Fire-Resistant Design and Detailing: Firewalls, Fire Barriers and Fire Partitions

November 5, 2026

Presented by:

Jessica Scarlett, EIT
WoodWorks



Image: The Hearth on Broad, Holst Architecture, ESI, Gabe Border Photography

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

AIA Approved Continuing Education

Course Description

With an increase in wood-frame buildings, more designers are seeking information on code-compliant and constructible detailing. Many are unsure of the code's requirements for details, specifically at the intersection of rated assemblies and where structure and fire protection meet. This presentation will focus interior fire-rated assemblies such as firewalls, fire barriers and fire partitions. Discussion will include fire-resistance rating continuity, allowable uses of wood framing in rated assemblies, and allowable penetrations.

Learning Objectives

1. Review methods for determining fire-resistance ratings.
2. Discuss detailing aspects of fire resistance for firewalls, fire barriers and fire partitions, including material and assembly options, continuity, structural stability, and penetrations.
3. Explore requirements for horizontal assemblies.
4. Understand requirements for individual encasement of beams and columns.

https://www.woodworks.org/resources/designing-with-wood-under-the-ibc/

First Tech Federal Credit Union / Hacker / Kramer Gehlen & Associates / Swinerton
Photo Jeremy Bittermann

Designing with Wood Under the IBC

Construction Type, Building Size, and Fire Resistance

Fire and Life Safety: Assessing Risk

The International Building Code (IBC) is guided by the principle of designing for fire and life safety based on the theory of equivalent risk. In other words, the code assesses the potential risk of each building and prescribes an appropriate minimum level of protection. Occupancy classifications (Chapter 3) help identify the risks associated with the building's use while construction types (Chapter 6) and their associated fire-resistance ratings (FRRs) establish, in part, different levels of fire safety. Allowable building sizes (Chapter 5) aim to balance these levels of risk and safety by limiting building heights and floor areas.

Occupancies with a higher risk generally have smaller allowable building sizes, while larger buildings are allowed for lower-risk occupancies. For example, in an office occupancy (Group B), most people in the building are expected to be alert and mobile, allowing them to evacuate more quickly than those in a residential occupancy (e.g., R-2), who may be asleep. The allowable building sizes in Chapter 5 balance the difference in risk between these occupancies by allowing larger buildings for business occupancies than residential within each construction type. As another example, consider assembly occupancies (A), which are associated with a higher density of people and longer egress times, versus low-hazard industrial facilities (F-1) that are sparsely populated; assembly occupancies often have smaller allowable building sizes while factories can be much larger.

Similarly, construction types with more stringent limitations on the types of materials that can be used and higher FRR requirements (i.e., higher levels of fire safety) are generally allowed to be taller and larger. On the other hand, construction types that are more lenient in terms of materials and FRRs generally have smaller allowable building sizes.



The Village at Mines Park / Golden, Colorado
SAR+ Architects / Fortis Structural / Millender White Construction
Hybrid mass timber/light-frame wood student housing includes Types III-B, V-A, and I-A construction across four and five-story buildings

Additional fire and life safety provisions are included throughout the IBC, such as egress requirements, fire protection and life safety systems (e.g., sprinklers, fire alarms, etc.), and additional FRR requirements. While not addressed explicitly in this paper, they follow a similar pattern; more stringent requirements often apply to higher-risk occupancies and/or fewer fire-resistance requirements.

This paper explores the interconnection between allowable building size, construction type, occupancy, FRRs, and other fire and life safety requirements, with an emphasis on where wood structural materials are permitted by code. Unless otherwise noted, references are to the 2024 IBC.

EXPERT TIP

Detailing Floor-to-Exterior Wall Conditions in Type III Projects



Discusses common questions not clearly answered in the IBC, clarifying language added to the 2024 edition and providing example strategies and additional resources

Five stories of Type III-A construction over I-A podium
Maison Pacific / JS Sullivan / RG Architecture / Photo IMEG

https://www.woodworks.org/resources/detailing-floor-to-exterior-wall-conditions-in-type-iii-projects/

https://www.woodworks.org/resources/five-story-light-frame-wood-over-podium/

Five-Story Light-Frame Wood Structure Over Podium

DESIGN EXAMPLE



WOODWORKS
WOOD PRODUCTS COUNCIL

The Bishop / Atlanta, Georgia
Niles Bolton Associates / EM Structural
Photo: Thomas Watkins

https://www.woodworks.org/resources/taking-the-guesswork-out-of-mixed-use-building-requirements-2/



Pike Place Marketfront / The Miller Hull Partnership / Magnusson Klemencic Associates
Photo: Lara Swimmer

Ashley Cagle, PE, SE
WoodWorks – Wood Products Council
June 2026

Taking the Guesswork out of Mixed-Use Building Requirements

Design Strategies and Fire Separation Details for Light-Frame Wood Buildings

1. Introduction

Mixed-use buildings, which combine multiple occupancies in a single structure, are common, but determining how to apply their unique set of code requirements can be complex. To simplify code analysis, this paper provides logical steps for key elements of design—such as determining allowable building size, fire separation needs, detailing requirements, and the application of special provisions. With an emphasis on light-frame wood construction in Type III and V buildings, it includes examples, calculations, and sample details demonstrating how to navigate the various code requirements associated with mixed-use projects, including those related to fire and life safety, while maximizing building size.

Mixed-use buildings come in many shapes, sizes and configurations. In this paper, "mixed-use" refers to a building with more than one occupancy group or more than one intended use. Examples include a low-rise commercial building with a shoe store, insurance agency, restaurant, and warehouse storage space adjacent to each other; a mid-rise building with ground-floor parking and multiple stories of residential apartments above; and a high-rise building with combinations of offices, retail space, residential units, and parking.

Before beginning a mixed-use analysis, it is important to understand the fire and life safety principles that guide design in accordance with the International Building Code (IBC). Allowable building sizes (heights and areas) and fire-resistance rating (FRR) requirements are based in part on the occupancy and construction type of the building. For foundational information about construction types, allowable building sizes, and FRRs, see *Designing with Wood Under the IBC: Construction Types, Building Size, and Fire Resistance*. Unless noted otherwise, references in this paper are to the 2024 IBC.

2. Mixed-Use Buildings

The IBC requires each portion of a building to be classified as an occupancy based on its primary purpose or use. The simplest way to analyze a mixed-use project is as a single-occupancy building. This can be accomplished through code provisions such as those allowing incidental uses or small assembly spaces. When a building contains multiple occupancies, the code provides several options for analyzing it as mixed-use, as discussed in Section 3.



Hearth – Boise, ID
Holst Architecture / Axiom

Eight-story development includes residential and live/work units, a fitness center, co-working and conference rooms, retail space, and parking

- Review of Fire Resistance Methods
- Interior Fire Rated Wall Assemblies
  - Fire Walls
  - Fire Barriers
  - Fire Partitions/Corridors
- Horizontal Assemblies



Landing Apartments, Russell Scott Steedle & Capione Architects, photo Gregory Folkins

- Review of Fire Resistance Methods
  - Interior Fire Rated Wall Assemblies
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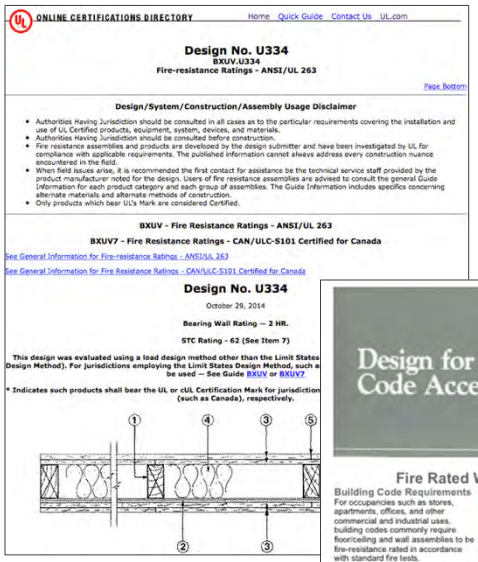
1430 Q, The HR Group Architects, Buehler Engineering, Greg Folkins Photography

Fire Resistance Ratings – IBC 703.2

Fire resistance of elements, components or assemblies shall be based on testing (ASTM E119):

- UL Listings
- Gypsum Catalog
- Proprietary Manufacturer Tests
- Industry Documents: such as AWC's DCA3

OR…


ONLINE CERTIFICATIONS DIRECTORY

Design No. U334

BXUV.U334

Fire-resistance Ratings - ANSI/UL 263

Design/System/Construction/Assembly Usage Disclaimer

BXUV - Fire Resistance Ratings - ANSI/UL 263

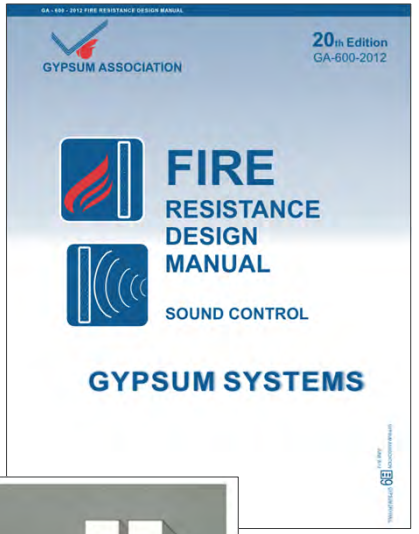
BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

Design No. U334

October 29, 2014

Bearing Wall Rating — 2 HR.

STC Rating - 62 (See Item 7)





Fire Resistance Ratings – IBC 703.3

Methods for determining fire resistance:

- Prescriptive designs per IBC 721.1

TABLE 721.1(3)—continued
MINIMUM PROTECTION FOR FLOOR AND ROOF SYSTEMS[a, q]

FLOOR OR ROOF CONSTRUCTION	ITEM NUMBER	CEILING CONSTRUCTION	THICKNESS OF FLOOR OR ROOF SLAB (inches)				MINIMUM THICKNESS OF CEILING (inches)			
			4 hours	3 hours	2 hours	1 hour	4 hours	3 hours	2 hours	1 hour
28. Wood I-joist (minimum I-joist depth $9^{1}/_{4}$" with a minimum flange depth of $1^{1}/_{2}$" and a minimum flange cross-sectional area of 2.25 square inches; minimum web thickness of $^{3}/_{8}$") @ 24" o.c. Unfaced fiberglass insulation or mineral wool insulation is installed between the I-joists supported on the upper surface of the flange by stay wires spaced 12" o.c.	28-1.1	Base layer of $^{5}/_{8}$" Type C gypsum wallboard attached directly to I-joists with $1^{5}/_{8}$" Type S drywall screws spaced 12" o.c. with ends staggered. Minimum 0.0179" thick hat-shaped $^{7}/_{8}$-inch furring channel 16" o.c. (channels doubled at wallboard end joints), placed perpendicular to the joist and attached to each joist by $1^{5}/_{8}$" Type S drywall screws after the base layer of gypsum wallboard has been applied. The middle and face layers of $^{5}/_{8}$" Type C gypsum wallboard applied perpendicular to the channel with end joints staggered. The middle layer is fastened with 1" Type S drywall screws spaced 12" o.c. The face layer is applied parallel to the middle layer but with the edge joints offset 24" from those of the middle layer and fastened with $1^{5}/_{8}$" Type S drywall screws 8" o.c. The joints shall be taped and covered with joint compound.	—	—	—	Varies	—	—	$2^{3}/_{4}$	—

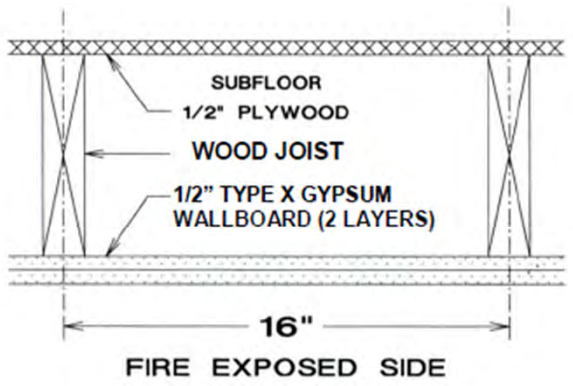
Fire Resistance Ratings – IBC 703.3

Methods for determining fire resistance:

- Prescriptive designs per IBC 721.1
- Calculated Fire Resistance per IBC 722.6

TABLE 722.6.2(1)
TIME ASSIGNED TO WALLBOARD MEMBRANES[a, b, c, d]

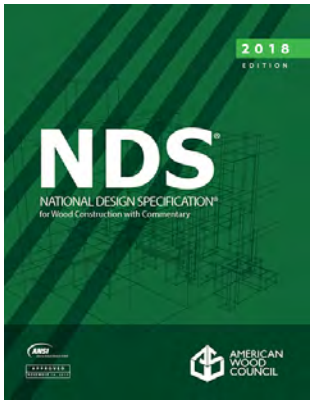
DESCRIPTION OF FINISH	TIME[a](minutes)
3/8-inch wood structural panel bonded with exterior glue	5
15/32-inch wood structural panel bonded with exterior glue	10
19/32-inch wood structural panel bonded with exterior glue	15
3/8-inch gypsum wallboard	10
1/2-inch gypsum wallboard	15
5/8-inch gypsum wallboard	30
1/2-inch Type X gypsum wallboard	25
5/8-inch Type X gypsum wallboard	40
Double 3/8-inch gypsum wallboard	25
1/2-inch + 3/8-inch gypsum wallboard	35
Double 1/2-inch gypsum wallboard	40



1/2 inch Type X Gypsum wallboard	=	25 minutes
1/2 inch Type X Gypsum wallboard	=	25 minutes
Wood joists	=	10 minutes
Combined Assembly Fire Resistance Rating	=	60 minutes

Figure 2 Floor/Ceiling Assembly

Fire Resistance Ratings – IBC 703.3

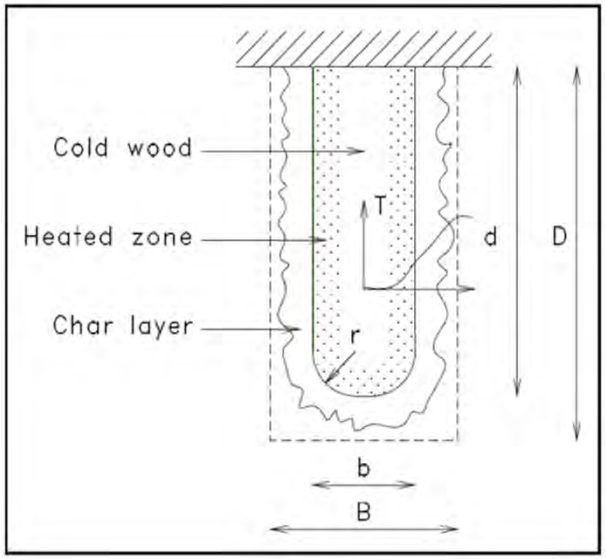


Methods for determining fire resistance:

- Prescriptive designs per IBC 721.1
- Calculated Fire Resistance per IBC 722.6
- Calculated Fire Resistance per IBC 722.1

Table 16.2.1A Char Depth and Effective Char Depth (for β_n = 1.5 in./hr.)

