypsum Board*** — 1 in. thick gypsum wallboard liner panels, supplied in nominal 24 in. widths. Vertical edges inserted in "I" studs. Free edge of end panels attached to long leg of "J" runners with 1-5/8 in. long Type S self-drilling, self-tapping bugle head steel screws spaced not greater than 24 in. OC.

UL U499 Reprinted from Product iQ with permission from UL Solutions © 2026 UL LLC

3. **Gypsum Board*** — Gypsum liner panels, nom 1 in. thick, 24 in. or 600 mm (for metric spacing) wide. Panels cut 1 in. less in length than floor to ceiling height. Vertical edges inserted in "T" shaped section of C-T studs, "H" portion of "C-H" studs, the holding tabs of the "I" shaped stud, or the gap between the two 3/4 in. legs of the "E" studs. Free edge of end panels attached to long leg of vertical "J" - runners with 1-5/8 in. long Type S steel screws spaced not greater than 12 in. OC. When wall height exceeds liner panel length, liner panel may be butted to extend to the full height of the wall. Horizontal joints need not be backed by steel framing. In System I, butt joints in liner panels are staggered min 36 in. Butt joints backed with 6 in. by 22 in. strips of 3/4 in. thick gypsum wallboard (Item 4). Wallboard strips centered over butt joints and secured to liner panels with six 1-1/2 in. long Type G steel screws, three screws along the 22 in. dimension at the top and bottom of the strips. For all systems, when J-shaped Runners (Item 1) are supplied with securement tabs, free edge of end panels may be secured by bending the securement tabs, max. 12 in. OC, to a 90 degree angle to securely friction-fit panels in J-shaped runners.

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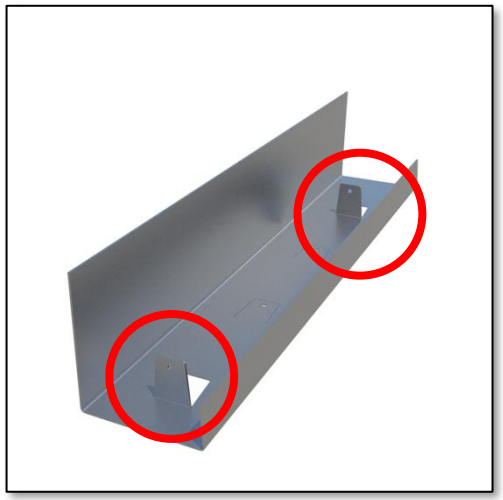
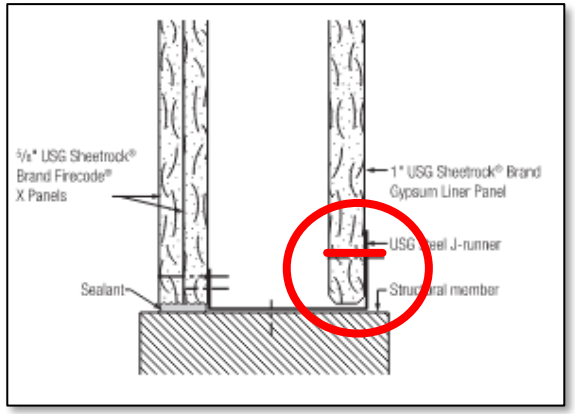


The panels are inserted against the long leg of the "J" runners and into the 1 in. deep recess of the studs. Free edges of end panels are retained by bending tabbed "J" runner tabs (12 in. oc) at a 90° angle.

Image is in plan view to illustrate end of wall construction



SHAFTWALL CEILING ASSEMBLIES

Corridor Assembly

2024 IBC – 708.4 Continuity

Fire partition to extend from top of foundation or floor/ceiling assembly and attached to:

1. Underside of floor or roof sheathing, deck or slab above
2. Underside of floor/ceiling or roof/ceiling assembly having fire-resistance rating not less than fire-resistance rating of fire partition

Exception:

3. Fire partitions serving as a corridor permitted to terminate at upper membrane of the corridor ceiling assembly where corridor ceiling is constructed as required for the corridor wall

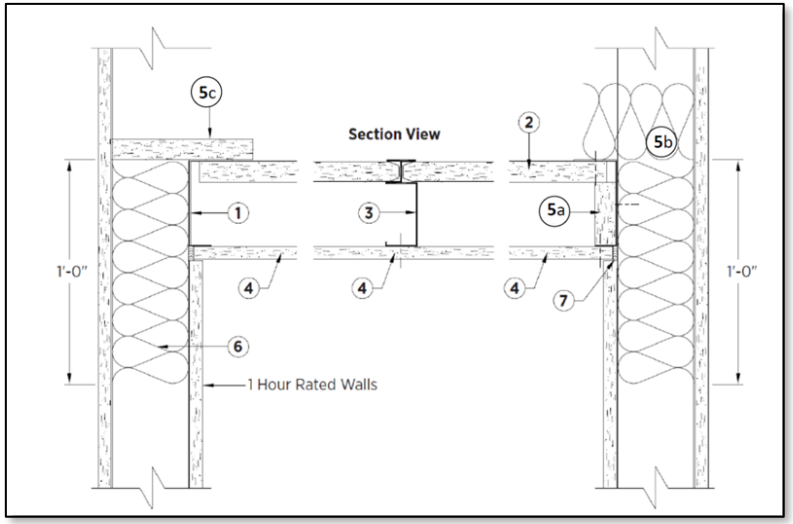


Image from United States Gypsum – CCRR-0502

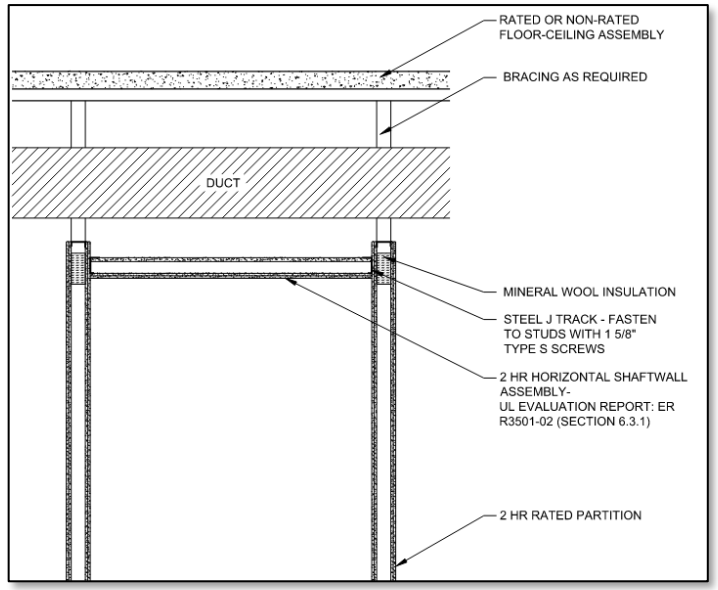


Image from National Gypsum Company – The Purple Book

SHAFTWALL CEILING ASSEMBLIES

Duct Enclosure Assembly

- Horizontal span limitations
- (3) layers of 1/2” Type C or 5/8” Type X on horizontal
- (2) layers of 1/2” Type C or 5/8” Type X on vertical

