



# Adding Value: Commonly Overlooked Areas for Wood Framing

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Rooftop Decks, Accessory Occupancies, Shafts, Stairs, & More

Momo Sun & Karen Gesa

# Rooftop decks

IBC 503.1

Many buildings are implementing occupiable roof top decks, either for individual use or as a gathering space

No current code sections clearly discuss this except for basic exit provisions but several design routes have been used

Typically these spaces do not have a roof and therefore aren't classified as stories per the definition of a story (IBC 202)



# Rooftop decks

IBC 503.1

## Occupied Roofs Code Development

**2012 IBC** section 1021 contains exit provisions for occupied roofs

**2015 IBC** clarified egress requirements for occupied roofs (IBC 1006.3)

**2018 IBC** further recognizes occupied roofs. 2018 IBC provisions:

302.1: Occupied roof classified as occupancy it most closely resembles

503.1.4: Permitted to be used as an occupied roof if the occupancy of the roof is an occupancy that is permitted by code for the story immediately below the roof. Area of the occupied roofs is not required to be included in the building area. Further exceptions for sprinklered buildings exist



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## Does an occupied rooftop/roof deck need to be included in allowable building size (height and area) calculations?

Occupied rooftops are becoming common in multi-family and commercial buildings as building designers and owners seek to increase marketability by offering amenities such as roof decks. In most cases, these roof decks are open and uncovered with half height walls/parapets around their perimeter. However, some or all of the roof deck space may also be enclosed by full height walls and a roof covering. In both scenarios, questions that often arise include whether the roof deck needs to be considered as a separate story and how the occupancy and area contribute when evaluating height and area requirements based on a specific construction type.

Code language regarding this topic continues to evolve. Under the 2012 and 2015 IBC, some feel that the relevant code provisions leave room for interpretation. As such, a design team may choose to consult with the Authority Having Jurisdiction (AHJ) regarding what he or she deems acceptable. Code changes set for inclusion in the 2018 IBC further clarify provisions on this topic (see below).

In the meantime, following is a summary of how designers in the U.S. have successfully implemented occupied roof decks in their projects without including them in the total



### Roof Decks without Roof Coverings

IBC 2012 Table 502 and IBC 2015 Table 504.4 provide limitations on allowable number of stories in a given building. However, per

<http://www.woodworks.org/ask-an-expert/>

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### Project Assistance

Our technical experts offer free project support from design through construction, on issues ranging from allowable heights and areas to structural design, lateral systems and fire- or acoustical-rated assemblies.

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### Ask an Expert

Q: When is blocking/bracing within wood-frame walls required? What is considered adequate bracing for wood wall studs in their weak axis?

A: Wood studs used in light-frame wall construction may require horizontally-oriented blocking for a number of reasons—including blocking at shear panel edges, fire blocking, and buckling restraint when subject to axial loads. Structural Blocking Purposes Blocking to Reduce Stud Slenderness Ratio Section 3

