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ADM48-25 Part II

IBC: 1705.21 (New), TABLE 1705.21 (New)

Proponents: Theresa Weston, The Holt Weston Consultancy, representing Air Barrier Association of America (ABAA) (holtweston88@gmail.com)

2024 International Building Code

Add new text as follows:

1705.21 Water-resistive barrier installation. Where required by the *building official*, a special inspection shall be conducted for the installation of the *water-resistive barrier* and the intersection of the water-resistive barrier with flashing in accordance with Sections 1704.2 and Table 1705.21. A statement of special inspections shall be included in the construction documents and shall include the proposed inspection schedule, the list of inspection items, and inspection documentation to be provided. The periodic inspection shall be conducted during construction while the water-resistive barrier is still accessible for inspection and repair.

TABLE 1705.21 REQUIRED SPECIAL INSPECTIONS FOR WATER-RESISTIVE BARRIER INSTALLATION

WATER-RESISTIVE BARRIER TYPE	INSPECTION ITEM	
All water-resistive barriers	Verify the water-resistive barrier is continuous to the top of walls.	
	Verify the water-resistive barrier is integrated with flashing installed at wall and roof intersections as described in section 1503.2.	
	Verify the water-resistive barrier is terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section 1402.2 and is integrated with flashings in accordance with Section 1404.4	
Applicable to specific types of water-resistive barriers.	No 15 felt, and water-resistive barriers complying with ASTM E2556	Verify the water-resistive barrier is applied shingle fashion with the upper layer lapped over the lower layer not less than 2 inches (51 mm).
		Verify vertical joints in the water-resistive barrier sheets are lapped not less than 6 inches (152 mm)
	Foam plastic insulating sheathing water-resistive barriers systems	Verify installation in accordance with manufacturer's installation instructions.
	Water-resistive barrier approved through ASTM E331 testing in accordance with Section 1402.2	Verify installation is in accordance with the installation specified in the testing report.
	Water-resistive barriers approved as alternative materials	Verify the water-resistive barrier is installed in accordance with the manufacturer's installation instructions

Reason: This proposal updates the code sections on the specification and inspection of the e*xterior wall assembly* and *water-resistive barrier* installation, as follows:

1. Updates the terminology in Section 107.2.4 to include the revision of the term "exterior wall envelope" to "exterior wall assembly" that was made in the 2024 IBC Section 202: *exterior wall envelope* was replaced with *exterior wall assembly.*
2. Adds a new section with requirements for inspection of the *water-resistive barrier* installation (and renumbers subsequent sections). The section has an exception for special inspections.
3. Adds a new section in Chapter 17 with the *water-resistive barrier* special inspection criteria to be used when required by the building official.

Water-resistive barriers and their installation are critical to the weather resistance performance of the exterior wall assembly. It is estimated that 70% of construction claims are due to water and moisture issues in the enclosure. [2,5] According to a recent report on building enclosure damage, "Water intrusion... .dreaded by homeowners, contractors, and insurance adjusters alike. It is evident why, as it ranks as the second most common cause for property insurance claims and first for the most expensive type of claim. In addition, water intrusion accounts for 70% of construction litigation. On average, each incident costs $11,098; collectively, water intrusion costs over $20 billion annually throughout the United States.[6]Water-resistive barrier detailing is currently required in the construction documents. However, these details need to be installed correctly as data suggests these water intrusion issues are often a result of incorrect installation: A survey of "top 100" general contracting firms found the "53% of all defects of defects originate from poor workmanship, supervision and inspection of trade contractors during construction." [2] A third party quality assurance inspection firm lists several defects in water-resistive barrier and flashing integration among the "top 10 construction defects observed across the U.S. in 2018." [3] This proposal seeks to reduce water intrusion issues resulting from incorrect installation of the water-resistive barrier and/or integration of flashings with the water-resistive barrier through requiring a special inspection of water-resistive barrier installation.

The new Section 1705.21 was contains a table of inspection items which are based on the requirements in Sections 1403.2 and a survey of common errors in water-resistive barrier installation based on industry audit information, interviews with industry professionals, and internet searches.[2, 5, 7] The table aligns with requirements based on requirements for specific types of water-resistive barriers 1403.2. It should be noted that EIFS and EIFS water-resistive barriers already are subject to special inspections.

Bibliography: 1. ABAA, Air Barrier Quality Assurance Program, https://www.airbarrier.org/qap-overview/
2. Grosskopf, K. R. and D. E. Lucas, “Identifying the Causes of Moisture-Related Defect Litigation in U. S. Building Construction”, COBRA 2008 – The Construction and Building Research Conference of the Royal Institution of Chartered Surveyors, Dublin, Sept 4-5, 2008
3. Hoch, Jeff, “The Top 10 Construction Defects Observed Across the U.S. in 2018, QualityBuilt, March 12, 2019; https://www.qualitybuilt.com/resources/top-10-construction-defects-2018/
4. Report of the Barrett Commission of Inquiry into the Quality of Condominium Construction in British Columbia, Vancouver BC, 1998.
5. Stroik, Brian, “Mock-ups: The Crash Test Dummy for Building Enclosures’” ABAA Conference, Norfolk, VA, March 26-27 2019. https://www.abaaconference.com/wp-content/uploads/2019/04/Mock-Ups-The-Crash-Test-Dummy-for-Building-Enclosures-Brian-Stroik.pdf
6. Swart, Amelia, “Damage Report: Water Intrusion”, Forum Forensics, September 20, 2022, https://www.forumforensics.com/blog/damage-report-water-intrusion

Cost Impact: Increase

Estimated Immediate Cost Impact:

$.20 to .40 per square foot of opaque wall area for the case when special inspections were conducted.

Estimated Immediate Cost Impact Justification (methodology and variables):

This estimate was based on the cost of quality audits reported by the Air Barrier Association of America [1] and is likely a high estimate as an air barrier quality audit would cover more items than a special inspection of the water-resistive barrier and flashing alone. The increased immediate cost needs to be weighed against the liability for potential water intrusion damage if the water-resistive barrier and flashing are not installed correctly. Experience has shown that because of the relative inaccessibility of the water management components in the building enclosures, rebuilding a wall system can cost twice as much as the original wall cost per sq. ft. [4]

ADM60-25

IBC: APPENDIX A, SECTION A101, [A] A101.1, [A] A101.2, [A] A101.3, [A] A101.4, SECTION A102, [A] A102.1, TABLE A102.1

Proponents: Jeff Grove, Chair, representing BCAC (bcac@iccsafe.org)

2024 International Building Code

Delete without substitution:

~~APPENDIX A EMPLOYEE QUALIFICATIONS~~

~~SECTION A101 BUILDING OFFICIAL QUALIFICATIONS~~

~~**[A] A101.1 Building official.** The *building official* shall have not fewer than 10 years' experience or equivalent as an architect, engineer, inspector, contractor or superintendent of construction, or any combination of these, 5 years of which shall have been supervisory experience. The *building official* should be certified as a *building official* through a recognized certification program. The *building official* shall be appointed or hired by the applicable governing authority.~~

~~**[A] A101.2 Chief inspector.** The *building official* can designate supervisors to administer the provisions of this code and the *International Mechanical Code*, *International Plumbing Code* and International Fuel Gas Code. Each supervisor shall have not fewer than 10 years' experience or equivalent as an architect, engineer, inspector, contractor or superintendent of construction, or any combination of these, 5 years of which shall have been in a supervisory capacity. They shall be certified through a recognized certification program for the appropriate trade.~~

~~**[A] A101.3 Inspector and plans examiner.** The *building official* shall appoint or hire such number of officers, inspectors, assistants and other employees as shall be authorized by the *jurisdiction*. A *person* who has fewer than 5 years of experience as a contractor, engineer, architect, or as a superintendent, foreman or competent mechanic in charge of construction shall not be appointed or hired as inspector of construction or plans examiner. The inspector or plans examiner shall be certified through a recognized certification program for the appropriate trade.~~

~~**[A] A101.4 Termination of employment.** Employees in the position of *building official*, chief inspector or inspector shall not be removed from office except for cause after full opportunity has been given to be heard on specific charges before such applicable governing authority.~~

~~SECTION A102 REFERENCED STANDARDS~~

~~**[A] A102.1 General.** See Table A102.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, standard title, and the section or sections of this appendix that reference the standard.~~

~~TABLE A102.1 REFERENCED STANDARDS~~

~~STANDARD ACRONYM~~	~~STANDARD NAME~~	~~SECTIONS HEREIN REFERENCED~~
~~IBC—24~~	~~*International Building Code*~~	~~A101.2~~
~~IMC—24~~	~~*International Mechanical Code*~~	~~A101.2~~
~~IPC—24~~	~~*International Plumbing Code*~~	~~A101.2~~
~~IFGC—24~~	~~*International Fuel Gas Code*~~	~~A101.2~~

Reason: This appendix is only in the IBC. Employee qualification is a jurisdictional decision. This is not something that should be in the code, even as guidance material. Definitely not as an adoptable appendix.

This proposal is submitted by the ICC Building Code Action Committee (BCAC).
BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and 2024 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC webpage.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This appendix does not include any construction requirements.

G35-25

IBC: 303.1.2, TABLE 1607.1; IFC: [BG] 203.2.2

Proponents: Ali Fattah, City of San Diego Development Services Department, representing City of San Diego (afattah@sandiego.gov)

THIS CHANGE WILL BE HEARD BY THE IBC STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

2024 International Building Code

Revise as follows:

303.1.2 Small assembly ~~spaces~~ areas. The following rooms and spaces shall not be classified as Assembly occupancies:

1. A room or space used for assembly purposes with an *occupant load* of less than 50 *persons* and accessory to another occupancy shall be classified as a Group B occupancy or as part of that occupancy.
2. A room or space used for assembly purposes that is less than 750 square feet (70 m^2) in area and accessory to another occupancy shall be classified as a Group B occupancy or as part of that occupancy.

TABLE 1607.1 MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_0 , AND MINIMUM CONCENTRATED LIVE LOADS

OCCUPANCY OR USE			UNIFORM (psf)	CONCENTRATED (pounds)	ALSO SEE SECTION
1.	Apartments (see residential)		—	—	—
2.	Access floor systems	Office use	50	2,000	—
		Computer use	100	2,000	—
3.	Armories and drill rooms		150[a]	—	—
4.	Assembly areas	Fixed seats (fastened to floor) and small assembly areas in accordance with Section 303.1.2	60[a]	—	—
		Lobbies	100[a]		
		Movable seats	100[a]		
		Stage floors	150[a]		
		Platforms (assembly)	100[a]		
		Bleachers, folding and telescopic seating and grandstands	100[a] (See Section 1607.18)		
		Stadiums and arenas with fixed seats (fastened to the floor)	60[a] (See Section 1607.18)		
		Other assembly areas	100[a]		
5.	Balconies and decks		1.5 times the live load for the area served, not required to exceed 100	—	—
6.	Catwalks for maintenance and service access		40	300	—
7.	Cornices		60	—	—
8.	Corridors	First floor	100	—	—
		Other floors	Same as occupancy served except as indicated		
9.	Dining rooms and restaurants		100[a]	—	—
10.	Dwellings (see residential)		—	—	—
11.	Elevator machine room and control room grating (on area of 2 inches by 2 inches)		—	300	—
12.	Finish light floor plate construction (on area of 1 inch by 1 inch)		—	200	—
13.	Fire escapes		100	—	—
		On single-family dwellings only	40		
14.	Fixed ladders		See Section 1607.10		—
15.	Garages and vehicle floors	Passenger vehicle garages	40[c]	See Section 1607.7	—
		Trucks and buses	See Section 1607.8		
		Fire trucks and emergency vehicles	See Section 1607.8		
		Forklifts and movable equipment	See Section 1607.8		
16.	Handrails, guards and grab bars		See Section 1607.9		—
17.	Helipads	Helicopter takeoff weight 3,000 pounds or less	40[a]	See Section 1607.6.1	Section 1607.6
		Helicopter takeoff weight more than 3,000 pounds	60[a]	See Section 1607.6.1	Section 1607.6
		Corridors above first floor	80	1,000	
		Operating rooms, laboratories	60	1,000	

18.	Hospitals	OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (pounds)	ALSO SEE SECTION
		Patient rooms	40	1,000	
19.	Hotels (see residential)		—	—	—
20.	Libraries	Corridors above first floor	80	1,000	—
		Reading rooms	60	1,000	—
		Stack rooms	150[b]	1,000	Section 1607.17
21.	Manufacturing	Heavy	250[b]	3,000	—
		Light	125[b]	2,000	
22.	Marquees, except one- and two-family dwellings		75	—	—
23.	Office buildings	Corridors above first floor	80	2,000	—
		File and computer rooms shall be designed for heavier loads based on anticipated occupancy	—	—	
		Lobbies and first-floor corridors	100	2,000	
		Offices	50	2,000	
24.	Penal institutions	Cell blocks	40	—	—
		Corridors	100		
25.	Public restrooms		Same as live load for area served but not required to exceed 60 psf	—	—
26.	Recreational uses	Bowling alleys, poolrooms and similar uses	75[a]	—	—
		Dance halls and ballrooms	100[a]		
		Gymnasiums	100[a]		
		Theater projection, control, and follow spot rooms	50		
		Ice skating rinks	250[b]		
		Roller skating rinks	100[a]		
27.	Residential	One- and two-family dwellings:		—	Section 1607.21
		Uninhabitable attics without storage	10		
		Uninhabitable attics with storage	20		
		Habitable attics and sleeping areas	30		
		Canopies, including marquees	20		
		All other areas	40		
		Hotels and multifamily dwellings:			
		Private rooms and corridors serving them	40		
		Public rooms	100 [a]		
		Corridors serving public rooms	100		
28.	Roofs	Ordinary flat, pitched, and curved roofs (that are not occupiable)	20	—	Section 1607.14
		Roof areas used for assembly purposes	100[a]	—	
		Roof areas used for occupancies other than assembly	Same as occupancy served	—	
		Vegetative and landscaped roofs:			
		Roof areas not intended for occupancy	20	—	
		Roof areas used for assembly purposes	100[a]	—	
		Roof areas used for occupancies other than assembly	Same as occupancy served	—	
		Awnings and canopies:			
		Fabric construction supported by a skeleton structure	5[a]	—	
		All other construction, except one- and two-family dwellings	20	—	
		Primary roof members exposed to a work floor:			Section 1607.15
		Single panel point of lower chord of roof trusses or any point along primary structural members supporting roofs over manufacturing, storage warehouses, and repair garages	—	2,000	
		All other primary roof members	—	300	
		All roof surfaces subject to maintenance workers	—	300	
29.	Schools	Classrooms	40	1,000	—
		Corridors above first floor	80	1,000	
		First-floor corridors	100	1,000	
30.	Scuttles, skylight ribs and accessible ceilings		—	200	—
31.	Sidewalks, vehicular driveways and yards, subject to trucking		250[b]	8,000	Section 1607.19
32.	Stairs and exits	One- and two-family dwellings	40	300	Section 1607.20
		All other	100	300	Section 1607.20
33.	Storage areas above ceilings		20	—	—
34.	Storage warehouses (shall be designed for heavier loads if required for anticipated storage)	Heavy	250[b]	—	—
		Light	125[b]		
		Retail:			

	OCCUPANCY OR USE		UNIFORM (psf)	CONCENTRATED (pounds)	ALSO SEE SECTION
35.	Stores	First floor	100	1,000	—
		Upper floors	75	1,000	
		Wholesale, all floors	125[b]	1,000	
36.	Vehicle barriers		See Section 1607.11		—
37.	Walkways and elevated platforms (other than exitways)		60	—	—
38.	Yards and terraces, pedestrian		100[a]	—	—

For SI: 1 inch = 25.4 mm, 1 square inch = 645.16 mm^2, 1 square foot = 0.0929 m^2, 1 pound per square foot = 0.0479 kN/m^2, 1 pound = 0.004448 kN.

a. Live load reduction is not permitted.

b. Live load reduction is only permitted in accordance with Section 1607.13.1.2 or Item 1 of Section 1607.13.2.

c. Live load reduction is only permitted in accordance with Section 1607.13.1.3 or Item 2 of Section 1607.13.2.