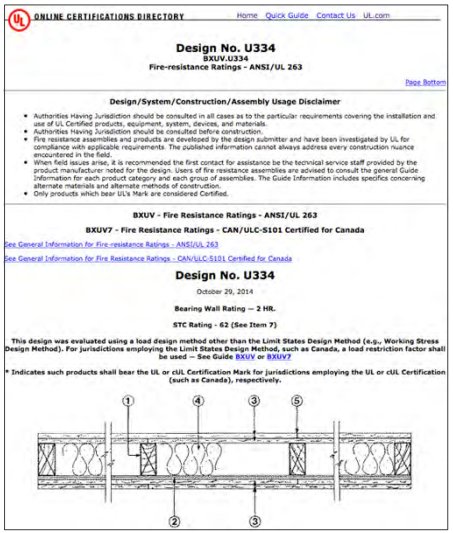
Required Fire Resistance (hr.)	Char Depth, a_{char} (in.)	Effective Char Depth, a_{eff} (in.)
1-Hour	1.5	1.8
1½-Hour	2.1	2.5
2-Hour	2.6	3.2



Fire Resistance Ratings – IBC 703.3

Methods for determining fire resistance:

- Prescriptive designs per IBC 721.1
- Calculated Fire Resistance per IBC 722
- Fire-resistance designs documented in sources
- Engineering analysis based on a comparison
- Fire-resistance designs certified by an approved agency


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Design No. U334

BXUV.U334

Fire-resistance Ratings - ANSI/UL 263

Page Bottom

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

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

Design No. U334

October 29, 2014

Bearing Wall Rating — 2 HR.

STC Rating - 62 (See Item 7)

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**


Design for Code Acceptance

3

Fire Rated Wood Floor and Wall Assemblies

Building Code Requirements

For occupancies such as stores, apartments, offices, and other commercial and industrial uses, building codes commonly require floor/ceiling and wall assemblies to be fire-resistance rated in accordance with standard fire tests.

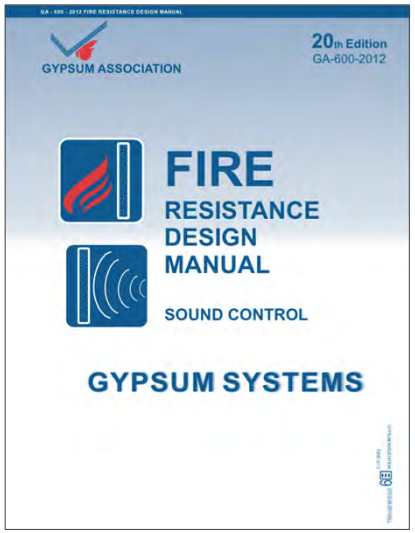
Depending on the application, wall assemblies may need to be rated either from one side or both sides. For specific exterior wall applications, the *2000 International Building Code (IBC)*, the *1999 National Building Code (NBC)*, and the *1999 Standard Building Code (SBC)* allow wood-frame, wood-sided walls to be tested for exposure to fire from the inside only. Rating for both interior and exterior exposure is only required when the wall has a fire separation distance of less than 5 feet. Code recognition of one and two-hour wood-frame wall systems is also predicated on successful fire and hose stream testing in accordance with ASTM E119, *Standard Test Methods for Fire Tests of Building Construction Materials*.

Fire Tested Assemblies

Fire-rated wood-frame assemblies can be found in a number of sources including the *IBC*, Underwriters Laboratories (UL) *Fire Resistance Directory*, Intertek Testing Services' *Directory of Listed Products*, and the Gypsum Association's *Fire Resistance Design Manual*. The American Forest & Paper Association (AF&PA) and its members have tested a number of wood-frame fire-rated assemblies. Descriptions of these successfully tested assemblies are provided in Table 1 for one-hour rated wall assemblies, Table 2 for two-hour rated wall assemblies, Table 3 for one-hour rated floor/ceiling assemblies, and Table 4 for two-hour rated floor/ceiling assemblies. Additional tests are being conducted and the Tables will be updated periodically.

Conclusions

Wood-frame assemblies are used in architectural designs because of their adaptability to style preferences, ease and economies of construction, and energy-saving performance.


GA - 600 - 2012 FIRE RESISTANCE DESIGN MANUAL

GYPSUM ASSOCIATION

20th Edition
GA-600-2012

FIRE
RESISTANCE
DESIGN
MANUAL

SOUND CONTROL

GYPSUM SYSTEMS

Outline

- Review of Fire Resistance Methods
- Interior Fire Rated Wall Assemblies
  - Fire Walls
  - Fire Barriers
  - Fire Partitions/Corridors
- Horizontal Assemblies



1430 Q, The HR Group Architects, Buehler Engineering, Greg Folkins Photography

Fire-Resistance Rated Wall Assemblies

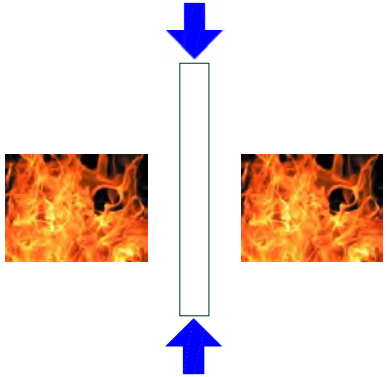
Fire-Resistance Rating: The period of time a building element, component or assembly maintains the ability to confine a fire, continues to perform a given structural function, or both, as determined by the tests, or the methods based on tests, prescribed in Section 703.

Tested under a standardized test fire exposure for a given duration to:

1. Prevent the passage of flame and temperature rise from one side to the other
2. Continue to provide vertical structural support when exposed to fire and elevated temperatures



Fire Confinement



Structural Performance

Interior Fire-Rated Walls: Differences

Fire walls

- Building Separation
- Openings are protected and limited
- Continuous from foundation to/through roof and exterior wall to/through exterior wall
- Structural stability

Fire Barrier

- Shafts; Occupancy Separation
- Openings are protected and limited
- Continuous from floor through concealed space at each level

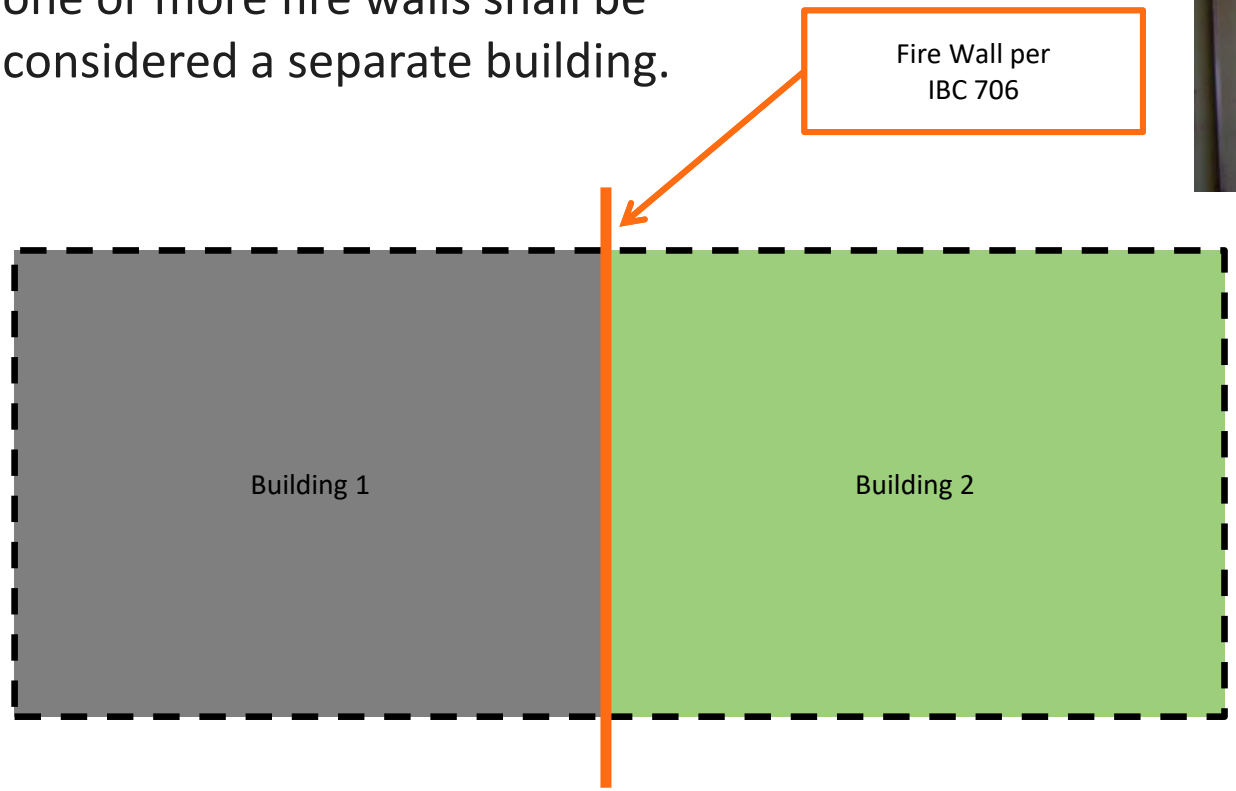
Fire Partition:

- Dwelling Unit Separation; Corridors
- Openings are protected
- May terminate at a fire rated floor/ceiling/roof assembly

Fire Walls – IBC 706

Each portion of a building separated by one or more fire walls shall be considered a separate building.





Fire Walls – Ratings & Materials

TABLE 706.4
FIRE WALL FIRE-RESISTANCE RATINGS

GROUP	FIRE-RESISTANCE RATING (hours)
A, B, E, H-4, I, R-1, R-2, U	3[a]
F-1, H-3[b], H-5, M, S-1	3
H-1, H-2	4[b]
F-2, S-2, R-3, R-4	2

a. In Type II or V construction, walls shall be permitted to have a 2-hour fire-resistance rating.

b. For Group H-1, H-2 or H-3 buildings, also see Sections 415.6 and 415.7.

IBC 706.3 – Fire walls shall be of any approved noncombustible materials.

Exception: Buildings of type V construction

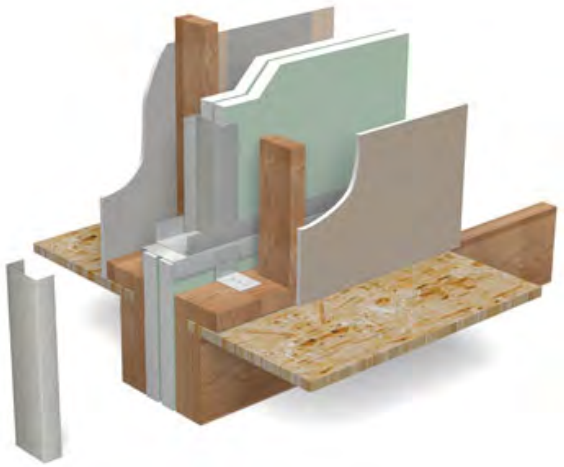
Fire Walls – Ratings & Materials

Opportunity for Wood Framed Fire Walls:

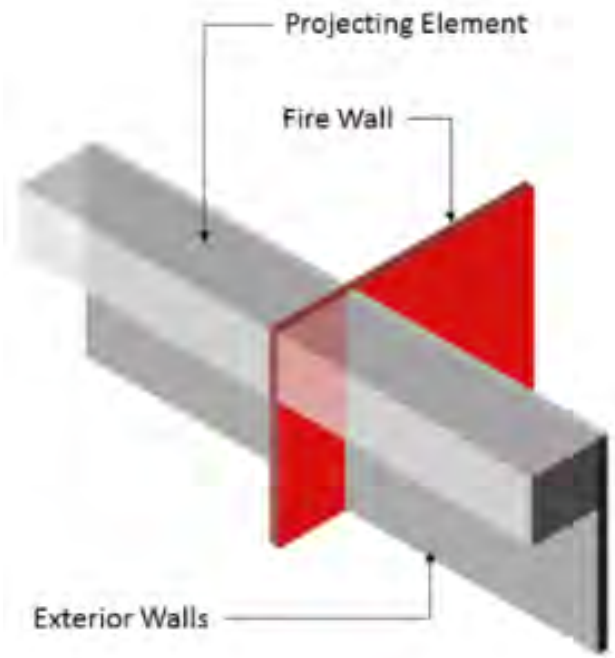
- Permitted in type V construction
- Fire Walls in type V construction of A, B, E, R and several other occupancies may be 2-hr

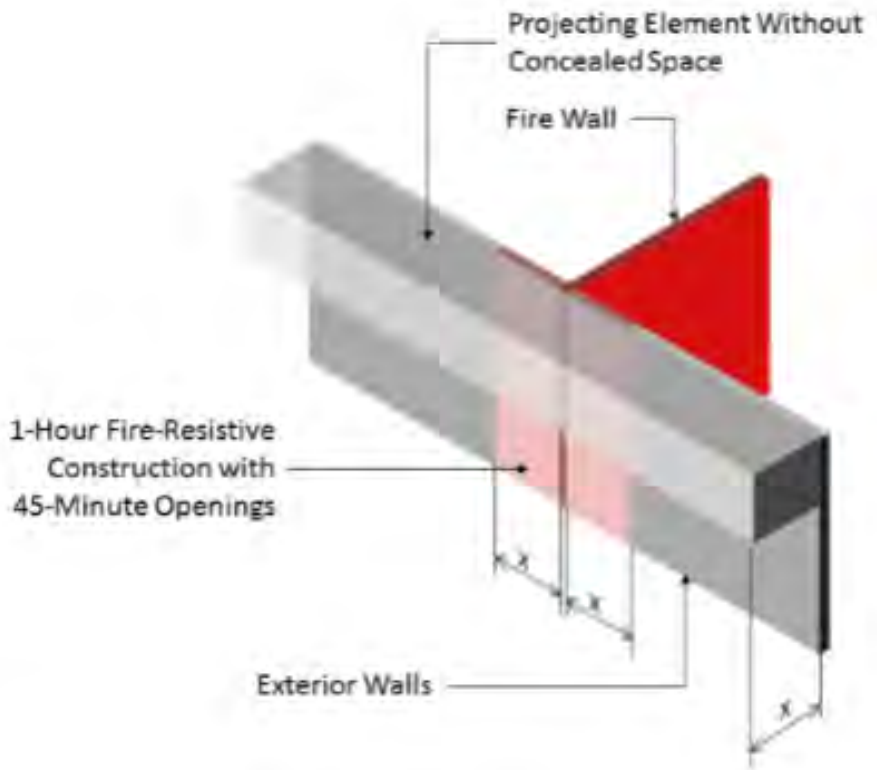
Fire Walls in type III and IV construction are required to be constructed of noncombustible materials

- Opportunity for wood frame bearing walls on each side of fire wall to meet structural stability requirements