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### Feature Project



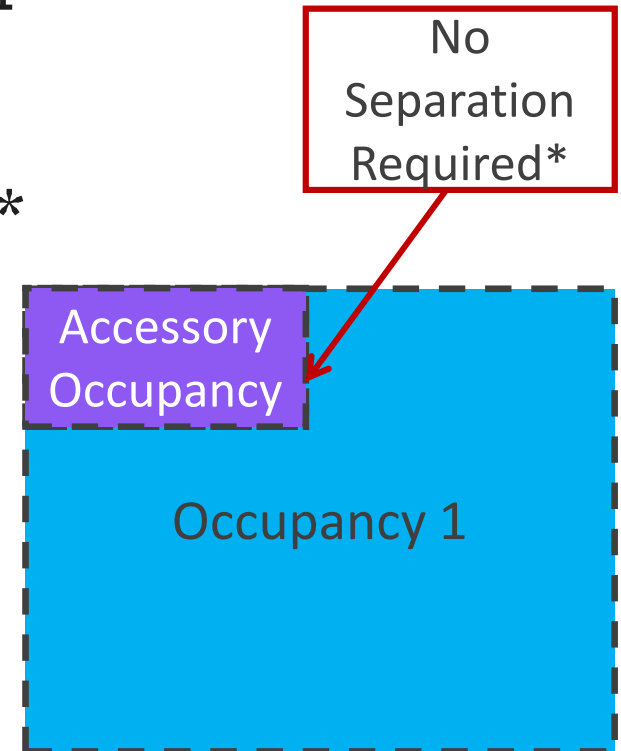
# Accessory occupancies

IBC 508.2

- Ancillary to the main occupancy
- Aggregate accessory area not greater than:
  - 10% of the main Occupancy on same floor
  - Table 503 non-increased Allowable Area limit of accessory occupancy
- No separation between occupancies required\*
- Allowable building area and height per main occupancy

\*Hazardous occupancies require separation

\*Residential separations per Section 420 still apply



# Accessory occupancies

## Accessory occupancies Example:

IBC 508.2

- Unsprinklered, 1 story, type VA building
- Factory (f-1) 9,600 sf
- Two office (b) spaces: 400 sf and 800 sf
- Table 503: allowable area = 14,000 sf
- Total floor area = 10,800 sf < 14,000 sf ok
- Aggregate Accessory use areas = 1,200 sf
- Max. allowable aggregate accessory use area =  $10,800 \times 0.10 = 1,080$  sf
- Does not work as accessory occupancies
- Solution: reduce office area, increase factory area or use mixed-use occupancies



# Small assembly spaces

IBC 303.1.1 & 303.1.2

## Small assembly spaces:

- A building or tenant space used for assembly purposes with an occupant load of less than 50 persons shall be classified as a Group B occupancy.

Example: small cafe

## Small assembly spaces accessory to other occupancies:

- Occupant load less than 50 persons or less than 750 sf in area - can be classified as a Group B occupancy or as part of main occupancy

Examples:

- Conference room in office building
- Fitness center in hotel





# Assembly spaces in educational facilities

IBC 303.1.3

## Educational facilities:

- A room or space used for assembly purposes that is associated with a Group E occupancy is not considered a separate occupancy.

Examples: gymnasium used for school sports; cafeteria used for school meals





# Special provisions

IBC 510.4

## Parking beneath Group R

- Unique application similar to podium provision but more flexibility



# Special provisions

IBC 510.4

## Parking beneath Group R

Single story above grade, S-2 parking:

- Type I (enclosed or open) or
- Type IV (open)

Group R occupancy above

- # of stories measured from floor above parking
- Floor separating parking & group R:
  - Same construction type as parking
  - Hourly rating per table 508.4



