Mid-Rise Wood Construction

Navigating Codes and Detailing Assemblies

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CODE RED CONSULTANTS

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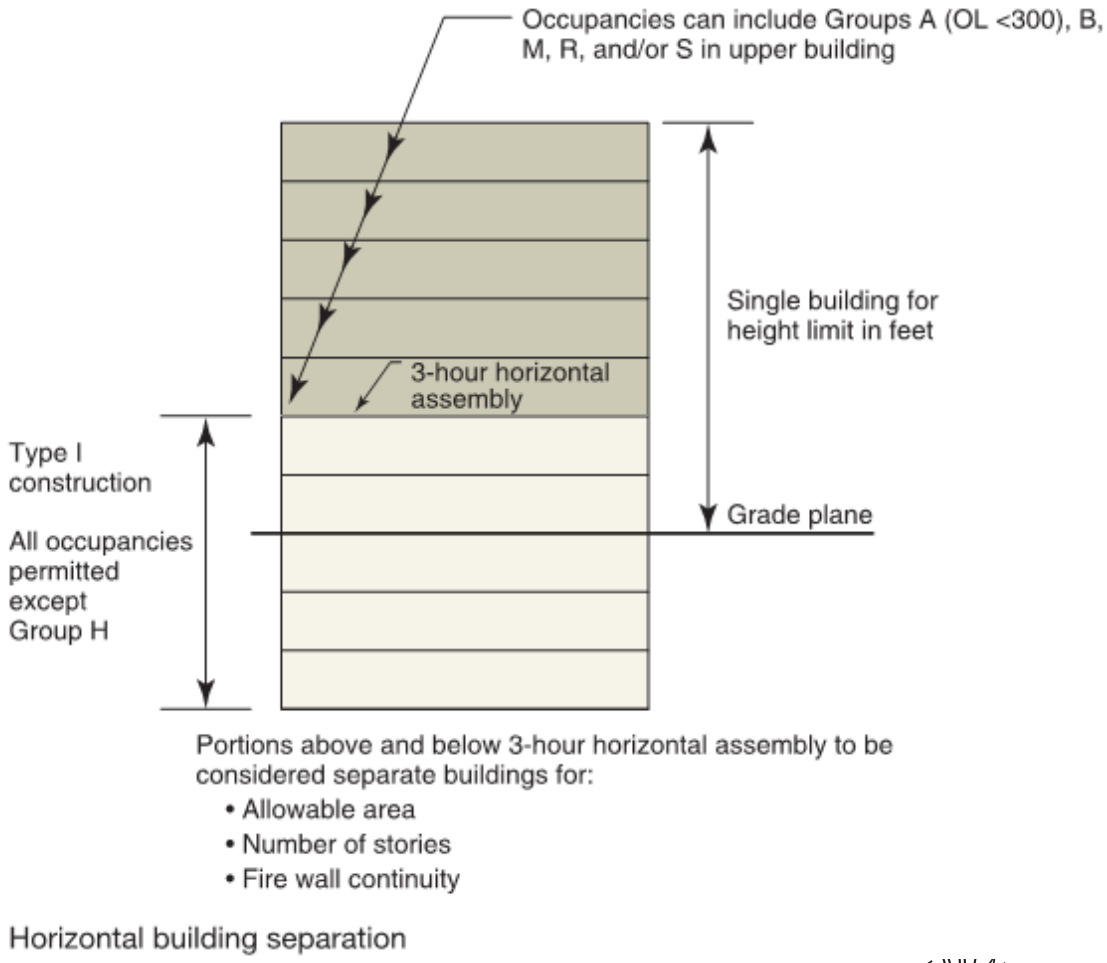
General Code

Podium Code Basics

- Under 2015 IBC, multiple stories are now allowed below 3-hr podium per Section 510.2. Construction below podium is Type IA construction.

- Wood mid-rise podium construction is typically either Type IIIA (5 stories) or Type VA (4 stories). *Note that it is possible to have a high-rise wood "mid-rise" Construction Type III building. T-504.3 allows for Type IIIA Group R occupancy to be 85' above Grade Plane.*

- 602.3 requires that Type III exterior walls are non-combustible. Fire-retardant treated wood framing is permitted.



Horizontal building separation

Podium Code Basics

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TABLE 504.3[a]
ALLOWABLE BUILDING HEIGHT IN FEET ABOVE GRADE PLANE

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
A, B, E, F, M, S, U	NS[b]	UL	160	65	55	65	55	65	50	40
	S	UL	180	85	75	85	75	85	70	60
H-1, H-2, H-3, H-5	NS[c,d]	UL	160	65	55	65	55	65	50	40
	S									
H-4	NS[c,d]	UL	160	65	55	65	55	65	50	40
	S	UL	180	85	75	85	75	85	70	60
I-1 Condition 1, I-3	NS[d,e]	UL	160	65	55	65	55	65	50	40
	S	UL	180	85	75	85	75	85	70	60
I-1 Condition 2, I-2	NS[b,d,e]	UL	160	65	55	65	55	65	50	40
	S	UL	180	85						
I-4	NS[d,e]	UL	160	65	55	65	55	65	50	40
	S	UL	180	85	75	85	75	85	70	60
R	NS[d,e]	UL	160	65	55	65	55	65	50	40
	S13R	60	60	60	60	60	60	60	60	60
	S	UL	180	85	75	85	75	85	70	60

