



# Vertically Offset Exterior Walls

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# Exterior Wall Fire Resistance

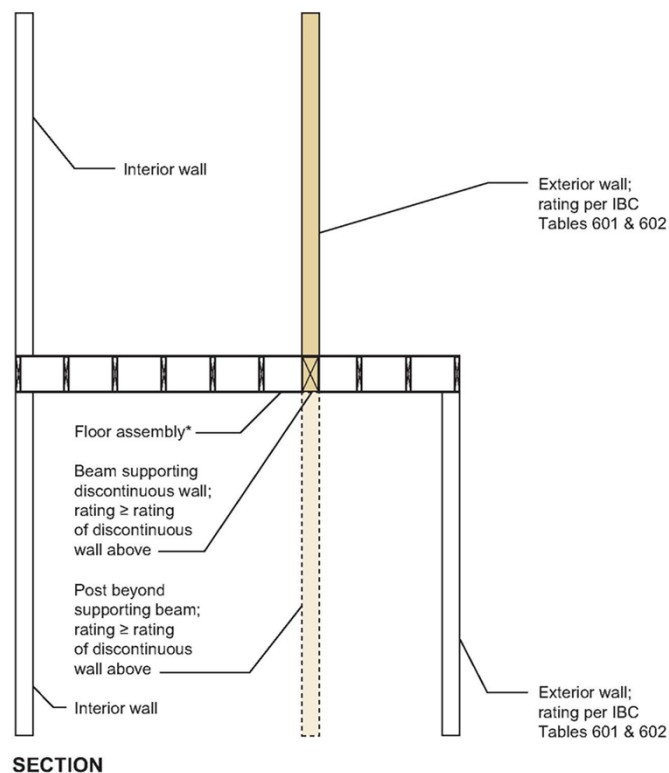
**TABLE 601**  
**FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)**

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
	A	B	A	B	A	B	HT	A	B
Primary structural frame <sup>f</sup> (see Section 202)	3 <sup>a, b</sup>	2 <sup>a, b</sup>	1 <sup>b</sup>	0	1 <sup>b</sup>	0	HT	1 <sup>b</sup>	0
Bearing walls									
Exterior <sup>c, f</sup>	3	2	1	0	2	2	2	1	0
Interior	3 <sup>a</sup>	2 <sup>a</sup>	1	0	1	0	1/HT	1	0
Nonbearing walls and partitions	See Table 602								
Exterior									
Nonbearing walls and partitions							See		
Interior <sup>d</sup>	0	0	0	0	0	0	Section	0	0
2304.11.2									
Floor construction and associated secondary members (see Section 202)	2	2	1	0	1	0	HT	1	0
Roof construction and associated secondary members (see Section 202)	1 1/2 <sup>b</sup>	1 <sup>b, c</sup>	1 <sup>b, c</sup>	0 <sup>c</sup>	1 <sup>b, c</sup>	0	HT	1 <sup>b, c</sup>	0

**TABLE 602**  
**FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE<sup>a, d, g</sup>**

FIRE SEPARATION DISTANCE = X (feet)	TYPE OF CONSTRUCTION	OCCUPANCY GROUP H <sup>a</sup>	OCCUPANCY GROUP F-1, M, S-1 <sup>f</sup>	OCCUPANCY GROUP A, B, E, F-2, I, R, S-2, U <sup>h</sup>
X < 5 <sup>b</sup>	All	3	2	1
5 ≤ X < 10	IA	3	2	1
	Others	2	1	1
10 ≤ X < 30	IA, IB	2	1	1 <sup>c</sup>
	IIB, VB	1	0	0
	Others	1	1	1 <sup>c</sup>
X ≥ 30	All	0	0	0