# Parking beneath Group R

# Special provisions

IBC 510.4

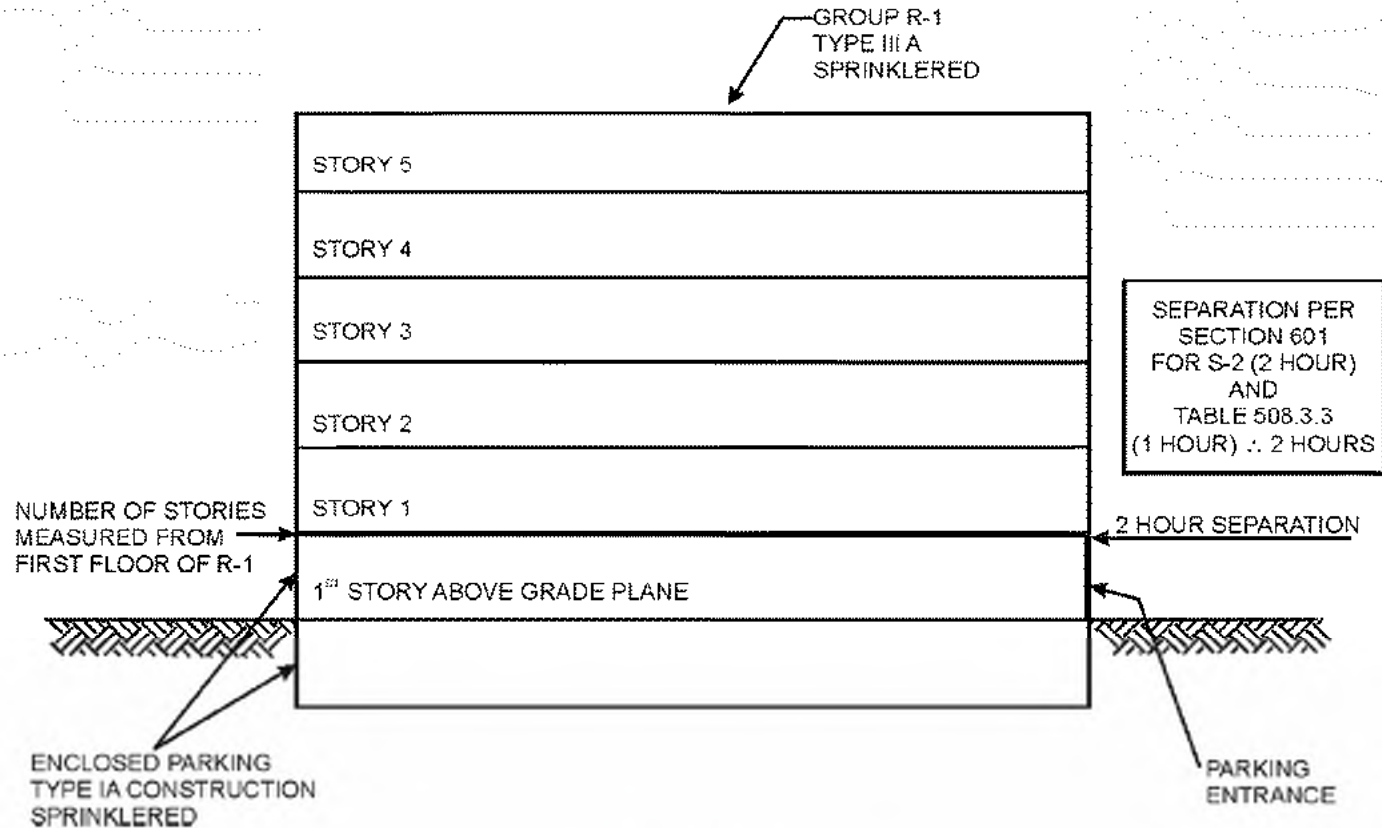


Figure 510.4  
EXAMPLE R-1 OVER ENCLOSED PARKING

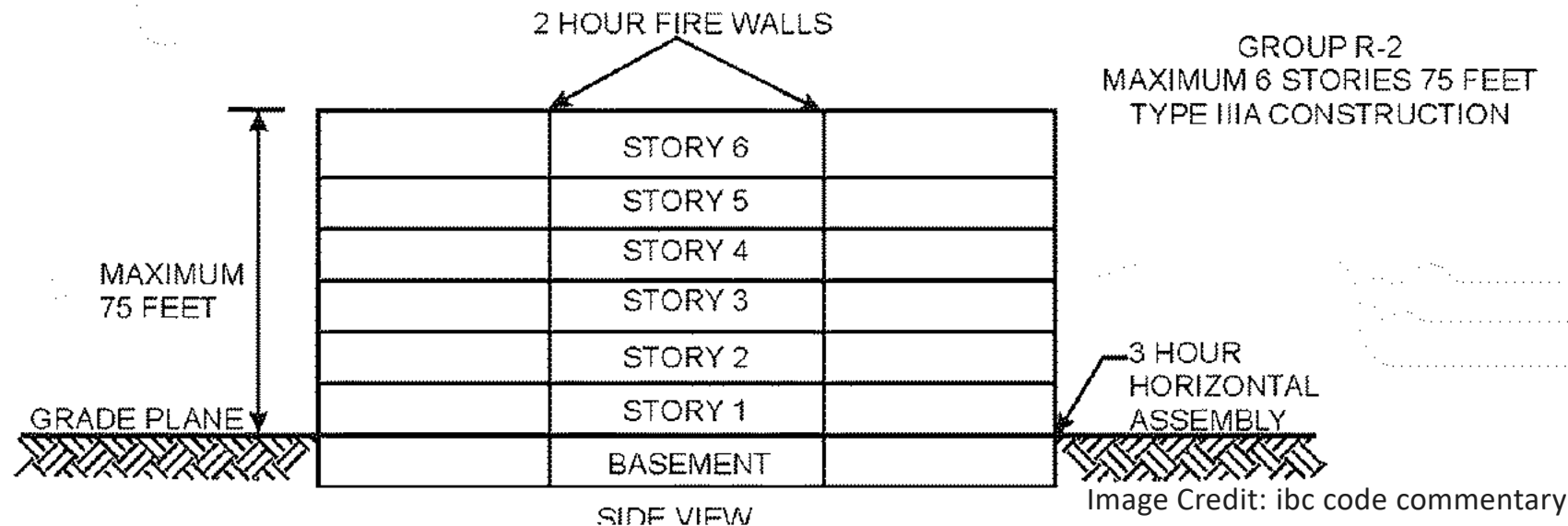
Image Credit: ibc code commentary

# Special provisions

## Group R-1 & R-2, Type IIIa buildings

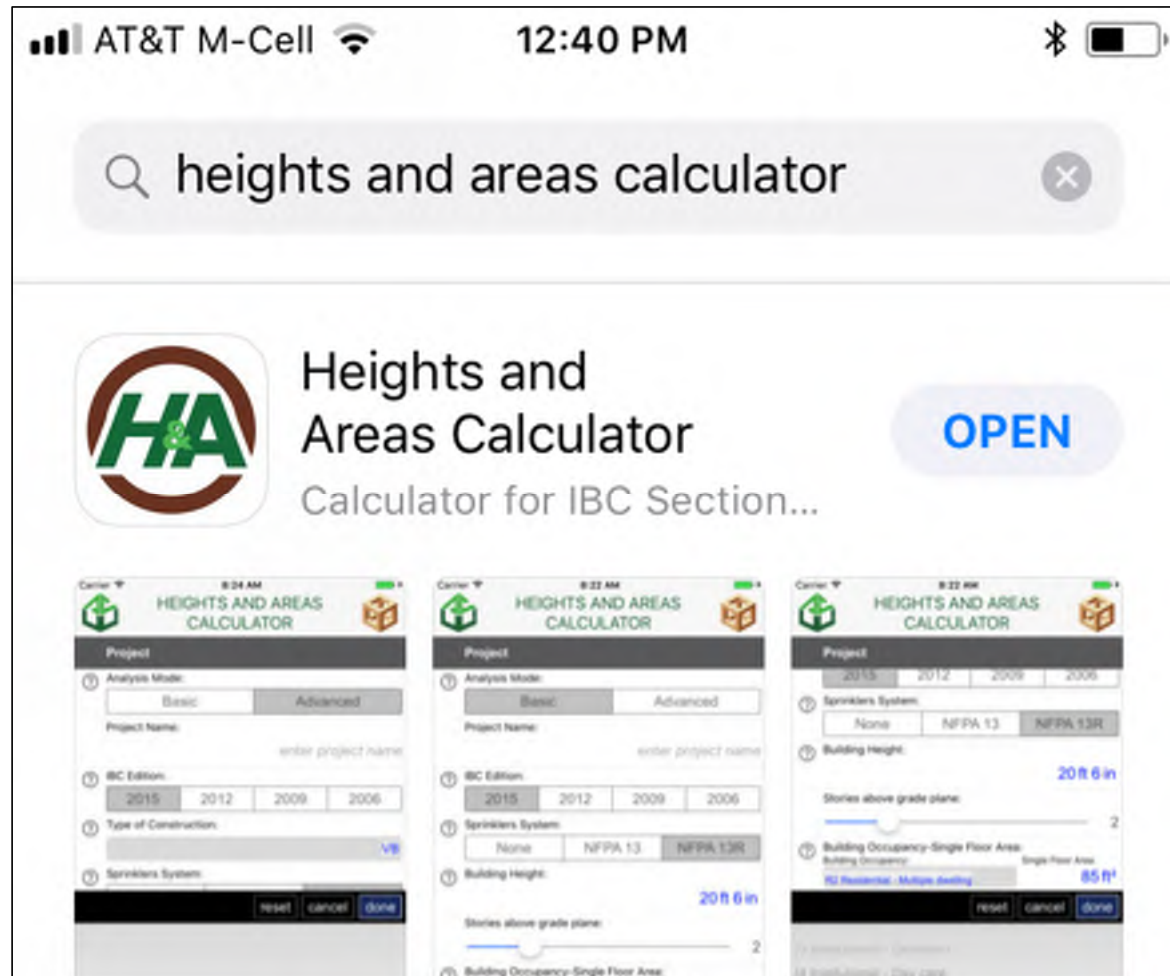