TABLE 504.4[a,b]—continued
ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
R-1	NS[d,e]	UL	11	4	4	4	4	4	3	2
	S13R	4	4						4	3
	S	UL	12	5	5	5	5	5	4	3
R-2	NS[d,e]	UL	11	4	4	4	4	4	3	2
	S13R	4	4	4					4	3
	S	UL	12	5	5	5	5	5	4	3
R-3	NS[d,e]	UL	11	4	4	4	4	4	3	3
	S13R	4	4						4	4
	S	UL	12	5	5	5	5	5	4	4
R-4	NS[d,e]	UL	11	4	4	4	4	4	3	2
	S13R	4	4						4	3
	S	UL	12	5	5	5	5	5	4	3
S-1	NS	UL	11	4	2	3	2	4	3	1
	S	UL	12	5	3	4	3	5	4	2
S-2	NS	UL	11	5	3	4	3	4	4	2
	S	UL	12	6	4	5	4	5	5	3
U	NS	UL	5	4	2	3	2	4	2	1
	S	UL	6	5	3	4	3	5	3	2

Podium Code Basics

- Under 2015 IBC, multiple stories are now allowed below 3-hr podium per Section 510.2. Construction below podium is Type IA construction.

- Wood mid-rise podium construction is typically either Type IIIA (5 stories) or Type VA (4 stories). *Note that it is possible to have a high-rise wood "mid-rise" Construction Type III building. T-504.3 allows for Type IIIA Group R occupancy to be 85' above Grade Plane.*

- 602.3 requires that Type III exterior walls are non-combustible. Fire-retardant treated wood framing is permitted.

CHAPTER 6

TYPES OF CONSTRUCTION

SECTION 601
GENERAL

601.1 Scope. The provisions of this chapter shall control the classification of buildings as to type of construction.

SECTION 602
CONSTRUCTION CLASSIFICATION

602.1 General. Buildings and structures erected or to be erected, altered or extended in height or area shall be classified in one of the five construction types defined in Sections 602.2 through 602.5. The building elements shall have a *fire-resistance rating* not less than that specified in Table 601 and exterior walls shall have a *fire-resistance rating* not less than that specified in Table 602. Where required to have a *fire-resistance rating* by Table 601, building elements shall comply with the applicable provisions of Section 703.2. The protection of openings, ducts and air transfer openings in building elements shall not be required unless required by other provisions of this code.

602.1.1 Minimum requirements. A building or portion thereof shall not be required to conform to the details of a type of construction higher than that type which meets the minimum requirements based on occupancy even though certain features of such a building actually conform to a higher type of construction.

602.2 Types I and II. Types I and II construction are those types of construction in which the building elements listed in Table 601 are of noncombustible materials, except as permitted in Section 603 and elsewhere in this code.

602.3 Type III. Type III construction is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of any material permitted by this code. *Fire-retardant-treated wood* framing complying with Section 2303.2 shall be permitted within *exterior wall* assemblies of a 2-hour rating or less.