****Consult manufacturer for span limitations, attachments, and connections to structure.**

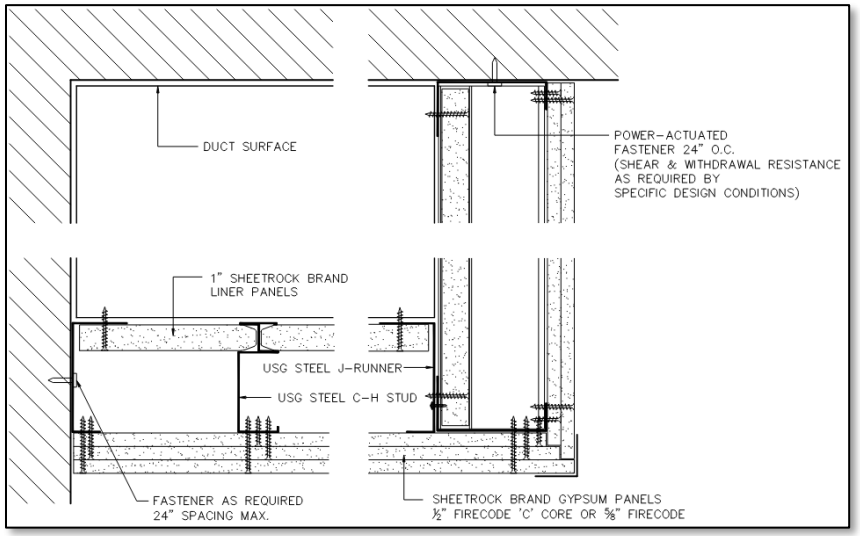


Image from United States Gypsum

VERTICAL - 2 HR
UL DESIGN: W419
HORIZONTAL - 2 HR
UL DESIGN: I516

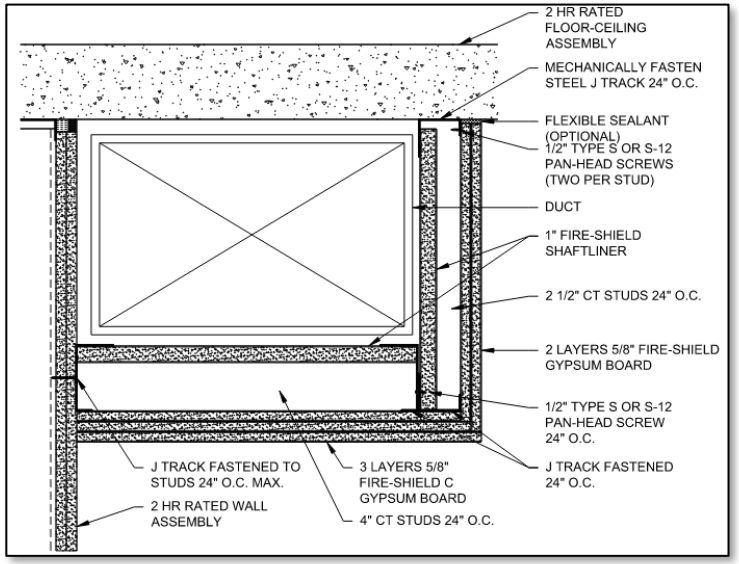
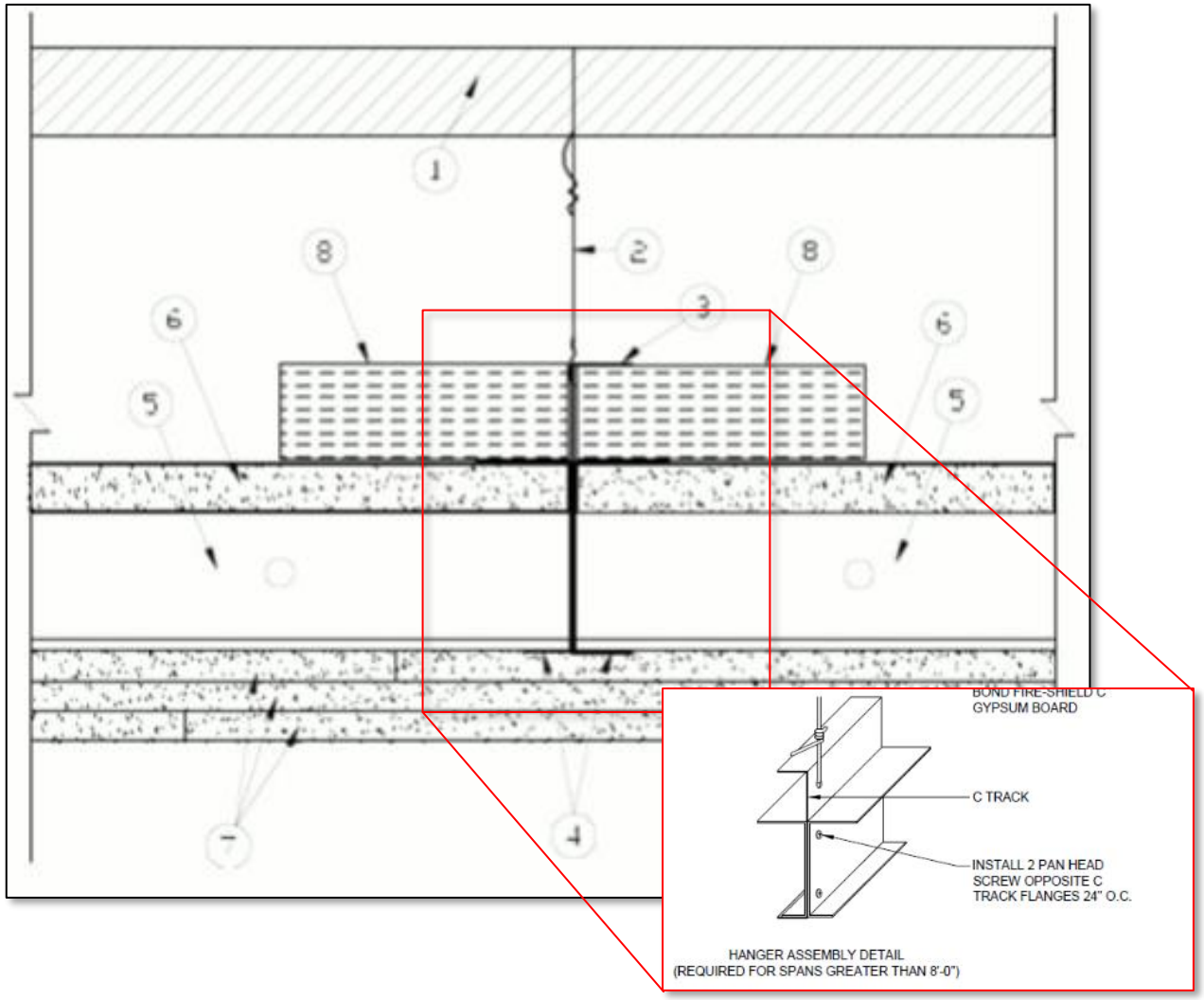


Image from National Gypsum – The Purple Book

SHAFTWALL CEILING SYSTEMS



Design No. I516

Ceiling Membrane Rating – 2 Hr

1. **Supporting Structure** — Suitable point of attachment for Hanger Wire (Item 2).

2. **Hanger Wire** — Min. 8 gauge steel wire, hung from holes punched in C-Channel (Item 3). Hanger wire spaced nominally 24 in. OC.

3. **C-Channel** — C Shaped Steel channel, min 6 in. deep. Channels fabricated from minimum No. 25 MSG galv steel with minimum 1-1/4" legs.