2024 International Fire Code

Revise as follows:

[BG] 203.2.2 Small assembly ~~spaces~~ areas. The following rooms and spaces shall not be classified as Assembly occupancies:

1. A room or space used for assembly purposes with an *occupant load* of less than 50 persons and accessory to another occupancy shall be classified as a Group B occupancy or as part of that occupancy.
2. A room or space used for assembly purposes that is less than 750 square feet (70 m^2) in area and accessory to another occupancy shall be classified as a Group B occupancy or as part of that occupancy.

Reason: The proposed code change is intended to avoid confusion caused when an assembly area is classified as a occupancy Group B and not occupancy Group A2 or A-3. This allowance dates back to the legacy codes. The floor live load table in IBC Table 1607.1 displays live loads based on uses based and not based on occupancy and generalizes all assembly areas.

Assembly areas with fixed seating are assigned a lower live load since the seating area is better defined. When the floor live load for an assembly area using fixed seats is shown at 60 psf a logical reason is the location of the load is defined and not moveable and by defining the seating an aisle is collaterally defined.

When 7 psf per occupant is multiplied by 7 results in 700 lb per occupant it is clear that the load builds in a level of conservatism to account for occupant comfort due to floor vibrations, deflection and also the possibly of the occupants clustered in one area of the floor and not others.

Small assembly areas are similar to areas of fixed seating and when employee lunch areas, small conference rooms and small restaurants like a fast-food subway sandwich store are proposed; the small space has a floor area less than 750 sq ft in the assembly areas is self-limiting, a 25 by 30 area that includes seating, merchandizing shelving etc.

My jurisdiction during the 1990's assigned a floor live load of 75 psf similar to what a legacy code required for retail spaces.

There is limited literature on this subject however proponent is aware of proposals to ASCE 7 for a similar subject area for huddle rooms. An article "Design Live Loads for Office Gathering Spaces published in the Journal of Structural Engineering in 2023 recommends revisiting the building code requirements and using a 50 pfs floor live load for huddle rooms that are small assembly areas.

Small assembly areas include furniture like seating, conference tables etc to make the space useable and as a result the load is forced to be distributed.

Bibliography: ASCE Structural

Cost Impact: Decrease

Estimated Immediate Cost Impact:

This code change will reduce confusion and will reduce the cost of construction since office buildings include floors designed for 70 psf LL (office live load plus partition loads). Floor live load has changed over the decades, and since the legacy Uniform Building Code, and as a result the cost reduction is zero in an existing building since the floor will most likely be compliant with the proposed 60 psf live load. With the proposed live load existing and proposed floors will certainly more compliant than if the 100 pf live load required by the 2024 IBC is implemented; the 2024 IBC will require significant strengthening of the existing floor, or heavier framing for new floors. In an existing building this could cost $300,000 or more in a steel framed building or $100,000 to $200,000 in a wood framed building. In accordance with "Building Valuation Data – FEBRUARY 2024" for a Group B occupancy Type IA construction is 38% more costly than Type VA construction. Concrete buildings tend have floors with additional capacity since a large portion of the gravity load is the dead load due to the heavy weight of reinforced concrete. In a new building the cost increase will be 20% if constructed with structural steel and less if constructed with concrete since additional reinforcing and concrete may be required with roughly the same labor costs; if prestressed concrete it can assumed to be less costly than reinforced concrete since additional pre-stressing and slightly thicker slabs may be require.

Estimated Immediate Cost Impact Justification (methodology and variables):

Lower live load requires smaller floor framing and as a result reduces cost of compliance with the 2024 IBC. The costs include after hours work to access the underside of floors if tenant spaces below are occupied, removal and replacement of ceiling finishes and HVAC if any exists below the floor. If the floor is wood framed strengthening to comply with the 2024 IBC will be simpler than strengthening floors framed with structural steel framing due to the weight of framing materials and steel plates and the need for welding equipment to field welding to weld reinforcing plates. It is assumed that the cost is $300 per square foot under the 700 sq ft room above and accounting for framing that spans to receiving columns beyond the small assembly area.

Attached Files

- **ASCE 2023 Structural Journal Article Corotis-et-al reduced part 2.pdf**
  https://www.cdpaccess.com/proposal/11073/35127/files/download/8924/
- **ASCE 2023 Structural Journal Article Corotis-et-al reduced part 1.pdf**
  https://www.cdpaccess.com/proposal/11073/35127/files/download/8923/

G52-25

IBC: 403.6.1, Table 403.6.1 (New), 3002.4, [F] 3003.1.3

Proponents: Jeffrey Grove, representing Southern Nevada ICC Chapter (jeff.grove@coffman.com); Allen Burris, Clark County Nevada, representing Southern Nevada Chapter (allen.burris@clarkcountynv.gov)

2024 International Building Code

SECTION 403
HIGH-RISE BUILDINGS

Revise as follows:

403.6.1 Fire service access elevator. In *buildings* with an occupied floor more than 120 feet (36 576 mm) above the lowest level of fire department vehicle access, not fewer than two fire service access elevators, or all elevators, whichever is less, shall be provided in accordance with Section 3007. Each fire service access elevator shall have a capacity of not less than 3,500 pounds (1588 kg) and shall comply with Section 3002.4.

Exception: Where a building is provided with multiple ambulance stretcher-sized elevator cars in accordance with Section 3002.4 in the quantities prescribed in Table 403.6.1, fire service access elevators shall not be required.

Add new text as follows:

TABLE 403.6.1 AMBULANCE STRETCHER-SIZED ELEVATOR CAR

HIGHEST FLOOR LEVEL SERVED ABOVE THE LOWEST LEVEL OF FIRE DEPARMTNE ACCESS (feet)	NUMBER OF ELEVATOR CLARS TO ACCOMMODATE AN AMBULANCE STRETCHER[a]
120 - 599	3
600 - 899	4
900 and greater	5

For SI: 1 foot = 0.348 m

SECTION 3002
HOISTWAY ENCLOSURES

Revise as follows:

3002.4 Elevator car to accommodate ambulance stretcher. Where elevators are provided in *buildings* four or more *stories* above, or four or more *stories* below, *grade plane*, not fewer than one elevator, or the number specified in Table 403.6.1 for high-rise buildings, shall be provided for fire department emergency access to all floors. The elevator car shall be of such a size and arrangement to accommodate an ambulance stretcher 24 inches by 84 inches (610 mm by 2134 mm) with not less than 5-inch (127 mm) radius corners, in the horizontal, open position and shall be identified by the international symbol for emergency medical services (star of life). The symbol shall be not less than 3 inches (76 mm) in height and shall be placed inside on both sides of the hoistway door frame.

SECTION 3003
EMERGENCY OPERATIONS

[F] 3003.1.3 Two or more elevators. Where two or more elevators are controlled by a common operating system, all elevators shall automatically transfer to standby power within 60 seconds after failure of normal power where the standby power source is of sufficient capacity to operate all elevators at the same time. Where the standby power source is not of sufficient capacity to operate all elevators at the same time, all elevators shall transfer to standby power in sequence, return to the designated landing and disconnect from the standby power source. After all elevators have been returned to the designated level, not less than one elevator, and all elevators installed in accordance with the Exception to Section 403.6.1, shall remain operable from the standby power source.

Reason: The use of these elevators have been incorporated into every high-rise greater than 120 feet in Southern Nevada since the adoption of the 2000 IBC.

Base IBC Section 403.6.1 requires a minimum of two (2) fire service access elevators, or all elevators, whichever is less, to be provided in buildings with an occupied floor more than 120' above the lowest level of fire department access. Per the commentary to the 2021 IBC, this is based on past experience that has shown that elevators are often not available due to shutdowns for various reasons. Requiring two (2) fire service access elevators increases the likelihood there will be an elevator available for fire department use in an emergency event.

High rise elevator cores are typically located centrally within a tower, and exit stairs are typically located on either end of the tower. Depending on the size and occupant load of the tower, a tertiary (or more) stair may be located centrally within the tower; however, such stairs are typically not necessary and therefore not provided, many times resulting in a modification to the tower design to accommodate a stair and elevator adjacent to each other.

The design and economic implications of providing a minimum of two (2) fire service access elevators in high-rise buildings is significant when taking into consideration all of the required support features in addition to the elevators themselves, such as enclosed lobbies with direct access to an interior exit stair. Requiring fire service access elevators to open into an enclosed lobby with direct access to an interior exit stair could potentially eliminate a guestroom from each level, or leasable space from each level, etc., due to the footprint required for the lobby and stair. IBC Section 3007.6.4 requires fire service access elevator lobbies to have a minimum size of 150 square feet with a minimum dimension of 8 feet, and interior exit stairs are required to be sized in accordance with IBC Section 1009.2.

Further, the base code only mandates two (2) fire service access elevators for fire department use, including "supertall" buildings, which could have a negative impact on firefighter response & operations. The proposed Exception to Section 403.6.1 would require additional stretcher elevators based on floor height instead of providing only (2) fire service access elevators regardless of building height. It is important to provide tools for firefighting in large structures. It is important to maximum protection to large/tall facilities. If a major event occurs, this proposed amendment will provide multiple means of access for emergency responders beyond that which is required by base code, providing for efficient and effective response. By amending Section 403.6.1 and 3002.4 as proposed, not only would larger elevators be required, but also additional elevators would be required for the various heights of high-rise facilities.

Section 3003.1.3 would also require updates to correspond with changes to earlier part of the code and ties it back to the Exception to Section 403.6.1 to be provided with secondary power simultaneously so that all elevators are available. Simultaneous access is necessary as emergency responders utilize multiple teams performing various functions.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This code change proposal provides an alternative to the base code provisions that is not mandatory. It is an option to the base code provisions. The base code provisions do not change.

G96-25

IBC: TABLE 504.3, TABLE 504.4

Proponents: Jeffrey Shapiro, LTFR, representing Lake Travis Fire Rescue (jshapiro@LTFR.org)

2024 International Building Code

Revise as follows:

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

Portions of table not shown remain unchanged.

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION												
	See Footnotes	Type I		Type II		Type III		Type IV				Type V	
		A	B	A	B	A	B	A	B	C	HT	A	B
R[h]	NS[d]	UL	160	65	55	65	55	65	65	65	65	50	40
	S13D	60	60	60	60	60	60	60	60	60	60	60~~50~~	60~~40~~
	S13R	60	60	60	60	60	60	60	60	60	60	60	60
	S	UL	180	85	75	85	75	270	180	85	85	70	60

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

Portions of table not shown remain unchanged.

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION												
	See Footnotes	Type I		Type II		Type III		Type IV				Type V	
		A	B	A	B	A	B	A	B	C	HT	A	B
R-3[h]	NS[d]	UL	11									3	3
	S13D	4	4	4	4	4	4	4	4	4	4	4~~3~~	4~~3~~
	S13R	4	4									4	4
	S	UL	12	5	5	5	5	18	12	5	5	4	4

Reason: Although I serve as a consultant to the National Fire Sprinkler Association, this proposal has not been reviewed or endorsed by NFSA, and I am not representing NFSA on this issue.

Recommended changes are supported on the basis of:

1. Improved correlation between the IRC and IBC with respect to limits on Type V-B construction,
2. Empirical evidence supporting the effectiveness of NFPA 13D sprinkler systems in controlling and extinguishing dwelling fires that was not available when the IBC originally considered story/height credit for Group R3 more than 25 years ago.

1. IRC Correlation: Following approval of Proposal RB17-07/08, which added an allowance for habitable attics to the 2009 IRC, the IRC has continued to expand the habitable attic concept to the point where it essentially constitutes a 4th story, even though the code is technically limited to 3-story construction. Proposal RB166-16 eliminated a prior restriction requiring the ceiling of a habitable attic to be limited to rafters/roof framing, so lacking restrictions on the height of surrounding knee walls or dormer size, the 2018 and 2021 IRC editions essentially equate habitable attics and stories. Proposal RB152-19 called attention to the IRC 4th story habitable attic loophole, with the intent of pushing such construction back to the IBC, but that proposal was later modified to instead place a size limit on habitable attics and require NFPA 13D fire sprinklers when a habitable attic is placed above the third story. Today, standing outside of a newly constructed dwelling with a habitable attic above the third story, you'd be looking at what appears to be an 4-story unlimited height (in feet) Type V-B building, protected by a NFPA 13D sprinkler system, that meets the IRC. It makes no sense for the IBC to not allow Type V construction or require changing to a NFPA 13R sprinkler system to construct a similarly configured Group R-3 building.

2. Performance of residential sprinkler systems: Since the question of NFPA 13D performance was previously considered in the code arena, a considerable number of NFPA 13D sprinkler systems have been installed throughout the U.S., and there have been a considerable number of fires in structures protected by NFPA 13D systems, enough to provide meaningful data regarding the effectiveness of these systems in controlling and extinguishing dwelling fires. An analysis of data captured by the National Fire Incident Reporting System shows that in more than 2,500 fire incidents in the period 2000-2022 where sprinklers operated and were effective, presumably NFPA 13D systems considering that the data is associated with one-and two-family dwelling fires, fire spread was limited to the object or room of origin in 87% of fires, and up to the story of origin in a total of 92% of fires. This seems sufficiently equivalent to the effectiveness of NFPA 13 and NFPA 13R systems to justify receiving similar height/story incentive for one- and two-family dwellings and townhouses.

It is noteworthy that the ICC has already rendered favorable consideration on a variety of incentives for NFPA 13D sprinkler systems for dwelling unit protection, so this proposal is not plowing entirely new ground. For example, IBC Section 1031.2, Exception 5 (which recognizes NFPA 13D for a means of escape incentive); IFC Section 1205.2.1.3 (which allows a reduction of required setbacks for PV systems on roofs); IFC Appendix Table B105.1(1) (which allows a reduction in required fire flow); IFC Appendix Section D107.1 (which allows a reduction in the required number of fire apparatus access roads); IRC Section R317.5 (which per reference to Table R302.1(2) equates sprinkler protection to a 1-hour exterior wall and property line separation or wall penetrations and openings); among others.

It is also important to point out that the additional story will not trigger requirements in Section 1023.2 for additional fire-resistive protection of the 4-story stairway because stairways within dwelling and townhouse units are *exit access stairways,* not interior exit stairways (to which Section 1023.2 applies).

Cost Impact: Decrease

Estimated Immediate Cost Impact:

Since similar construction is already permitted under the IRC, the estimated impact is $0, and adding the recommended provisions to the IBC is not a significant change with respect to the ICC code family.