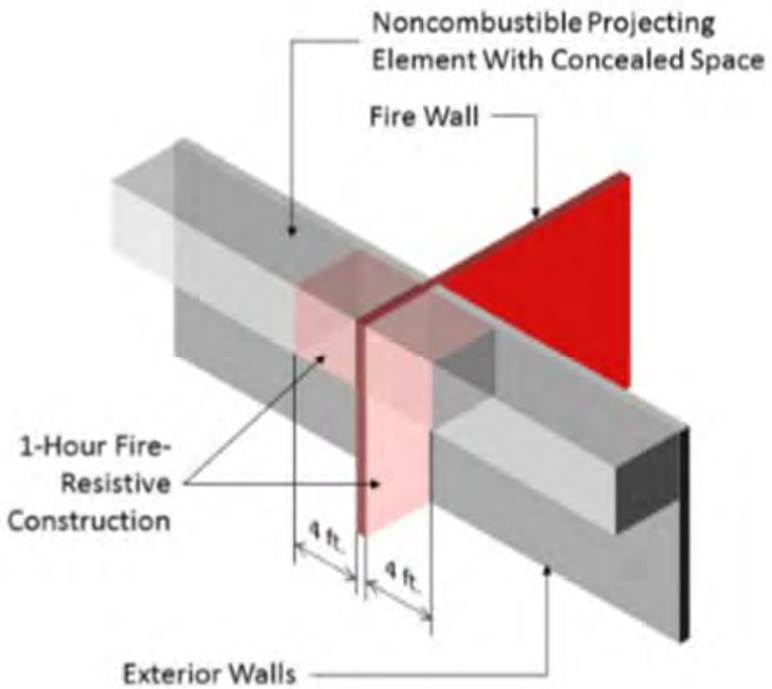


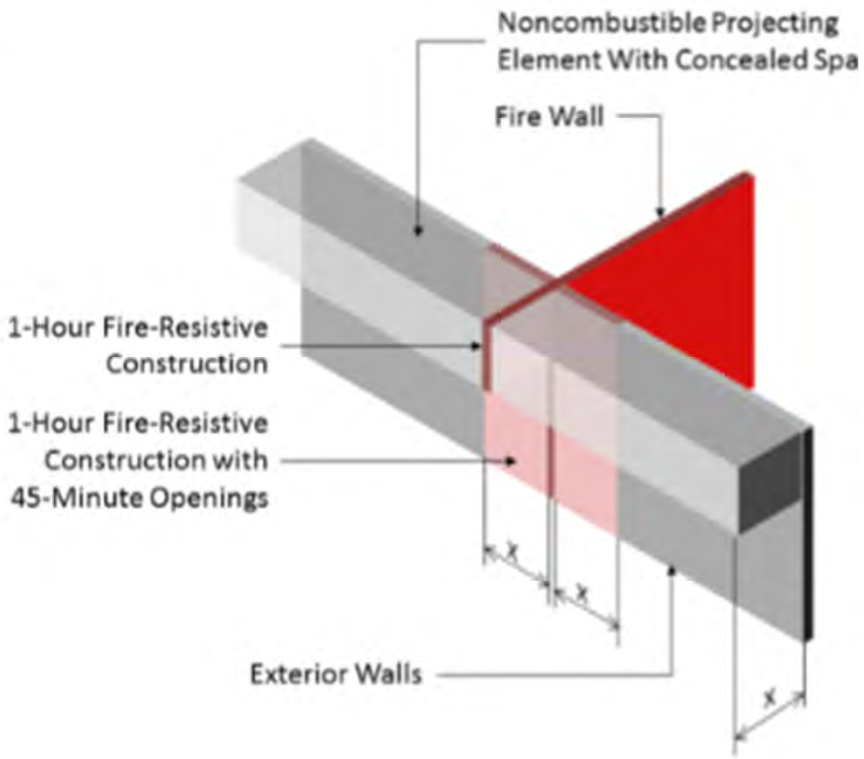
Fire Walls – Horizontal Continuity



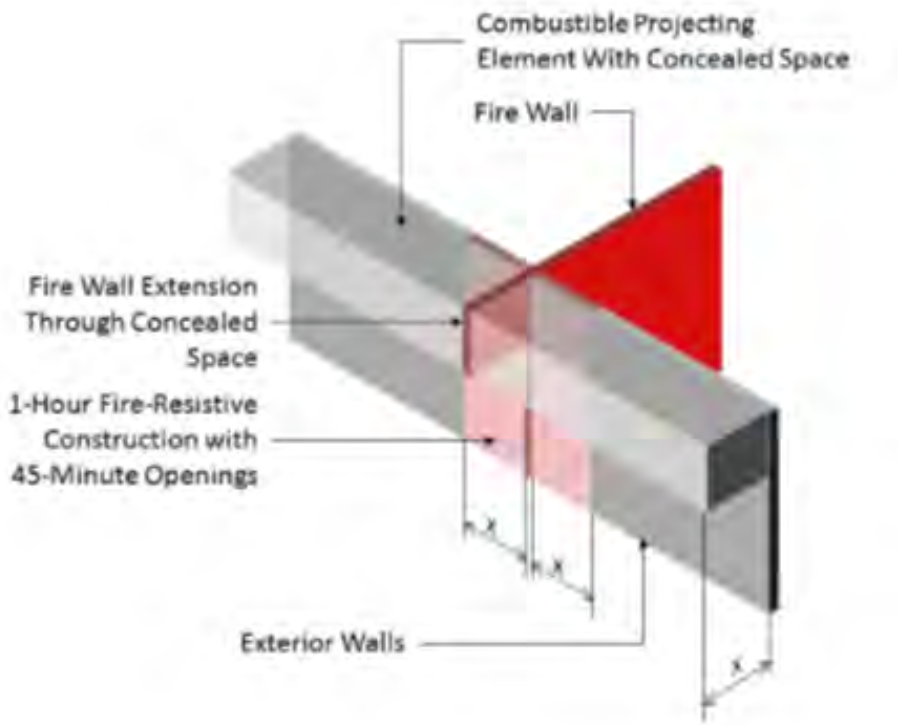


Fire Walls – Horizontal Continuity



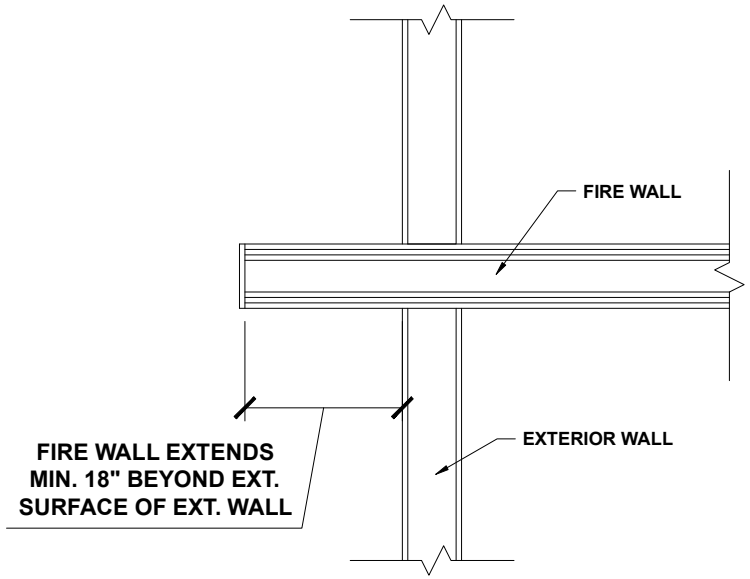


Fire Walls – Horizontal Continuity



Fire Walls – Horizontal Continuity

Fire walls are required to be continuous from exterior wall to exterior wall

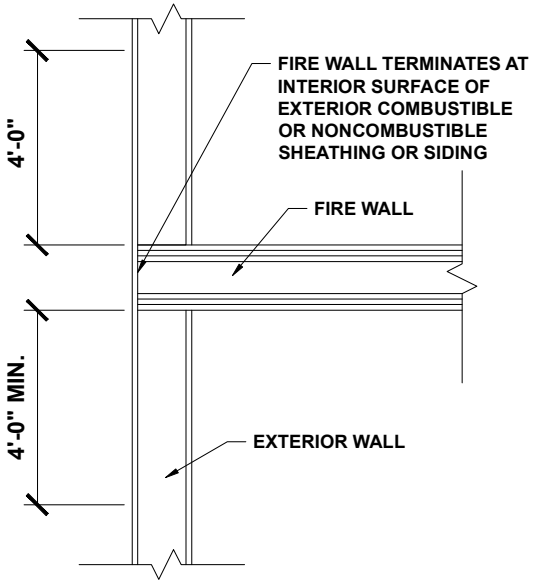


FIRE WALL TO EXTERIOR WALL: OPTION 1

Fire Walls – Horizontal Continuity

ALTERNATIVES:

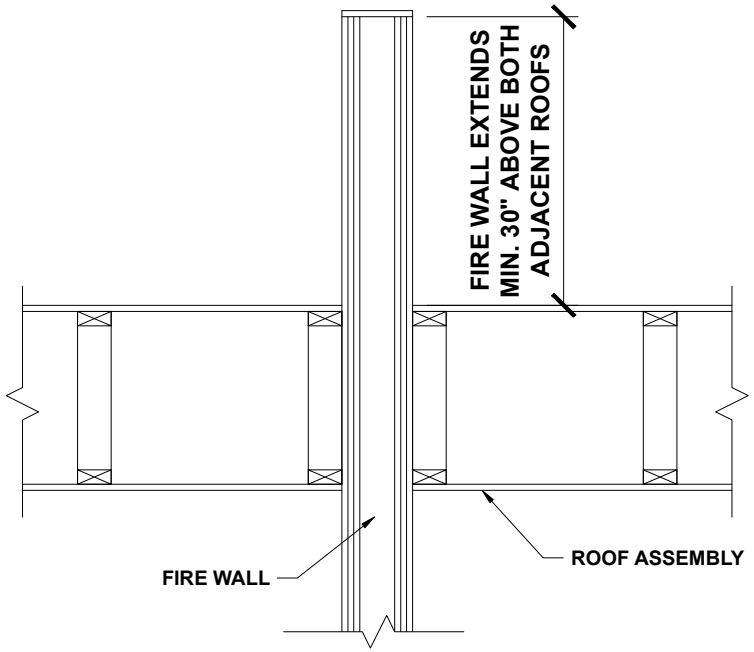
1. **EXTERIOR WALL RATED FOR 1 HR MIN. 4FT EACH SIDE (OPENING PROTECTION REQ'D)**
2. **NONCOMBUSTIBLE SHEATHING/SIDING EXTENDS MIN. 4FT EACH SIDE**
3. **BUILDING ON EACH SIDE OF THE FIRE WALL IS EQUIPPED THROUGHOUT WITH AN NFPA OR NFPA 13 SPRINKLER SYSTEM**