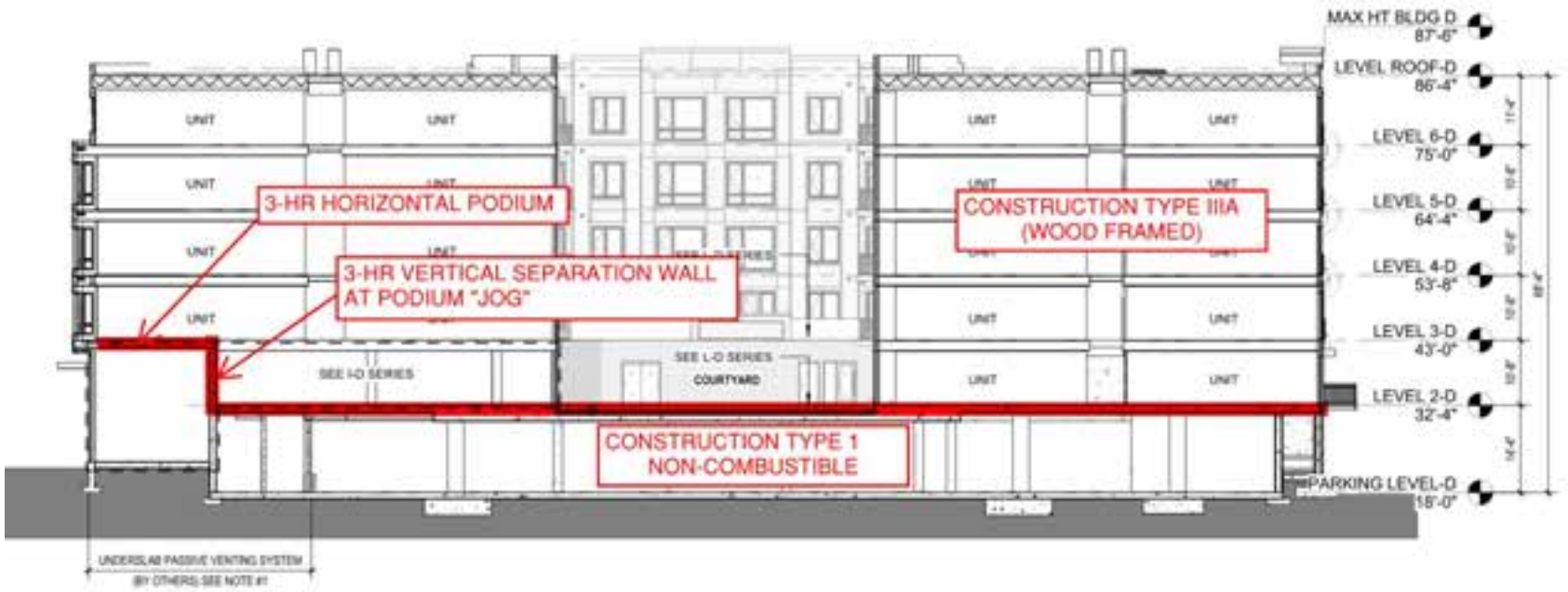
602.4 Type IV. Type IV construction (Heavy Timber, HT) is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of solid or laminated wood without concealed spaces. The details of Type IV construction shall comply with the provisions of this section and Section 2304.11. Exterior walls complying with Section 602.4.1 or 602.4.2 shall be permitted. Minimum solid sawn nominal dimensions are required for structures built using Type IV construction (HT). For glued-laminated members and structural composite lumber (SCL) members, the equivalent net finished width and depths corresponding to the minimum nominal width and depths of solid sawn lumber are required as specified in Table 602.4. *Cross-laminated timber* (CLT) dimensions used in this section are actual dimensions.

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[f] (see Section 202)	3[b]	2[b]	1	0	1	0	HT	1	0
Bearing walls Exterior[c,f] Interior	3 3[b]	2 2[b]	1 1	0 0	2 1	2 0	2 1/HT	1 1	0 0
Nonbearing walls and partitions Exterior	See Table 602								
Nonbearing walls and partitions Interior[d]	0	0	0	0	0	0	See Section 602.4.6	0	0
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)	1½[b]	1[b,e]	1[b,e]	0[e]	1[b,e]	0	HT	1[b,e]	0

Podium Construction – Bump Ups

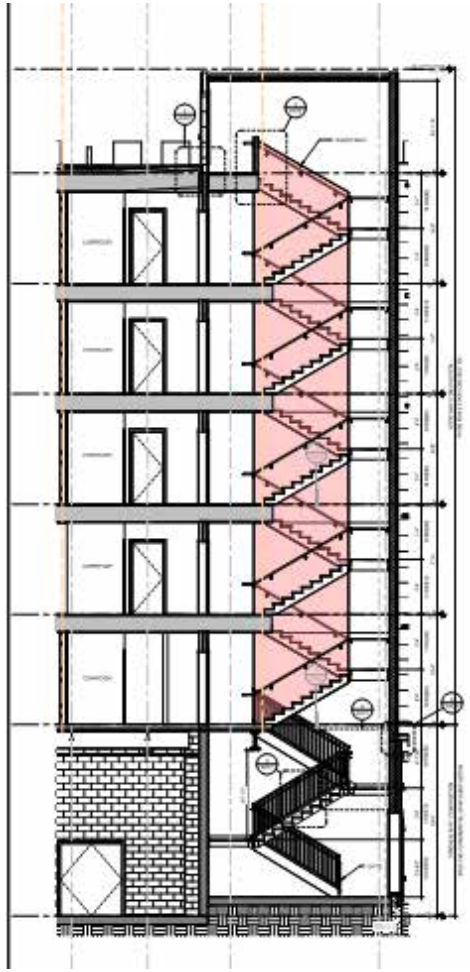
- To maintain separation, jog 3-hr fire ratings at up- and down-turns. Vertical wall is often termed “Vertical Separation Wall”



Podium Construction – Stairs

- What material is allowed for stairs that span both construction types?
- Safe bet pre-2021 IBC is wood above podium; non-combustible construction below. Some AHJs have allowed wood throughout.
- 2021 IBC will have changes to allow it more prescriptively

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.



Combustible Facades & NFPA 285

- Type III exterior walls of certain heights require NFPA 285 testing when they include foam plastic insulation, combustible facades, or combustible AVBs

- Prior test standard did not accommodate FRT wood-framed backup walls, which are allowed by building code – there was a gap. The standard has been recently revised.

5.7 Construction Details of Test Specimen.

***N* 5.7.1 General.**

5.7.1.1 The test specimen shall be constructed and secured to the test frame or apparatus using fastening and construction details representative of actual field installations in accordance with the manufacturer's instructions.