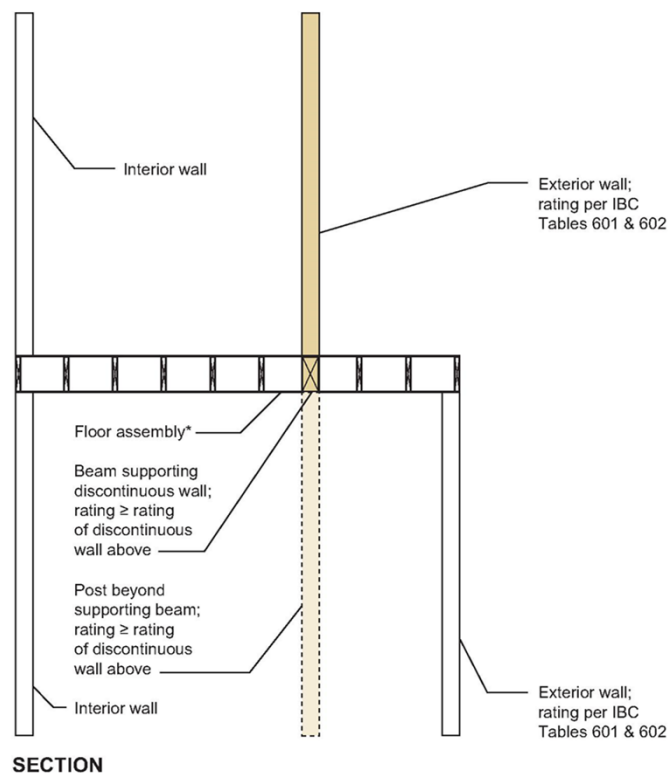
# Exterior Wall Vertical Offsets



- » Exterior wall does not have to be continuous to the foundation in a stepped building
- » Members that support a rated exterior wall must be fire-resistance rated not less than the rating of the supported wall
- » IBC 704.1:

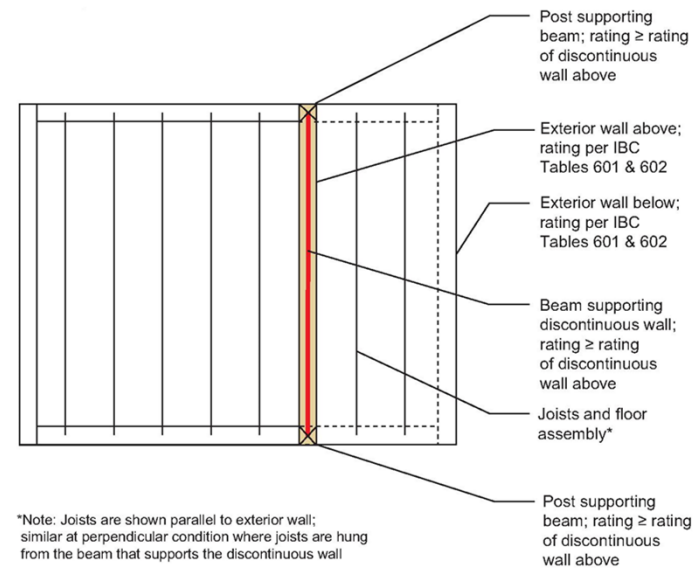
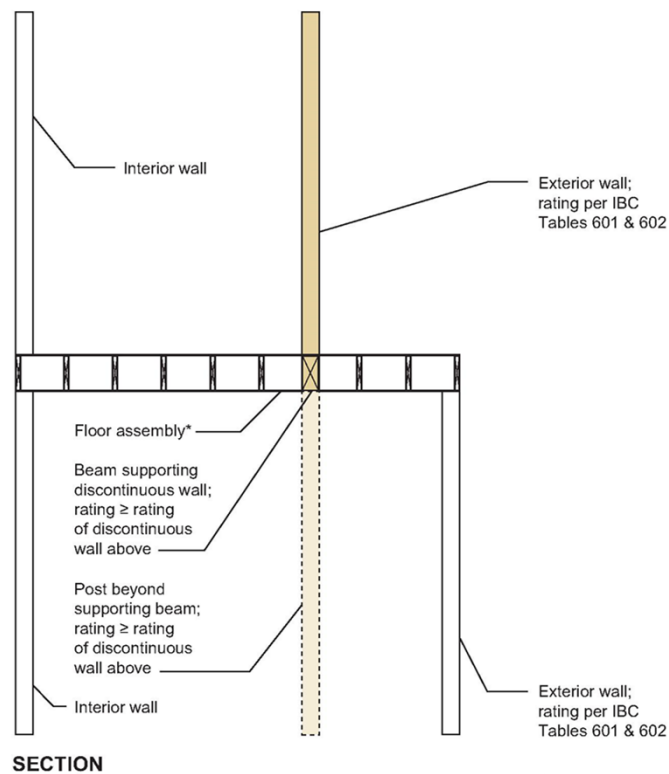
*The fire-resistance ratings shall not be less than the ratings required for the fire-resistance-rated assemblies supported by the structural members.*