FIRE WALL TO EXTERIOR WALL: OPTION 2

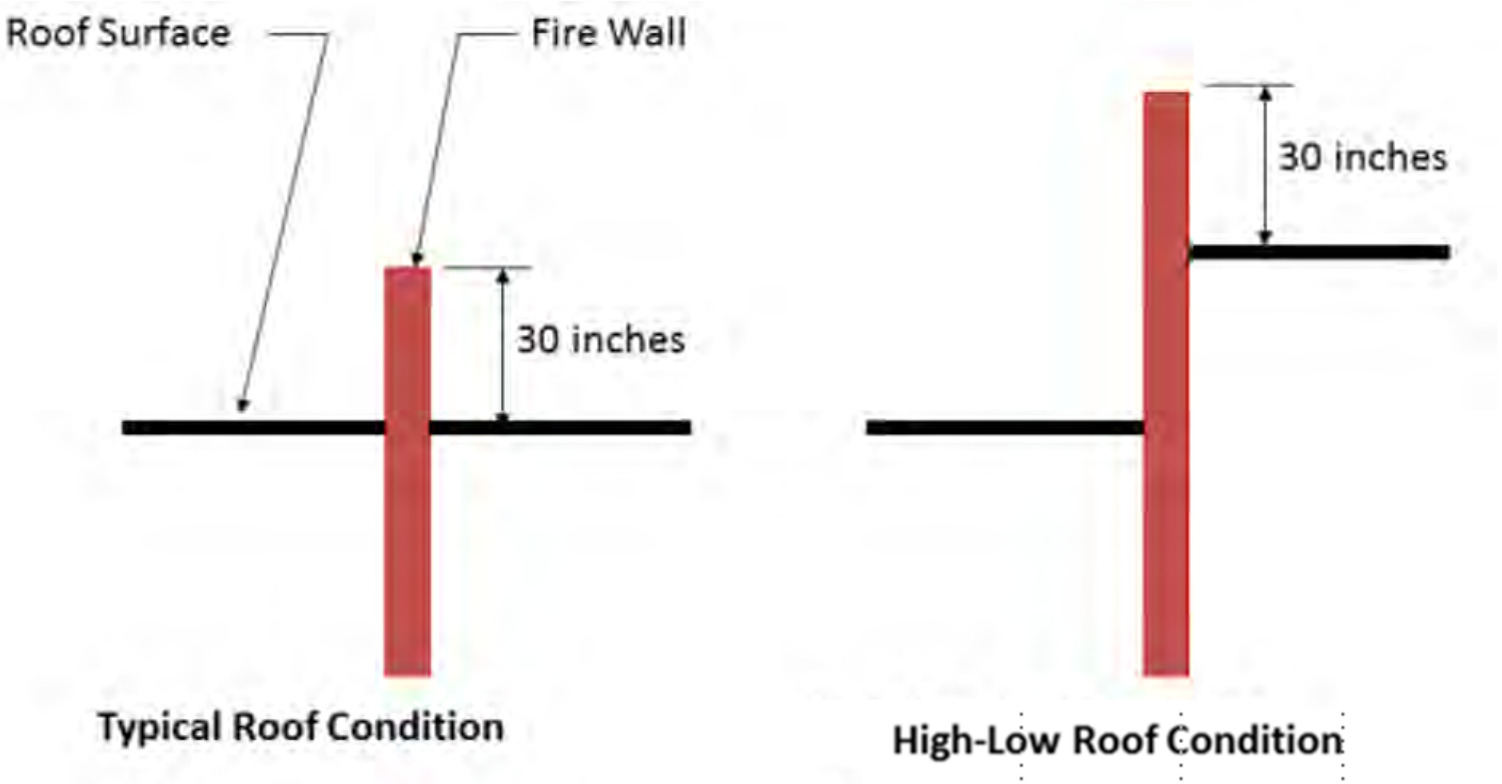
Fire Walls – Vertical Continuity

Fire walls are required to be continuous from foundation to roof

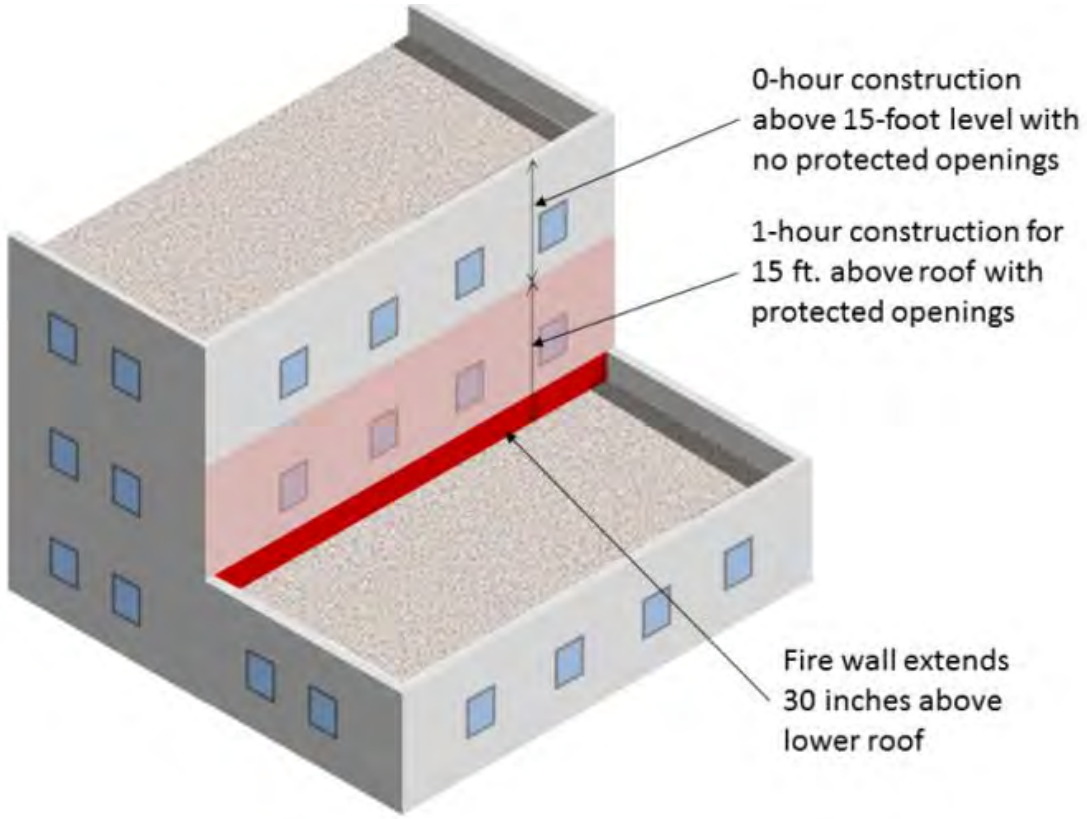


FIRE WALL TO ROOF: OPTION 1

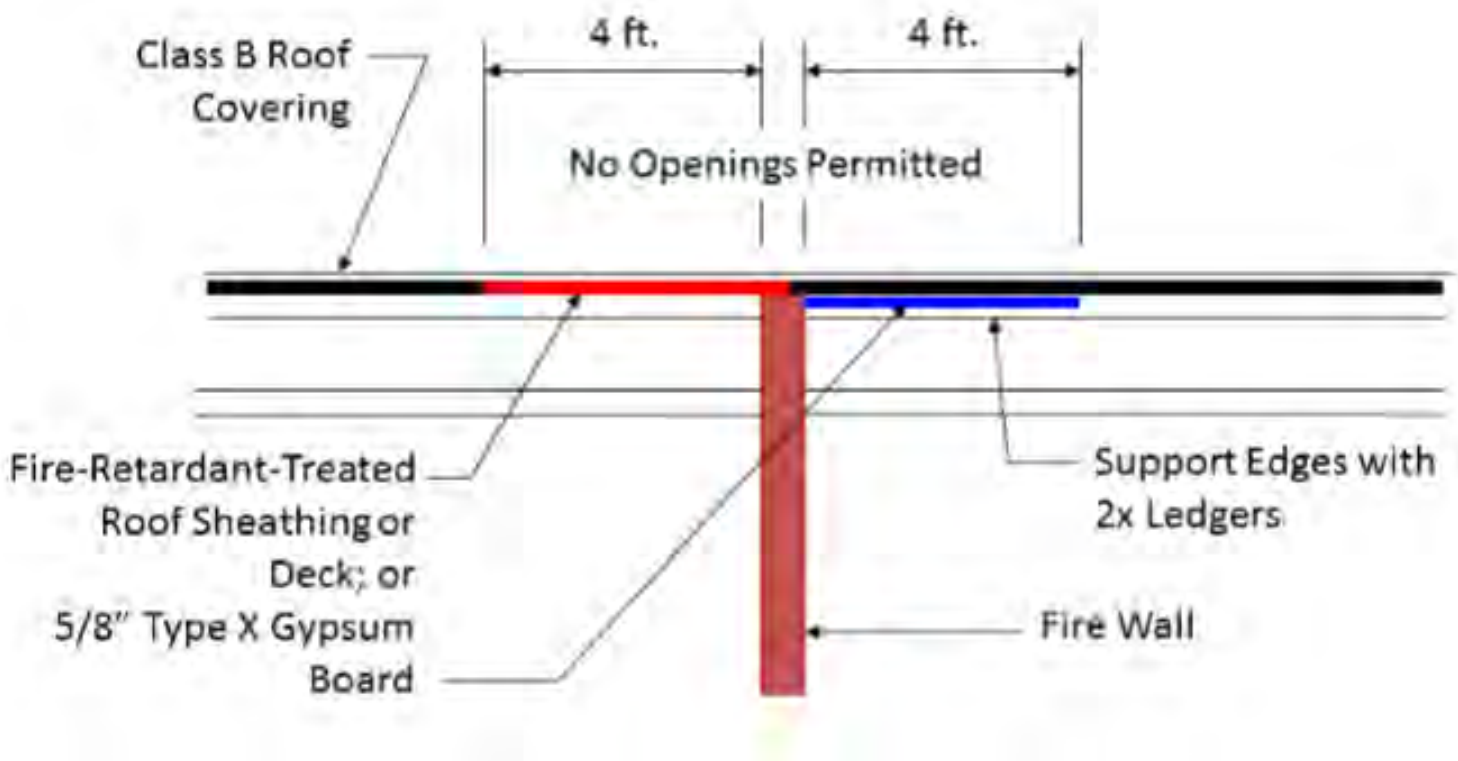
Fire Walls – Vertical Continuity



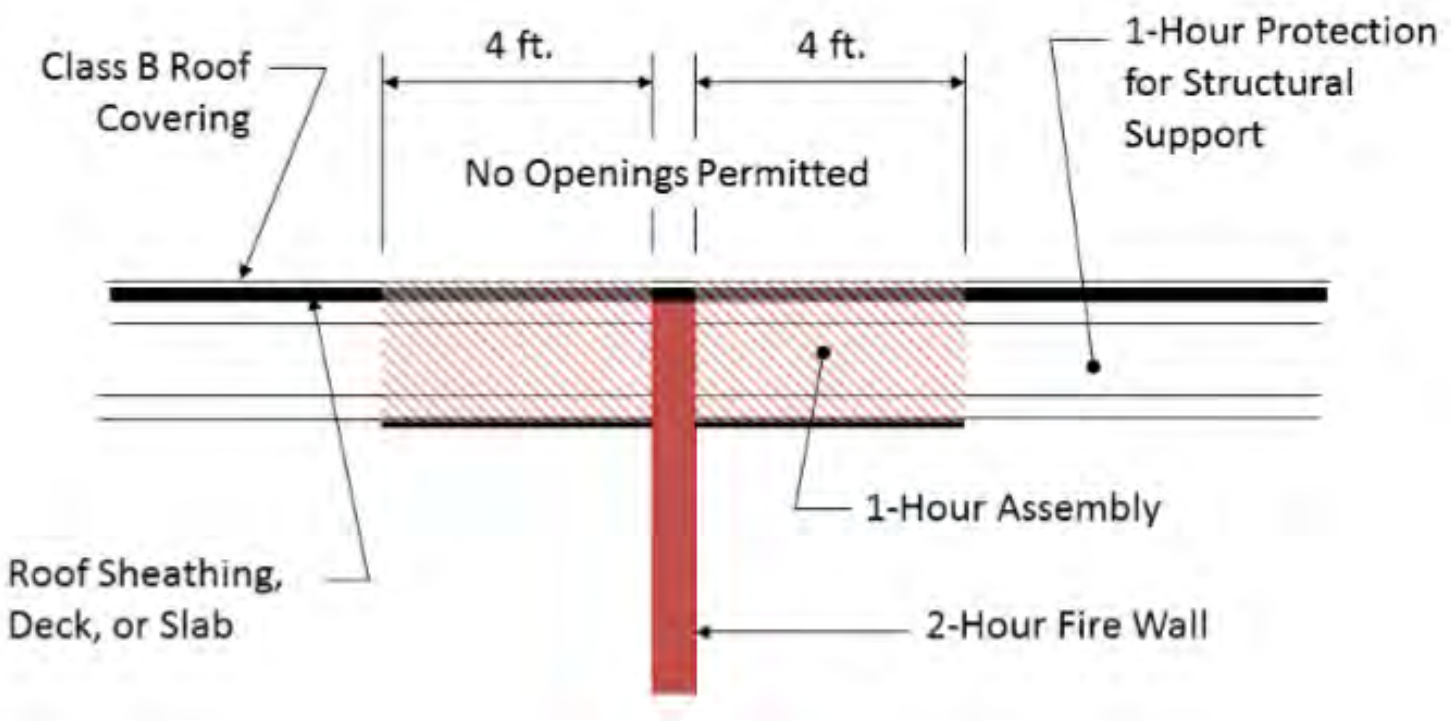
Fire Walls – Vertical Continuity



Fire Walls – Vertical Continuity



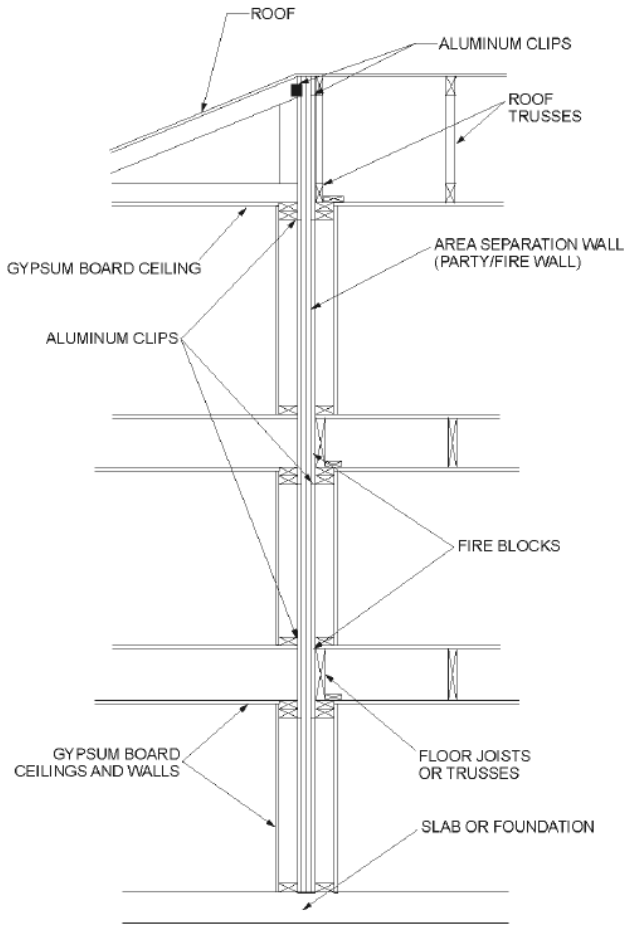
Fire Walls – Vertical Continuity



Fire Walls – Structural Stability

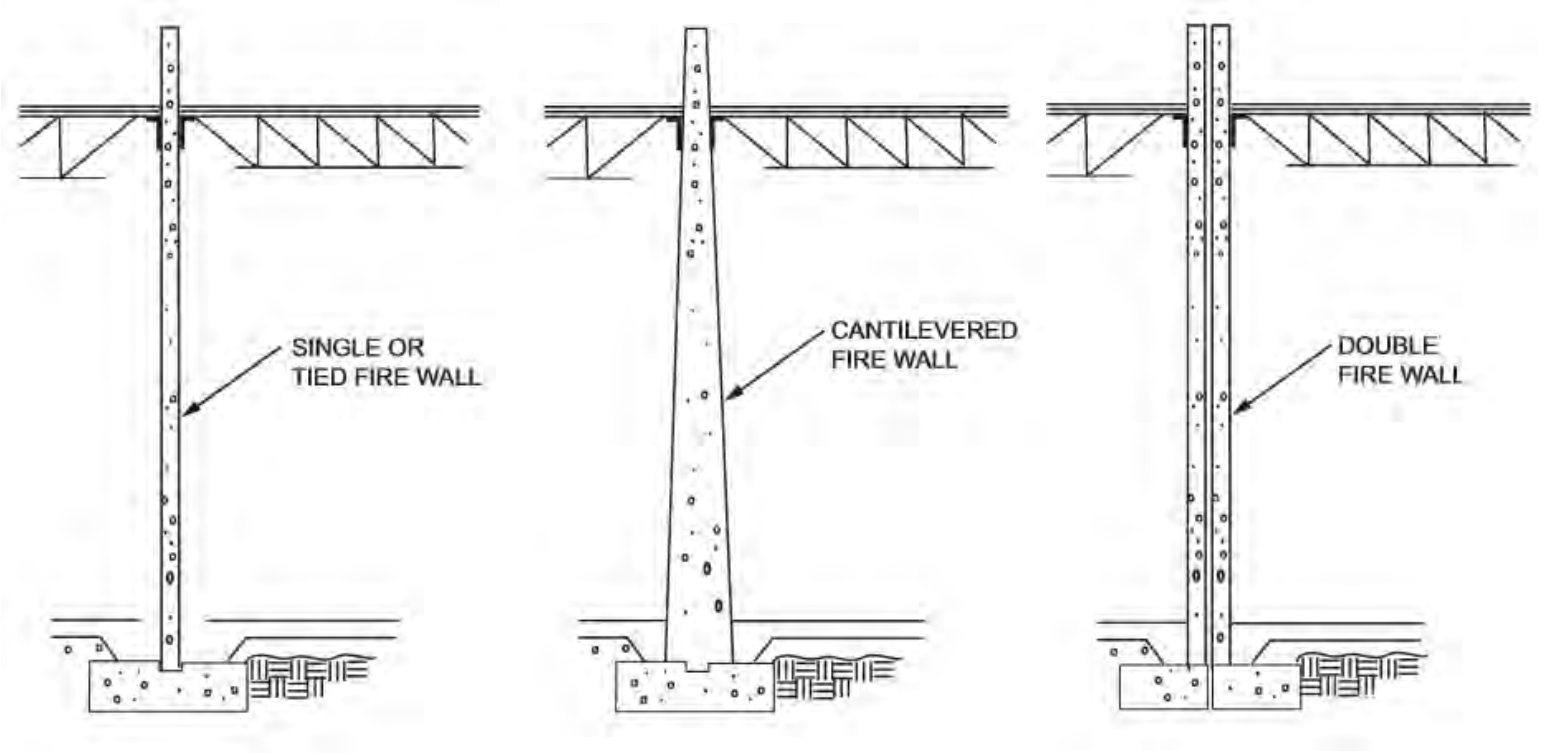
706.2 Structural Stability:

Fire walls shall have sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the wall for the duration of time indicated by the required fire-resistance rating or shall be constructed as double fire walls in accordance with NFPA 221.

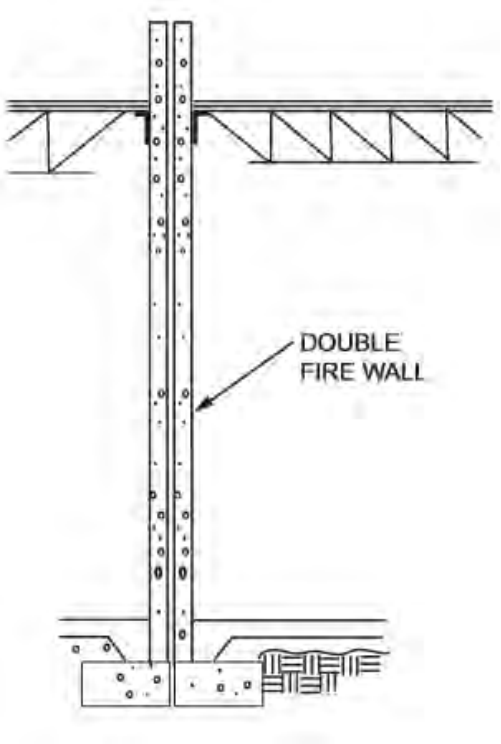


Commentary Figure 706.2(2) Details of Gypsum Board Area Separation Walls (Firewalls)

NFPA 221


SINGLE OR
TIED FIRE WALL
CANTILEVERED
FIRE WALL
DOUBLE
FIRE WALL

NFPA 221 – Double Walls



4.5* Double Wall Assemblies. Where either wall of a double wall is laterally supported by a building frame with a fire resistance rating less than that required for the wall, double wall assemblies shall be considered to have a combined assembly fire resistance rating as specified in Table 4.5.