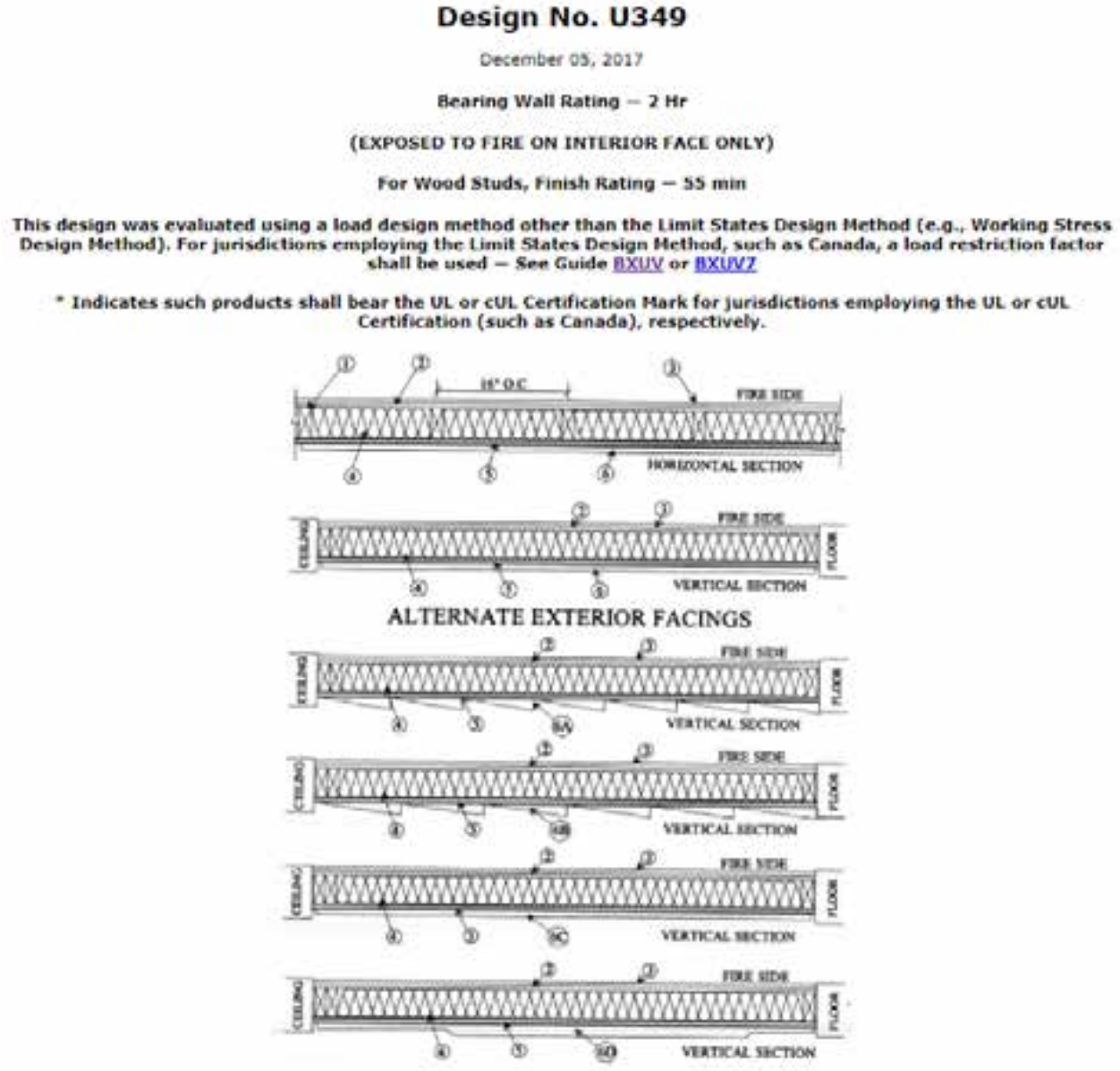
5.7.1.2* Details of the construction of the test specimen shall be representative of actual field installations in accordance with the manufacturer's instructions.

5.7.1.3* The framing system used to support the wall assembly that makes up the test specimen shall consist of steel studs or wood studs.