# Exterior Wall Vertical Offsets: Case 1

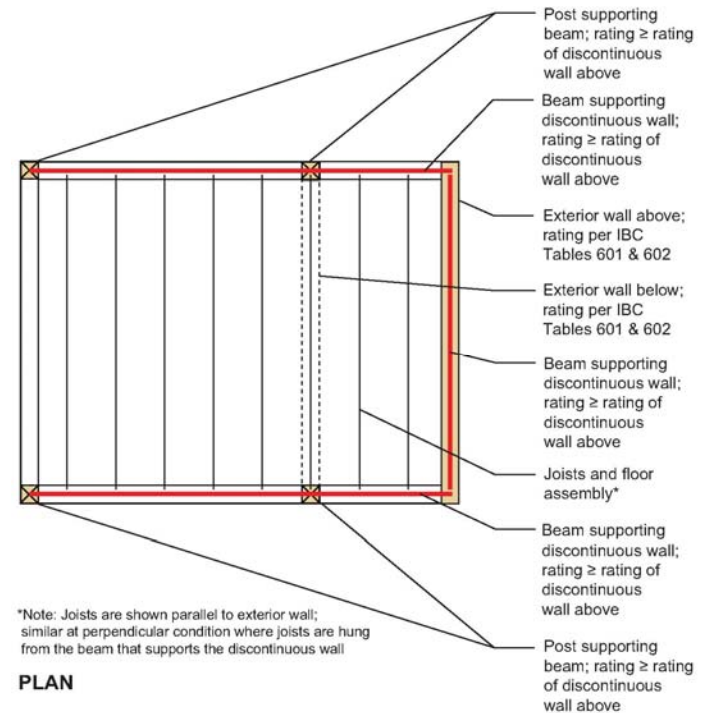
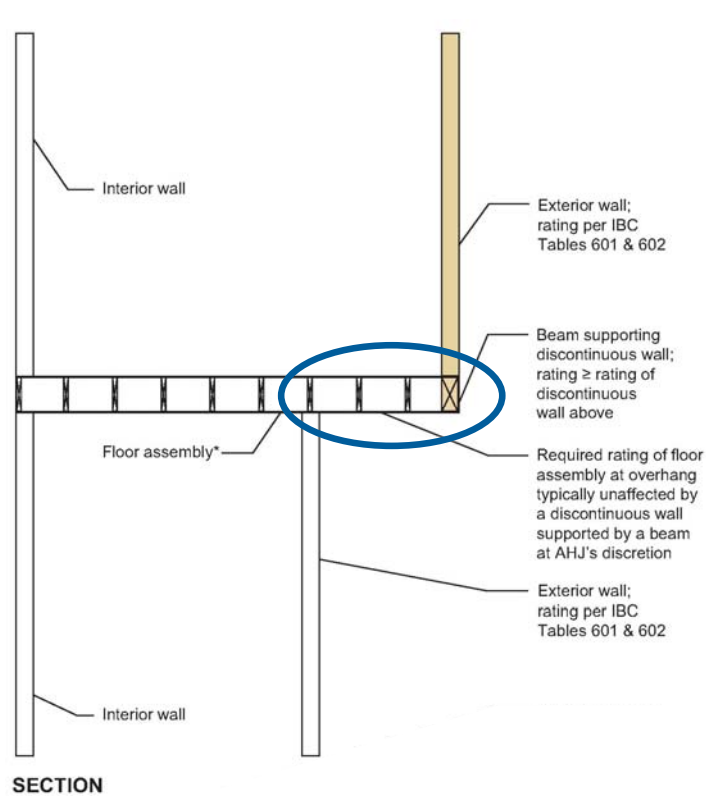