Estimated Immediate Cost Impact Justification (methodology and variables):

This proposal would allow a larger area of the habitable attic under the IRC as a full 4th story in the IBC. Allowing a larger area of what is essentially already permitted by code adds design freedom and only impacts cost when someone would chose to take advantage of the proposed allowance. It could also be viewed as a cost reduction for cases where the larger area of the upper story would otherwise require changing from a NFPA 13D system (under the IRC) to a NFPA 13R system (under the IBC), or changing from Type V to Type I, Type II, Type III or Type IV construction to exceed IRC habitable attic area limits that were added in the 2021 IRC. Regardless of which code is used, IBC or IRC, dwellings affected by this proposal will require fire sprinklers, even in jurisdictions where IRC Section 313 has not been adopted, because IRC Section 326 requires sprinklers per NFPA 13D or IRC P2904 to extend a habitable attic above the third story of an IRC dwelling.

G97-25

IBC: TABLE 504.3, TABLE 504.4

Proponents: Greg Johnson, Johnson & Associates Consulting Services, representing self (gjohnsonconsulting@gmail.com); Robert Buchetto, HED, representing Self (rbuchetto@hed.design); Jay Peters, representing Codes and Standards International (peters.jay@me.com)

2024 International Building Code

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

Portions of table not shown remain unchanged.

OCCUPANCY CLASSIFICATION	See Footnotes	TYPE OF CONSTRUCTION											
		Type I		Type II		Type III		Type IV				Type V	
		A	B	A	B	A	B	A	B	C	HT	A	B
A, B, D, E, F, M, S, U	NS[b]	UL	160	65	55	65	55	65	65	65	65	50	40
	S	UL	180	85	75	85	75	270	180	85	85	70	60

For SI: 1 foot = 304.8 mm.

UL = Unlimited; NS = Buildings not equipped throughout with an automatic sprinkler system; S = *Buildings* equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.

b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.

c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.

d. The NS value is only for use in evaluation of existing building height in accordance with the *International Existing Building Code*.

e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies Condition 1, see Exception 1 of Section 903.2.6.

f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and with Section 1103.5 of the *International Fire Code*.

g. For new Group I-4 occupancies, see Exceptions 2 and 3 of Section 903.2.6.

h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.

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

Portions of table not shown remain unchanged.

OCCUPANCY CLASSIFICATION	See Footnotes	TYPE OF CONSTRUCTION											
		Type I		Type II		Type III		Type IV				Type V	
		A	B	A	B	A	B	A	B	C	HT	A	B
D	NS	UL	11	4	2	3	2	4	4	4	4	3	1
	S	UL	12	5	4	4	4	10	7	5	5	4	2

UL = Unlimited; NP = Not Permitted; NS = Buildings not equipped throughout with an automatic sprinkler system; S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

a. See Chapters 4 and 5 for specific exceptions to the allowable height in this chapter.

b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.

c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.

d. The NS value is only for use in evaluation of existing building height in accordance with the *International Existing Building Code*.

e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies, Condition 1, see Exception 1 of Section 903.2.6.

f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and Section 1103.5 of the *International Fire Code*.

g. For new Group I-4 occupancies, see Exceptions 2 and 3 of Section 903.2.6.

h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.

Reason: Data centers are unique uses and should have their own occupancy classification to remove confusion in the field, as is proposed in a companion proposal. Data centers are frequently assigned an F-1 or S-1 occupancy classification. The values proposed in this proposal are consistent with a S-1 occupancy classification.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Data centers are currently and frequently being constructed with these height limits so no additional costs accrue.

G104-25

IBC: TABLE 506.2

Proponents: Greg Johnson, Johnson & Associates Consulting Services, representing self (gjohnsonconsulting@gmail.com); Robert Buchetto, HED, representing Self (rbuchetto@hed.design); Jay Peters, representing Codes and Standards International (peters.jay@me.com)

2024 International Building Code

TABLE 506.2 ALLOWABLE AREA FACTOR (A_t = NS, S1, S13R, S13D or SM, as applicable) IN SQUARE FEET[a, b]

Portions of table not shown remain unchanged.

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION											
		Type I		Type II		Type III		Type IV				Type V	
		A	B	A	B	A	B	A	B	C	HT	A	B
D	NS	UL	48,000	26,000	17,500	26,000	17,500	76,500	51,000	31,875	25,500	14,000	9,000
	S1	UL	192,000	104,000	70,000	104,000	70,000	306,000	204,000	127,500	102,000	56,000	36,000
	SM	UL	144,000	78,000	52,500	78,000	52,500	229,500	153,000	95,625	76,500	42,000	27,000

For SI: 1 square foot = 0.0929 m^2.

UL = Unlimited; NP = Not Permitted; NS = Buildings not equipped throughout with an automatic sprinkler system; S1 = Buildings a maximum of one story above grade plane equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; SM = Buildings two or more stories above grade plane equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1; S13R = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2; S13D = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.3.

a. See Chapters 4 and 5 for specific exceptions to the allowable area in this chapter.

b. See Section 903.2 for the minimum thresholds for protection by an automatic sprinkler system for specific occupancies.

c. New Group H occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.5.

d. The NS value is only for use in evaluation of existing building area in accordance with the *International Existing Building Code*.

e. New Group I-1 and I-3 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6. For new Group I-1 occupancies, Condition 1, see Exception 1 of Section 903.2.6.

f. New and existing Group I-2 occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.6 and with Section 1103.5 of the *International Fire Code*.

g. New Group I-4 occupancies see Exceptions 2 and 3 of Section 903.2.6.

h. New Group R occupancies are required to be protected by an automatic sprinkler system in accordance with Section 903.2.8.

i. The maximum allowable area for a single-story nonsprinklered Group U greenhouse is permitted to be 9,000 square feet, or the allowable area shall be permitted to comply with Table C102.1 of Appendix C.

Reason: Data centers are unique occupancies and need their own occupancy classification to better inform designers and AHJs. Currently data centers are frequently classified as Group S-1 occupancies. The values proposed for Group D occupancies matches those allowed for Group S-1.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Data centers are currently being constructed with these provisions. Assigning a newly named occupancy classification will not impact costs.

G105-25

IBC: 506.3.2, 506.3.3, TABLE 506.3.3, 506.3.3.1, TABLE 506.3.3.1

Proponents: Jeffrey Grove, representing Coffman Engineers (jeff.grove@coffman.com)

2024 International Building Code

SECTION 506
BUILDING AREA

Revise as follows:

506.3.2 Minimum frontage distance. To qualify for an area factor increase based on frontage, the *public way* or open space adjacent to the *building* perimeter shall have a minimum distance of (W) 20 feet (6096 mm) measured at right angles from the *building* face to any of the following:

1. The closest interior *lot line*.
2. The entire width of a street, alley or *public way*.
3. The exterior face of an adjacent *building* on the same property.

~~The frontage increase shall be based on the smallest *public way* or open space that is 20 feet (6096 mm) or greater, and the percentage of *building* perimeter having a minimum 20 feet (6096 mm) *public way* or open space.~~

Where the value of W is greater than 30 feet (9144 mm), a value of 30 feet (9144 mm) shall be used in calculating the building area increase based on frontage, regardless of the actual width of the *public way* or open space. Where the value of W varies along the perimeter of the building, the calculation performed in accordance with Equation 5-5 shall be based on the weighted average calculated in accordance with Equation 5-4.

$W = (L_1 \times w_1 + L_2 \times w_2 + L_3 \times w_3 \ldots)/F$ **(Equation 5-4)**

where: W (Width: weighted average = Calculated width of *public way* or open space (feet).

L_n = Length of a portion of the exterior perimeter wall.

w_n = Width (≥ 20 feet (6096mm)) of *public way* or open space associated with that portion of the exterior perimeter wall.

F = Building perimeter that fronts on a *public way* or open space having a width of 20 feet (6096 mm) or more.

Exception: Where a building space meets the requirements of Section 507, as applicable, except for compliance with minimum 60 foot (18288 mm) public way or yard requirement, and the value of W is greater than 30 feet (9144 mm), the value of W shall not exceed 60 feet (18,288 mm)

506.3.3 Amount of increase. The area factor increase based on frontage shall be determined in accordance with ~~Table 506.3.3~~ Equation 5-5.

$I_f = [F/P - 0.25]W/30$ **(Equation 5-5)**

where: I_f = Area factor increase due to frontage.

F = Building perimeter that fronts on a public way or open space having minimum distance of 20 feet (6096 mm).

P = Perimeter of entire building (feet).

W = Width of public way or open space (feet) in accordance with Section 506.3.2.

Delete without substitution:

~~**TABLE 506.3.3 FRONTAGE INCREASE FACTOR[a]**~~

PERCENTAGE OF BUILDING PERIMETER	OPEN SPACE (feet)		
	20 to less than 25	25 to less than 30	30 or greater
0 to less than 25	0	0	0
25 to less than 50	0.17	0.21	0.25
50 to less than 75	0.33	0.42	0.50
75 to 100	0.50	0.63	0.75

For SI: 1 foot = 304.8 mm.

a. Interpolation is permitted.

506.3.3.1 Section 507 buildings. Where a *building* meets the requirements of Section 507, as applicable, except for compliance with the minimum 60-foot (18 288 mm) *public way* or *yard* requirement, the area factor increase based on frontage shall be determined in accordance with Table 506.3.3.1. The frontage increase shall be based on the smallest *public way* or open space that is 30 feet (9144 mm) or greater, and the percentage of *building* perimeter having a minimum 30 feet (9144 mm) *public way* or open space.

TABLE 506.3.3.1 SECTION 507 BUILDINGS[a]

PERCENTAGE OF BUILDING PERIMETER	OPEN SPACE (feet)					
	30 to less than 35	35 to less than 40	40 to less than 45	45 to less than 50	50 to less than 55	55 or greater
0 to less than 25	0	0	0	0	0	0
25 to less than 50	0.29	0.33	0.38	0.42	0.46	0.50
50 to less than 75	0.58	0.67	0.75	0.83	0.92	1.00
75 to 100	0.88	1.00	1.13	1.25	1.38	1.50

For SI: 1 foot = 304.8 mm.

a. Interpolation is permitted.

Reason: This proposal addresses the unintended consequence of a modification made by G86-18 during the 2021 IBC Code Development Process. G86-18 states that the values in the new frontage factor table (2021 and 2024 IBC Editions) are based on the calculation using Equation 5-5 of the 2018 IBC. However, as you will read below, the frontage factors that are determined using the 2018 IBC vs. the 2021/2024 IBC method are not the same.

In the 2018 Edition of the IBC, the frontage factor (I_f) was determined using an equation that would calculate a value based on a weighted average of the available width of the public way along the building perimeter. In the revision cycle for the 2021 IBC, a code change proposal was approved to simplify the process of determining the frontage factor by providing values in a table format. Per the code change proposal, the proponent argued that "values in the table are based on the calculations using Equation 5-5" of the 2018 IBC. The code change was approved and included in the 2021 and 2024 IBC. The following examples will demonstrate that the 2021/2024 IBC tabular method produces results that are inconsistent with the 2018 IBC calculation method. The main difference between the two methods is that the 2018 IBC method utilizes a weighted average of the available frontage along the building perimeter that fronts on a public way of at least 20 feet; whereas the 2021/2024 IBC method is based on the smallest public way that is 20 feet or greater. This approach can be restrictive for buildings that have a majority of their building perimeter fronting public ways well over 20 feet in width, but have a small portion with a frontage width of only 20 feet. By limiting the frontage factor to the smallest public way, rather than allowing for a weighted average, building configurations will be limited. This disparity is the reason that we believe that the area factor should be calculated using the previous weighted average width calculation method provided in the 2018 IBC.

Additionally, the G86-18 proposal states the frontage increase is easier to determine in the table format because previously, readers were using the wrong value from the area table (Table 506.2). The proponent argues that code users often confused the NS value with the S1 or SM value and that the new frontage factor table will eliminate this confusion. IBC Table 506.2 is not used in determining the frontage factor in either the 2018 or 2021/2024 IBC methods. Once the frontage factor (I_f) is determined, the code user still has to insert the factor into Equation 5-1, 5-2, or 5-3 and select the appropriate NS value from Table 506.2, regardless of which method is used.

Attached to this document are example buildings in various configurations to demonstrate the discrepancies that result in calculating the frontage factor with the 2018 IBC and 2021/2024 IBC methods. Results are outlined below. Below, we present exemplary cases of the various building configurations we studied and their frontage factor results:

1. This building has three sides which can be included in the frontage factor calculation (public way ≥ 20 feet). Using the 2021/2024 IBC tabular method, a frontage factor of 0.33 is produced. If interpolation is performed, as allowed by the Table 506.3.3 footnote, the result is 0.35. Using the 2018 IBC equation method, a result of 0.48 is calculated.
2. This Type IB building meets the requirements for unlimited area buildings of IBC 507, with the exception of the minimum 60-foot public way requirement. Using the 2021/2024 IBC tabular method, a frontage factor of 1.00 is produced. If interpolation is performed, as allowed by the Table 506.3.3 footnote, the result is 1.03. Using the 2018 IBC equation method, a result of 1.16 is calculated.
3. This building was designed as a perfect square, but one side fronts on a public way of only 19 feet. Using the 2021/2024 IBC tabular method, a frontage factor of 0.75 is produced. Using the 2018 IBC equation method, a result of 0.50 is calculated.

As demonstrated in the examples above, the 2021/2024 IBC tabular method does not provide results consistent with the previous 2018 IBC calculation. Therefore, the 2021 IBC code change proponent's statement that values in the 2021/2024 IBC tables are based on the calculations using 2018 IBC Equation 5-5 is inaccurate. We propose that the code language revert back to the previous method of determining the frontage factor, as this approach does not restrict buildings to their smallest public way width. Rather it is balanced by providing greater area increases for buildings with larger frontage widths and smaller area increases for buildings with minimal frontage widths.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This code change proposal is submitted to address unintended errors when calculating the allowable building area. Therefore, this is a code clarification and no impact to the cost of construction.

Attached Files

- **Frontage Code Change Proposal Attachment.pdf**
  https://www.cdpaccess.com/proposal/11775/35718/files/download/8994/

G106-25

IBC: 507.2.1, 507.2.1.1 (New), 506.3.3.1, TABLE 506.3.3.1

Proponents: Ali Fattah, City of San Diego Development Services Department, representing City of San Diego (afattah@sandiego.gov)

2024 International Building Code

Revise as follows:

507.2.1 Reduced open space. The *public ways* or *yards* of 60 feet (18 288 mm) in width required in Sections 507.3, 507.4, 507.5, 507.6 and 507.12 shall be permitted to be reduced per Section 507.2.1.1 or 507.2.1.2 ~~to not less than 40 feet (12 192 mm) in width, provided that the following requirements are met:~~

1. ~~The reduced width shall not be allowed for more than 75 percent of the perimeter of the *building*.~~
2. ~~The *exterior walls* facing the reduced width shall have a *fire-resistance rating* of not less than 3 hours.~~
3. ~~Openings in the *exterior walls* facing the reduced width shall have opening protectives with a *fire protection rating* of not less than 3 hours.~~

Add new text as follows:

507.2.1.1 Obstructed open space. *Public ways* or *yards* of 60 feet (18 288 mm) in width required in Sections 507.3, 507.4, 507.5, 507.6 and 507.12 shall be permitted to be reduced to not less than 40 feet (12 192 mm) in width, provided that the following requirements are met:

1. The reduced width shall not be allowed for more than 75 percent of the perimeter of the *building*.
2. The *exterior walls* facing the reduced width shall have a *fire-resistance rating* of not less than 3 hours.
3. Openings in the *exterior walls* facing the reduced width shall have opening protectives with a *fire protection rating* of not less than 3 hours.