4. **J-Track** — "J" shaped track fabricated from minimum No. 20 MSG galv steel, min. 4 in. wide with unequal legs of 2 in. and 1 in. Used to support C-T Studs (Item 4). Secured to both sides of C-Channel (Item 3) and edges of adjacent wall assembly so that 2 in. leg is on top and 1 in. leg on bottom (facing finished gypsum side of ceiling), flush with bottom leg of C-Channel (Item 3). J-Track secured to C-Channel and wall assembly with 1/2 in. Type S screws spaced 24 in. OC along centerline of J-Tracks. Where J-Tracks form a butt joint, screws placed at both top and bottom of both sides of butt joint.

5. **Steel Studs** — "CT" shaped studs, nominal 1-1/2 in. wide by min 4 in. deep, fabricated from min. No. 20 MSG galv steel. Studs fit into J-Track (Item 4) and fastened at top and bottom with 1/2 in. Type S screws. "T" shaped section of studs face upward for installation of Gypsum Board liner panels (Item 6). "C" shaped section of studs face downward for attachment of Gypsum Board (Item 7). Bottom screws fastened through bottom leg of J-Track into stud. Top screws fastened through top of studs into top leg of J-Track. Maximum unsupported length of studs not to exceed 96 in.

8. **Mineral Wool*** — Nominal 2 in. thick by 6 in wide pieces of mineral wool glued to surface of Gypsum Board (Item 6) on both sides and across full length of C-Channel (Item 3) with construction adhesive (Item 9).

WHAT IF……..

YOU NEED TO ACCOUNT FOR VERTICAL DEFLECTION AT THE HEAD OF SHAFTWALL?

SHAFTWALL HEAD OF WALL JOINT SYSTEMS

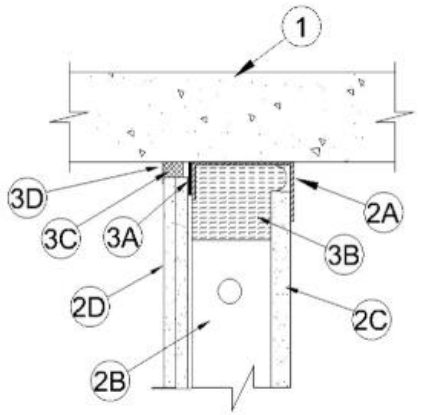
2024 International Building Code Chapter 7

- 715.3.1 → Fire-resistance joint systems tested in accordance with the requirements of ASTM E1966 or UL 2079

Information provided by the Design Professional to Contractor:

- Hourly rating – 1-HR, 2-HR, etc.
- Nominal (Installed) gap
- Vertical movement requirements (i.e. amount of movement in both compression and extension clearly defined) – Avoid expressing in terms of “L/XXX” and express in terms of inches

SHAFTWALL H.O.W. JOINT SYSTEMS



Section A-A

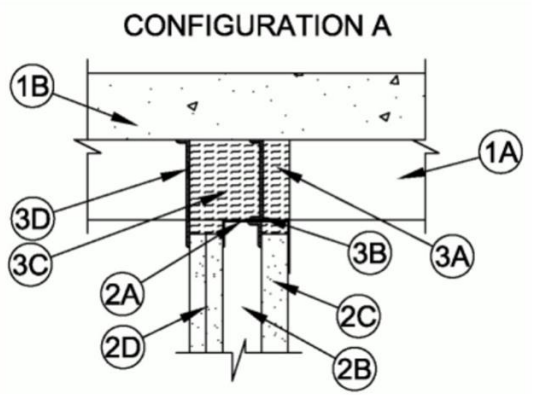
ANSI/UL2079
Assembly Ratings — 1 and 2 Hr (See Item 2)
Nominal Joint Width - 1/4 to 3/4 In. (See Item 3)
Class II or III Movement Capabilities — 80% Compression or 33% Extension
L Rating At Ambient — Less Than 1 CFM/Lin ft
L Rating At 400 F — Less Than 1 CFM/Lin ft

2. **Shaft Wall Assembly** — The 1 or 2 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400, V400 or W400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

B. **Studs** — "C-T", "I", or "C-H" shaped steel studs to be min 2 1/2 in. (64 mm) wide and formed of min 25 ga galv steel. Studs cut 1/2 to 1 in (13 to 25 mm) less in length than assembly height with bottom nesting in and secured to floor track. Studs to nest in ceiling track without attachment when DL or JR Series (Item 3) is used. When slotted ceiling track SL or SS Series (Item 3) is used, steel studs secured to slotted leg of ceiling track on finished side with No. 8 by 1/2 in. (13 mm) long wafer head steel screws at mid-height of exposed slot. Studs spaced max 24 in. (610 mm) OC.

A3. **Fill, Void or Cavity Material* — Track** — For nom 1/2 in. (13 mm) joints at time of installation, one of the following min 0.029 in. (0.74 mm) tracks shall be used: J-shaped track having unequal solid legs of 2 and 3 in. (51 and 76 mm), or U shaped track having one 3 in. (76 mm) solid leg and one 3 in. (76 mm) slotted leg. Optional, track includes J retaining flange formed off 3 in. (76 mm) solid leg. Track provided with a nom 1-1/4 in. (32 mm) wide intumescent strip affixed to the top of the leg or slotted leg facing the finished side of wall. Gypsum board to overlap a min of 3/4 in. (19 mm) over the intumescent strip. Track to be secured to bottom side of floor assembly with steel concrete anchors spaced a max of 24 in. (610 mm) OC.

SHAFTWALL H.O.W. JOINT SYSTEMS



ANSI/UL2079

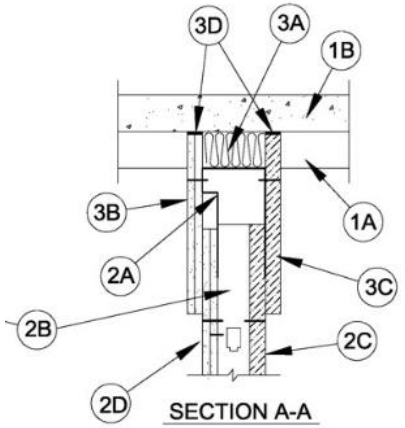
Assembly Ratings — 1 and 2 Hr (See Item 2)
Maximum Joint Width — 3/4, 1 or 1-1/2 In. (See Item 3)
Class II Movement Capabilities — 50 or 100 %Compression or Extension (See Item 3)
L Rating At Ambient — Less Than 1 CFM/sq ft
L Rating At 400 F — Less Than 1 CFM/sq ft

2. **Shaft Wall Assembly —** The 1 or 2 hr fire rated shaft wall assembly shall be constructed of the materials and in the manner described in the individual U400, V400 or W400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A2. **Light Gauge Framing* - Slotted Ceiling Track — (for use in Configuration A Only)** As an alternate to Item 2A, slotted ceiling track shall consist of galv steel channels with slotted flanges. Slotted ceiling track sized to accommodate steel studs (Item 2C). Attached to concrete at ceiling with steel fasteners spaced max 12 in. OC (305 mm).