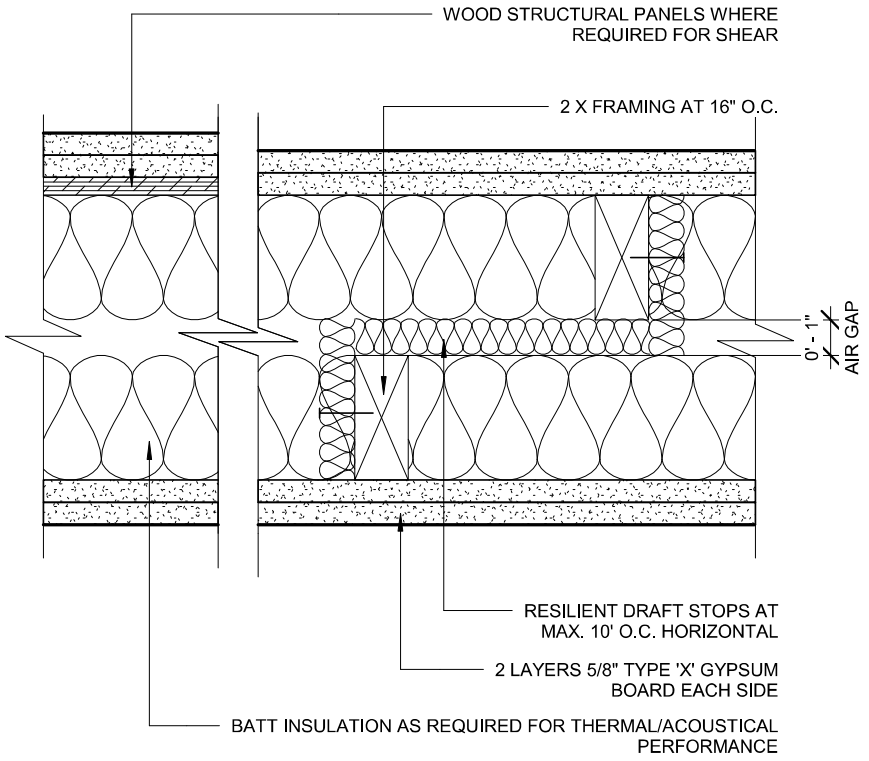
Table 4.5 Fire Resistance Ratings for Double Wall Assemblies

Fire Resistance Rating of Each Wall (hr)	Equivalent to Single Wall (hr)
3	4
2	3
1	2

2-Hour Fire W

Constructic

» V only



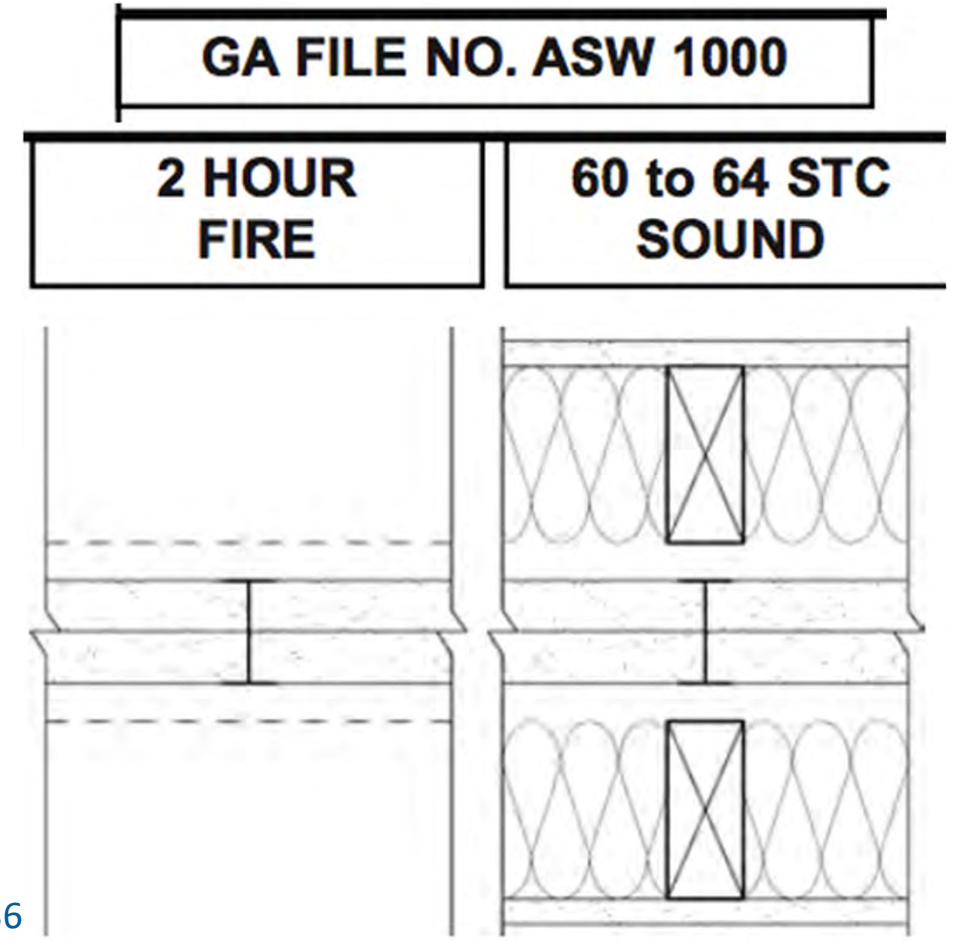
2-HOUR RATING PER GA FILE NO. WP 3820

2-HOUR DOUBLE STUD WALL

2-Hour Fire Wall Assembly

Construction Types:

- III
- IV
- V

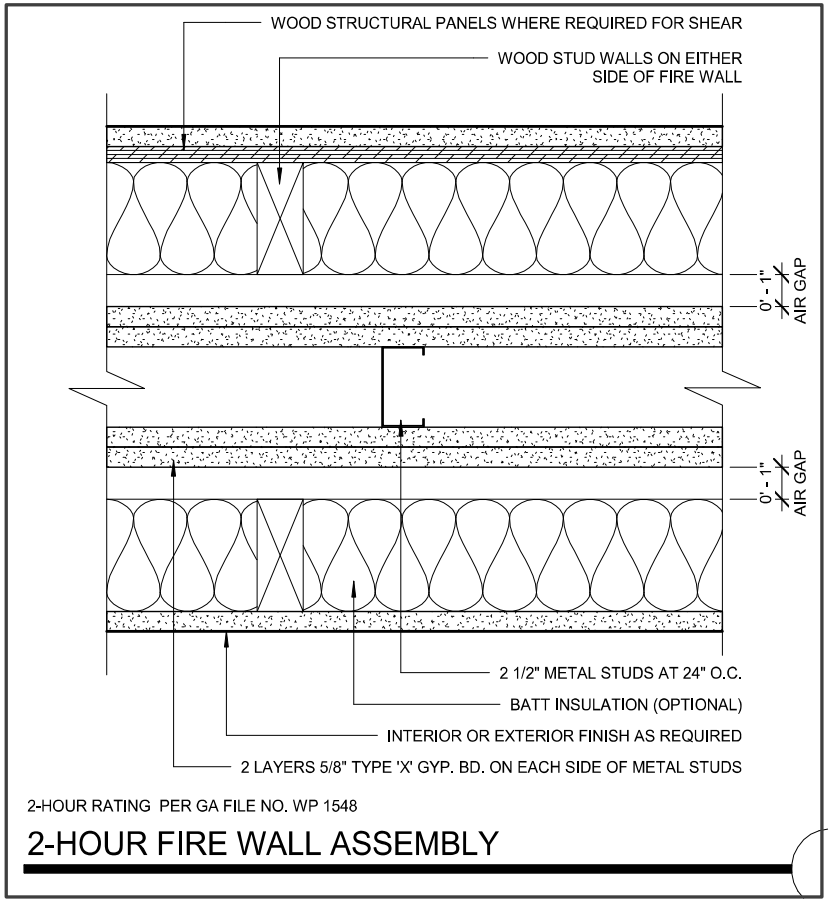


*Also see UL 336

2-Hour Fire Wall Assembly

Construction Types:

- III
- IV
- V



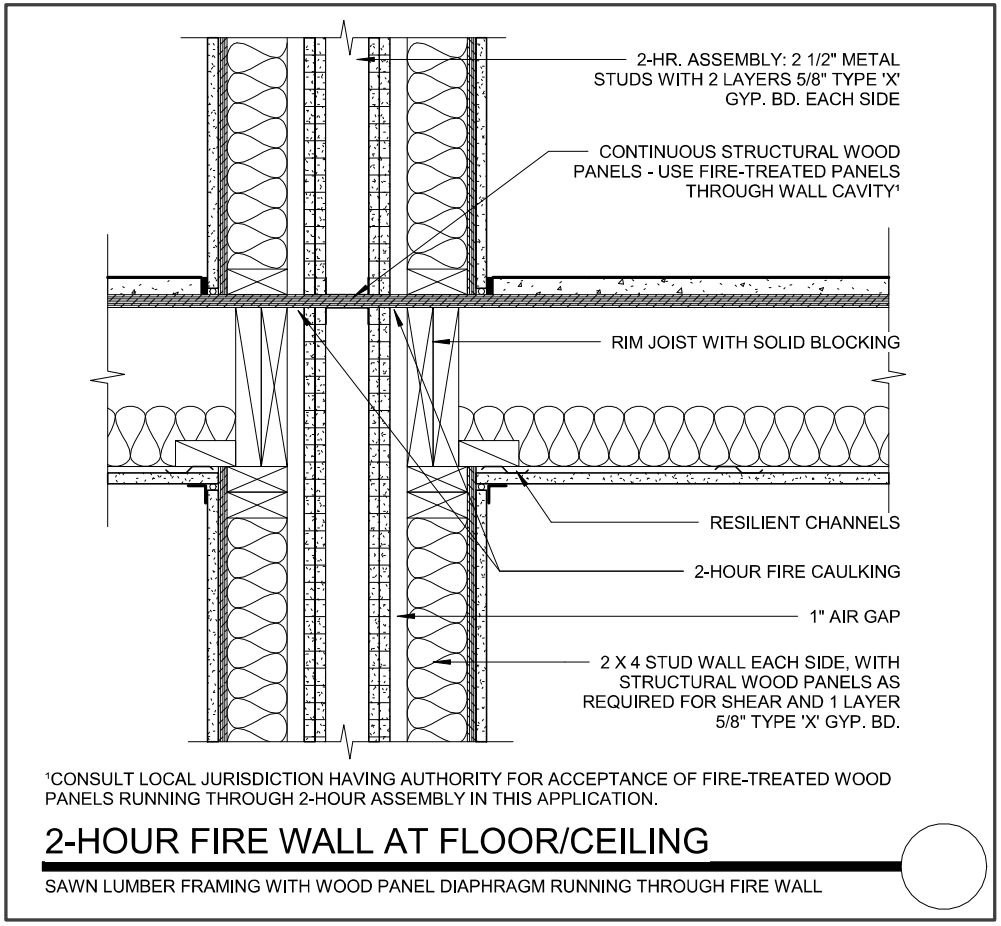
GA WP 1548
UL U411

CAD & Revit Details: www.woodworks.org

2-Hour Fire Wall Assembly

Construction Types:

- III
- IV
- V



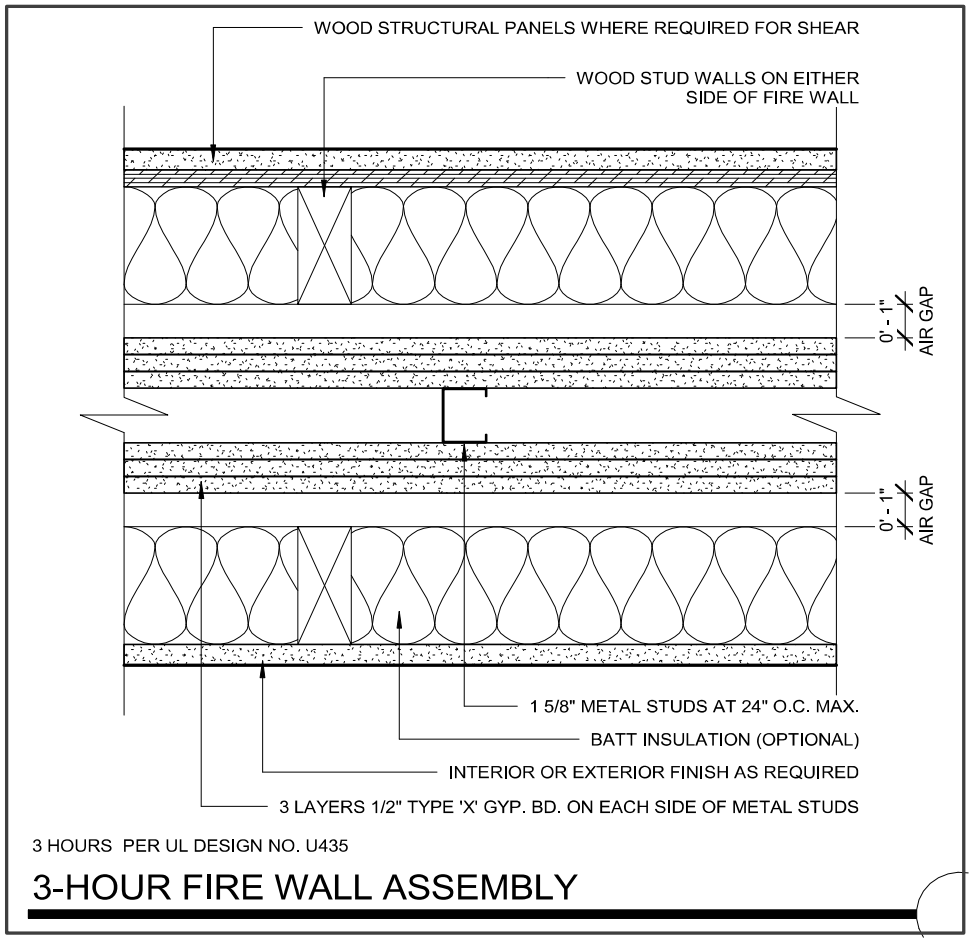
GA WP 1548
UL U411

CAD & Revit Details: www.woodworks.org

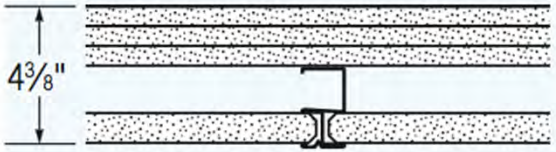
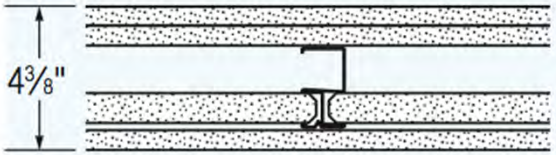
3-Hour Fire Wall A

Construction Type

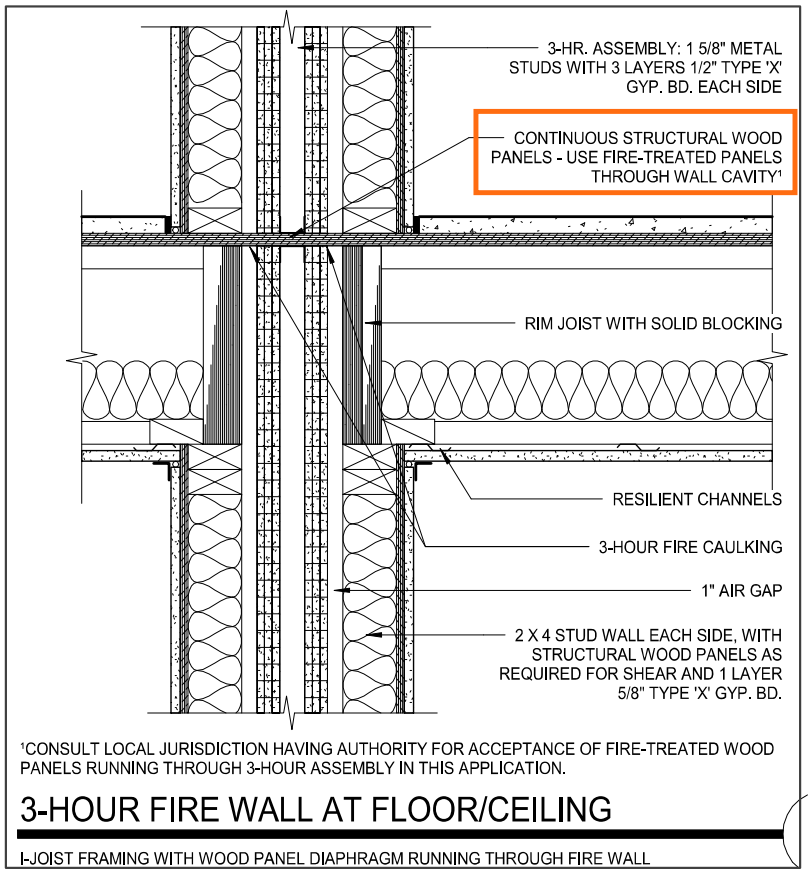
- III
- IV
- V



3-Hour Fire Wall Assembly

3 Hour Fire-Rated Construction		
wt. 13  	• 5/8" SHEETROCK FIRECODE C Core gypsum panels, face layer joints finished • 2-1/2" USG C-H Studs 25 gauge 24" o.c. • 1" SHEETROCK gypsum liner panels	**UL Des U415, System G**
wt. 13  	• 5/8" SHEETROCK FIRECODE C Core gypsum panels, face layer joints finished • 2-1/2" USG C-H Studs 25 gauge 24" o.c. • 1" SHEETROCK gypsum liner panels • 5/8" SHEETROCK FIRECODE C Core gypsum panels, joints finished	**UL Des U415, System H**