Assemblies & Details

Loadbearing Exterior Walls

- 2-hour Load Bearing Exterior Wall
  - UL W408 (*FSD)
  - UL U349 (*FSD)



Design No. U349

December 05, 2017

Bearing Wall Rating — 2 Hr

(EXPOSED TO FIRE ON INTERIOR FACE ONLY)

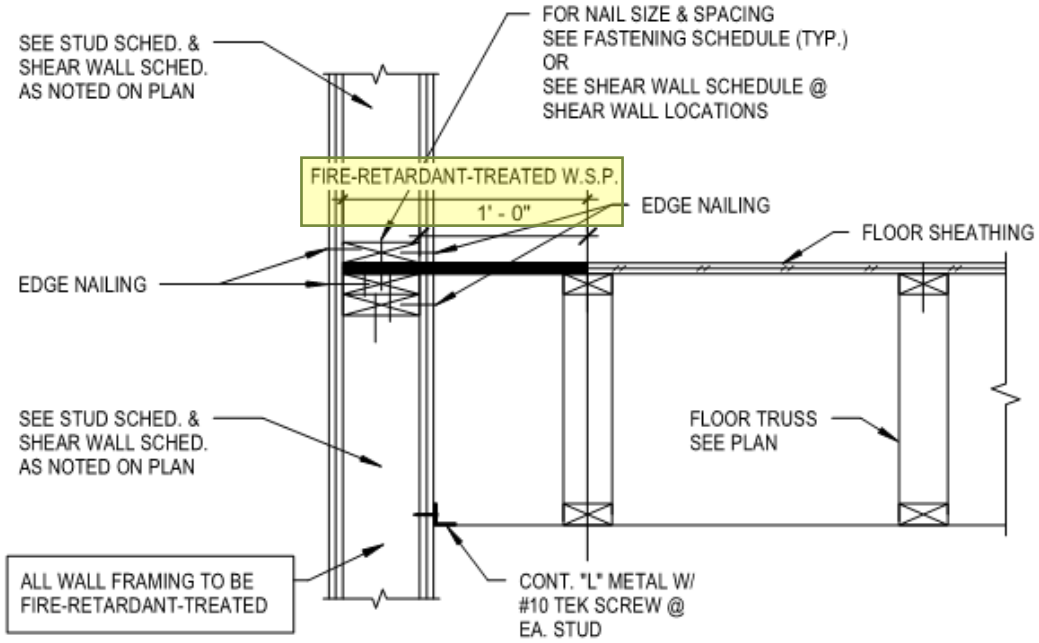
For Wood Studs, Finish Rating — 55 min

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.**

ALTERNATE EXTERIOR FACINGS