B. **Steel Studs —** "C-H", "E" (back-to-back), "I" or "C-T"-shaped steel studs to be min 2-1/2 in. (64 mm) wide and formed of min 24 MSG galv steel. For configuration A studs cut 1/2 to 1-1/4 in. (13 to 32 mm) less in length than assembly height or for configuration B studs cut 1 to 1-1/2 in. (25 to 38 mm) less in length than assembly height with bottom nesting in and resting on floor runner and with top nesting in ceiling runner or slotted ceiling track. Studs spaced 24 in. (610 mm) OC. After installation of gypsum board liner panels (Item 2D), studs secured to flange of floor runner on finished side of wall with No. 6 by 1/2 in. (13 mm) long self-drilling, self-tapping steel screws. Studs secured to flange of slotted ceiling track on finished side of wall only with No. 8 by 1/2 in. (13 mm) long self-drilling, self-tapping wafer head steel screws at slot midheight.

SHAFTWALL H.O.W. JOINT SYSTEMS



ANSI/UL2079

Assembly Ratings — 1 and 2 Hr (See Item 2)
Nominal Joint Width — 0, 1, 2, 3 and 4 in. (See Item 3)
Class II or III Movement Capabilities — See Item 3 Tables 1 and 2
L Rating At Ambient — Less Than 1 CFM/lin ft
L Rating At 400°F — Less Than 1 CFM/lin ft

2. **Shaft Wall Assembly —** The 1 or 2 hr fire rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400, V400 or W400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Light Gauge Framing* —** Deflection Track — Deflection track of wall assembly consists of galv steel channels sized to accommodate steel studs (Item 2B) and offset bottom leg on one side to accommodate finished side wall cladding.

B. **Studs —** Steel studs to be min 2-1/2 in. (64 mm) wide and as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory. Studs cut 1-1/2 in. (38 mm) less in length than the assembly height plus maximum joint width. Assembly height is measured from floor to bottom of Steel Floor Form Units or flat concrete deck. Stud bottom nesting in and resting on floor runner and with top nesting in ceiling runner without attachment. Stud spacing not to exceed 24 in. (610 mm) OC.

Limitations and Common Misuses

SFIA
STEEL FRAMING INDUSTRY ASSOCIATION

SHAFTWALL LIMITATIONS

- Published limiting heights and spans are tested in accordance with AISI S916 (Per **Section D – Testing of AISI S220**) or an *approved* test method (ICC-ES AC86)
- Deflections limited to L/120, L/180, L/240 and L/360
- Lateral live load pressures range from 5.0 PSF to 15.0 PSF
- 6” maximum stud depth
- 43 MIL (18 GA) maximum thickness
- Fire/Smoke and Height limitations tested with spacing at 24” on center
  - Some 3rd party reports only permit 24” on center
- Limited to nonload-bearing wall assemblies where superimposed axial load is ZERO pounds

SHAFTWALL LIMITATIONS

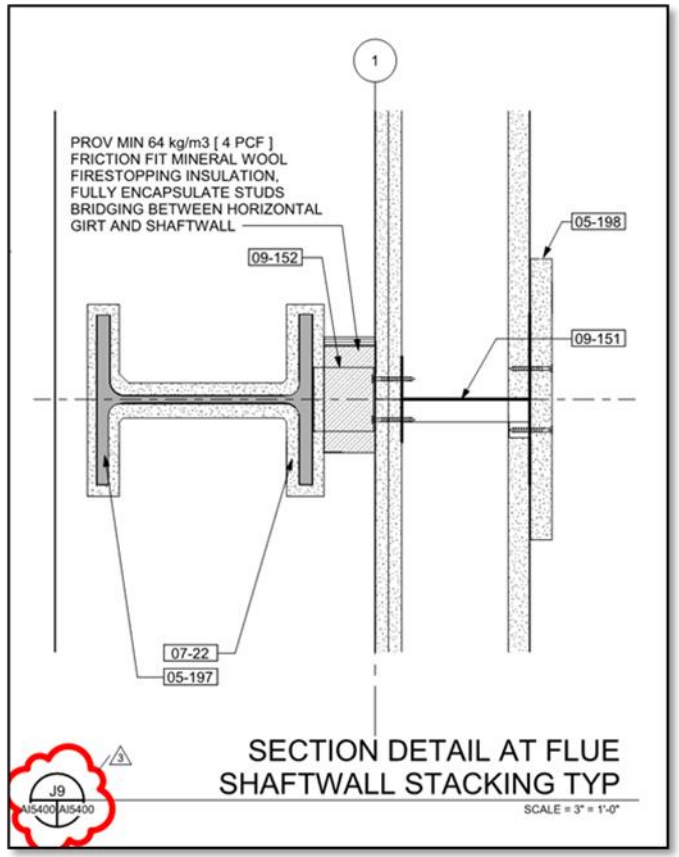
- Interior nonload-bearing – Superimposed vertical load is ZERO pounds
  - Studs cut 3/8 in. to 5/8 in. less than floor to ceiling height – deflection may govern larger gap
- Corridor ceiling system – Superimposed vertical load is ZERO pounds
- For CT Studs* and I Studs*
  - **NO STACKING**
  - **NO SPLICING** – Full length and in one piece
    - Exception – J-runner when attached to structural element such as steel column, concrete, or masonry block
  - Simple span members – **NO INTERMEDIATE SUPPORT**
  - Not recommended for use as unlined HVAC supply shafts or ducts
- For CH Studs*
  - Stacking/By-Pass applications have been permitted in years past

***Consult with respective stud manufacturer to better understand their product limitations**

BUT……..

DESIGN AND/OR FIELD CONDITIONS DO NOT ALWAYS MEET TESTING. SO THEN WHAT?

SCENARIO #1: SHAFTWALL BY-PASSES FLOOR LEVELS – "STACKED"



Example: 8-story structure where shaftwalls are continuous to roof; Shaftwall Assmbly needs 2 HR rating and Floor/Ceiling Assembly needs 1 HR

- Shaftwall by-passes intermediate supporting location(s)
  - No fire test standard at intermediate supports
  - Most 3rd party certification reports and manufacturers will not support
  - CH profile has been supported with limitations (need to verify with manufacturer)
- Shaftwall is stacked and/or spliced
  - Certified fire testing is single span, full length members
  - Most 3rd party certification reports and manufacturers will not support
  - CH profile has been supported with limitations (need to verify with manufacturer)

SCENARIO #1: SHAFTWALL BY-PASSES FLOOR LEVELS – "STACKED"