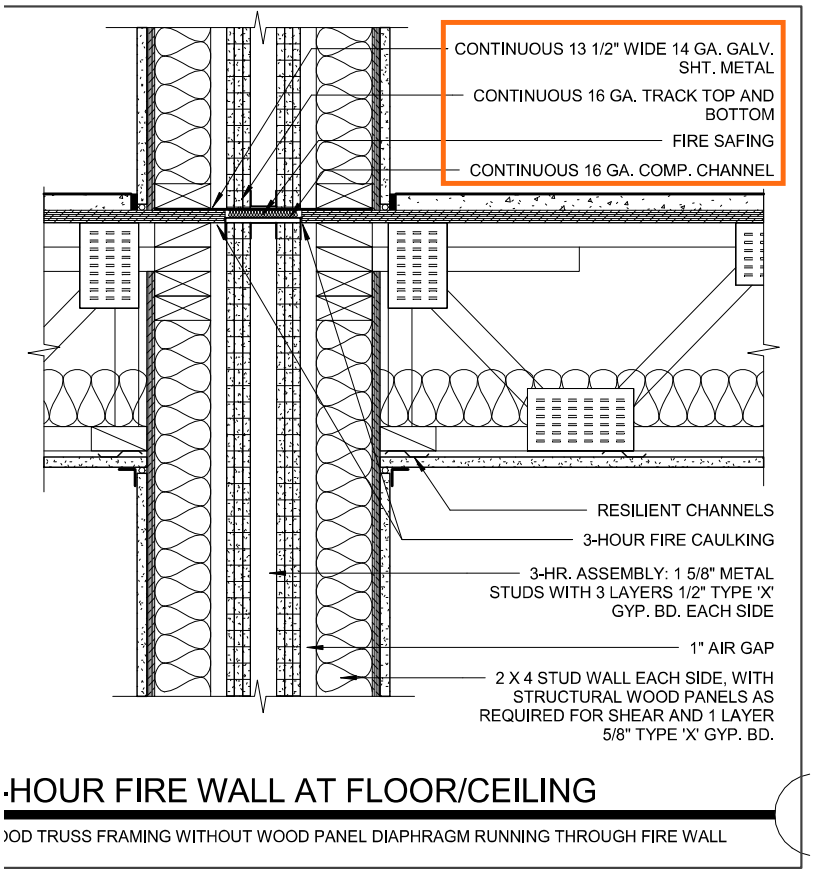
*Can install wood bearing wall on each side of 3-hour wall



[1]CONSULT LOCAL JURISDICTION HAVING AUTHORITY FOR ACCEPTANCE OF FIRE-TREATED WOOD PANELS RUNNING THROUGH 3-HOUR ASSEMBLY IN THIS APPLICATION.

3-HOUR FIRE WALL AT FLOOR/CEILING

I-JOIST FRAMING WITH WOOD PANEL DIAPHRAGM RUNNING THROUGH FIRE WALL



-HOUR FIRE WALL AT FLOOR/CEILING

)OD TRUSS FRAMING WITHOUT WOOD PANEL DIAPHRAGM RUNNING THROUGH FIRE WALL

CAD & Revit Details: www.woodworks.org

Fire Walls – Seismic Diaphragm Continuity

IBC Provisions Allow Floor Sheathing Through Firewall under Certain Conditions

706.2 Structural stability.

Fire walls shall be designed and constructed to allow collapse of the structure on either side without collapse of the wall under fire conditions. *Fire walls* designed and constructed in accordance with NFPA 221 shall be deemed to comply with this section.

Exception: In Seismic Design Categories D through F, where double *fire walls* are used in accordance with NFPA 221, floor and roof sheathing not exceeding $^{3}/_{4}$ inch (19.05 mm) thickness shall be permitted to be continuous through the wall assemblies of light frame construction.

Fire Walls – Openings

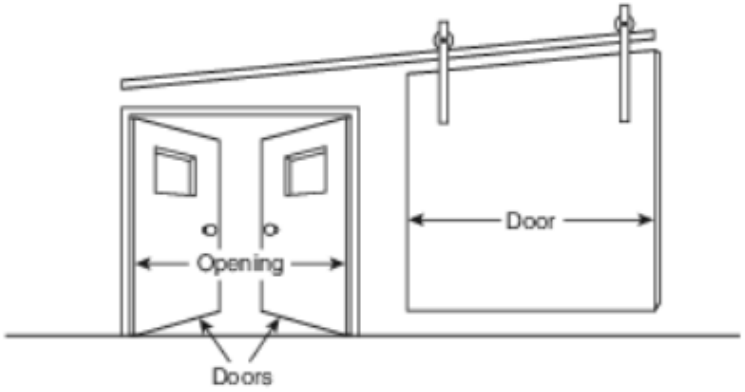


FIGURE A.5.8.3(a) Swinging Door and Sliding Door Configuration for Egress Purposes in an HC Fire Wall.

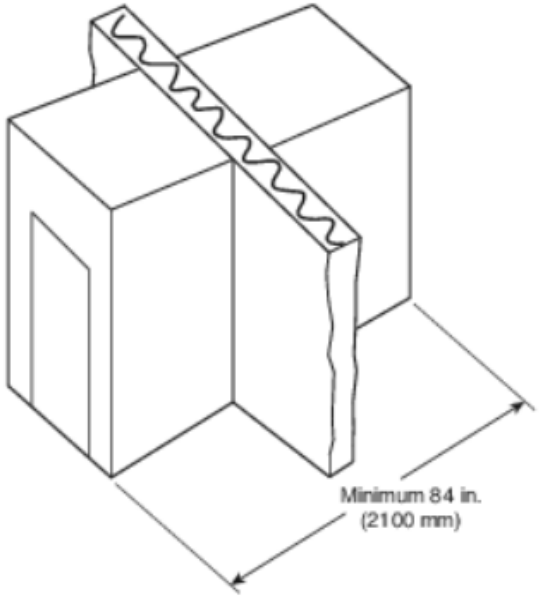


FIGURE A.5.8.3(b) Vestibule Arrangement for Egress Purposes in an HC Fire Wall.

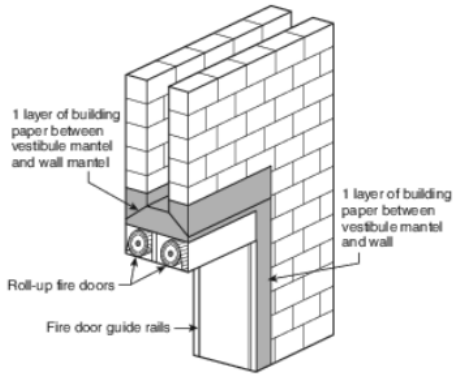
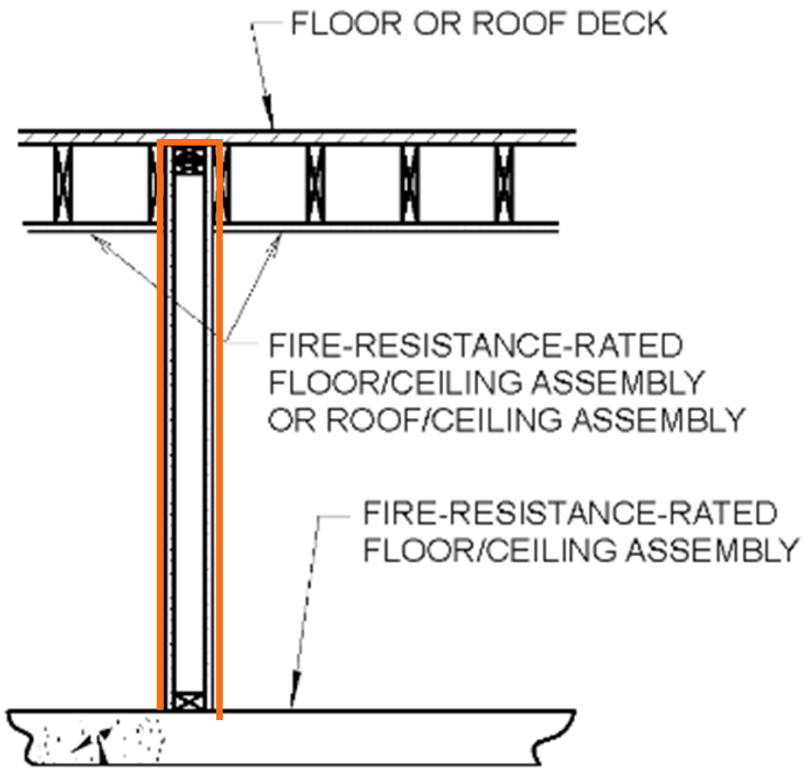


FIGURE A.5.8.4 Double Doors on a Freestanding Vestibule.

Fire Barriers – IBC 707

Commonly used for:

- Shaft enclosures
- Interior exit stairway
- Exit stairway enclosures
- Exit passageways
- Incidental uses
- Separated occupancies
- Fire Areas

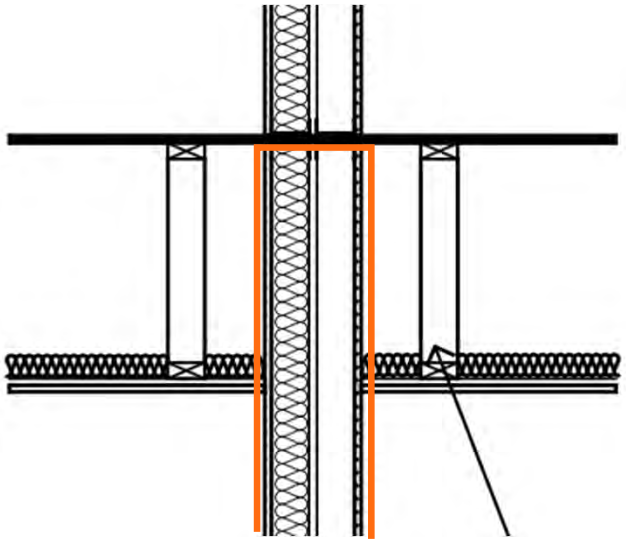


Fire Barrier Example
2024 IBC Code & Commentary

Fire Barriers – IBC 707

Fire Barriers:

- May be constructed with any materials permitted by the construction type
- Fire Resistance Ratings:
  - Shaft Enclosures: IBC 713.4
    - 2-hr when connecting 4 stories or more,
    - 1-hr when connecting less than 4 stories
  - Separated Occupancies: IBC Table 508.4
  - Fire Areas: IBC Table 707.3.10



Fire Barriers – IBC 707

707.5: Continuity. Fire barriers shall extend from the top of the foundation or floor/ceiling assembly below to the underside of the floor or roof sheathing, slab or deck above and shall be securely attached thereto. Such fire barriers shall be continuous through concealed space, such as the space above a suspended ceiling. Joints and voids at intersections shall comply with Sections 707.8 and 707.9

707.5.1 Supporting Construction. The supporting construction for a fire barrier shall be protected to afford the required fire-resistance rating of the fire barrier supported. Hollow vertical spaces within a fire barrier shall be fireblocked in accordance with Section 718.2 at every floor level.

Exceptions: for... walls separating incidental uses in buildings of Type IIB, IIIB and VB construction.

Other requirements for openings, penetrations, joints

Fire Barriers – IBC 707



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Common Detailing Method: Fire Barrier & membrane extend to underside of floor deck above

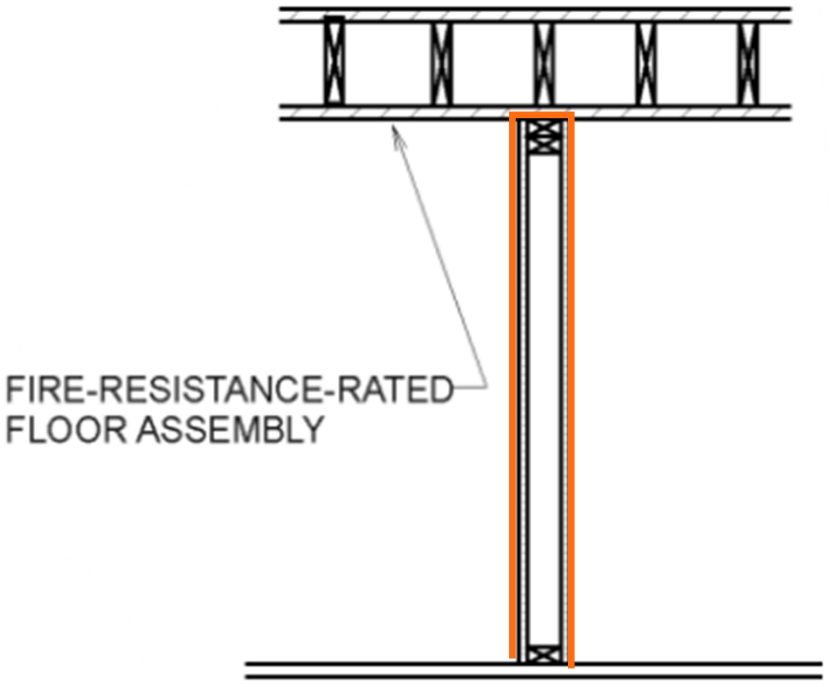
Fire Partitions – IBC 708

Commonly used to separate:

- Dwelling or sleeping units in same bldg.
- Tenant spaces in malls
- Corridor walls

Minimum 1-hr rating except:

- Some corridors
- Separate dwelling units in VB and IIIB



Fire Partition Example
2024 IBC Code & Commentary

Commentary Figure 708.4(1) Continuity of Fire Partitions

Fire Partitions – IBC 708

Fire Partitions:

- May be constructed with any materials permitted by the construction type
- 708.3 Fire Resistance Ratings:
  - » Fire partitions shall have a *fire-resistance rating* of not less than 1 hour.

Exceptions:

1. Corridor walls permitted to have a ½-hour fire-resistance rating by Table 1020.2
2. Dwelling unit and sleeping unit separations in buildings of Type IIB, IIIB and VB construction shall have fire-resistance ratings of not less than ½ hour in buildings equipped throughout with an [NFPA 13] automatic sprinkler system in accordance with Section 903.3.1.1.

Fire Partitions – IBC 708

708.4 Continuity.

Fire partitions shall extend from the top of the foundation or floor/ceiling assembly below and be securely attached to one of the following:

1. The underside of the floor or roof sheathing, deck or slab above.
2. The underside of a floor/ceiling or roof/ceiling assembly having a fire-resistance rating that is not less than the fire-resistance rating of the fire partition.

Exceptions: for certain crawlspace conditions, corridor conditions (See Section 708.4).

708.4.2 Supporting construction.

The supporting construction for a fire partition shall have a fire-resistance rating that is equal to or greater than the required fire-resistance rating of the support fire partition.

Exceptions: for... walls separating dwelling units, ambulatory care facilities, walls separating sleeping units (R-1 & R-2), and corridor walls in buildings of Type IIB, IIIB and VB construction.