- » Exterior wall rating per Tables 601 & 602
- » Upper wall supported by beam
- » Floor joists parallel to exterior wall (shown)  
or
- » Floor joists perpendicular to exterior wall, but hung from sides of beam (not shown)
- » Beam(s) supporting discontinuous wall and posts/columns supporting beam(s) require  $FRR \geq FRR$  of discontinuous wall

# Exterior Wall Vertical Offsets: Case 1



# Exterior Wall Vertical Offsets: Case 2



# Individual Encasement vs. Membrane Protection

- » Columns: IBC 704.2
  - » Generally, require individual encasement protection
  - » **Light frame exception (704.4.1)** for studs, columns, boundary elements *located entirely between the top and bottom plates*
- » Primary structural frame other than columns: IBC 704.3
  - » If they support *more than two floors or one floor and roof, or support a load-bearing wall or a non-load-bearing wall more than two stories high*, require individual encasement protection
- » Secondary members: IBC 704.4
  - » Generally, require individual encasement protection, except:
  - » **Light frame (704.4.1)**, allows membrane protection provided for wall
  - » **Horizontal assemblies (704.4.2)**, allows membrane protection provided by ceiling



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## Do light-frame wood columns located entirely within fire resistance-rated walls also require individual fire protection or encasement?

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.

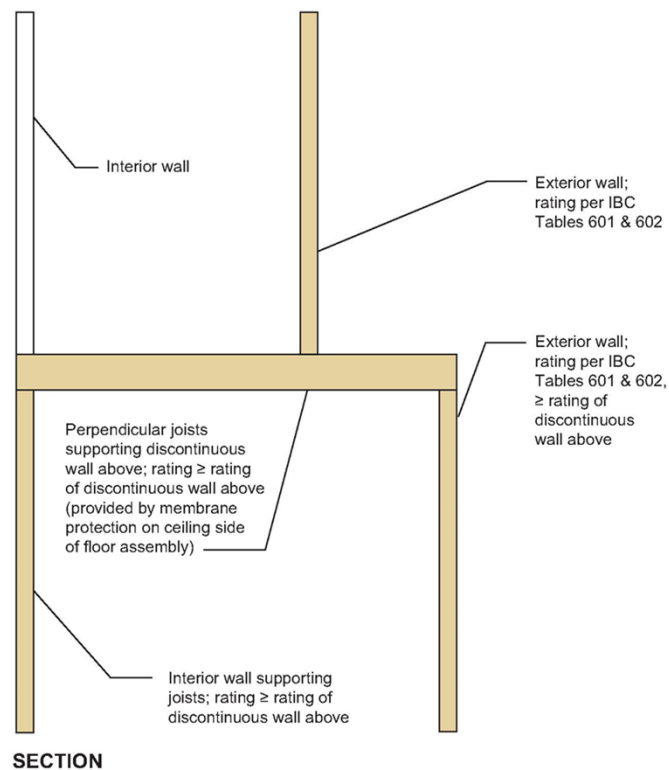
*Where columns are required to have protection to be fire-resistance rated, the entire column shall be provided individual encasement protection by protecting it on all sides for the full column length, including connections to other structural members, with materials having the required fire-resistance rating. Where the 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.*