Revise as follows:

~~**506.3.3.1**~~ **507.2.1.2** ~~**Section 507 buildings**~~ **Reduced frontage increase.** Where a *building* meets the requirements of Section 507, as applicable, except for compliance with the minimum 60-foot (18 288 mm) *public way* or *yard* requirement, the area factor increase based on frontage shall be determined in accordance with Table ~~506.3.3.1.~~ 507.2.1.2.The frontage increase shall be based on the smallest *public way* or open space that is 30 feet (9144 mm) or greater, and the percentage of *building* perimeter having a minimum 30 feet (9144 mm) *public way* or open space.

TABLE ~~506.3.3.1~~ 507.2.1.2 ~~SECTION 507 BUILDINGS~~[a] ALTERNATIVE REDUCED OPEN SPACE ~~Reduced open space~~

PERCENTAGE OF BUILDING PERIMETER	OPEN SPACE (feet)					
	30 to less than 35	35 to less than 40	40 to less than 45	45 to less than 50	50 to less than 55	55 or greater
0 to less than 25	0	0	0	0	0	0
25 to less than 50	0.29	0.33	0.38	0.42	0.46	0.50
50 to less than 75	0.58	0.67	0.75	0.83	0.92	1.00
75 to 100	0.88	1.00	1.13	1.25	1.38	1.50

For SI: 1 foot = 304.8 mm.

a. Interpolation is permitted.

Reason: The proposed code change is editorial in nature and proposes to relocate reduce frontage requirements for unlimited area buildings to be located in Section 507 where the regulations appropriately belong. It is not intuitive to go to Section 506 to look for the requirements where they exist, and it is not clear whether you use either the Section 506 rules or the Section 507 rules. The code change that resulted in the revisions shown in Section 506 was a part of a multi-part code change. It was not clear the reason why the building standard was not included in the unlimited area section. G86-18 appears to have been the code change and is attached.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This code change relocates a requirement.

G107-25

IBC: 506.3.3.1, TABLE 506.3.3.1

Proponents: Ali Fattah, City of San Diego Development Services Department, representing San Diego Area Chapter of ICC (afattah@sandiego.gov)

2024 International Building Code

507.2.1 Reduced open space. The *public ways* or *yards* of 60 feet (18 288 mm) in width required in Sections 507.3, 507.4, 507.5, 507.6 and 507.12 shall be permitted to be reduced to not less than 40 feet (12 192 mm) in width, provided that the following requirements are met:

1. The reduced width shall not be allowed for more than 75 percent of the perimeter of the *building*.
2. The *exterior walls* facing the reduced width shall have a *fire-resistance rating* of not less than 3 hours.
3. Openings in the *exterior walls* facing the reduced width shall have opening protectives with a *fire protection rating* of not less than 3 hours.

Revise as follows:

~~506.3.3.1~~ 507.2.1.1 Section 507 buildings. Where a *building* meets the requirements of Section 507, as applicable, except for compliance with the minimum 60-foot (18 288 mm) *public way* or *yard* requirement, the area factor increase based on frontage shall be determined in accordance with Table 507.2.1.1 ~~506.3.3.1~~. The frontage increase shall be based on the smallest *public way* or open space that is 30 feet (9144 mm) or greater, and the percentage of *building* perimeter having a minimum 30 feet (9144 mm) *public way* or open space.

TABLE ~~506.3.3.1~~ 507.2.1.1 SECTION 507 BUILDINGS[a]

PERCENTAGE OF BUILDING PERIMETER	OPEN SPACE (feet)					
	30 to less than 35	35 to less than 40	40 to less than 45	45 to less than 50	50 to less than 55	55 or greater
0 to less than 25	0	0	0	0	0	0
25 to less than 50	0.29	0.33	0.38	0.42	0.46	0.50
50 to less than 75	0.58	0.67	0.75	0.83	0.92	1.00
75 to 100	0.88	1.00	1.13	1.25	1.38	1.50

For SI: 1 foot = 304.8 mm.

a. Interpolation is permitted.

Reason: The proposed code change is editorial and co-locates requirements allowing reduced frontage for unlimited area buildings with the remainder of the requirements. Code users will go to the unlimited area building Section 507 and would not think to go back to Section 506 that discusses determination of allowable building area and that also includes area increases due to frontage. Interesting the relocated Section and associated table actually reduce the area of unlimited area buildings.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There is not change in regulatory effect proposed.

G113-25

IBC: TABLE 508.4

Proponents: Greg Johnson, Johnson & Associates Consulting Services, representing self (gjohnsonconsulting@gmail.com); Robert Buchetto, HED, representing Self (rbuchetto@hed.design); Jay Peters, representing Codes and Standards International (peters.jay@me.com)

2024 International Building Code

Revise as follows:

TABLE 508.4 REQUIRED SEPARATION OF OCCUPANCIES (HOURS)[f]

Portions of table not shown remain unchanged.

OCCUPANCY	A, E		I-1[a], I-3, I-4		I-2		R[a]		F-2, S-2[b], U		B[e], D[g], F-1, M,S-1		H-1		H-2		H-3, H-4		H-5	
	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS
B[e], D[g], F-1, M, S-1	1	2	1	2	2	NP	1	2	1	2	N	N	NP	NP	2	3	1	2	1	NP

S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

NS = Buildings not equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.N = No separation requirement.NP = Not Permitted.

a. See Section 420.

b. The required separation from areas used only for private or pleasure vehicles shall be reduced by 1 hour but not to less than 1 hour.

c. See Sections 406.3.2 and 406.6.4.

d. Separation is not required between occupancies of the same classification.

e. See Section 422.2 for ambulatory care facilities.

f. Occupancy separations that serve to define fire area limits established in Chapter 9 for requiring fire protection systems shall also comply with Section 707.3.10 and Table 707.3.10 in accordance with Section 901.7.

g. See Table 509.1 for separations for rooms with energy storage systems using lithium-ion or lithium metal batteries.

Reason: Data centers are being proposed to be assigned a Group D occupancy classification. As such, provisions for separated uses must be provided. Current field practice often assigns and S-1 classification so proposed new Group D is added to the row containing S-1. A footnote is provided to reference incidental use Table 509.1 where a new row for lithium ion batteries will be added requiring sprinklers and a 2-hour fire separation.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Data centers are typically be constructed currently with a 2 hour separation between the data hall and any accessory office spaces. This proposal mirrors current industry practices and should add no cost.

G118-25

IBC: TABLE 601

Proponents: Joseph Summers, Mashantucket Pequot Tribal Nation, representing Self

2024 International Building Code

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[a]	2[a]	1	0	2[a]	2[a]	3[a]	2[a]	2[a]	2[a]	1	0
Interior	3[a]	2[a]	1	0	1	0	3[a]	2[a]	2[a]	1/HT[g]	1	0
Nonbearing walls and partitionsExterior	See Table 705.5											
Nonbearing walls and partitionsInterior[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

For SI: 1 foot = 304.8 mm.

a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.

b. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing and decking where every part of the roof construction is 20 feet or more above any floor or mezzanine immediately below. Fire-retardant-treated *wood* members shall be allowed to be used for such unprotected members.

c. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed for roof construction, including primary structural frame members, where a 1-hour or less fire-resistance rating is required.

d. Not less than the fire-resistance rating required by other sections of this code.

e. Not less than the fire-resistance rating based on fire separation distance (see Table 705.5).

f. Not less than the fire-resistance rating as referenced in Section 704.9.

g. Heavy timber bearing walls supporting more than two floors or more than a floor and a roof shall have a fire-resistance rating of not less than 1 hour.

Reason: Have had a few projects of Type I-B construction with both primary structural frames and exterior load-bearing walls. In these situations the fire rating of the columns can be reduced by 1-hr when supporting a roof only, but exterior load-bearing walls do not offer this reduction. These situations creates a constructability issue since you have a 2 or 3-hr exterior wall and the roof construction that is bears on these walls is 1-hr rated.

This proposal is to offer the same 1-hr reduction for load-bearing walls as it does for primary structural frames.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

Range from $10k to several $100k, depending on the size and complexity of the structure.

Estimated Immediate Cost Impact Justification (methodology and variables):

This will simplify the constructability of roofs resting on load-bearing walls.

Estimated Life Cycle Cost Impact:

this is primarily for during construction. However, over the life of the structure the potential cost for window and door replacements would reduced

Estimated Life Cycle Cost Impact Justification (methodology and variables):

Depending on the method of the wall construction the windows and doors may be required to be fire-resistant rated and the adoption of this proposal would reduce the fire-resistant requirements for windows and doors, thus reducing the cost of future alterations/renovations.

G119-25

IBC: TABLE 601

Proponents: Richard Walke, Creative Technology Inc. and CM Services, representing National Fireproofing Contractors Association (richwalke61@gmail.com)

2024 International Building Code

Revise as follows:

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 partitionsExterior	See Table 705.5											
Nonbearing walls and partitionsInterior[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

For SI: 1 foot = 304.8 mm.

a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.

b. ~~Except in Group F-1, H, M and S-1 occupancies,~~ Where every part of the roof construction is 20 feet or more above the floor or mezzanine immediately below, fire protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing and decking ~~where every part of the roof construction is 20 feet or more above any floor or mezzanine immediately below.~~ except where any of the following conditions apply:

   1. In Group F-1, H, M and S-1 occupancies.

   2. Where the roof is occupiable.

   Fire-retardant-treated *wood* members shall be allowed to be used for such unprotected members.

c. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed for roof construction, including primary structural frame members, where a 1-hour or less fire-resistance rating is required.

d. Not less than the fire-resistance rating required by other sections of this code.

e. Not less than the fire-resistance rating based on fire separation distance (see Table 705.5).

f. Not less than the fire-resistance rating as referenced in Section 704.9.

g. Heavy timber bearing walls supporting more than two floors or more than a floor and a roof shall have a fire-resistance rating of not less than 1 hour.

Reason: The intent of this proposal is to prohibit the use of the “20 ft rule” stated in Exception b of Table 601 for occupiable roofs.

Footnote b as currently written reflects the facts that a roof is typically not occupied and that if sufficient distance exists between the floor below and the bottom side of the roof assembly there is little potential for the ignition of the roofing materials on top of the roof assembly. However, if the roof is occupiable, there is a need to protect those occupants through fire-resistance-rated construction just as if they were occupying the floor beneath the roof. As such, this proposal creates an exception to the use of the “20 ft rule” for occupiable roofs.

Cost Impact: Increase

Estimated Immediate Cost Impact:

Based on industry and manufacturer input, this code proposal will increase the cost of construction by approximately $1 to $3 per square foot of roof assembly protected.

Estimated Immediate Cost Impact Justification (methodology and variables):

This includes materials and labor costs for a typical roof assembly. The total cost in any given building will depend upon the area of the roof assembly and whether or not the "20 ft rule" even applied.

G120-25

IBC: TABLE 601

Proponents: Richard Walke, Creative Technology Inc. and CM Services, representing National Fireproofing Contractors Association (richwalke61@gmail.com)

2024 International Building Code

Revise as follows:

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~~g] (see Section 202)	3[a, ~~b~~c]	2[a, ~~b,~~ c, d]	1[~~b,~~ c, d]	0[~~c~~d]	1[~~b,~~ c, d]	0	3[a]	2[a]	2[a]	HT	1[~~b,~~ c, d]	0
Bearing walls												
Exterior[~~e,~~ f, g]	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~~h]	1	0
Nonbearing walls and partitions Exterior	See Table 705.5											
Nonbearing walls and partitions Interior[~~d~~e]	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, c]	1[b, c, d]	1[~~b,~~ c, d]	0[~~c~~d]	1[~~b,~~ c, d]	0	1 1/2[b]	1[b]	1[b]	HT	1[~~b,~~ c, d]	0

For SI: 1 foot = 304.8 mm.

a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.

b. The *fire-resistance rating* of an *occupiable roof* shall be equal to or greater than the required *fire-resistance rating* of the floor construction below.

~~b~~ c. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing and decking where every part of the roof construction is 20 feet or more above any floor or mezzanine immediately below. Fire-retardant-treated *wood* members shall be allowed to be used for such unprotected members.

~~c~~ d. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed for roof construction, including primary structural frame members, where a 1-hour or less fire-resistance rating is required.

~~d~~ e. Not less than the fire-resistance rating required by other sections of this code.

~~e~~ f. Not less than the fire-resistance rating based on fire separation distance (see Table 705.5).

~~f~~ g. Not less than the fire-resistance rating as referenced in Section 704.9.

~~g~~ h. Heavy timber bearing walls supporting more than two floors or more than a floor and a roof shall have a fire-resistance rating of not less than 1 hour.

Reason: The purpose of this code proposal is two-fold. First, it provides protection to the occupants of the occupiable roof. Second, it provides clarity that the entire occupiable roof must be rated.

The first purpose is achieved by requiring an occupiable roof to have a fire-resistance rating equal to the required fire-resistance rating of the floor below. This provides the same degree of fire-resistance for occupants of the occupiable roof as the occupants on the floor below. The second purpose is achieved by reference to an occupiable roof instead of an occupiable space. It is not permitted to rate just that portion of the roof beneath the occupiable space. This proposal recognizes that the size of the occupied space can change after certificate of occupancy is granted. By rating the entire occupiable roof, changes can be made in the size of the occupiable space without the need to address fire-resistance again when the cost of fire-resistance is increased due to obstructed access from the underside of the roof assembly. Ducts, piping, ceiling grid hangers, all cause production to massively slow down when in the way of fireproofing operations regardless of protection material type.

Cost Impact: Increase

Estimated Immediate Cost Impact:

Based on industry and manufacturer input, this code proposal will increase the cost of construction by approximately $1 to $3 per square foot of roof assembly protected.

Estimated Immediate Cost Impact Justification (methodology and variables):

This includes materials and labor costs for a typical roof assembly. The total cost in any given building will depend upon the area of the roof assembly.

G121-25

IBC: TABLE 601

Proponents: Richard Walke, Creative Technology Inc. and CM Services, representing National Fireproofing Contractors Association (richwalke61@gmail.com)

2024 International Building Code

Revise as follows:

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~~g] (see Section 202)	3[a, ~~b~~c]	2[a, ~~b,~~ c, d]	1[~~b,~~ c, d]	0[~~c~~d]	1[~~b,~~ c, d]	0	3[a]	2[a]	2[a]	HT	1[~~b,~~ c, d]	0
Bearing walls												
Exterior[~~e, f,~~ g]	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~~h]	1	0
Nonbearing walls and partitions Exterior	See Table 705.5											
Nonbearing walls and partitions Interior[~~d~~e]	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~~c]	1[~~b,~~ c, d]	1[~~b,~~ c, d]	0[~~c~~b,d]	1[~~b,~~ c, d]	0[b]	1 1/2	1	1	HT	1[~~b,~~ c, d]	0

For SI: 1 foot = 304.8 mm.

a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.

b. *Occupiable roofs* of single-story buildings without a required *fire-resistance ratings* on the floor construction of the first floor shall have a *fire-resistance rating* of 1 hr on the *occupiable roof.*

~~b~~ c. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing and decking where every part of the roof construction is 20 feet or more above any floor or mezzanine immediately below. Fire-retardant-treated *wood* members shall be allowed to be used for such unprotected members.