Fire Partitions – IBC 708



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Common Detailing Method: Fire Partition & membrane stop at underside of rated floor/ceiling with fireblocking/draftstopping if required

Fire Barriers & Partitions – Horizontal Continuity

- Code language exists to clarify vertical & horizontal continuity requirements of **fire walls**.
- However, for **fire barriers** & **fire partitions**, only vertical continuity requirements exist.
- How are partition wall to partition wall (or partition wall to exterior wall) intersections handled?



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Corridors – Fire Resistance Ratings



Photo WoodWorks

Corridor Walls

IBC 1020.1: Corridor walls required to be fire-resistance rated shall comply with Section 708 for fire partitions.

708.3 Fire-resistance rating.

Fire partitions shall have a fire-resistance rating of not less than 1 hour.

Exception: Corridor walls permitted to have a ½-hour fire-resistance rating by Table 1020.1 (applies to R occupancies with NFPA 13 or NFPA 13R sprinkler systems)

Corridors – Fire Resistance Ratings

Check requirements of IBC Tables 601 and 1020.1 for Corridor Wall and Floor/Ceiling FRR

TABLE 1020.2—CORRIDOR FIRE-RESISTANCE RATING

OCCUPANCY	OCCUPANT LOAD SERVED BY CORRIDOR	REQUIRED FIRE-RESISTANCE RATING (hours)	
		Without automatic sprinkler system	With automatic sprinkler system
H-1, H-2, H-3	All	Not Permitted	1[c]
H-4, H-5	Greater than 30	Not Permitted	1[c]
A, B, E, F, M, S, U	Greater than 30	1	0
R	Greater than 10	Not Permitted	0.5[c]/1[d]
I-2[a]	All	Not Permitted	0
I-1, I-3	All	Not Permitted	1[b, c]
I-4	All	1	0

a. For requirements for occupancies in Group I-2, see Sections 407.2 and 407.3.
b. For a reduction in the fire-resistance rating for occupancies in Group I-3, see Section 408.8.
c. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 where allowed.

TABLE 601—FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Primary structural frame[f] (see Section 202)	3[a, b]	2[a, b, c]	1[b, c]	0[c]	1[b, c]	0	3[a]	2[a]	2[a]	HT	1[b, c]	0
Bearing walls												
Exterior[e, f]	3	2	1	0	2	2	3	2	2	2	1	0
Interior	3[a]	2[a]	1	0	1	0	3	2	2	1/HT[g]	1	0
Nonbearing walls and partitions Exterior	See Table 705.5											
Nonbearing walls and partitions Interior[d]	0	0	0	0	0	0	0	0	0	See Section 2304.11.2	0	0
Floor construction and associated secondary structural members (see Section 202)	2	2	1	0	1	0	2	2	2	HT	1	0
Roof construction and associated secondary structural members (see Section 202)	1 1/2[b]	1[b, c]	1[b, c]	0[c]	1[b, c]	0	1 1/2	1	1	HT	1[b, c]	0

Corridor Walls -708.4

Exceptions:

2. Fire partitions serving as a corridor wall shall not be required to extend above the lower membrane of a corridor ceiling provided that the corridor ceiling membrane is equivalent to corridor wall membrane, and either of the following conditions is met:
   - 2.1 The room-side membrane of the corridor wall extends to the underside of the floor or roof sheathing of a fire-resistance-rated floor or roof above.
   - 2.2 The building is equipped with an NFPA 13 or NFPA 13R sprinkler system installed throughout, including in the space between the top of the fire partition and underside of the floor or roof sheathing, deck or slab above.
3. Fire partitions serving as a corridor wall shall be permitted to terminate at the upper membrane of the corridor ceiling assembly where the corridor ceiling is constructed as required for the corridor wall.

Corridor Walls – 708.4 Exception 2

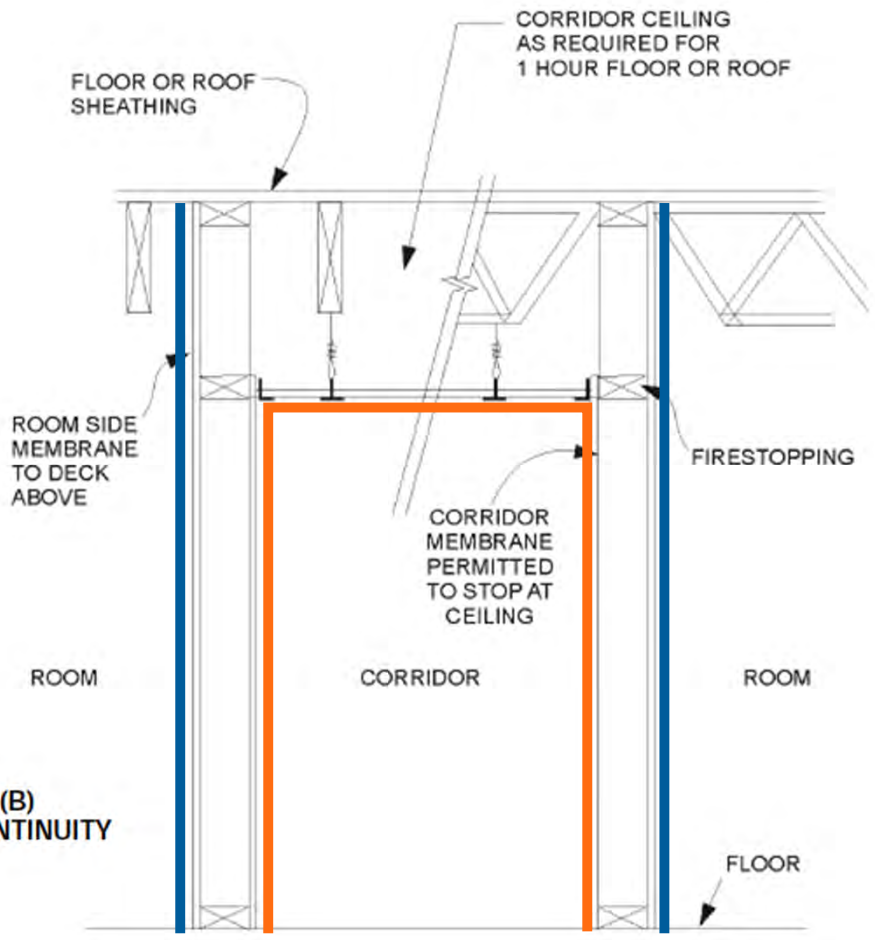
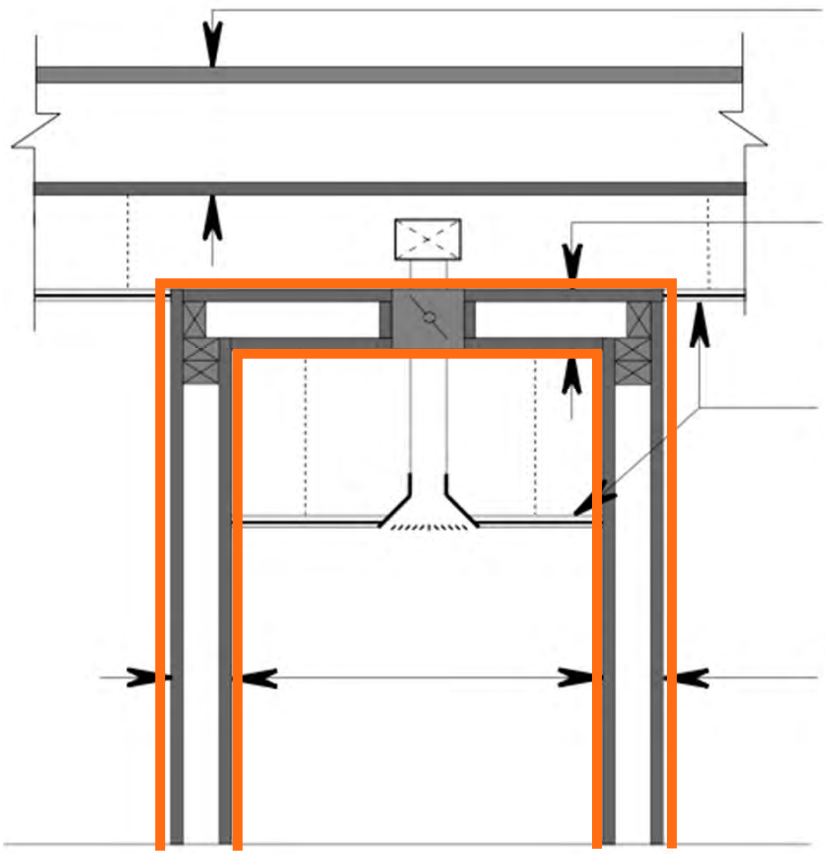


Figure 708.4(2)(B)
FIRE PARTITION CONTINUITY

Corridor Walls – 708.4 Exception 3



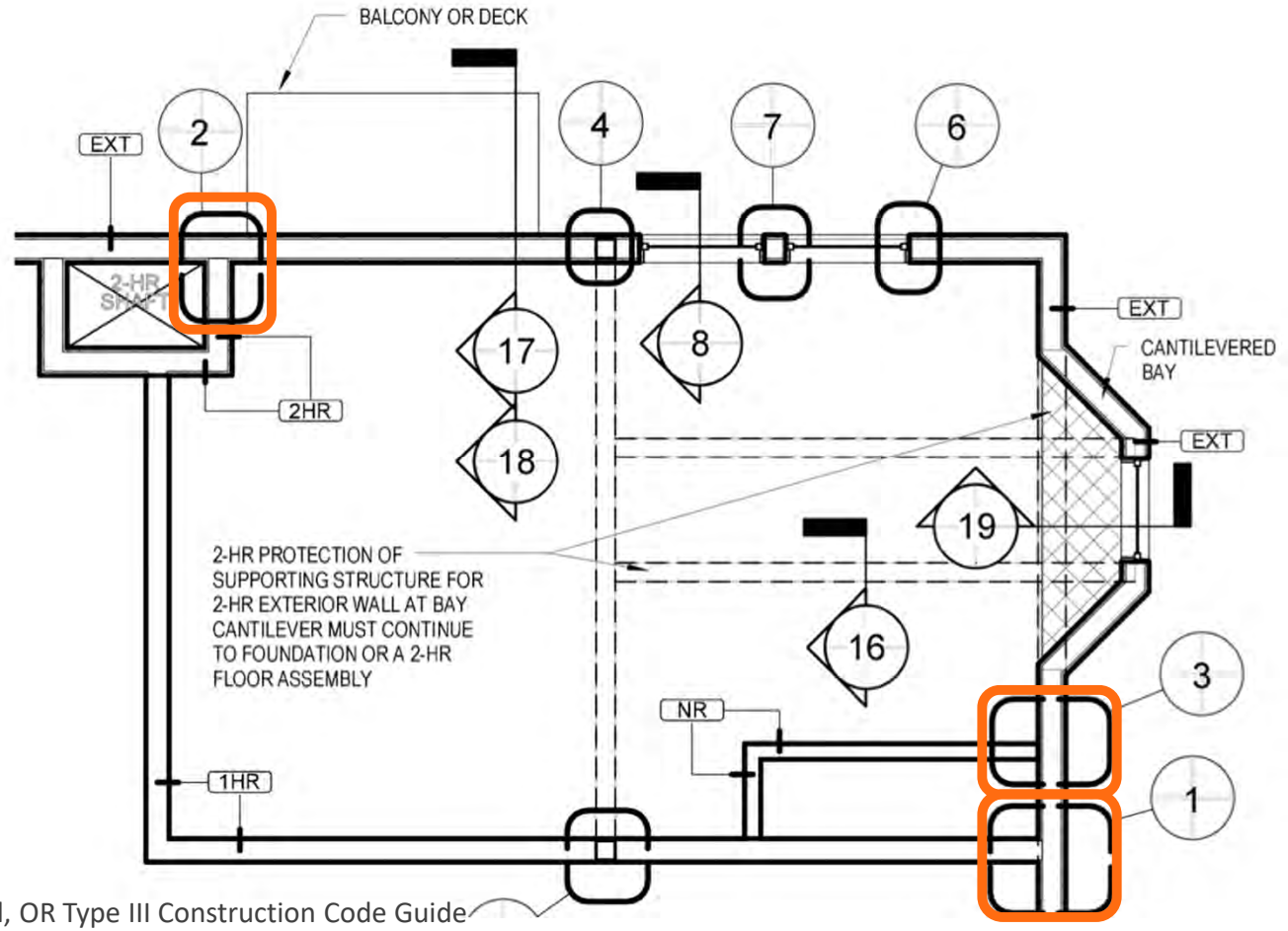
Floor or roof sheathing, framing and ceiling membrane as required for a one-hour fire-resistive floor or roof system throughout entire story.

Corridor ceiling constructed the same as corridor walls.

Optional nonrated suspended ceiling.

Corridor wall framing and membrane each side as required for one-hour fire-resistive wall construction.

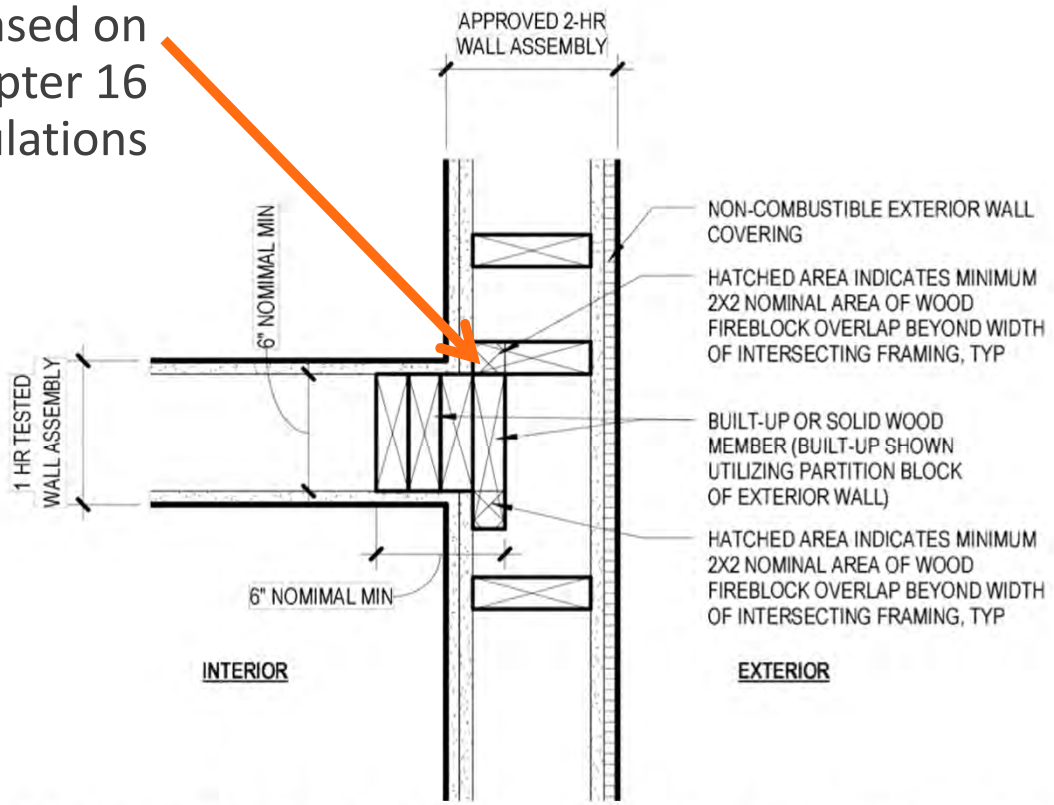
Fire Barriers & Partitions – Horizontal Continuity