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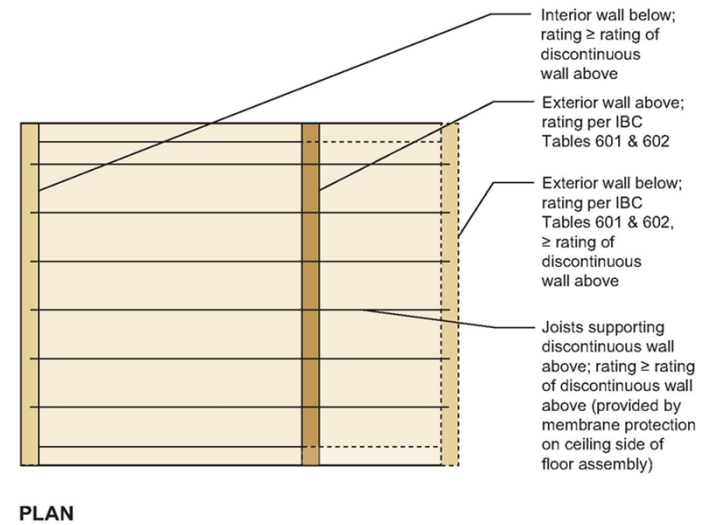
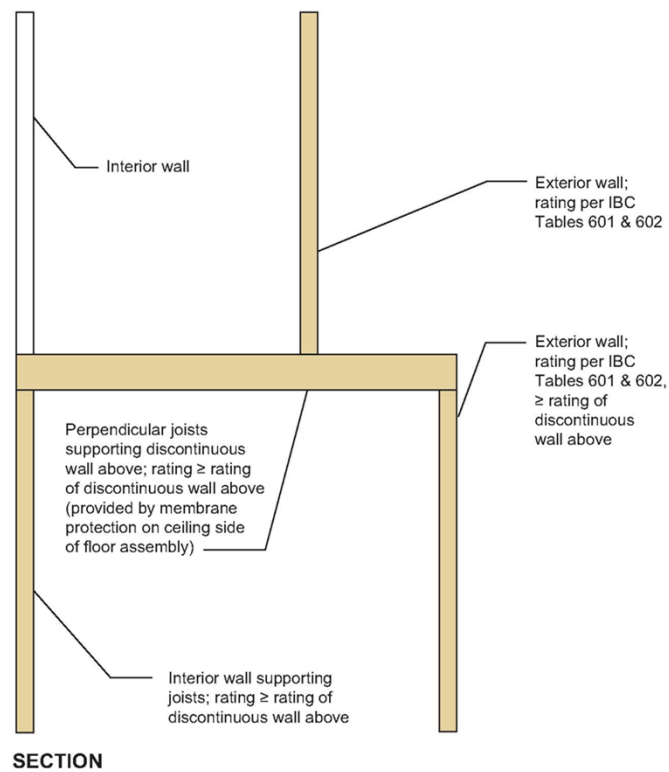