~~c~~ d. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed for roof construction, including primary structural frame members, where a 1-hour or less fire-resistance rating is required.

~~d~~ e. Not less than the fire-resistance rating required by other sections of this code.

~~e~~ f. Not less than the fire-resistance rating based on fire separation distance (see Table 705.5).

~~f~~ g. Not less than the fire-resistance rating as referenced in Section 704.9.

~~g~~ h. Heavy timber bearing walls supporting more than two floors or more than a floor and a roof shall have a fire-resistance rating of not less than 1 hour.

Reason: The purpose of this code proposal is three-fold. First, it provides protection to the occupants of the occupiable roof. Second, it provides clarity that the entire occupiable roof must be rated.

The first purpose is achieved by requiring an occupiable roof to have a fire-resistance rating of 1 hr. This provides a reasonable period of time for the occupants of the occupiable roof to egress the building in the case of fire. The second purpose is achieved by reference to an occupiable roof instead of an occupiable space. It is not permitted to rate just that portion of the roof beneath the occupiable space. This proposal recognizes that the size of the occupied space can change after certificate of occupancy is granted. By rating the entire occupiable roof, changes can be made in the size of the occupiable space without the need to address fire-resistance again when the cost of fire-resistance is increased due to obstructed access from the underside of the roof assembly. Ducts, piping, ceiling grid hangers, all cause production to massively slow down when in the way of fireproofing operations regardless of protection material type.

Cost Impact: Increase

Estimated Immediate Cost Impact:

Based on industry and manufacturer input, this code proposal will increase the cost of construction by approximately $1 to $3 per square foot of roof assembly protected.

Estimated Immediate Cost Impact Justification (methodology and variables):

This includes materials and labor costs for a typical roof assembly. The total cost in any given building will depend upon the area of the roof assembly.

G122-25

IBC: TABLE 601

Proponents: Jeffrey Grove, representing Coffman Engineers (jeff.grove@coffman.com)

2024 International Building Code

Revise as follows:

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 partitionsExterior	See Table 705.5											
Nonbearing walls and partitionsInterior[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

For SI: 1 foot = 304.8 mm.

a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.

b. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing and decking where every part of the roof construction is 20 feet or more above any floor or mezzanine immediately below. ~~Fire-retardant-treated *wood* members shall be allowed to be used for such unprotected members.~~

c. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed for roof construction, including primary structural frame members, where a 1-hour or less fire-resistance rating is required.

d. Not less than the fire-resistance rating required by other sections of this code.

e. Not less than the fire-resistance rating based on fire separation distance (see Table 705.5).

f. Not less than the fire-resistance rating as referenced in Section 704.9.

g. Heavy timber bearing walls supporting more than two floors or more than a floor and a roof shall have a fire-resistance rating of not less than 1 hour.

Reason: IBC 603.1 Item 1.3 permits fire-retardant treated wood in roof construction of Type I or II buildings. The final sentence of Table 601 footnote b creates redundancy and potential misinterpretation regarding FRT wood use. The current wording could incorrectly suggest FRT wood is limited to unprotected roof members above 20 feet, when it can be used in any Type I or II construction roof assembly meeting Table 601's fire-resistance requirements.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This code change proposal addresses the unintended redundancy and potential misinterpretation regarding FRT wood use. This code change proposal therefore has no impact to the cost of construction.

G123-25

IBC: TABLE 601

Proponents: Jeffrey Grove, representing Coffman Engineers (jeff.grove@coffman.com)

2024 International Building Code

Revise as follows:

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 partitionsExterior	See Table 705.5											
Nonbearing walls and partitionsInterior[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

For SI: 1 foot = 304.8 mm.

a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.

b. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing, ~~and~~ decking , and portions of columns above 20 feet where every part of the roof construction is 20 feet or more above any floor or mezzanine immediately below. Fire-retardant-treated *wood* members shall be allowed to be used for such unprotected members.

c. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed for roof construction, including primary structural frame members, where a 1-hour or less fire-resistance rating is required.

d. Not less than the fire-resistance rating required by other sections of this code.

e. Not less than the fire-resistance rating based on fire separation distance (see Table 705.5).

f. Not less than the fire-resistance rating as referenced in Section 704.9.

g. Heavy timber bearing walls supporting more than two floors or more than a floor and a roof shall have a fire-resistance rating of not less than 1 hour.

Reason: For columns that support roofs greater than 20 feet above any floor or mezzanine immediately below, Table 601 Footnote b is understood to primarily be enforced in two ways:

- Columns are required to be encased with fireproofing the full height of the column, including the area of the column 20 feet or more above any floor or mezzanine immediately below, or
- Columns are encased for the first 20 feet above any floor or mezzanine immediately below, with the height of the column above 20 feet permitted to be exposed. This interpretation is recognized by other standards (such as NFPA 101) but not explicit in the IBC codified language. This proposal helps to reinforce this interpretation.

This code modification proposes that fireproofing not be required for the column height above 20 feet, and retains the requirement for fireproofing less than or equal to 20 feet above the floor or mezzanine immediately below.

Encasement is intended to protect structural stability by delaying heating and weakening of structural framing elements due to fire exposure. Encasement is effective where structural members are exposed to high temperatures near to a fire with high fire exposure, with no substantial benefit to life safety and structural stability where encased members are remote from a fire with reduced fire exposure.

The prescriptive building code acknowledges this behavior in the current Table 601 Footnote b, by permitting primary structural frame members, roof framing and decking and every part of roof construction 20 feet or more above the floor or mezzanine immediately below to be exempt from fireproofing. The exemption of fireproofing greater than 20 feet above the floor or mezzanine acknowledges the lesser severity at higher elevations.

As heat transfer is a function of structural framing size and roof framing members are considerably smaller than columns, for an equivalent fire severity and exposed structural framing, roof framing members will be the limiting factor for structural stability compared to columns.

Given applied protection for roof framing is permitted to be exempt and structural framing for roof framing is considered to be the limiting factor for structural stability, portions of columns greater than 20 feet above the floor or mezzanine immediately below should also be permitted to be exempt for fireproofing, as the level of safety and structural stability is considered to be maintained for this condition.

Bibliography: NFPA 101, Life Safety Code

Cost Impact: Decrease

Estimated Immediate Cost Impact:

This proposal will result in a cost decrease for fire-proofing columns above 20 feet in this scenario. The cost can vary significantly depending upon the fireproofing strategy, but a lower estimate is approximately $5 per square foot for cementitious coatings. For buildings with multiple tall columns which support the roof this can present significant savings.

Estimated Immediate Cost Impact Justification (methodology and variables):

Costing information was gathered with the assistance of installing contractors and vendors.

G124-25

IBC: TABLE 601

Proponents: Charles Anderson, City of Minneapolis, representing Self (c.scott.anderson@minneapolismn.gov)

2024 International Building Code

Revise as follows:

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~~ 1	~~2~~ 1	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				1[e]	1[e]	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

For SI: 1 foot = 304.8 mm.

a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.

b. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing and decking where every part of the roof construction is 20 feet or more above any floor or mezzanine immediately below. Fire-retardant-treated *wood* members shall be allowed to be used for such unprotected members.

c. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed for roof construction, including primary structural frame members, where a 1-hour or less fire-resistance rating is required.

d. Not less than the fire-resistance rating required by other sections of this code.

e. Not less than the fire-resistance rating based on fire separation distance (see Table 705.5).

f. Not less than the fire-resistance rating as referenced in Section 704.9.

g. Heavy timber bearing walls supporting more than two floors or more than a floor and a roof shall have a fire-resistance rating of not less than 1 hour.

Reason: Under the UBC, the only legacy code I am familiar with, type III construction required exterior walls to be of non-combustible construction. This generally meant masonry or poured concrete construction. Bearing walls were required to be 4-hr rated and non-bearing walls were rated based on occupancy classification and Fire Separate Distance. Where FSD was 5 feet or less 4-hr rating was required. Where FSD was more than 5 feet and less than 20 feet were 2-hr rating was required. There was an allowance for fire retardant treated wood to be included in walls with a 2-hr or less required rating.

Under the UBC all exterior walls of most type III construction had a significant fire resistive rating.

With the introduction of the IBC in 2000 this changed significantly. The fire resistive rating for exterior bearing walls was reduced from 4-hr to 2-hr. Exterior non-bearing walls were reduced to 1-hr for any walls with a FSD less than 30’. The exception that allows FRT in walls with a 2-hr rating or less was maintained. It did not take designers long to recognize the significance of this change.

The entire exterior wall of type III construction can now be entirely of combustible construction. FRT lumber is still considered combustible construction. Given the higher allowable floor area and height type III construction buildings can, in many urban environments encompass entire blocks. Therefore the non-bearing walls have a FSD in excess of 30 feet so are permitted to have no fire resistive rating. In these cases there is very little difference between type III and V construction: The difference being the use of FRT and a smattering of 2-hr rated bearing walls.

This proposed change is an attempt to have the code catch up to the current construction practices and perhaps address some unintended results of the changes to the type III construction type in the very first IBC.

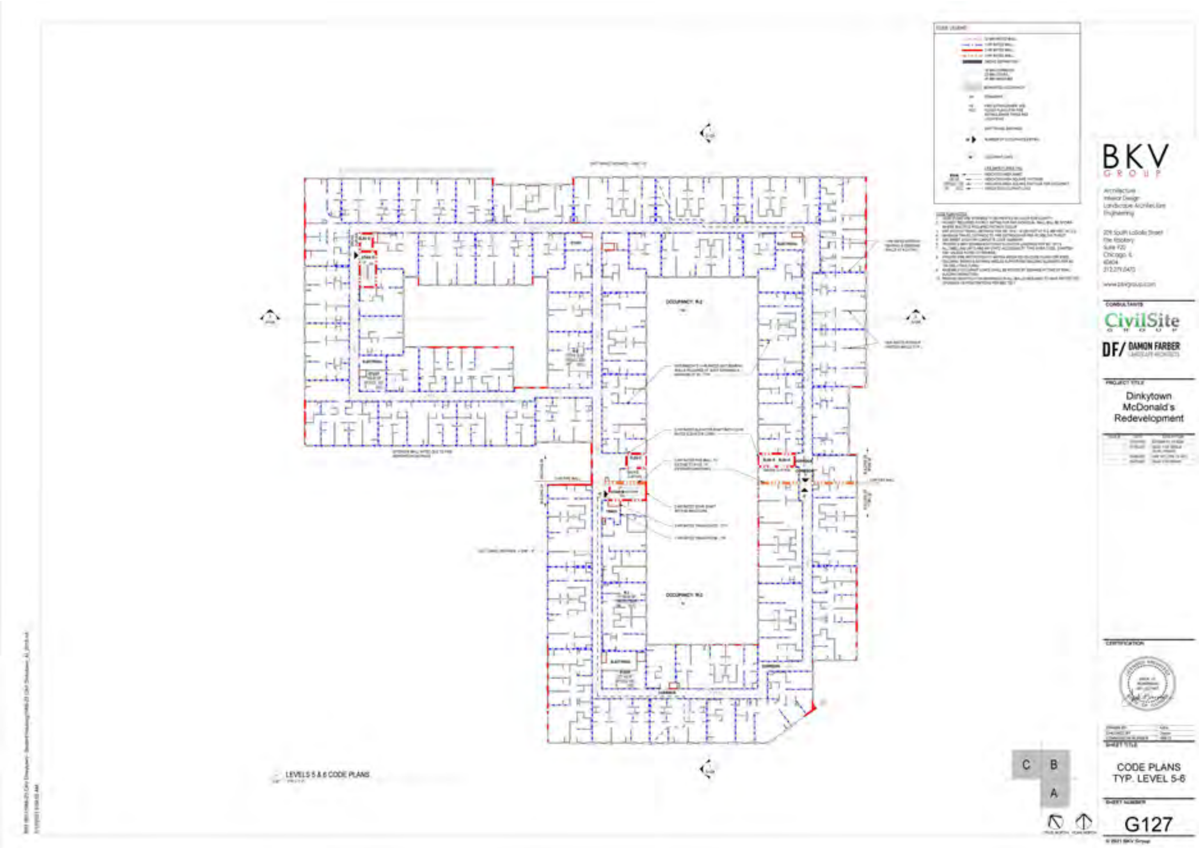
Type III construction is used extensively in the construction of R-2 dwelling units. The current construction practice is to run the floor and roof faming members parallel to the long dimension of the building. Limiting the amount of exterior bearing wall to the greatest extent possible. In a simple rectangular building this is not a significant issue. However most of these structures have numerous recesses in the exterior walls, due either to meeting zoning requirements for articulated facades or to provide for private decks and balconies. These articulations result is numerous short sections of exterior bearing walls. Many as short as 3-5 feet. The code requires that exterior bearing walls have a 2-hr fire resistive rating, designers, contractors and code officials spend an enormous amount of time and energy tracking all of these isolated wall assemblies through the building. This can get even more difficult when on upper levels the building steps back to create a smaller footprint on the upper levels. Again often in response to zoning requirements. Now not only the exterior bearing wall on this upper level is required to be 2-hr rated but all the supporting construction down through the interior of the building must also be 2-hr rated. Often the upper floor will have a different framing arrangement than the lower floor with a larger footprint. So the exterior bearing wall on floor 4 may in fact be above but back from an exterior non bearing wall on the floor 3.

The end result of applying these 2-hr rating requirements to all combustible construction is a great deal of work designing and maintaining isolated fire resistive elements. There is no practical or effective protection of the building construction. But at least we meet the code.

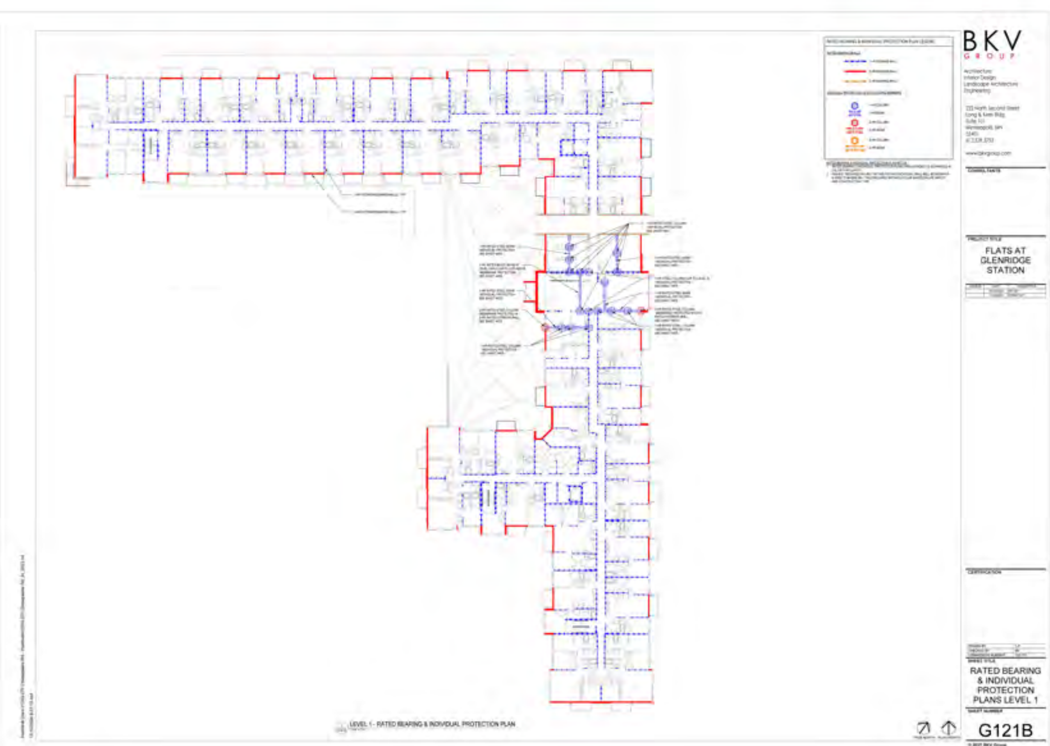
In lieu of this exercise in code compliance I am proposing we go back to the basic premise of type III construction. That is, that all exterior walls be provided with a fire resistive rating. Given the current construction practices most floor and wall assemblies in R-2 construction will have a minimum fire resistive rating of 1-hr. Yes there is an allowance to reduce it to 30 min when sprinkler system is being provided, but in practical terms the assemblies still meet the 1-hr rating.