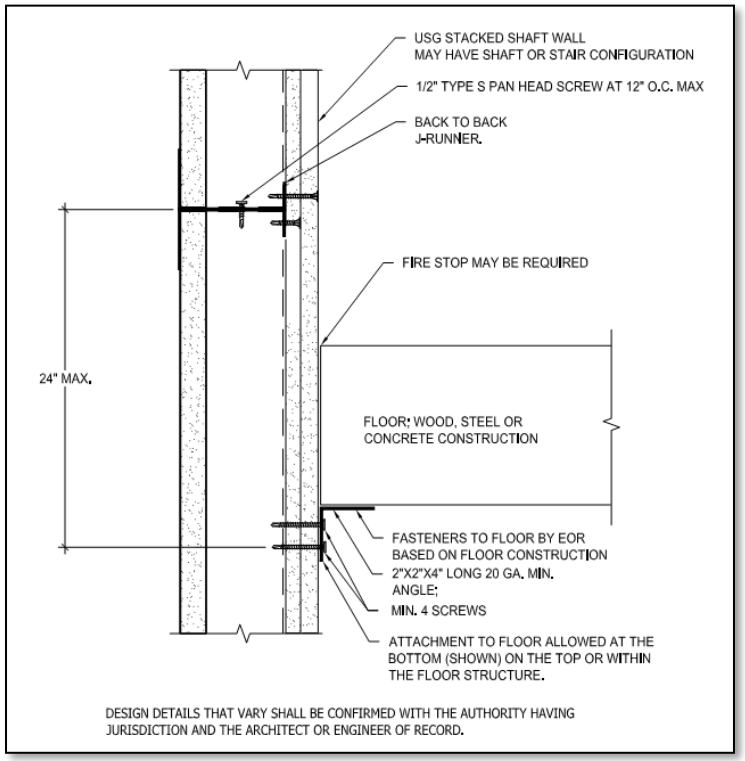


Image provided by United States Gypsum

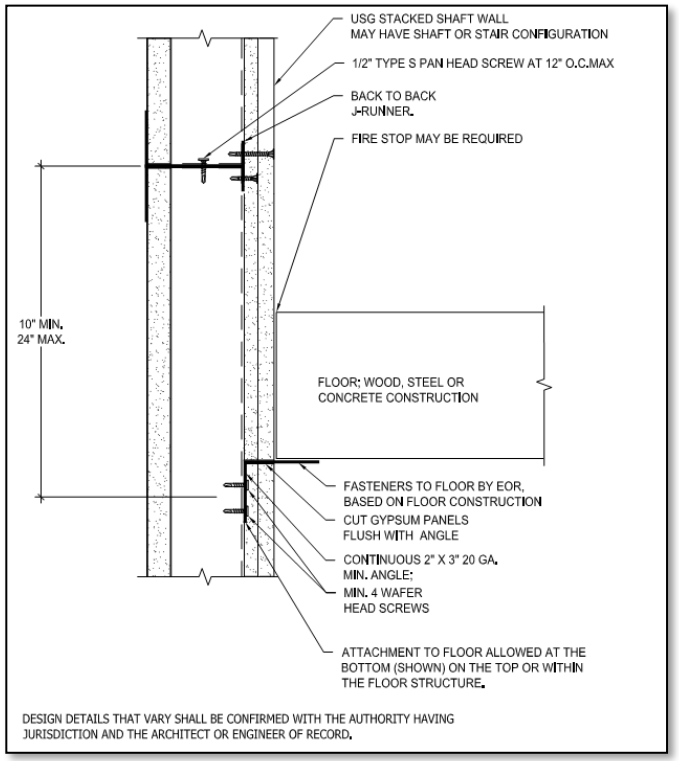


Image provided by United States Gypsum

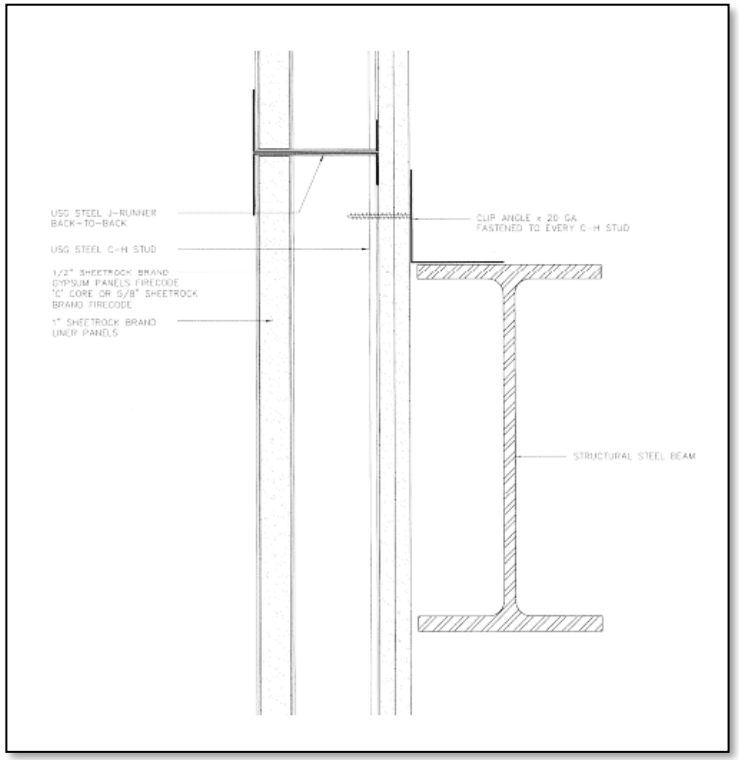


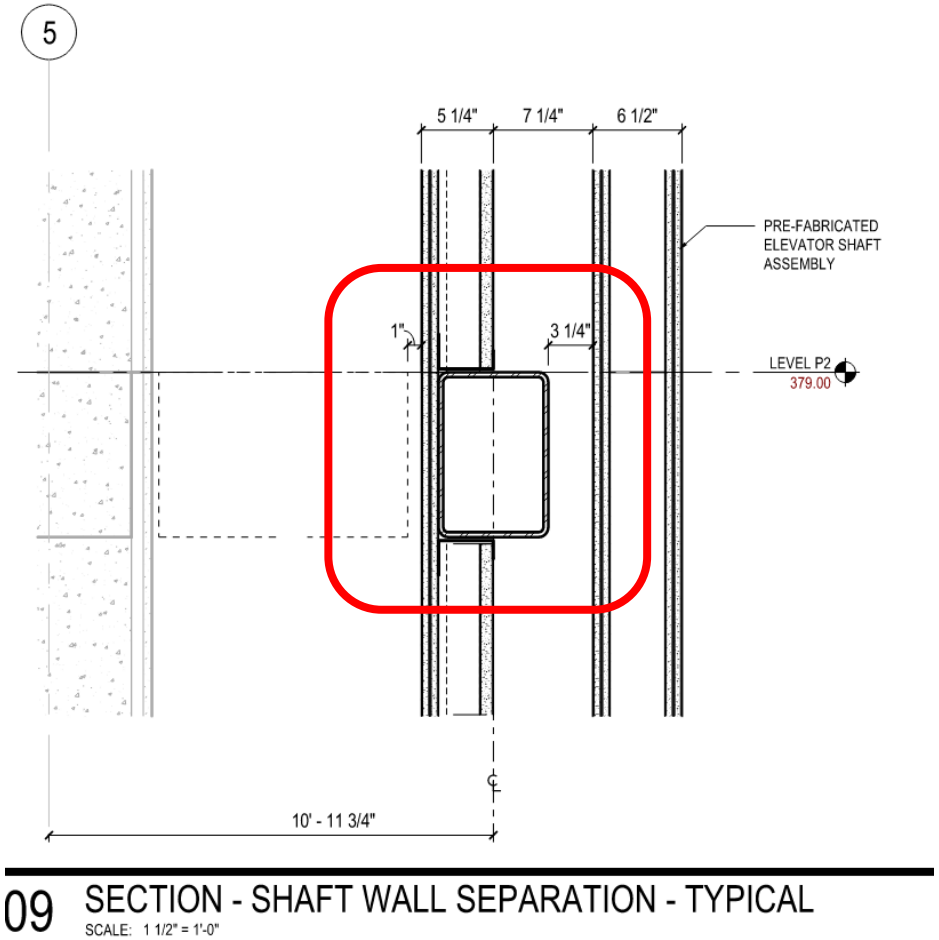
Image provided by United States Gypsum

***Consult with respective stud manufacturer to better understand their product limitations**

SCENARIO #1: SHAFTWALL BY-PASSES FLOOR LEVELS – "STACKED"