# Exterior Wall Vertical Offsets: Case 3

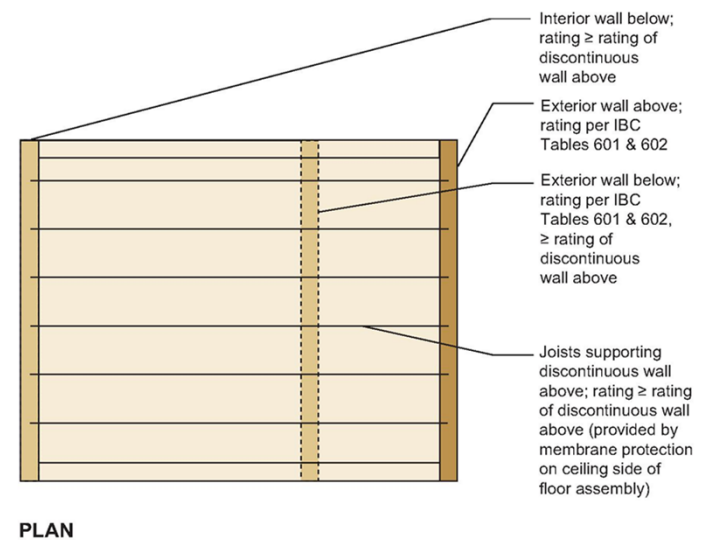
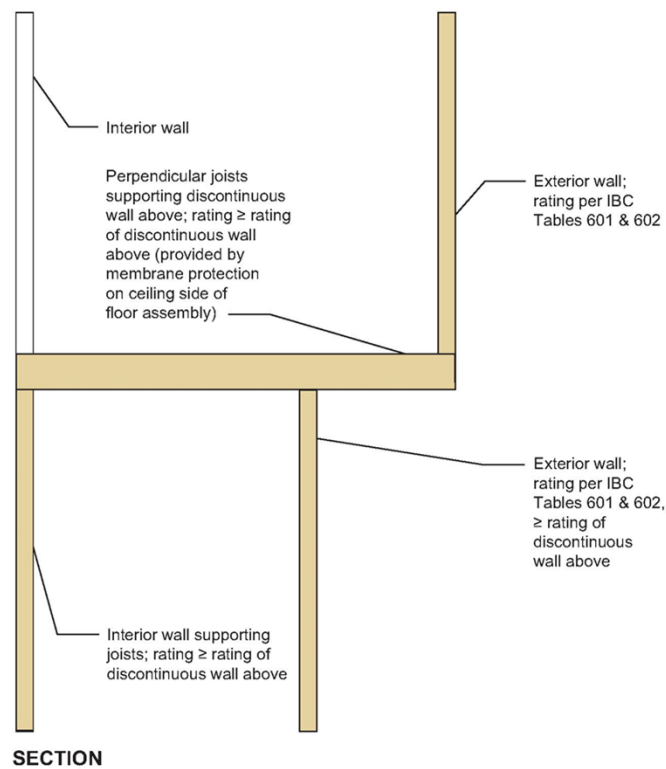


- » Exterior wall rating per Tables 601 & 602
- » Upper wall supported by floor assembly (i.e. floor joists perpendicular to exterior wall)
- » Floor assembly and walls supporting floor require  $FRR \geq FRR$  of discontinuous wall

# Exterior Wall Vertical Offsets: Case 3



# Exterior Wall Vertical Offsets: Case 4



# Type III Exterior Walls – FRT

## **Type III and IV Construction - IBC Section 602.3:**

Fire-retardant-treated wood framing complying with Section 2303.2 shall be permitted within exterior wall assemblies of a 2-hour rating or less

What does this FRTW requirement include?

- » Wall Framing (Studs & Plates) – **Yes**
- » Wall Sheathing – **Yes**
- » Supporting Members at Vertical Offsets – **Typically No**



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## What are the fire-resistance rating (FRR) and material requirements for elements supporting vertical offsets in exterior walls?

Mid-rise, multi-family and mixed-used buildings are often designed as Type III or V light wood-frame structures. Sometimes architectural and aesthetic requirements result in exterior walls that do not align in a single plane from the foundation to the roof; these are vertical offsets.

Tables 601 and 602 in the 2018 IBC give fire-resistance rating (FRR) requirements for various building elements. For Types III and V, exterior wall ratings vary from 0 to 2 hours and floor construction may be 0, 0.5 or 1 hour, unless otherwise required for occupancy separation. Additionally, Type III construction requires that exterior walls be constructed of fire retardant-treated wood (FRTW) or noncombustible materials. When a building has a vertical offset that results in the exterior walls being discontinuous from the foundation to the roof, this can raise questions about the required FRR and fire-retardant treatment of the walls' supporting elements.

Looking at FRRs first, Section 704.1 states in part, "The fire-resistance ratings shall not be less than the ratings required for the fire-resistance-rated assemblies supported by the structural elements." In other words, any framing element that supports a discontinuous wall above needs to have an FRR not less than the FRR of that exterior wall. This rating requirement tracks through to the foundation.

Often, a discontinuous wall is supported by one or more beams within the floor system below (see Figures 1 and 2 below).