Type III construction should as a requirement of the construction type have all exterior walls with a minimum 1-hr fire resistive rating. This may be increased based on FSD and is so noted in the footnote. This universal minimum 1-hr rating is more consistent with the historic type III construction and provides a better justification for the increased allowable floor area and height of type III vs type V construction. Further it makes more logical sense to have rated floor and roof assemblies supported by rated wall assemblies then non-rated assemblies which is currently permitted.

Attached example 1 shows a typical large scale type III apartment building. The exterior 2-hr rated walls are shown in red. Note that the entire north wall is non-rated construction. Note that in the middle of the north wall there are two 4 foot long walls perpendicular to the lot line that are 2- hr rated. The east and west walls have 2-hr rated assemblies for approx. 46% of the exterior wall and those rated assemblies are located at the extreme ends of the walls. The building walls facing the courtyard are also exterior walls and therefore include some 2-hr ratings.



Attached example 2 shows another typical type III apartment building. This one has balconies. Because of the definition of bearing walls these balconies create a series of exterior walls that qualify as bearing walls. The entire exterior wall design is a running pattern of non rated wall next to 2-hr rated wall next to non-rated wall next to 2-hr rated wall and on and on.



The point of these two examples is to show that, while it is possible to meet the letter of the code, it does not meet the original intent of the code sections. This alternating protected / non-protected pattern does not provide any realized protection of the structure, occupants, or first responders.

This proposed change at least restores the intent of type III construction in that it provides a minimum fire resistive rating for all exterior walls.

Bibliography: 1997 UBC

2000 IBC

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The reduction in detailing 2-hr rated combustible construction should ultimately balance any increase in construction cost to provide 1-hr construction in the non-bearing walls.

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IBC: 3001.2, TABLE 3001.3, 3001.5, 3002.5, [F] 3003.2, 3007.1, 3008.7.1, EN Chapter 35 (New), ISO Chapter 35 (New)

Proponents: Stephen Smith, representing Center for Building in North America (stephen@centerforbuilding.org)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IBC GENERAL CODE COMMITTEE. PART II WILL BE HEARD BY THE STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2024 International Building Code

Revise as follows:

3001.2 Elevator emergency communication systems. An elevator emergency two-way communication system that includes both visual and audible communication modes complying with the requirements in ASME A17.1/CSA B44 or ISO 8100-1 shall be provided in each elevator car. The system shall provide a means to enable authorized personnel to verify:

1. The presence of someone in the car.
2. That the person(s) is trapped.

Once an entrapment is verified, the system shall enable authorized personnel to:

1. Determine if assistance is needed.
2. Communicate when help is on the way.
3. Communicate when help arrives on site.

Exception: If the elevator standard used does not include a requirement for two-way visual communication, then the interior of the elevator cabin shall include a sign with a phone number that can accept text messages, along with a unique identifier for occupants to identify their elevator car.

TABLE 3001.3 ELEVATORS AND CONVEYING SYSTEMS AND COMPONENTS

TYPE	STANDARD
Automotive lifts	ALI ALCTV
Belt manlifts	ASME A90.1
Conveyors and related equipment	ASME B20.1
Elevators, escalators, dumbwaiters, moving walks, material lifts	ASME A17.1/CSA B44, ASME A17.7/CSA B44.7; or ISO 8100-1, ISO 8100-2
Industrial scissor lifts	ANSI MH29.1
Platform lifts, stairway chairlifts, wheelchair lifts	ASME A18.1

3001.5 Change in use. A change in use of an elevator from freight to passenger, passenger to freight, or from one freight class to another freight class shall comply with Section 8.7 of ASME A17.1/CSA B44 or both ISO 8100-1: Annex C and ISO 8100-1: 7.3.2 (b).

3002.5 Emergency doors. Where an elevator is installed in a single blind hoistway or on the outside of a *building*, there shall be installed in the blind portion of the hoistway or blank face of the *building*, an emergency door in accordance with ASME A17.1/CSA B44 or ISO 8100-1.

[F] 3003.2 Fire fighters' emergency operation. Elevators shall be provided with Phase I emergency recall operation and Phase II emergency in-car operation in accordance with ASME A17.1/CSA B44 or EN81-72.

3007.1 General. Where required by Section 403.6.1, every floor above and including the lowest level of fire department vehicle access of the *building* shall be served by fire service access elevators complying with Sections 3007.1 through 3007.9. Except as modified in this section, fire service access elevators shall be installed in accordance with this chapter and ASME A17.1/CSA B44 or EN81-72.

Exceptions:

1. Elevators that only service an open or enclosed parking garage and the lobby of the *building* shall not be required to serve as fire service access elevators.

2. The elevator shall not be required to serve the top floor of a *building* where that floor is utilized only for equipment for *building* systems.

3008.7.1 Elevator recall. The *fire command center* or an alternate location *approved* by the fire department shall be provided with the means to manually initiate a Phase I Emergency Recall of the occupant evacuation elevators in accordance with ASME A17.1/CSA B44 or EN81-72.

Add new standard(s) as follows:

EN

European Committee for Standardization
Rue de la Science 23 B
Brussels, Belgium 1040
Belgium

EN81-72:2020	Firefighters lifts
ISO 8100-1:2019	Safety rules for the construction and installation of passenger and goods passenger lifts
ISO 8100-2:2019	Design rules, calculations, examinations and tests of lift components

Reason: In 1957, elevator regulators, inspectors, and manufacturers from around Europe met in Milan to discuss harmonizing safety standards. “It was learned,” wrote Finland's longtime representative to the European elevator standard's technical committee, “that differing opinions concerning safety existed, though risks connected to elevators should be the same in all countries.” Each country in Europe at the time had its own elevator safety standard, but as part of a project of European unification, their rules were gradually consolidated into what would become Europe’s EN 81 family of elevator standards.[1] In North America, a similar process took place a few decades later as the United States and Canada harmonized their standards into a unified ASME/CSA set of standards, with A17.1/B44 as the flagship text.[2] A battle between the European and North American standards played out around the world, and Europe won. Virtually every country in the world now either accepts or is working towards convergence with European elevator standards, which were inscribed as global standards standards in the form of ISO 8100-1 and ISO 8100-2, as China – which now has far and away the world’s largest fleet of elevators, and the majority of new installations globally – finally sided with the Europeans.[3]

The global harmonization of elevator rules around the ISO 8100 standards and related EN 81 family of standards has marooned the United States and Canada on a technological and market island. Americans have access to a narrower range of models built by a small and shrinking pool of manufacturers. We are left to pick through slimmer catalogs of components than our counterparts outside of North America, who can buy parts conforming to the global standard on the more competitive global market. For a few concrete examples, compare the number of landing and car doors and lift machines that Wittur is able to sell in North America compared to their offerings in Europe, or the number of elevator door detectors that WECO – the world’s largest manufacturer of the devices – has available in the two markets.[4]

We lag behind the rest of the world in practices – the machine room less elevator came late to America, and hydraulic models that have mostly fallen out of fashion abroad still make up a significant share of new installations in the U.S. We have the world’s highest elevator costs, with devices in similarly sized buildings costing three to four times what they do in high-income countries in Western Europe, even after adjusting for cost-of-living differences. New walk-up apartment buildings are commonplace across the United States, up to three stories in garden apartments throughout the country and up to six stories in places that have made small-lot multifamily buildings easier to build through amendments to Section 1006. In Western Europe, on the other hand, with its much more affordable elevators, walk-ups are nearly extinct in even low-rise new construction.[5]

The primary goal of referenced elevator standards is safety, but there is no solid evidence that the ASME standards provide more safety for workers within the elevator industry (who are disproportionately at risk from elevators) than global standards. What limited evidence there is hints at the opposite. Beyond risks to elevator workers from installed devices, the walk-up buildings that continue to proliferate in America pose significant risk to residents and other construction workers. Over 1 million Americans are treated in emergency rooms each year for injuries incurred while using stairs, and thousands lose their lives.[6]

Referencing the ISO and EN global standards in addition to ASME’s North American ones would be a big shift for the elevator industry and regulators, but it is a well-trod path that hundreds of other countries around the world have already gone down. The A17.1 standard is more prescriptive than the ISO standards, but even ASME has recognized the benefits of performance-based design, with its A17.7 performance-based elevator standard, as has the ICC with its own Performance Code for Buildings and Facilities. Lawmakers’ rising interest in affordability and infill urban development may push the industry to accept the global elevator standards outside of the model code process, with bills introduced in the 2025 legislative session in Washington

State to force adoption of the ISO's elevator standards, with the support of the state AARP chapter.[7]

My proposal takes a step towards opening the North American market up to global standards by offering owners the option of choosing elevators that conform to the status quo ASME standard, or the global ISO and related EN standards. The ISO 8100-1 and ISO 8100-2 standards contain the bulk of what is addressed in the ASME A17.1 standard, but there remain a few items referenced in the IBC that are outside of their scope. For these items, I have found the relevant EN standards (EN standards, written by CEN-CENELEC, form the basis of the ISO 8100 standards as well). I believe these European standards are the most appropriate to reference, since Europe is the home of most global elevator manufacturers and of the global regulatory system for elevators, and is by far the largest high-income market for elevators in the world, with many times as many installed devices as in North America.

EN 81-72 contains Phase I emergency recall operation and Phase II emergency in-car operation instructions (in 5.8, "Control systems") that are similar to those in ASME A17.1. EN 81-73 contains rules for the behavior of elevators during fires. Seismic requirements found in ASME 17.1 have parallels in EN 81-77, written to address the many seismically active places in Europe (like Turkey or Italy) where this standard is adopted.

There are two IBC sections where I was not able to find a clean parallel to an ISO or EN standard: behavior during floods, and two-way visual communications.

For the latter, the reference to ASME A17.1 in IBC 1612, "Flood Loads," is simply left in place – building owners in flood hazard areas would need to either demonstrate an equivalence to the AHJ if they wanted to use devices not certified to ASME A17.1, or use equipment fully conforming to ASME A17.1.

The two-way visual communication requirement is trickier, since it applies to all devices, not just in special areas. Leaving the requirement in place as-is would therefore render the allowance in other sections for ISO/EN-conforming devices unusable. There is no ISO or EN equivalent to this new requirement, so my proposed solution is that equipment meeting ISO standards would, unless or until the standard is rewritten to include a visual communication requirement, require a sign with a phone number to text for people who cannot otherwise use the audio equipment provided. This is in line with common practice abroad, where most elevator cabs are provided with phone numbers. This would have the ancillary benefit of giving trapped riders another means to reach the proper authorities (that is, the elevator service company) rather than calling 911, which often leads firefighters to damage equipment while trying to disentrap riders, leaving elevators out of service while they wait for repairs and often leaving building inaccessible in the meantime. While a visual communication system that relies on the user to have a charged cell phone and cell service is not foolproof (no system is – even the current code requirements may leave the 8 percent of the U.S. population unable to speak English very well unserved), the anecdote provided by the proponent of EB 94-15 in support of one of the original proposals leading to this code section involved trapped riders with access to working phones with cell service.[8] I realize that the exception I have inserted into this section may not meet the intent of prior cycles' committees, and I am open to other solutions here (such as requiring that communications devices meet the standards laid out in a specific ASME A17.1 section).

Elevator standards are referenced in multiple chapters of the IBC, making any proposal to add an additional referenced standard option challenging. While the main references are in Chapter 30 with some additional references in Chapter 16, both heard during Group B this year, there are some ancillary references in chapters 9 and 10, which were heard last year during Group A. While these references are more important than what is usually considered correlative, the elevator standard is referenced in so many different places that it would not otherwise be possible to introduce a new set of referenced standards in a single year, and any proposal adhering strictly to the separation of groups would end up disjointed and confusing. Given that the heart of the matter belongs in Chapter 30, I believe this proposal is best addressed during Group B.

If this proposal is successful, the following will be proposed in Group A.

1009.4.1 Standby power. The elevator shall meet the emergency operation and signaling device requirements of Section 2.27 of ASME A17.1/CSA B44 or ISO 8100-1. Standby power shall be provided in accordance with Chapter 27 and Section 3003.

[F] 907.3.3 Elevator emergency operation. *Automatic fire detectors* installed for elevator emergency operation shall be installed in accordance with the provisions of ASME A17.1/CSA B44 or both EN81-72 and EN81-73 and NFPA 72.

[F] 911.1.6 Required features. The *fire command center* shall comply with NFPA 72 and shall contain all of the following features: (portions not shown remain unchanged)17. Elevator fire recall switch in accordance with ASME A17.1/CSA B44 or both EN81-72 and EN81-73

Bibliography:

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2. *The A17.1 Code: A Century of Progress for Safety, 1921-2021* (Elevator World, 2021).
3. "IAEC Position Paper: Should ASME A17.1/CSA B44 'Converge' with ISO 8100?" (International Association of Elevator

Consultants, October 22, 2018), https://www.elevatoru.org/resources/Documents/IAEC-Convergence-Paper-Final.pdf; Christian de Mas Latrie, “Lift Associations ELA and CEA Align on Interpretation of Standards,” *Elevator World*, February 1, 2022, https://elevatorworld.com/article/closing-the-distance-between-europe-and-china/.
4. “Wittur,” accessed February 2, 2024, https://www.wittur.com/; “WECO Elevator Products Ltd.: Products,” accessed February 7, 2025, https://wecocanada.com/products/; “WECO Elevator Products,” accessed February 7, 2025, https://www.wecoeurope.com/products/door-detectors/.
5. Stephen Jacob Smith, “Elevators” (Center for Building in North America, May 2024), https://bit.ly/3XRH4Ij.
6. Smith, 40–42.
7. Washington State Legislature, “SB 5156 - 2025-26: Concerning Elevator Standards in Smaller Apartment Buildings,” accessed February 7, 2025, https://app.leg.wa.gov/billsummary?BillNumber=5156&Year=2025; Washington State Legislature, “HB 1183 - 2025-26: Concerning Building Code and Development Regulation Reform,” accessed February 7, 2025, https://app.leg.wa.gov/billsummary?BillNumber=1183&Year=2025&Initiative=False.
8. United States Census Bureau, “People That Speak English Less Than ‘Very Well’ in the United States,” April 8, 2020, https://www.census.gov/library/visualizations/interactive/people-that-speak-english-less-than-very-well.html; “2015 Group A Proposed Changes to the I-Codes Memphis Committee Action Hearings” (Memphis: International Code Council, April 19, 2015), EB 94-15, https://www.iccsafe.org/wp-content/uploads/IEBC4.pdf.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

It is difficult to quantify exactly the cost decrease. Based on a review of dozens of proposals across the two continents, elevators in high-income countries in Western Europe are roughly a third the cost of those in the U.S., however some of this cost decrease comes from small cabin sizes, some comes from labor inefficiencies that may or may not change with the a new standard, and some comes from factors external to codes and standards (like America's more difficult product liability environment, or its stricter immigration policies). My rough estimate based on dozens of interviews and overall evaluation of the market is that harmonizing with global standards will decrease the cost of an elevator for a mid-rise building by the low to mid-five figures. Very roughly, one-quarter of the $150,000 cost for a mid-rise multifamily elevator.