IBC 510.5

- Height limitation increased to 6 stories & 75 ft
- First floor assembly above the basement has a fire-resistance rating of not less than 3 hours
- Floor area is subdivided by 2-hour fire-resistance-rated fire walls into areas of not more than 3,000 square feet





## WoodWorks/AWC H&A Calculator



<https://www.awc.org/codes-standards/calculators-software/heights-areas>

# Stair, Elevator & MEP Shafts

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If the building can be framed with wood, the shafts can be framed with wood.



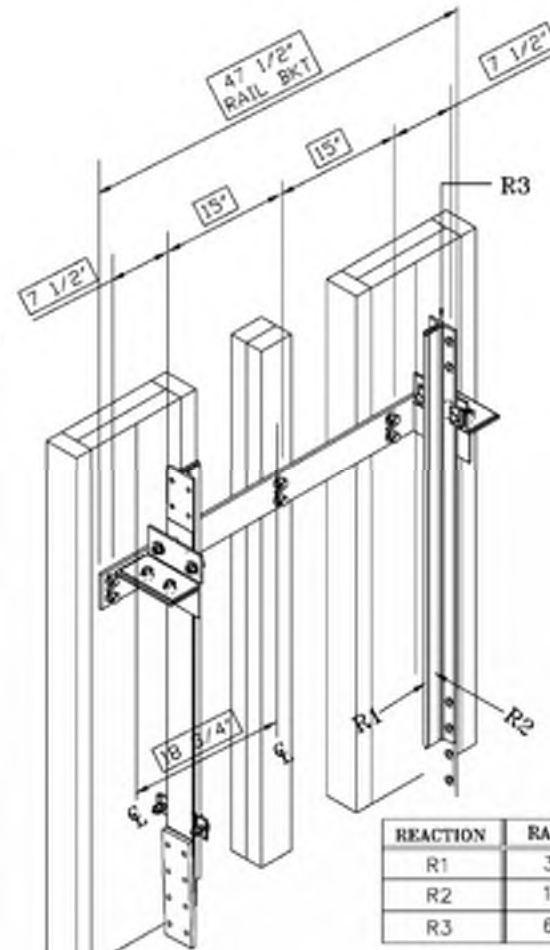
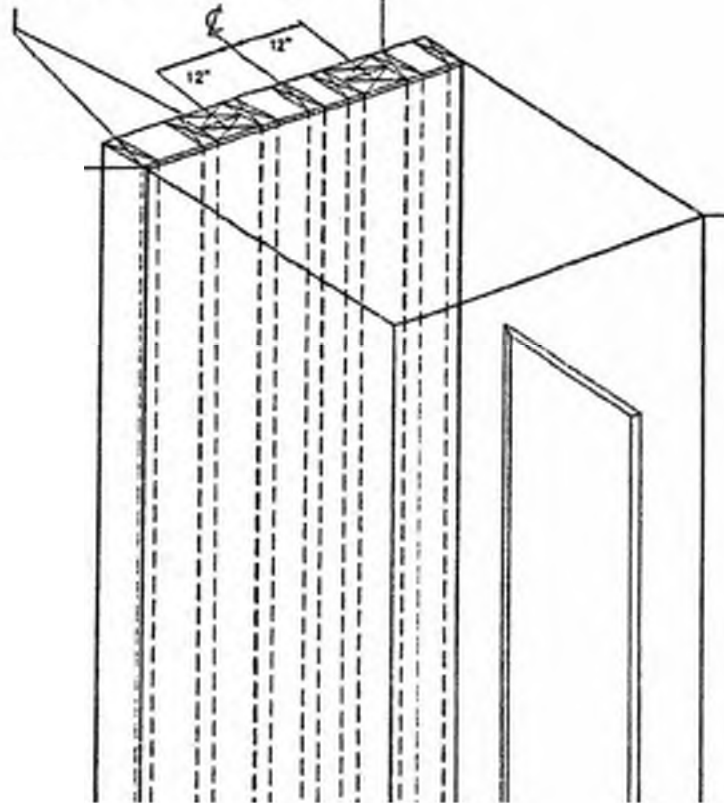
# Elevator Shafts