Example: 8-story structure where shaftwalls are continuous to roof

- Solutions:
  - Consult shaftwall stud **AND** gypsum board manufacturers
  - Add miscellaneous steel
  - Consult Fire Engineer/Consultant
  - Architect, Structural Engineer of Record and/or Authority Having Jurisdiction need to approve and give final direction

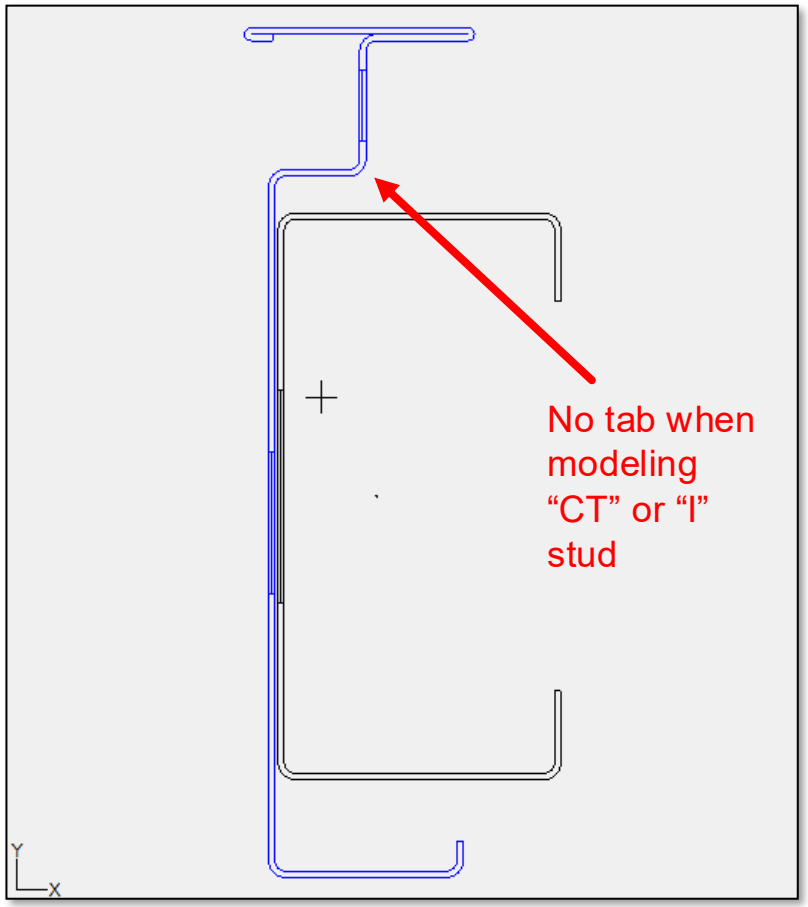


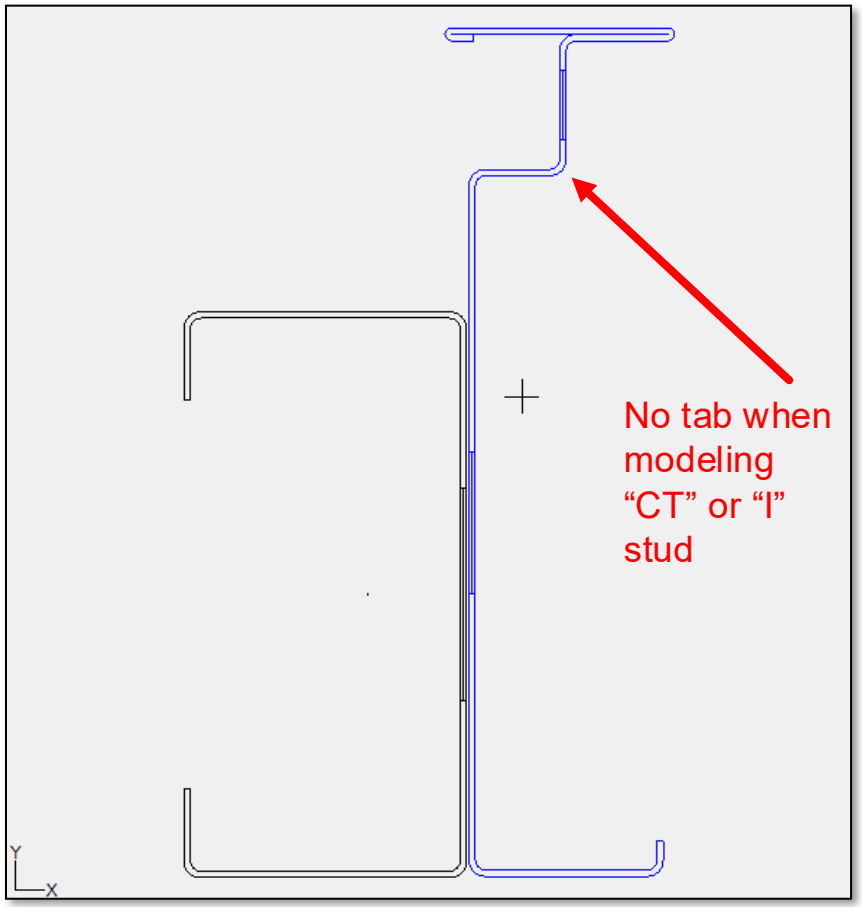
SCENARIO #2: SHAFTWALL HEIGHT EXCEEDS LIMITING HEIGHT

Example: 40 feet shaftwall stair wall height from ground slab to underside of roof deck

- Intermediate steel support to reduce heights?
  - Viable option – adds additional material cost and who is responsible for install? Contractor? GC?
- Reduce shaftwall stud spacing from 24” to 12”?
  - Doubles the tested stiffness = New limiting height is approximately 1.26 times the tested limiting height
  - Fire test is done at 24” on center – what does adding more steel do to the system? Increase thermal transfer?
  - 3rd party certification reports typically state spacing must be 24” on center
  - Supporting documentation from specialty engineer, shaftwall stud manufacturer **AND** gypsum board manufacturer
  - **Architect, Structural Engineer of Record, and/or Authority Having Jurisdiction (AHJ) needs to approve**
- Sister “C” shape member within wall cavity?
  - Restriction on web size of C-stud – Need to account for 1” liner panel
  - Affects on the system by adding more steel? Is thermal increase significant enough to fail test?
  - Supporting documentation from specialty engineer, shaftwall stud manufacturer **AND** gypsum board manufacturer
  - **Architect, Structural Engineer of Record, and/or Authority Having Jurisdiction (AHJ) needs to approve**