Estimated Immediate Cost Impact Justification (methodology and variables):

See above.

Estimated Life Cycle Cost Impact:

I expect lower costs due to increased availability of parts and testing procedures (for example, lower-cost alternative electronic testing). The magnitude is difficult to estimate, but I would guess that the percentage decrease in costs would be at least in the low double digits. In general, annual operating costs for mid-rise elevators in the U.S. are in the range of $7,500, compared to a third or quarter of that in Western Europe after adjustment for purchasing power parity in Western Europe (see pgs. 37-39 of my report for more details). However, like the immediate cost differential, this gap has more contributing factors beyond ASME vs. ISO/EN standards.

Estimated Life Cycle Cost Impact Justification (methodology and variables):

See above.

Staff Analysis: A review of the following standards proposed for inclusion in the code regarding some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before April 1, 2025:
EN 81-72:2020 Firefighters lifts
ISO 8100-1:2019 Safety rules for the construction and installation of passenger and goods passenger lifts
ISO 8100-2:2019 Design rules, calculations, examinations and tests of lift components

G173-25

IFC: SECTION 107, [A] 107.1; IBC: SECTION 108, [A] 108.1, SECTION 202, SECTION 3103, 3103.1, 3103.1.1, 3103.6, 3103.6.1, 3103.6.1.1, TABLE 3103.6.1.1, 3103.6.1.2, TABLE 3103.6.1.2, 3103.6.1.3, 3103.6.1.4, 3103.6.1.5, 3103.6.1.6, 3103.6.2, 3103.6.4, 3103.7

Proponents: Jennifer Goupil, American Society of Civil Engineers and Structural Engineering Institute, representing American Society of Civil Engineers (jgoupil@asce.org); Emily Guglielmo, representing NCSEA (eguglielmo@martinmartin.com)

2024 International Fire Code

SECTION 107
TEMPORARY STRUCTURES, USES, EQUIPMENT AND SYSTEMS

Revise as follows:

[A] 107.1 General. The *fire code official* is authorized to issue a permit for temporary structures, uses, equipment or systems as required in Sections 105.5 and 105.6. Such permits shall be limited as to time of service, but shall not be permitted for more than 180 days. *Public-occupancy temporary structures* shall be permitted for a period not to exceed one year. The *fire code official* is authorized to grant extensions for demonstrated cause.

2024 International Building Code

SECTION 108
TEMPORARY STRUCTURES, EQUIPMENT AND SYSTEMS

Revise as follows:

[A] 108.1 General. The *building official* is authorized to issue a *permit* for temporary *structures* , equipment or systems. Such *permits* shall be limited as to time of service, but shall not be permitted for more than 180 days. *Public-occupancy temporary structures* shall be permitted for a period not to exceed one year. The *building official* is authorized to grant extensions for demonstrated cause or in accordance with Section 3103. ~~Structures designed to comply with Section 3103.6 shall not be in service for a period of more than 1 year unless an extension of time is granted.~~
Detached *tents* and other *membrane structures* erected for a period of 180 days or less shall comply with the International Fire Code.

SERVICE LIFE. The period of time that a *structure* serves its intended purpose. For *temporary structures*, this shall be the cumulative time of service for sequential *temporary events* that may occur in multiple locations. ~~For *public-occupancy temporary structures* , this is assumed to be a minimum of 10 years.~~
TEMPORARY EVENT. A single use during the *service life* of a ~~*public-occupancy*~~ *temporary structure* at a given location that includes its installation, inspection, use and occupancy, and dismantling.

SECTION 3103
TEMPORARY STRUCTURES

3103.1 General. The provisions of ~~Sections 3103.1 through 3103.8~~ this section shall apply to *structures* erected for a period of ~~less than~~ 180 days or less. Temporary *special event structures*, *tents*, umbrella *structures* and other membrane *structures* erected for a period of ~~less than~~ 180 days or less shall also comply with the *International Fire Code*. *Temporary structures* erected for a longer period of time ~~and *public-occupancy temporary structures*~~ shall comply with applicable sections of this code for permanent structures.

Exceptions~~.~~:

~~1. *Public-occupancy temporary structures* complying with Section 3103.1.1 shall be permitted to remain in service for 180 days or more but not more than 1 year where *approved* by the *building official*.~~

~~2.~~ *Public-occupancy temporary structures* within the confines of an enclosed *existing structure* are not required to comply with Section 3103.6.

3103.1.1 Extended period of service time. ~~Public-occupancy temporary~~ *Temporary structures* shall be permitted to remain in service for 180 days or more without complying with requirements in this code for new *building* or structures where extensions for up to 1 year are granted by the *Building* Official in accordance with Section 108.1 and where the following conditions are satisfied:

1. Additional inspections as determined by the building official shall be performed by a qualified *person* to verify that site conditions and the *approved* installation comply with the conditions of approval at the time of final inspection.
2. A qualified *person* shall perform follow-up inspections after initial occupancy at intervals not exceeding 180 days to verify the site conditions and the installation conform to the *approved* site conditions and installation requirements. Inspection records shall be kept and shall be made available for verification by the *building official*.
3. An examination shall be performed by a *registered design professional* to determine the adequacy of the temporary structure to resist the structural loads required in Section 3103.6.
4. Relocation of the ~~*public-occupancy*~~*temporary structure* shall require a new *permit* application.
5. The use or occupancy *approved* at the time of final inspection shall remain unchanged.
6. A request for an extension is submitted to the *building official*. The request shall include records of the inspections and examination in Items 1 and 3.

3103.6 Structural requirements. *Temporary structures* ~~shall comply with the structural requirements of this code. *Public-occupancy temporary structures*~~ shall be designed and erected to comply with the structural requirements of this code and Sections 3103.6.1 through 3103.6.4. For the purposes of this section, the *service life* of *public-occupancy temporary structures* shall be assumed to be 10 years.

Exception: Where *approved*, *live loads* less than those prescribed by Table 1607.1 shall be permitted provided that a *registered design professional* demonstrates that a rational approach has been used and that such reductions are warranted.

Temporary non-*building structures* ancillary to public assemblies or temporary *special event structures* whose structural failure or collapse would endanger assembled public shall be assigned a *risk category* corresponding to the ~~*risk category* of the~~ public assembly occupant load in accordance with Section 1604.5. For the purposes of establishing an *occupant load* for the assembled public endangered by structural failure or collapse, the applicable *occupant load* determination in Section 1004.5 or 1004.6 shall be applied over the assembly area within a radius equal to 1.5 times the height of the temporary non-*building structure*

3103.6.1 Structural loads. ~~*Public-occupancy temporary*~~ *Temporary structures* shall be designed in accordance with Chapter 16, except as modified by Sections 3103.6.1.1 through 3103.6.1.6.

3103.6.1.1 Snow loads. Snow loads on ~~public-occupancy~~ *temporary structures* shall be determined in accordance with Section 1608. The ground snow loads, p_g, in Section 1608 shall be permitted to be modified according to Table 3103.6.1.1.

Exception: Ground snow loads, p_g, for *public-occupancy temporary structures* that employ controlled-occupancy procedures per Section 3103.8 shall be permitted to be modified using a ground snow load reduction factor of 0.65 instead of the ground snow load reduction factors in Table 3103.6.1.1.

Where the ~~*public-occupancy*~~ *temporary structure* is not subject to snow loads or not constructed and occupied during times when snow is to be expected, snow loads need not be considered, provided that where the period of time when the ~~*public-occupancy*~~ *temporary structure* is in service shifts to include times when snow is to be expected, one of the following conditions is met:

1. The design is reviewed and modified, as appropriate, to account for snow loads.
2. ~~Controlled~~ For a *public-occupancy temporary structure*, controlled occupancy procedures in accordance with Section 3103.8 are implemented.

TABLE 3103.6.1.1 REDUCTION FACTORS FOR GROUND SNOW LOADS FOR ~~PUBLIC-OCCUPANCY~~ TEMPORARY STRUCTURES

RISK CATEGORY	SERVICE LIFE	
	≤ 10 yr	>10 yr
II	0.7	1.0
III	0.8	1.0
IV	1.0	1.0

3103.6.1.2 Wind loads. The design wind load on ~~*public-occupancy*~~ *temporary structures* shall be permitted to be modified in accordance with the wind load reduction factors in Table 3103.6.1.2.

Exceptions:

1. Design wind loads for *public-occupancy temporary structures* that implement controlled occupancy procedures per Section 3103.8 shall be permitted to be modified using a wind load reduction factor of 0.65.
2. For ~~*public-occupancy*~~ *temporary structures* erected in a *hurricane-prone region* outside of hurricane season, the *basic wind speed*, *V*, shall be permitted to be set as follows, depending on *risk category*:

   2.1. *Risk Category* II: 115 mph.

   2.2. Risk Category III: 120 mph.

   2.3. Risk Category IV: 125 mph.

TABLE 3103.6.1.2 REDUCTION FACTORS FOR WIND LOADS FOR ~~PUBLIC-OCCUPANCY~~ TEMPORARY STRUCTURES

RISK CATEGORY	SERVICE LIFE	
	≤ 10 yr	>10 yr
II	0.8	1.0
III	0.9	1.0
IV	1.0	1.0

3103.6.1.3 Flood loads. ~~*Public-occupancy temporary*~~ *Temporary structures* need not be designed for flood loads specified in Section 1612. Controlled occupancy procedures in accordance with Section 3103.8 shall be implemented for *public-occupancy temporary structures* located in areas prone to flooding as defined on a flood hazard map.

3103.6.1.4 Seismic loads. Seismic loads on ~~*public-occupancy*~~ *temporary structures* assigned to *Seismic Design Categories* C through F shall be permitted to be taken as 75 percent of those determined by Section 1613. ~~*Public-occupancy temporary*~~ *Temporary structures* assigned to *Seismic Design Categories* A and B are not required to be designed for seismic loads.

3103.6.1.5 Ice loads. Ice loads on ~~public-occupancy~~ *temporary structures* shall be permitted to be determined with a maximum nominal thickness of 0.5 inch (13 mm), for all risk categories. Where the ~~*public-occupancy*~~ *temporary structure* is not subject to ice loads or not constructed and occupied during times when ice is to be expected, ice loads need not be considered, provided that where the period of time when the ~~*public-occupancy*~~ *temporary structure* is in service shifts to include times when ice is to be expected, one of the following conditions is met:

1. The design is reviewed and modified, as appropriate, to account for ice loads.
2. ~~Controlled~~ For a *public-occupancy temporary structure*, controlled occupancy procedures in accordance with Section 3103.8 are implemented.

3103.6.1.6 Tsunami loads. *Public-occupancy temporary structures* in a *tsunami design zone* are not required to be designed for tsunami loads specified in Section 1615. Controlled occupancy procedures in accordance with Section 3103.8 shall be implemented for *public-occupancy temporary structures* located in a tsunami design zone.

3103.6.2 Foundations. ~~Public-occupancy temporary~~ *Temporary structures* shall be permitted to be supported on the ground with temporary foundations where *approved* by the *building official*. Consideration shall be given for the impacts of differential settlement where foundations do not extend below the ground or where foundations are supported on compressible materials. The presumptive load-bearing value for ~~*public-occupancy*~~ *temporary structures* supported on a pavement, slab on grade or on other collapsible or controlled low-strength substrate soils such as beach sand or grass shall be assumed not to exceed 1,000 pounds per square foot (47.88 kPa) unless determined through testing and evaluation by a *registered design professional*. The presumptive load-bearing values listed in Table 1806.2 shall be permitted to be used for other supporting soil conditions.

3103.6.4 Durability. Reusable components used in the erection and the installation of ~~*public-occupancy*~~ *temporary structures* shall be manufactured of durable materials necessary to withstand environmental conditions at the service location. Components damaged during transportation or installation or due to the effects of weathering shall be replaced or repaired.

3103.7 Serviceability. The effects of structural loads or conditions shall not adversely affect the serviceability or performance of the ~~*public-occupancy*~~ *temporary structure.*

Reason: This proposal is being submitted to correct errors in the code, correlate the IBC and the IFC, make other clarifications, and addresses what appears to be a logical inconsistency in the 2024 IBC provisions for loads on temporary structures versus public-occupancy temporary structures, as described below. The change to IFC 107.1 is to coordinate the permit timeframe for public-occupancy temporary structures with the change to IBC 108.1. Although "public-occupancy temporary structures" is not used anywhere in the IFC, the IBC definition would govern (see IFC 201.3) and this would prevent any conflicts with what is allowed in the IBC.

BACKGROUND:

Prior to the 2024 IBC, there was confusion in the design and enforcement communities regarding the structural design of temporary structures--what loads should be required? Technically, the IBC required temporary structures to be designed for the same loads as permanent structures, but this seemed unreasonable. Lacking guidance in the IBC and ASCE 7, many design professionals and jurisdictions turned to ASCE 37, which contains load provisions for buildings under construction. Past attempts to codify ASCE 37 for temporary structures were defeated because ASCE 37 is not appropriate for buildings that are occupied by the public. In the last cycle, ASCE/SEI organized an ad-hoc committee of experts to develop code change proposal S116-22, which defined loads and special procedures, mostly focused on public-occupancy temporary structures. Ultimately, S116-22 was revised in the Public Comment Hearing and approved through the Online Governmental Consensus Vote process, and its provisions are in Section 3103 of the 2024 IBC.

As part of the effort to develop the next version of ASCE 7 (ASCE 7-28), a new chapter dealing with loads on temporary structures is currently under development. The subcommittee responsible for developing the new chapter used 2024 IBC Section 3103 as a starting point and is making improvements to the provisions. Also, recognizing that the changes to the 2024 IBC necessitated correlating changes to the IFC, the ASCE/SEI ad hoc committee was tasked with developing code change proposals for Group A. In the process of all this development, some errors and inconsistencies in the current 2024 IBC and 2024 IFC were identified. In Group A last year, the IFC Committee approved code change proposals F198-24 and F199-24 which correct some of the errors and aligns the IFC with the new IBC requirements. (Note that with the new ICC code development process, we will not know if public comments have been submitted on these Group A proposals until March, 2026.)