- If these beams are members of the primary structural frame



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# Exterior Wall – Bearing vs. Nonbearing

Non loading-bearing exterior walls may have lower fire resistance rating requirements than bearing walls in certain situations. IBC Chapter 2 defines load bearing walls as:

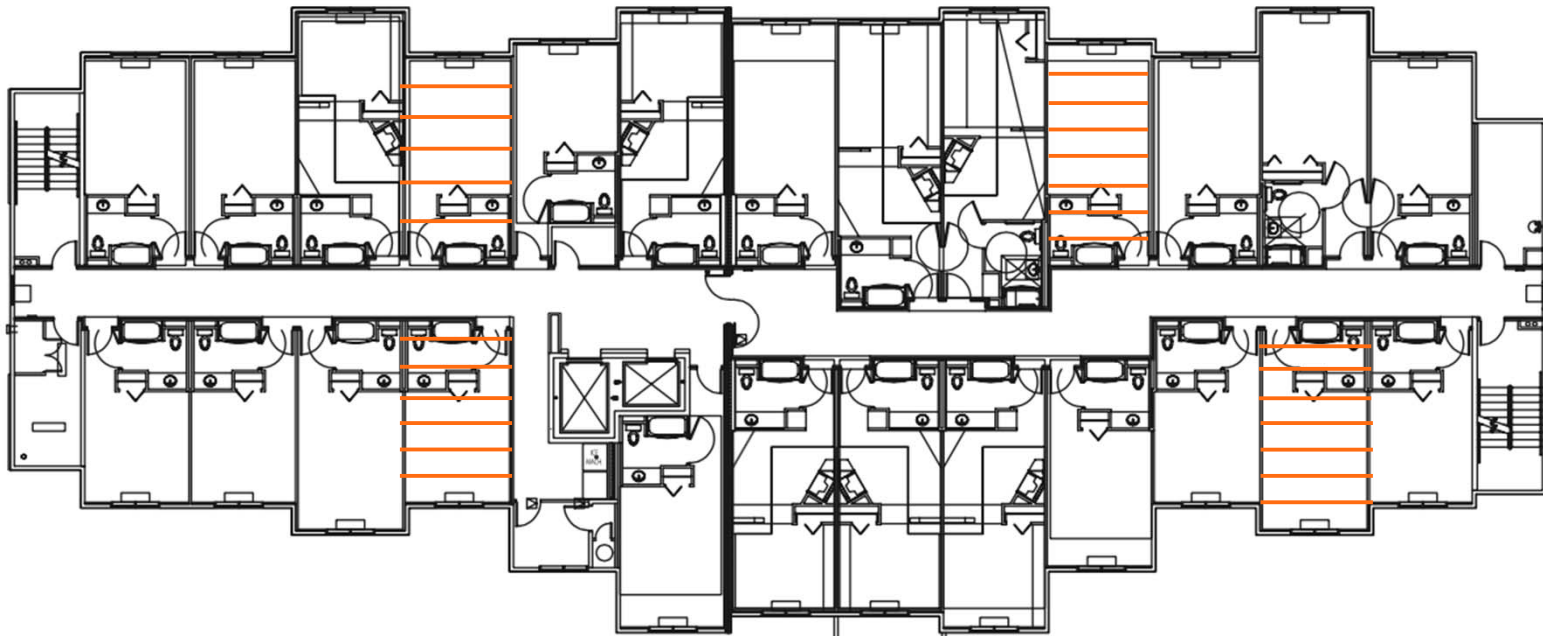
**[BS] WALL, LOAD-BEARING.** Any wall meeting either of the following classifications:

1. Any metal or wood stud wall that supports more than 100 pounds per linear foot (1459 N/m) of vertical load in addition to its own weight.

**[BS] WALL, NONLOAD-BEARING.** Any wall that is not a *load-bearing wall*.

# Exterior Walls – Bearing vs. Non-Bearing

If framing parallel to long exterior walls is possible, minimizes area of load bearing exterior walls



# Exterior Walls – Bearing vs. Non-Bearing

Utilization of structural beams in-board or directly over exterior walls can make walls non-bearing and reduce required fire resistance rating to 1-hr or 0-hr (IBC Table 602)

Note: Beams & Columns will most likely be considered “Primary Structural Frame” & require individual encasement per IBC 704