SCENARIO #2: SHAFTWALL HEIGHT EXCEEDS LIMITING HEIGHT

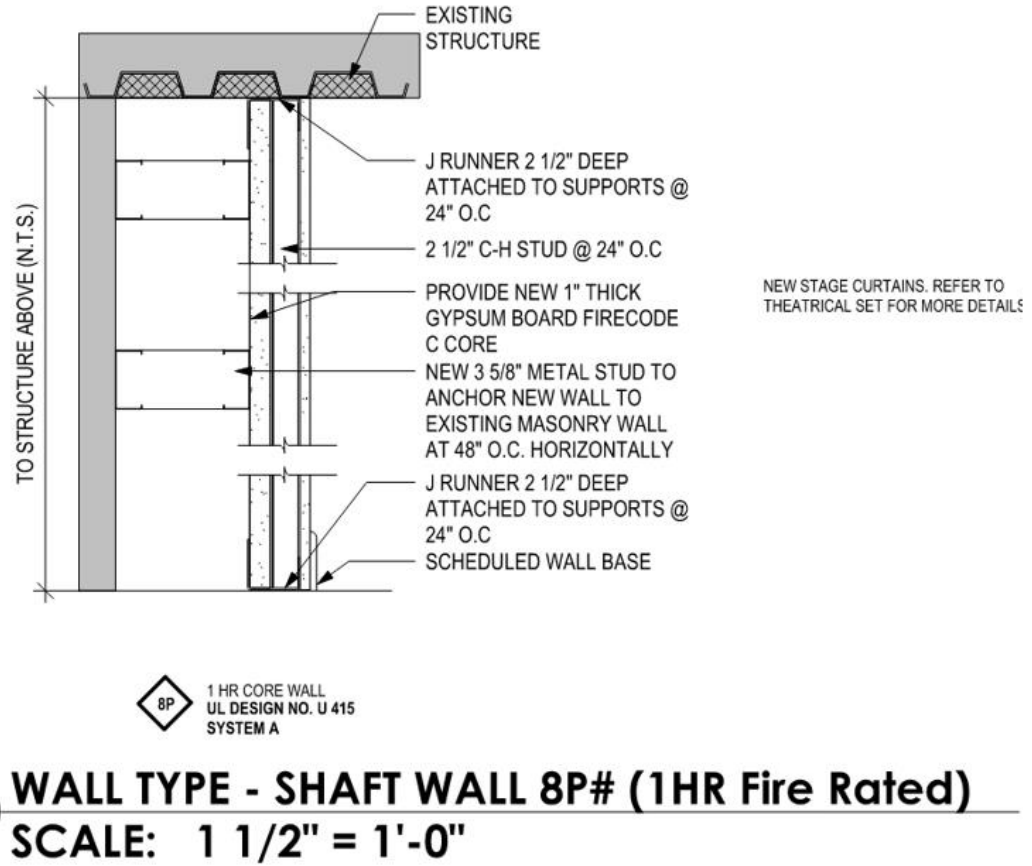




SCENARIO #3: SHAFTWALL EXCEEDS LIMITING HEIGHT AND IS STACKED

Example: ~ 45’-0” tall with intermediate braces at 48” on center to existing CMU

- Concerns:
  - Partition type calls for 2-1/2” wide
  - 45’ far exceeds limiting height
  - Shaftwall studs are stacked
  - No test supporting intermediate bracing



SCENARIO #3: SHAFTWALL EXCEEDS LIMITING HEIGHT AND IS STACKED

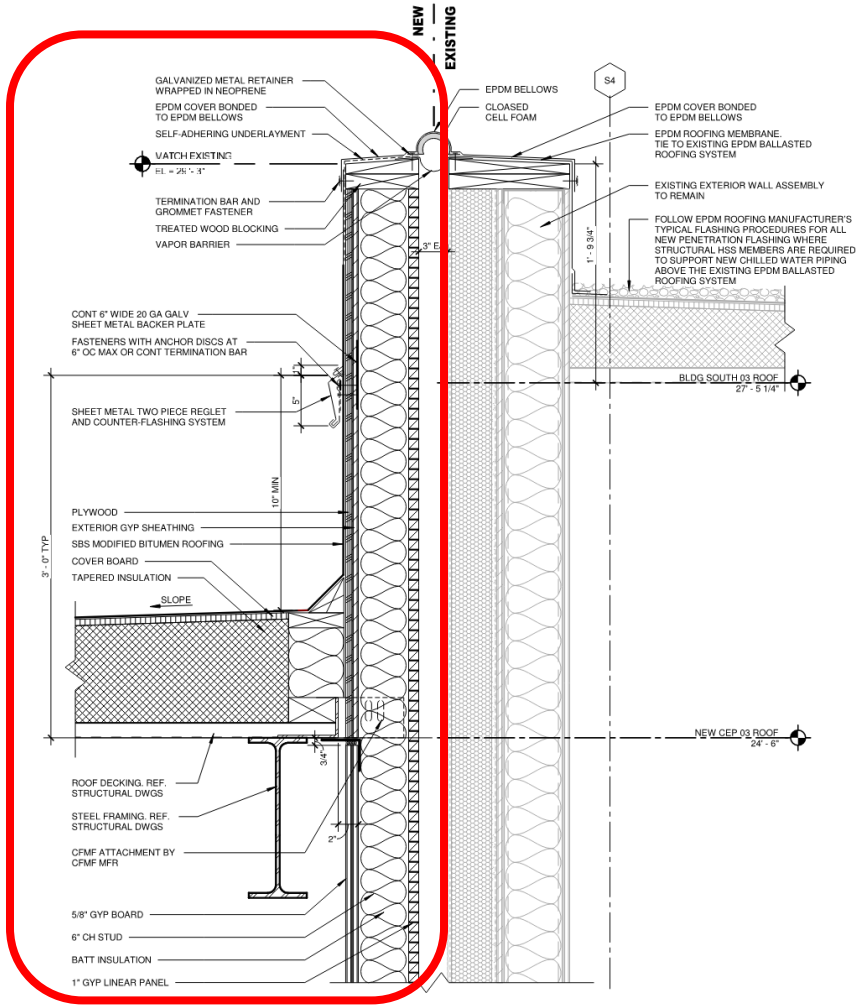
Example: ~ 45’-0” tall with intermediate braces at 48” on center to existing CMU

- Solutions:
  - Add miscellaneous steel
  - Increase wall width and sister structural stud(s) with approval from AHJ

SCENARIO #4: SHAFTWALL EXPOSED TO EXTERIOR ELEMENTS

Example: Existing structure has an addition spanning from slab-on-grade by-passing roof level forming parapet

- Concerns:
  - Tested up to a lateral pressure of 15 PSF
  - By-Passing Floor/Roof Level
  - Galvanized coating (G40 or G40EQ standard)
  - Building envelope (air/vapor/moisture barrier) issues