Source: City of Portland, OR Type III Construction Code Guide

Fire Barriers & Partitions – Horizontal Continuity

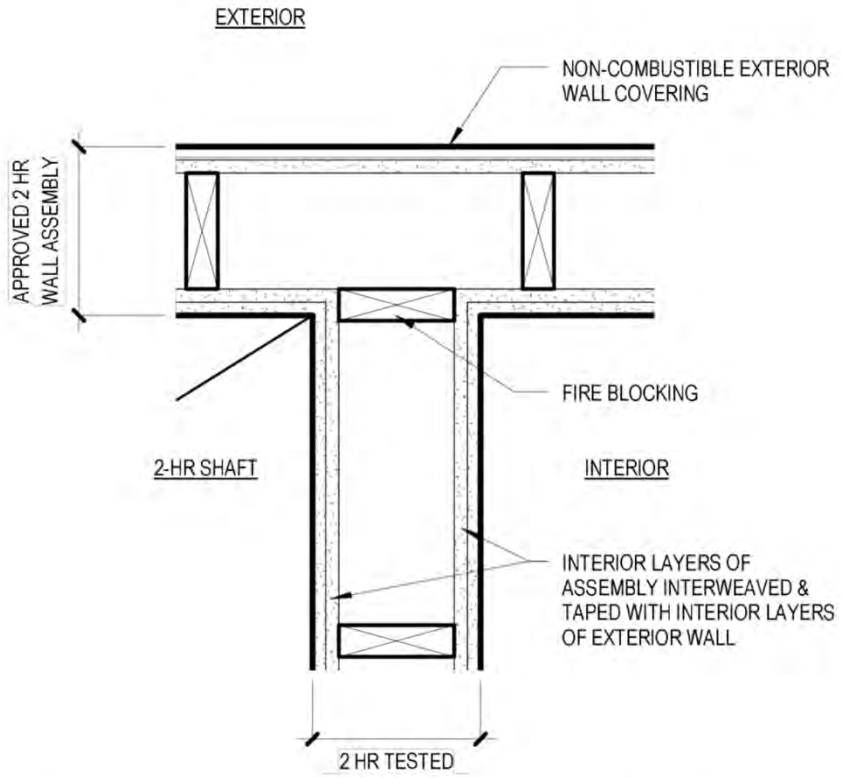
Rationale based on NDS Chapter 16 char calculations



1-HR INTERIOR WALL AT 2-HR EXTERIOR WALL

Source: City of Portland, OR Type III Construction Code Guide

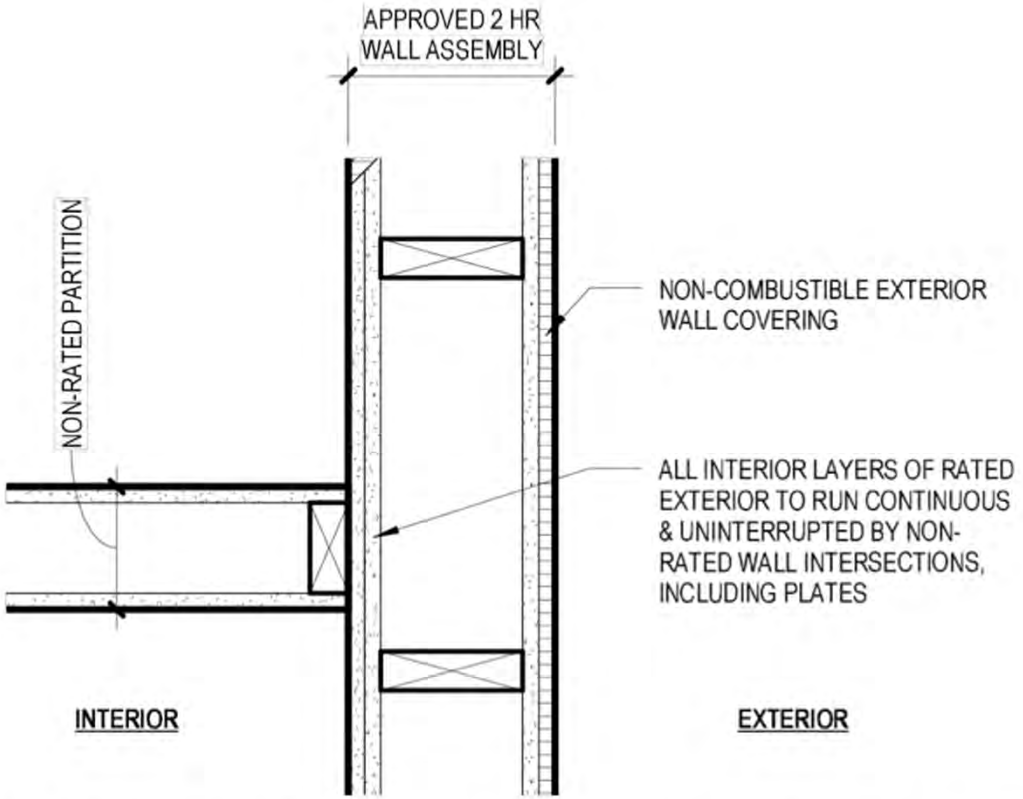
Fire Barriers & Partitions – Horizontal Continuity



2-HR INTERIOR WALL AT 2-HR EXTERIOR WALL

Source: City of Portland, OR Type III Construction Code Guide

Fire Barriers & Partitions – Horizontal Continuity



NON-RATED INTERIOR WALL AT EXTERIOR WALL

Source: City of Portland, OR Type III Construction Code Guide

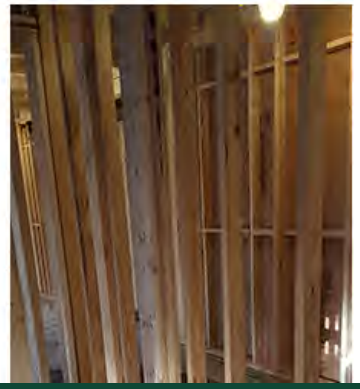
Expert Tips

Intersection of Partition Walls with Membrane-Protected Assemblies

Options for detailing the intersection of partition walls to fire resistance-rated wall, floor and roof assemblies that allow interruption of the membrane.

Share

For designers working on light wood-frame multi-family and commercial structures, there are many publicly available fire resistance-rated assemblies. However, each assembly must intersect other assemblies at its ends and often multiple points along its length, and the requirements for detailing the intersection of one assembly to another are seldom addressed. Specifically, interior partition walls often intersect fire resistance-rated interior and exterior walls, as well as the underside of fire resistance-rated floor and roof assemblies. While no interruption of the membrane on each fire resistance-rated assembly would seem to provide the most direct route of compliance, this approach can create issues with construction sequencing since it is often preferable to install all of the wood framing prior to any gypsum wall/ceiling membrane.



https://www.woodworks.org/resources/intersection-of-partition-walls-with-membrane-protected-assemblies/

Outline

- Review of Fire Resistance Methods
- Interior Fire Rated Wall Assemblies
  - Fire Walls
  - Fire Barriers
  - Fire Partitions/Corridors
- **Horizontal Assemblies**



1430 Q, The HR Group Architects, Buehler Engineering, Greg Folkins Photography

Horizontal Assemblies

- A floor or roof assembly required to have a fire resistance rating such as for occupancy separations and fire area separations
- May be constructed with any materials permitted by the construction type
- Occupancy separation: Fire resistance ratings per IBC Table 508.4
- Required to be continuous without vertical openings except as permitted in IBC 712
- Supporting construction required to have same fire-resistance rating as the fire barrier being supported (with exceptions per 711.4)
- Other requirements for openings, penetrations, joints



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Fire Resistance Ratings – 711.2.4

Fire resistance shall not be less than that required for:

- Separating mixed occupancies – 508.4
  - Up to 1-hr for sprinklered for other than I and H occupancy
  - Up to 2-hr for non-sprinklered for other than I and H occupancy
- Separating fire areas – 707.3.10
  - 2-hr for most occupancies for other than H and F-1
  - 3-hr for S1/ 1-hr for U
- Dwelling units – not less than 1hr
  - Except for IIB, IIIB, VB with NFPA 13 sprinklers is ½-hr
- Separating smoke compartments – 709
- Separating incidental uses – 509

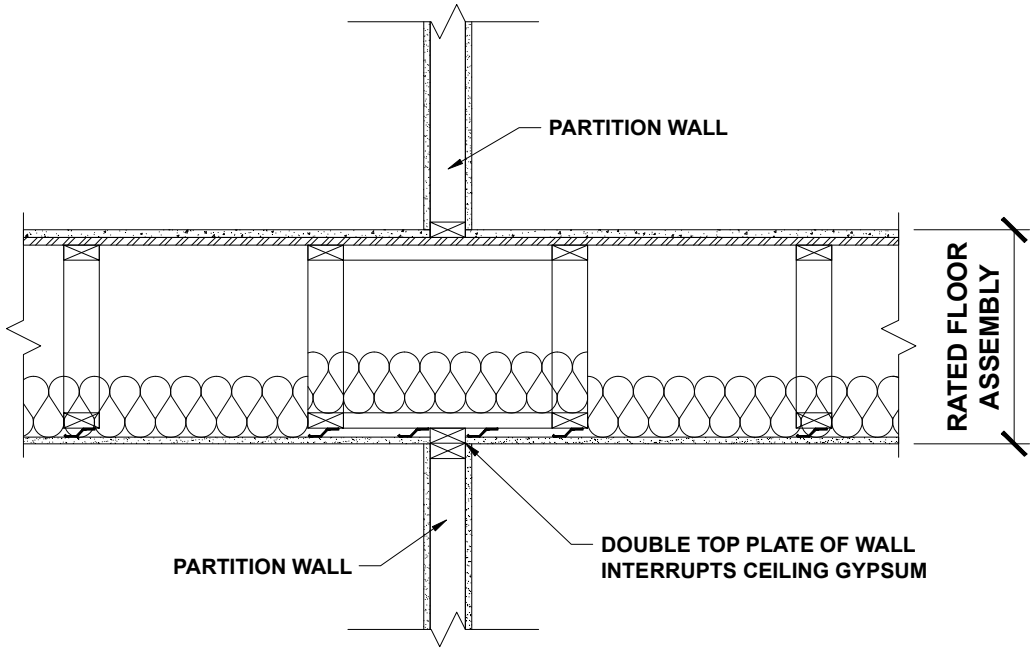
Assembly Intersection

Can a wall interrupt the ceiling gypsum of a rated horizontal assembly? **Yes!**

IBC 714.5.2 Membrane Penetrations

Exception 7:

The ceiling membrane of a maximum 2-hour fire-resistance-rated horizontal assembly is permitted to be interrupted with the double wood top plate of a wall assembly that is sheathed with Type X gypsum wallboard, provided that all penetrating items through the double top plates are protected in accordance with Section 714.5.1.1 or 714.5.1.2 and the ceiling membrane is tight to the top plates.



INTERIOR WALL TO FLOOR INTERSECTION

Expert Tips

Individual Encasement vs. Membrane Protection of Wood Columns in Walls

Individual fire protection and encasement requirements for light-frame wood columns located entirely within fire resistance-rated walls.

Share

It is not uncommon for light-frame wood columns, whether solid or built-up, to be embedded in light-frame walls (bearing or non-bearing). In many instances, these walls must be rated for fire resistance per IBC Table 601 or because they serve as fire barriers, fire partitions or fire walls. However, guidance on whether they are considered primary structural elements that require individual fire protection has evolved over the last several building code cycles.

Under the 2012 IBC, Section 704.2 was sometimes interpreted to mean that light-frame wood columns would need individual fire protection (demonstrated via their own gypsum wrap or charred wood calculations):

2012 IBC: 704.2 Column protection.

Where columns are required to have protection to be fire-resistance rated, the



https://www.woodworks.org/resources/individual-encasement-vs-membrane-protection-of-wood-columns-in-walls/

Individual Encasement – Columns

TABLE 601
FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Primary structural frame[f] (see Section 202)	3[a, b]	2[a, b, c]	1[b, c]	0[c]	1[b, c]	0	3[a]	2[a]	2[a]	HT	1[b, c]	0
Bearing walls												
Exterior[e, f]	3	2	1	0	2	2	3	2	2	2	1	0
Interior	3[a]	2[a]	1	0	1	0	3	2	2	1/HT[g]	1	0
Nonbearing walls and partitions Exterior	See Table 705.5											
Nonbearing walls and partitions Interior[d]	0	0	0	0	0	0	0	0	0	See Section 2304.11.2	0	0
Floor construction and associated secondary structural members (see Section 202)	2	2	1	0	1	0	2	2	2	HT	1	0
Roof construction and associated secondary structural members (see Section 202)	$1^1/_2$[b]	1[b,c]	1[b,c]	0[c]	1[b,c]	0	$1^1/_2$	1	1	HT	1[b,c]	0

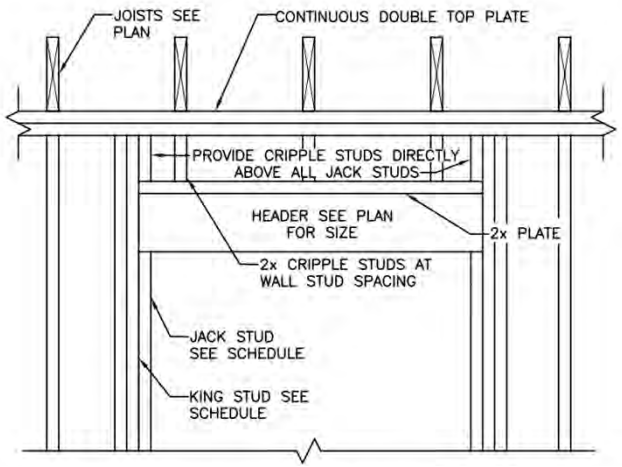
BEARING WALL STRUCTURE. *A building or other structure in which vertical loads from floors and roofs are primarily supported by walls.*

FRAME STRUCTURE. *A building or other structure in which vertical loads from floors and roofs are primarily supported by columns.*

Light Frame Bearing Walls – 2024 IBC

704.3 Protection of Secondary Structural Members.
Secondary structural members that are required to have protection to achieve a fire-resistance rating shall be protected by individual encasement protection, or by the membrane of a fire-resistance-rated wall or horizontal Assembly where the membrane provides the required fire-resistance rating.

704.3.1 Light Frame Construction.
Studs, columns and boundary elements that are integral elements in walls of light-frame construction and are located entirely between the top and bottom plates or tracks shall be permitted to have required fire-resistance ratings provided by the membrane protection provided for the wall.



Typ. Bearing Wall Opening Framing

IBC 704.3.1 Commentary:
Studs and columns in light-frame construction that are within the space defined by the top and bottom plate are considered as standard parts of the wall assembly rather than as individual members acting as a typical column. Other vertical elements would require individual encasement to achieve the required fire-resistance-rating

Beam Encasement – 2024 IBC

704.2 Protection of the primary structural frame.

Members of the primary structural frame that are required to have protection to achieve a fire-resistance rating shall be provided individual encasement protection by protecting them on all sides for the full length, including connections to other structural members, with materials having the required fire-resistance rating. Where a column extends through a ceiling, the encasement protection shall be continuous from the top of the foundation or floor/ceiling assembly below through the ceiling space to the top of the column.

Exceptions:

1. Individual encasement protection on all sides shall be permitted on all exposed sides provided that the extent of protection is in accordance with the required fire-resistance rating, as determined in Section 703.

2. Primary structural members other than columns that do not support more than two floors or one floor and roof, or a load-bearing wall or a non load-bearing wall more than two stories high, are permitted to be protected by the membrane of a fire-resistance-rated wall or horizontal assembly where the membrane provides the required fire-resistance rating.

3. Columns that meet the limitations of Section 704.3.1.

Questions? Ask us anything.



Jessica Scarlett, EIT

Regional Director – NC, SC, TN
(803) 616-6231
jessica.scarlett@woodworks.org



901 East Sixth, Thoughtbarn-Delineate Studio, Leap!Structures, photo Casey Dunn