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# Elevator Shafts

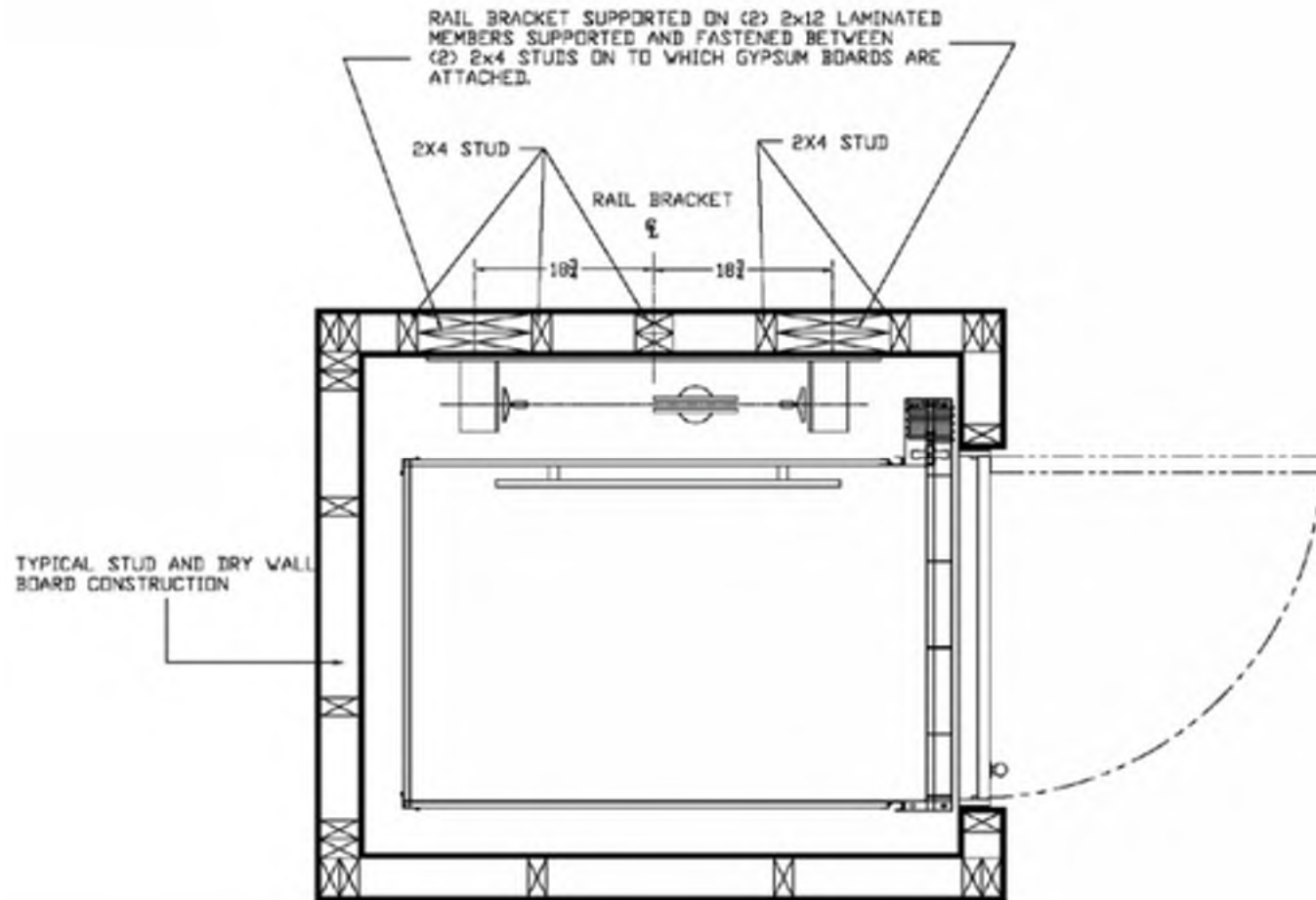
(2) 2 X 12'S LAMINATED, SUPPORTED AND FASTENED BETWEEN (2) 2 X 4'S BEHIND GYPSUM BOARD, IN (2) PLACES AS SHOWN, FOR SUPPORTING RAIL BRACKETS