Floors Framing into Exterior Walls

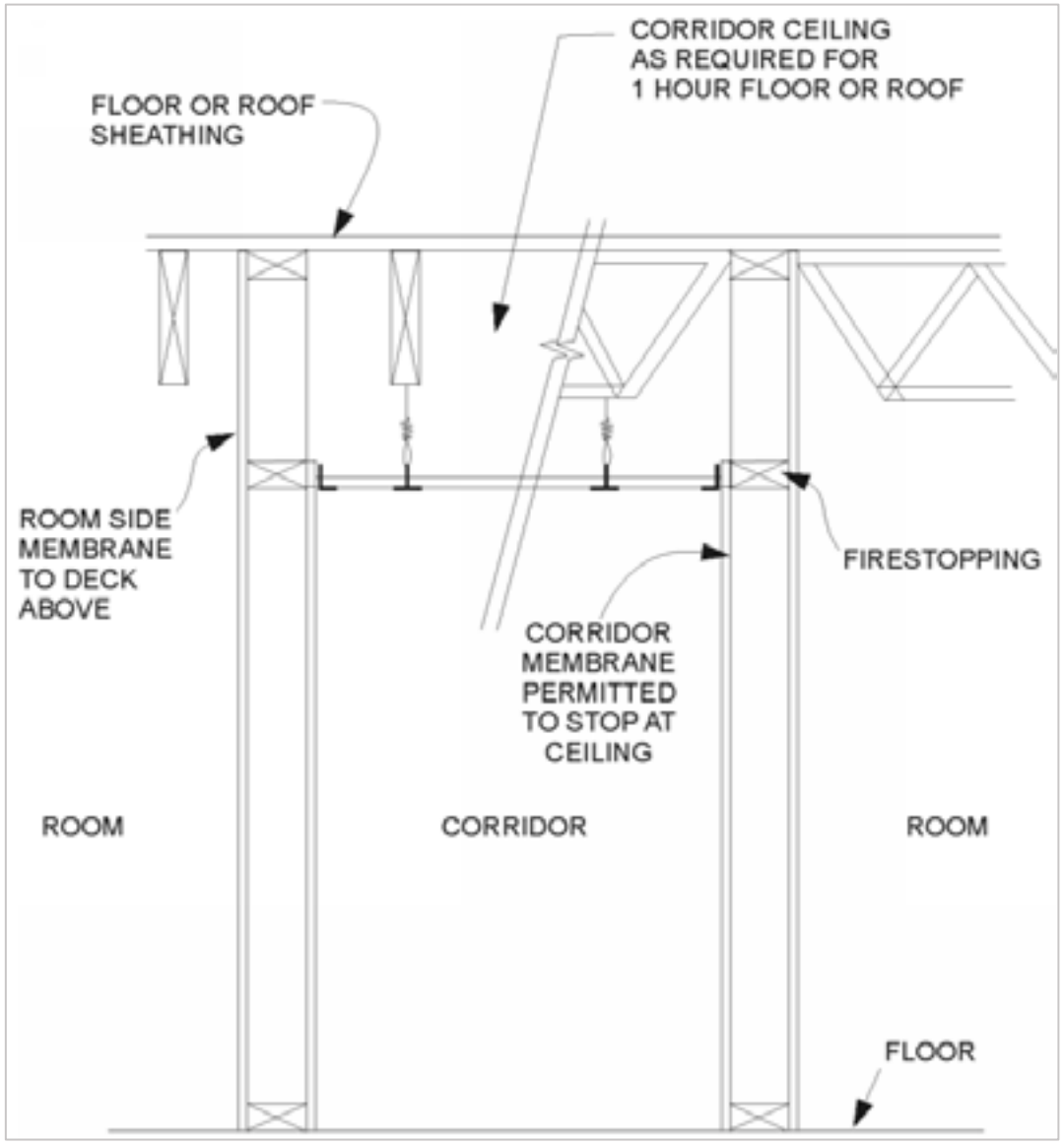


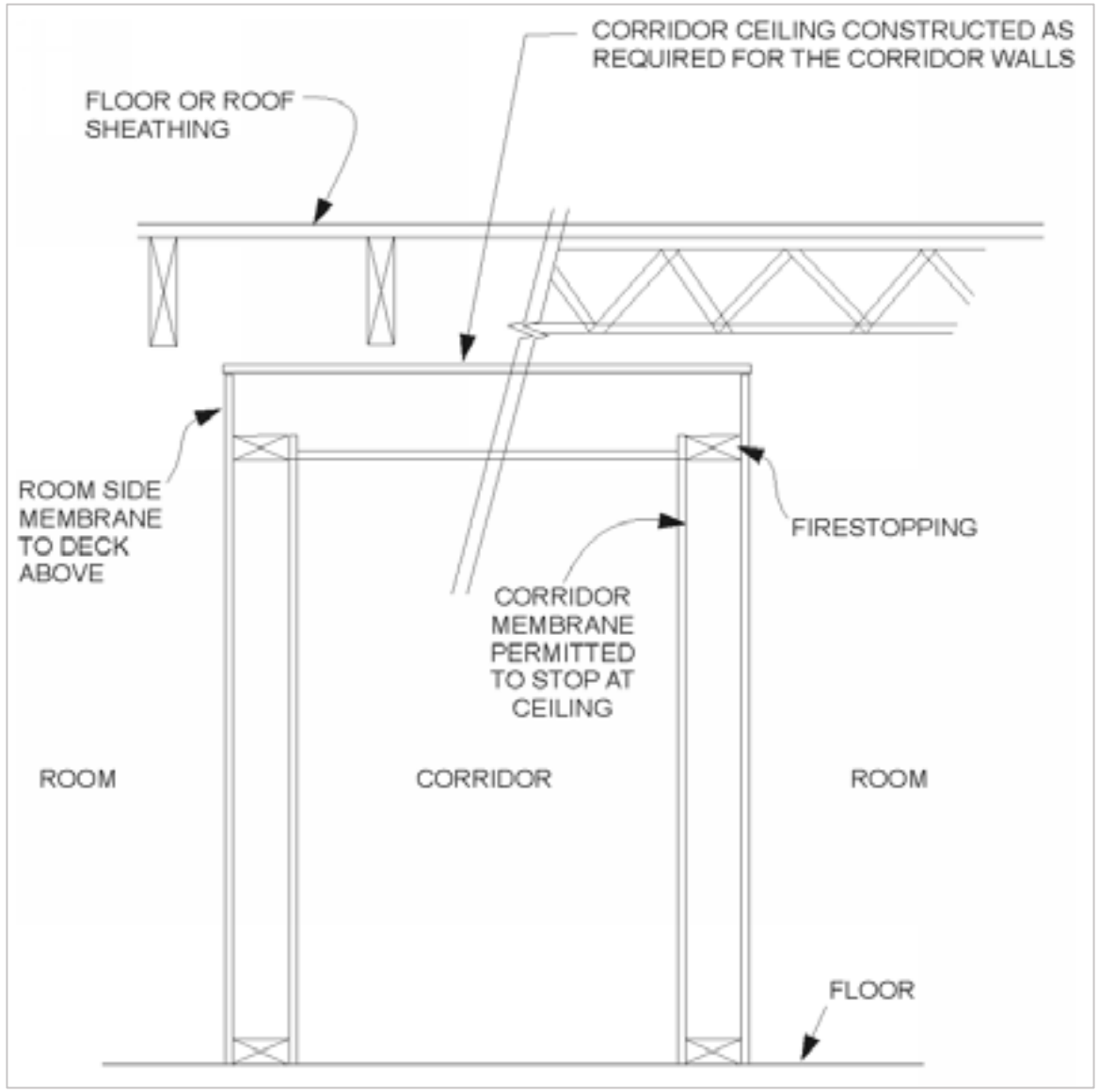
602.3 Type III. Type III construction is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of any material permitted by this code. *Fire-retardant-treated wood* framing complying with Section 2303.2 shall be permitted within *exterior wall* assemblies of a 2-hour rating or less.