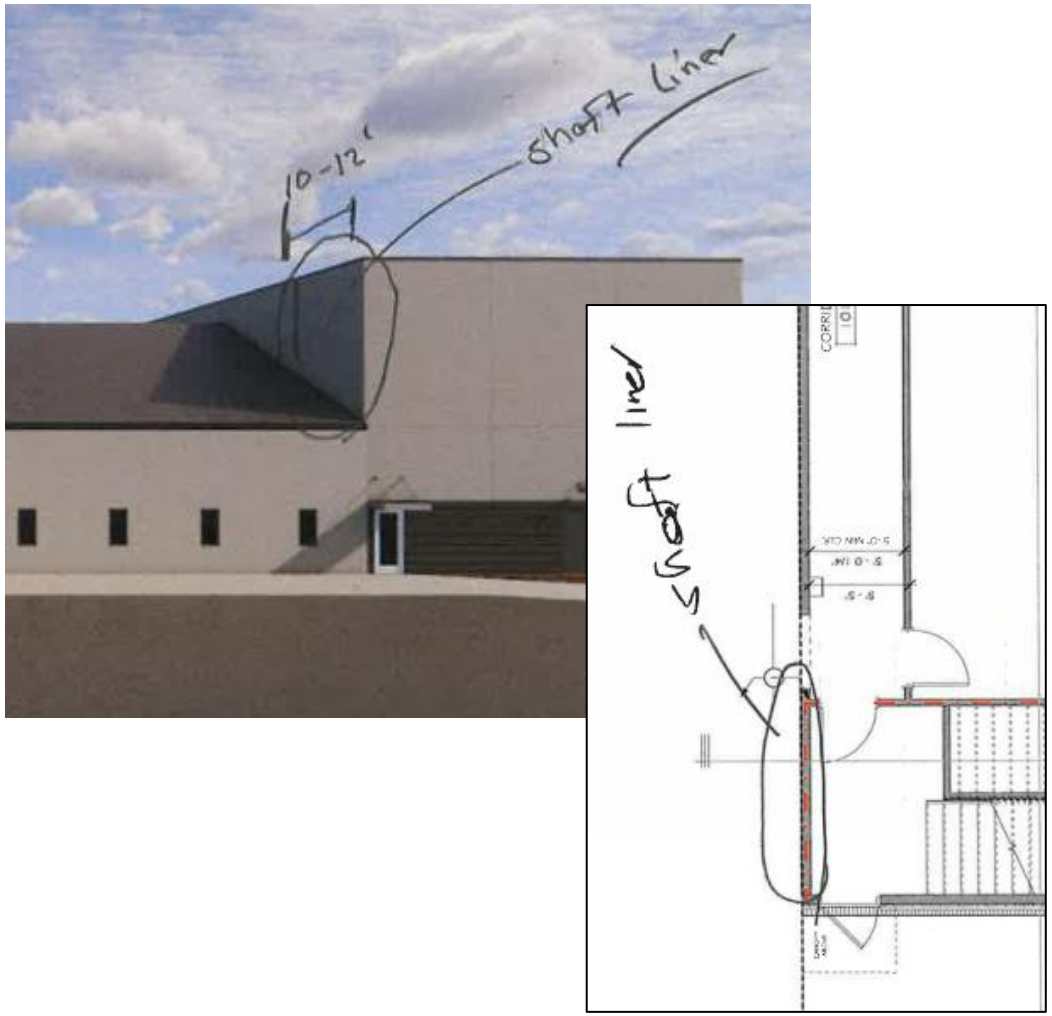


03 ROOF EXPANSION JOINT TO EXISTING SOUTH BUILDING
1 1/2" = 1'-0"

SCENARIO #4: SHAFTWALL EXPOSED TO EXTERIOR ELEMENTS

Example: Existing structure has an addition spanning from slab-on-grade past roof level forming parapet

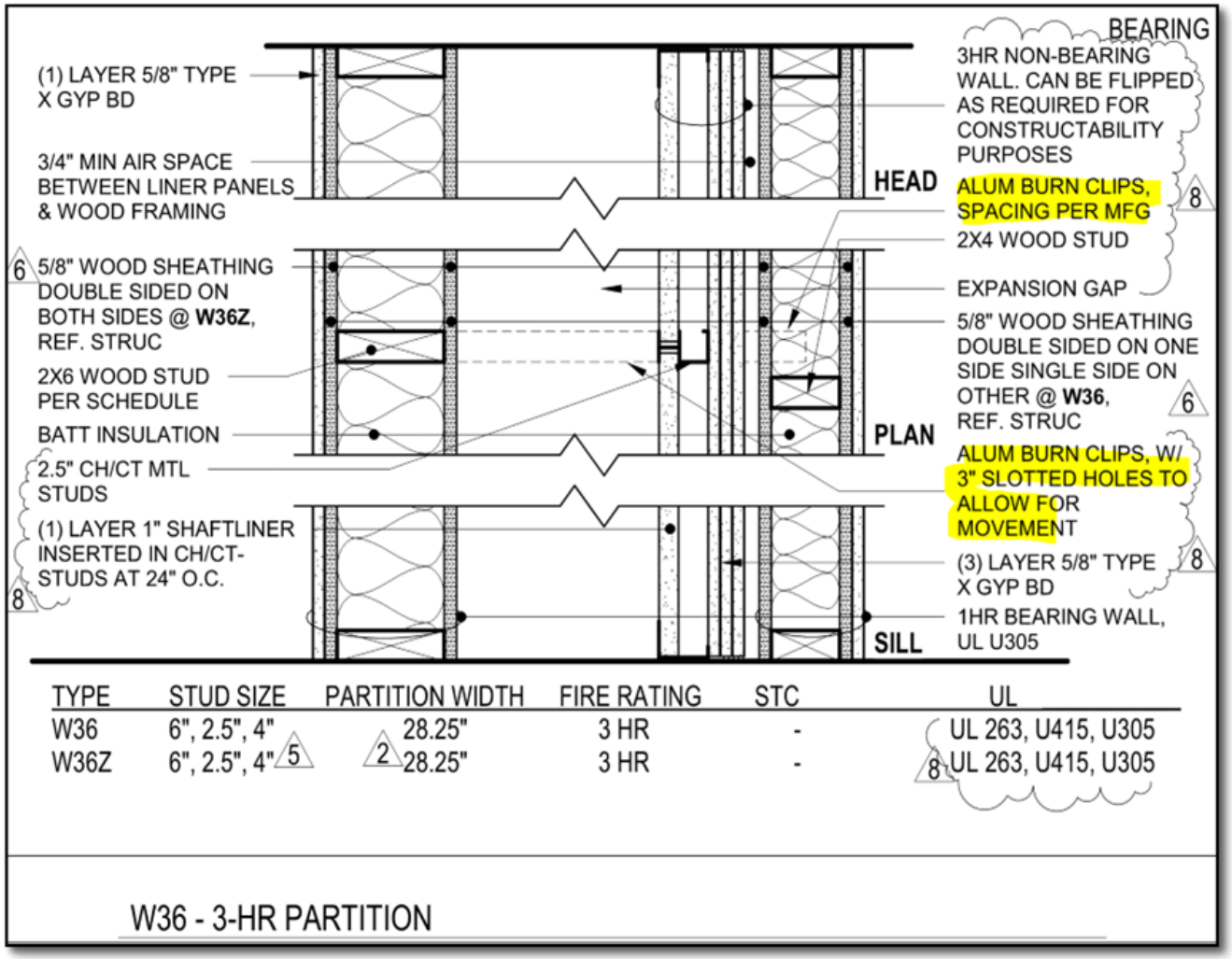
- Solutions:
  - Consult shaftwall stud **AND** gypsum board manufacturers
  - Add miscellaneous steel
  - Consult Fire Engineer/Consultant
  - Architect, Structural Engineer of Record, and/or AHJ give final direction



SCENARIO #5: SHAFTWALL USED AS AREA SEPARATION WALL

Example: Area separation needed between adjacent units/structures

- Concerns:
  - Shaftwall assemblies are not tested with aluminum burn clips
  - Slots in aluminum burn clips?
- Solutions:
  - Consult shaftwall stud **AND** gypsum board manufacturers to understand limitations and other available product options
  - Consult Fire Engineer/Consultant
  - Architect, Structural Engineer of Record, and/or AHJ give final direction



By now you should have a better understanding of the following:

1. The differences between the 3 shaftwall stud profiles – CT, I and CH studs.
2. Typical industry standard details and best construction practices for shaftwall assemblies.
3. Limitations in shaftwall assembly construction.
4. Common misused shaftwall applications and possible solutions.

QUESTIONS

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This concludes The American Institute of Architects Continuing Education Systems Course

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