REACTION	RAIL FORCES
R1	304 LBS
R2	194 LBS
R3	6400 LBS

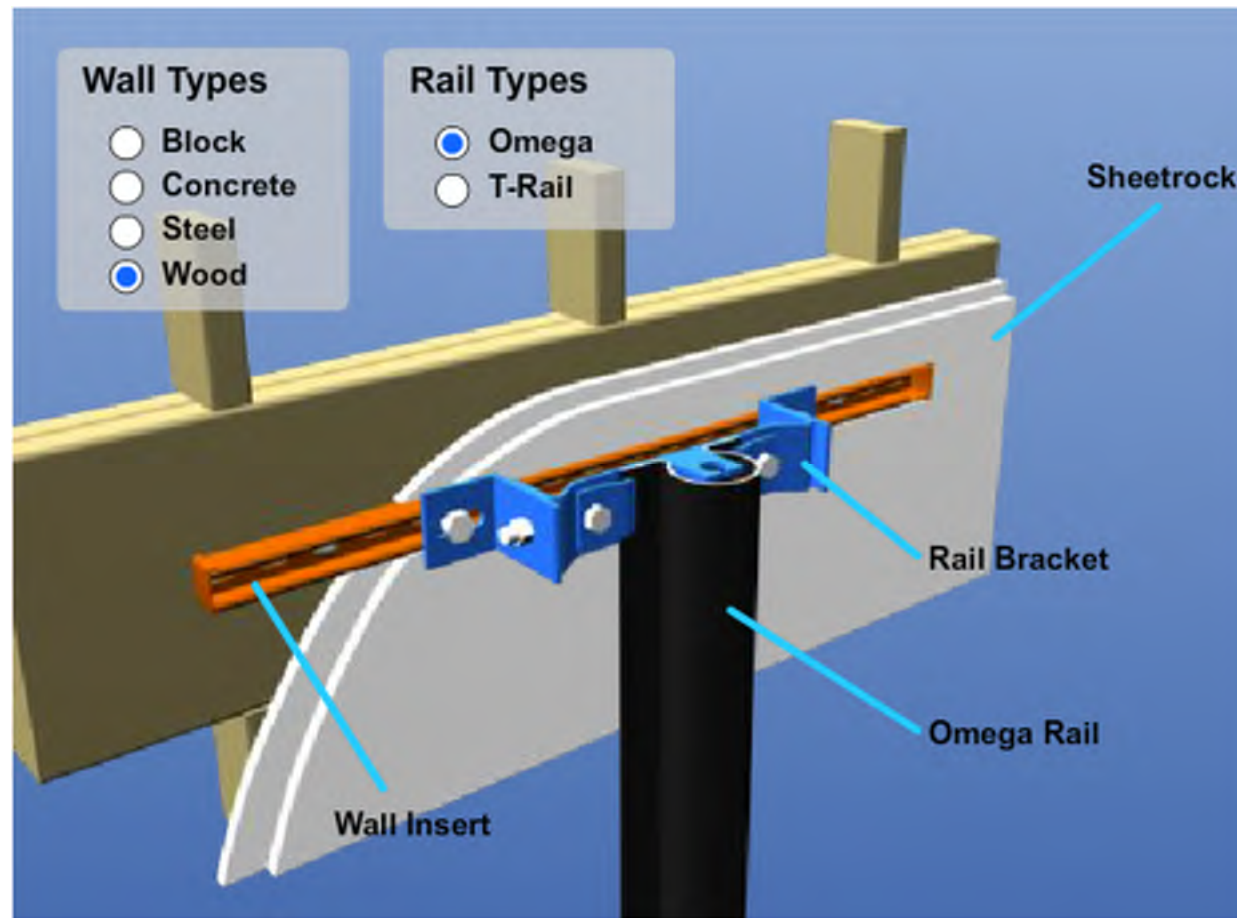


# Elevator Shafts



# Elevator Shafts

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## Shaft Wall Savings – Case Study

### Switch to Wood Framed Shaft Walls Saves Project \$176,000

- Gala at Oakcrest, Euless, TX
- 4 Story, 135,000 sf multi-family building
- 2 Elevator Shafts, 3 Stair Shafts, all originally designed in masonry – project was otherwise all wood framed
- Initial estimates were total of \$266,000 for all 5 shafts
- Team switched to wood shafts, cut \$176,000 from cost and at least 3 weeks from schedule

Source: Gardner Capital Construction, project General Contractor & Developer

# Stair Construction

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**2018 IBC 1011.7 states:**

**1011.7 Stairway construction.**

*Stairways shall be built of materials consistent with the types permitted for the type of construction of the building, except that wood handrails shall be permitted for all types of construction.*