Corridor Walls

- Interior bearing walls and floor-ceiling assemblies required to be 1-hr under Type IIIA and VA.
  Note exceptions to IBC 708.4.

Corridor Walls

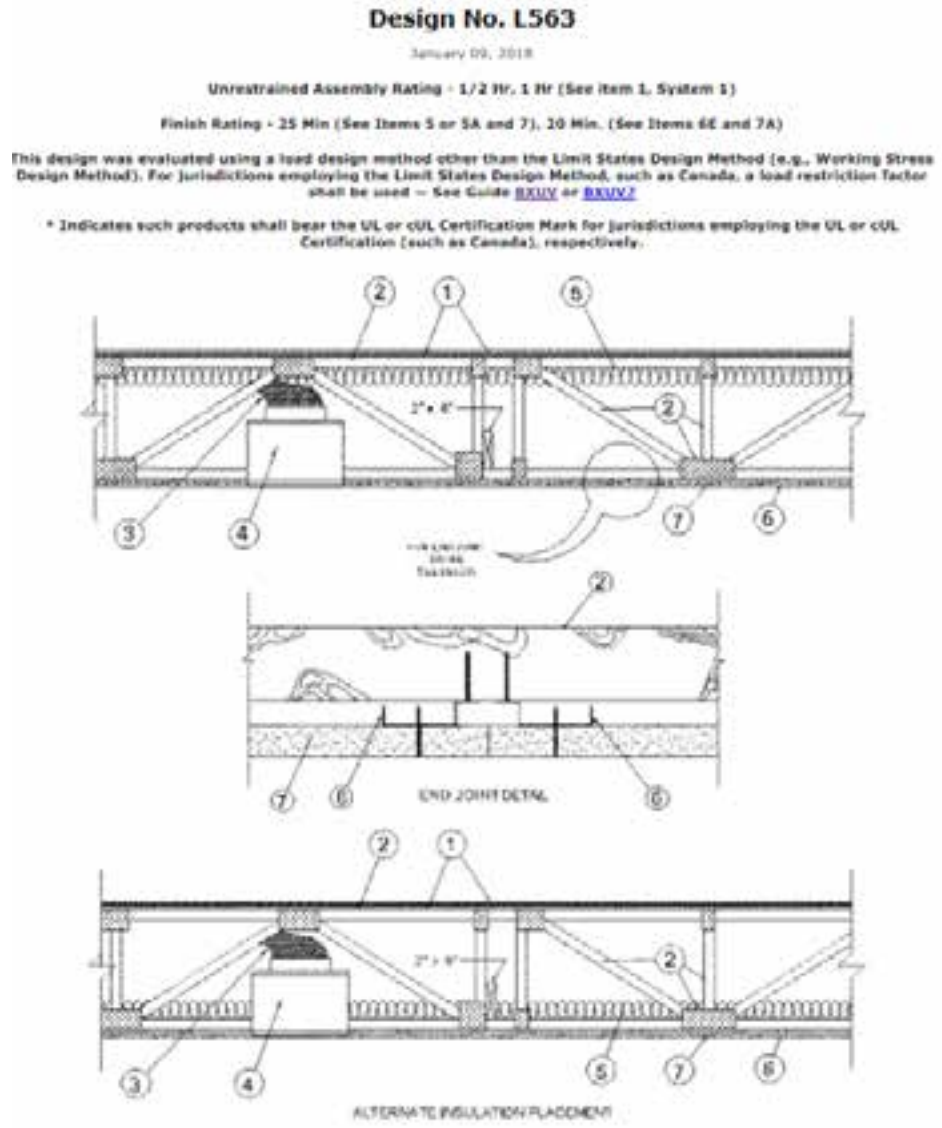




Interior Wall / Floor Intersections

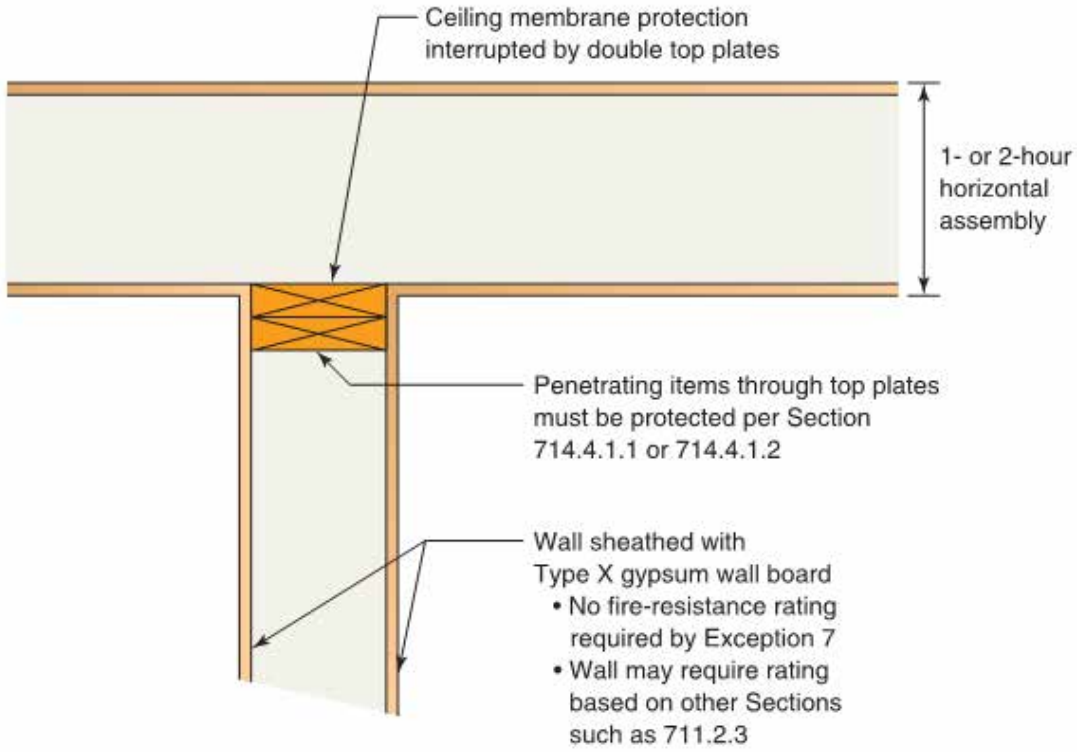
- Demising Walls
  - UL U341

- 1-hour Floors
  - UL L563, System 2 (gypcrete)
  - UL L529, System 1 (no gypcrete)
  - UL L579, System 3 & 5 (gyp/mat)



Interior Wall / Floor Intersections

- **Ceiling Membrane Interruption**
- New to 2015 IBC: Exception 7 to §714.4.2
  - The ceiling membrane of 1- and 2-hour fire-resistance-rated horizontal assemblies 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 714.1.1 or 714.4.1.2 and the ceiling membrane is tight to the top plates



Ceiling membrane interrupted by wall top plates

Interior Wall / Floor Intersections

- **Floor System Interruption**

Design No. L529

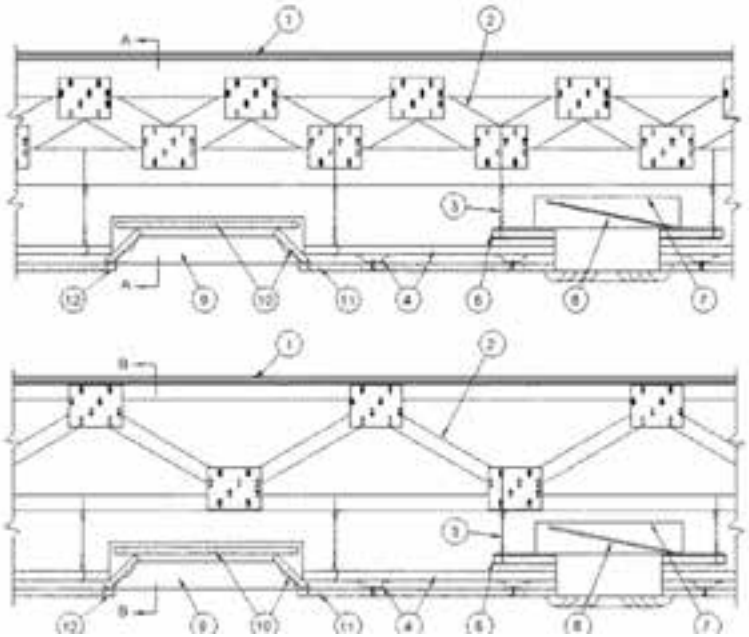
January 08, 2018

Unrestrained Assembly Rating - 1 Hr.

Finish Rating - 22 Min.

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.**



1. **Flooring System** — The flooring system shall consist of one of the following:

System No. 1

Subflooring — Min 23/32 in. thick T & G wood structural panels, min grade "Underlayment" or "Single-Floor". Face grain of plywood or strength axis of panels to be perpendicular to the trusses with end joints staggered 4 ft. Panels secured to trusses with construction adhesive and No. 6d ringed shank nails spaced 12 in. OC along each truss. Adhesive applied as 3/8 in. diam bead to top chord of trusses and grooved edges of plywood or panels.

Fire Safety During Construction

Minimum Compliance No Longer Cutting It

- Site superintendent responsible for fire safety
- Zero detection until FD F/A test
- Zero suppression until C of O
- One dry manual standpipe
- Stockpiling of combustibles
- Stair installation when subs are coordinated
- Dumpsters near buildings with non-FRT trash chutes
- Phased occupancy

Features for Consideration

- Strong NFPA 241 Plan
- Fire Protection Program Manager (FPPM)
- Passive barriers complete with rated doors installed
- Wireless detection and monitoring
- Onsite security with training and education
- Infrared scanning after hotwork
- Active suppression during construction with central station monitoring

QUESTIONS?

This concludes The American Institute of Architects Continuing Education Systems Course

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