**Commentary:**

*...Any structure supporting the stairway and the stairway enclosure must be fire-resistance rated consistent with the construction type; however, the stairway components inside the enclosure need only comply with the material limits for the type of construction."*



# Wood Within Podium Level(s)

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Credit: WoodWorks

## 2018 IBC 510.2:

“The building below the horizontal assembly is of Type IA construction.”

## 2021 IBC 510.2:

“Interior exit stairways located within the Type IA building are permitted to be of combustible materials where the following requirements are met:..”

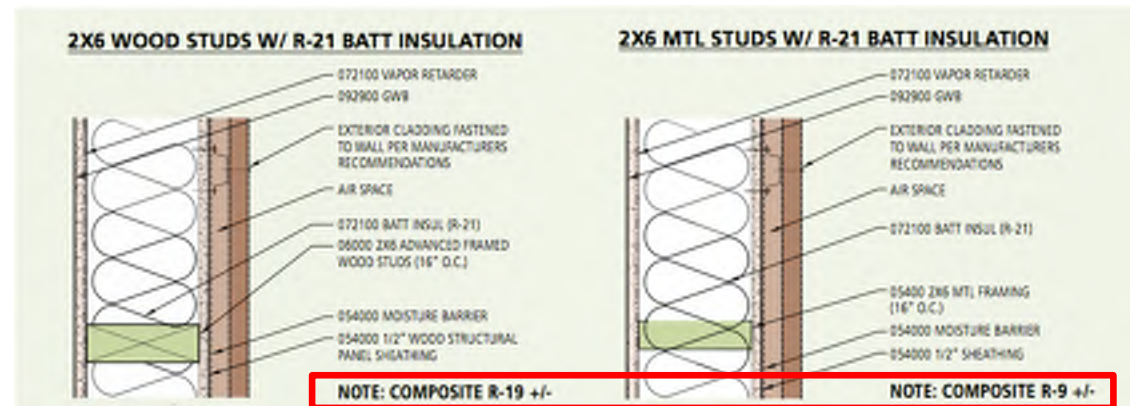
# Wood Within Podium Level(s)



Credit: WoodWorks

FRTW is permitted in non-bearing, non-rated exterior walls in types I & II (IBC 603.1)

Thermal/building envelope benefits, as well as consistent exterior wall detailing



Source: Mahlum Architects



# Questions?

This concludes The American Institute of Architects Continuing Education Systems Course

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