ERRORS AND INCONSISTENCIES:

- Section 108.1 (temporary structures).
  - S116-22 inserted an allowance for public-occupancy temporary structures to be permitted for up to 1 year and allows other extensions in Section 3103. However, Section 108.1 limits permits for temporary structures to 180 days. This proposal inserts the 1-year allowance for public-occupancy temporary structures and adds a pointer to Section 3103 for consistency.
  - As currently written, the IBC regulates temporary detached tents and other membrane structures, since they are not exempted from compliance. However, IFC Section 3103.1 also clearly regulates them. In Group A, F199-24 attempted to change the IFC to require these tents and membrane structures to comply with both the IFC and IBC. However, the IFC Committee and other testifiers clearly indicated that they wanted <u>only</u> the IFC to govern, and that requirement was removed for CAH 2. This proposal adds a pointer to the IFC for consistency.
- Temporary Event (definition). S116-22 inserted new definitions for Temporary Structure, Temporary Event, and Public-Occupancy Temporary Structure (hereinafter referred to as a POTS). A Temporary Structure is there to support a Temporary Event. POTSs are a subset of temporary structures that are there to serve assembly occupancies or other public uses. However, the current definition of Temporary Event is a "single use...of a <u>public-occupancy</u> temporary structure at a given location..." [emphasis added]. Putting everything together, by these definitions, only POTSs meet the definition of Temporary Structure. This is clearly a mistake made in

the drafting of S116-22, since it would exclude all temporary structures that are not POTSs, such as a temporary air-supported membrane structure used as an aircraft hangar. This proposal addresses the issue by revising the definition of Temporary Event such that it applies to all temporary structures.

- Section 3103.1 (general/scoping).
  - By definition, a Temporary Structure is one that is erected for 180 days or less. However, Section 3103.1 conflicts with that definition, stating that this section applies to structures erected for a "period of less than 180 days," and that certain structures erected for "less than 180 days" must comply with the IFC. Comparing this to other references to the 180 days in the IBC and IFC Section 3103, temporary structures are allowed up to and including the 180 days, so this proposal changes IBC 3103.1 to match.
  - The last sentence requires temporary structures that are erected for more than 180 days and POTSs to comply with "this code." The intent is that structures that are not temporary should comply with the code for new construction (see also "Clarifications" below). However, as written, all POTSs would need to comply with new construction code. This proposal removes POTSs to deal with this inconsistency, as well as to deal with the substantive change described below.
- Section 3103.6.1.1 (snow loads). As currently written, snow loads <u>must</u> be reduced using the factors in Table 3103.6.1.1. This was an error in the drafting of S116-22, in that there should be no issue if the design professional wants to design for full snow loads, without the reductions. This proposal modifies the second sentence of Section 3103.6.1.1 to make the reduction factors an option.
- Sections 3103.6.3 (flood) and 3103.6.1.6 (tsunami). As currently written, controlled occupancy procedures per Section 3103.8 are required to address both flood and tsunami hazards, whether or not the structure is located in a flood or tsunami hazard areas. This was an oversight in the drafting of S116-22, and this proposal addresses the issue by triggering the controlled occupancy procedures only if the structure is located in the associated hazard area.

CLARIFICATIONS:

- Service Life (definition) and Section 3103.6 (structural requirements). The definition of Service Life states that 10 years is to be assumed for the service life of a POTS. This was felt to be a requirement contained in the definition, so this proposal moves that requirement to 3103.6.
- Section 3103.1 (general/scoping). This proposal clarifies that the intent is that compliance with "this code" is intended to mean that structures that are erected for periods longer than the temporary structure limits are required to be designed as permanent structures, which would include full structural loads.
- Section 3103.1, exceptions.
  - Exception 1 is deleted because it is covered in Section 108.1.
  - Exception 2 has been revised to apply only where the POTS is erected within an <u>enclosed</u> structure. The original thinking behind this exception was that if the temporary structure is inside a building, it is not subject to environmental loading (snow, wind, etc.) However, there was concern that a temporary structure located underneath a roof structure with open sides could interpreted as being "within the confines of an existing structure," which would then expose these structures to those loads.
- Section 3103.6 (structural requirements--risk category). Concerns have been raised that the risk category language regarding ancillary non-building structures (etc.) is unclear when it refers to the "risk category of the public assembly." The requirement has been modified to refer to the "public assembly occupant load" instead, as a clarification.

LOADS ON TEMPORARY STRUCTURES vs POTSs:

The remaining changes in this proposal address what is seen as a logical inconsistency in the current 2024 IBC Section 3103.6. That is, why are POTSs allowed to be designed for lower structural loads than other temporary structures, such as a temporary shelter for cement bags? If a POTS (which involves a public assembly) is allowed to have reduced loading, it seems logical that the same load reductions should also be allowed for other temporary structures. This is the approach that is being taken with this proposal and is consistent with the approach being taken by the subcommittee that is developing the new chapter for ASCE 7-28.

S116-22 focused on reducing loads for POTSs. This proposal extends the load reductions to all temporary structures, with some exceptions. Because controlled occupancy procedures are not enforceable on temporary structures that are not POTSs, additional load reductions that are dependent on those controlled occupancy procedures are only allowed for POTSs (see the exceptions for snow and wind loads). In addition, for load conditions where the structure is erected outside of the season for those loads (hurricane, ice, snow), only POTSs are allowed to use controlled occupancy procedures in lieu of redesigning/strengthening the structure for those loads if the structure remains during the hazard season.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposed code change will reduce the loads for temporary structures other than public-occupancy temporary structures, since it proposes to extend the load reductions now only applicable to POTSs to all temporary structures. There will be no change in the cost of construction for POTSs.

Staff Analysis: F199-24 added references to IBC for tempoaray structures.

G179-25

IBC: SECTION 202, TABLE 3103.6.1.1, TABLE 3103.6.1.2

Proponents: Henry Kosarzycki, representing Self (hkosarzycki@flad.com)

2024 International Building Code

Revise as follows:

~~**SERVICE LIFE.** The period of time that a *structure* serves its intended purpose. For *temporary structures*, this shall be the cumulative time of service for sequential *temporary events* that may occur in multiple locations. For *public-occupancy temporary structures* , this is assumed to be a minimum of 10 years.~~

TEMPORARY EVENT. A single use ~~during the *service life*~~ of a *public-occupancy temporary structure* at a given location that includes ~~its~~ the amount of time for the installation, inspection, use and occupancy, and dismantling.

SECTION 3103 TEMPORARY STRUCTURES

3103.6.1.1 Snow loads. Snow loads on public-occupancy temporary structures shall be determined in accordance with Section 1608. The ground snow loads, p_g, in Section 1608 shall be modified according to Table 3103.6.1.1.

Exception: Ground snow loads, p_g, for *public-occupancy temporary structures* that employ controlled-occupancy procedures per Section 3103.8 shall be permitted to be modified using a ground snow load reduction factor of 0.65 instead of the ground snow load reduction factors in Table 3103.6.1.1.

Where the *public-occupancy temporary structure* is not subject to snow loads or not constructed and occupied during times when snow is to be expected, snow loads need not be considered, provided that where the period of time when the *public-occupancy temporary structure* is in service shifts to include times when snow is to be expected, one of the following conditions is met:

1. The design is reviewed and modified, as appropriate, to account for snow loads.
2. Controlled occupancy procedures in accordance with Section 3103.8 are implemented.

TABLE 3103.6.1.1 REDUCTION FACTORS FOR GROUND SNOW LOADS FOR PUBLIC-OCCUPANCY TEMPORARY STRUCTURES

RISK CATEGORY	~~SERVICE LIFE~~ REDUCTION FACTOR	
	~~≤ 10 yr~~	~~> 10 yr~~
II	0.7	~~1.0~~
III	0.8	~~1.0~~
IV	1.0	~~1.0~~

3103.6.1.2 Wind loads. The design wind load on *public-occupancy temporary structures* shall be permitted to be modified in accordance with the wind load reduction factors in Table 3103.6.1.2.

Exceptions:

1. Design wind loads for *public-occupancy temporary structures* that implement controlled occupancy procedures per Section 3103.8 shall be permitted to be modified using a wind load reduction factor of 0.65.
2. For *public-occupancy temporary structures* erected in a *hurricane-prone region* outside of hurricane season, the *basic wind speed*, *V*, shall be permitted to be set as follows, depending on *risk category*:
   2.1. *Risk Category* II: 115 mph.
   2.2. Risk Category III: 120 mph.
   2.3. Risk Category IV: 125 mph.

TABLE 3103.6.1.2 REDUCTION FACTORS FOR WIND LOADS FOR PUBLIC-OCCUPANCY TEMPORARY STRUCTURES

RISK CATEGORY	~~SERVICE LIFE~~ REDUCTION FACTOR	
	~~≤ 10 yr~~	~~> 10 yr~~
II	0.8	~~1.0~~
III	0.9	~~1.0~~
IV	1.0	~~1.0~~

Reason: The proposed language specific to "service life" creates a regulatory challenge where a code official is not able to verify or determine service life. Service life as currently proposed is based on a running clock with regards to time in use. Failure of any temporary structure or component is based on any number of factors more significant than service life. Manufactured flaws, environmental conditions will in use, erection methods and storage are all factors that can contribute to any collapse. Investigations associated with any injury or loss of life associated with a temporary structure failure will address all associated factors. This section would incorrectly place the burden of performance on the permitting authority without full understanding of the temporary structure condition. Even if the permitting authority knew when it was manufactured, the process would not be definitive in determining how many times and under what conditions the temporary structure was used. A temporary shelter for emergency operations may have only been deployed at practice drills for a couple of day a year. The charging language does not address how to record or document the use of the structure? Assuming the public-occupancy temporary structure service life is a minimum of 10 years and those days are cumulative; a tent used for temporary events in the summer could by 40 years old.

The concept of service life should be removed from these options as unenforceable.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This will allow for the reduced loads related to the time the structure will be erected.

G183-25 Part II

IRC: R105.2, SECTION 202 (New), SECTION R329 (New), R329.1 (New), R329.2 (New), R329.3 (New), R329.4 (New), R329.5 (New), ASTM Chapter 44 (New), APPENDIX BH, SECTION BH101, BH101.1, SECTION 202, SECTION BH102, BH102.1, SECTION BH103, BH103.1, BH103.2, SECTION BH104, BH104.1, TABLE BH104.1

Proponents: Catherine Mills-Reynolds, American Fence Association, representing AFA (catherine@americanfenceassociation.com); Ben Shirley, Ameristar Perimeter Security, representing ASTM F14 (ben.shirley@assaabloy.com); Dave Monsour, Thomas Associates, representing DASMA (dmonsour@thomasamc.com); Richard Sedivy, DoorKing, Inc., representing DASMA (rsedivy@doorking.com); Kevin Ward, Miller Edge Inc, representing American Fence Association (kward@milleredge.com); Don Jeppson, representing City of San Rafael (don.jeppson@cityofsanrafael.org); Scott Kinney, D&D Technologies, representing ASTM F14.15 Gates (skinney@ddtechusa.com); Eric Quanbeck, representing The Hummingbird Alliance (eric.m.quanbeck@gmail.com); Jeff Grove, Chair, representing BCAC (bcac@iccsafe.org)

2024 International Residential Code

Revise as follows:

R105.2 Work exempt from permit. Exemption from *permit* requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this *jurisdiction.Permits* shall not be required for the following:

Building:

1. Other than *storm shelters*, one-*story* detached *accessory structures,* provided that the floor area does not exceed 200 square feet (18.58 m^2).
2. Fences, other than swimming pool barriers, ~~not over~~ less than 84 inches ~~7 feet~~ (2134 mm) high.
3. Gates, other than swimming pool barriers, installed in an opening less than 48 inches (1219 mm) measured horizontally, or less than 84 inches (2134 mm) measured vertically.
3. *Retaining walls* that are not over 4 feet (1219 mm) in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge
4. Water tanks supported directly upon *grade* if the capacity does not exceed 5,000 gallons (18 927 L) and the ratio of height to diameter or width does not exceed 2 to 1.
5. Sidewalks and driveways.
6. Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work.
7. Prefabricated swimming pools that are less than 24 inches (610 mm) deep.
8. Swings and other playground equipment.
9. Window awnings supported by an exterior wall that do not project more than 54 inches (1372 mm) from the exterior wall and do not require additional support.
10. Decks not exceeding 200 square feet (18.58 m^2) in area, that are not more than 30 inches (762 mm) above *grade* at any point, are not attached to a *dwelling* or *townhouse* and do not serve the exit door required by Section R318.4.

Electrical:

1. *Listed* cord-and-plug connected temporary decorative lighting.
2. Reinstallation of attachment plug receptacles but not the outlets therefor.
3. Replacement of branch circuit overcurrent devices of the required capacity in the same location.
4. Electrical wiring, devices, *appliances,* apparatus or *equipment* operating at less than 25 volts and not capable of supplying more than 50 watts of energy.
5. Minor *repair* work, including the replacement of lamps or the connection of *approved* portable electrical equipment to *approved* permanently installed receptacles.

Gas:

1. Portable heating, cooking or clothes drying *appliances*.
2. Replacement of any minor part that does not alter approval of *equipment* or make such *equipment* unsafe.
3. Portable-fuel-cell *appliances* that are not connected to a fixed piping system and are not interconnected to a power grid.

Mechanical:

1. Portable heating *appliances*.
2. Portable ventilation *appliances*.
3. Portable cooling units.
4. Steam, hot- or chilled-water piping within any heating or cooling *equipment* regulated by this code.
5. Replacement of any minor part that does not alter approval of *equipment* or make such *equipment* unsafe.
6. Portable evaporative coolers.
7. Self-contained refrigeration systems containing 10 pounds (4.54 kg) or less of refrigerant or that are actuated by motors of 1 horsepower (746 W) or less.
8. Portable-fuel-cell *appliances* that are not connected to a fixed piping system and are not interconnected to a power grid.

Plumbing:

1. The stopping of leaks in drains, water, soil, waste or vent pipe; provided, however, that if any concealed trap, drainpipe, water, soil, waste or vent pipe becomes defective and it becomes necessary to remove and replace the same with new material, such work shall be considered as new work and a *permit* shall be obtained and inspection made as provided in this code.
2. The clearing of stoppages or the repairing of leaks in pipes, valves or fixtures, and the removal and reinstallation of water closets, provided such repairs do not involve or require the replacement or rearrangement of valves, pipes or fixtures.

Add new definition as follows:

VEHICULAR GATE. A gate that is intended for use at a vehicular entrance or exit to the *lot* of a one- or two-family dwelling, and that is not intended for use by pedestrian traffic.

Add new text as follows:

SECTION R329
GATES

R329.1 General. The design, installation, and construction of horizontal slide and swing gates, and automatic vehicular gates installed on the lot of a one- or two-family dwelling or a *townhouse* shall comply with this section. Gates installed on community property associated with one- or two-family dwellings or *townhouses* shall comply with the *International Building Code*. A horizontal slide or a swing gate installed in an opening more than 48 inches (1219 mm) measured horizontally or 84 inches (2134 mm) or greater measured vertically shall comply with this section and other applicable sections of this code. *Vehicular gates* of any size shall also comply with the requirements of this section.

R329.2 Slide Gates. A gate that slides in the plane of the gate shall be designed, constructed, and installed in accordance with ASTM F1184.

R329.3 Swing gates. A hinged or swing gate shall be designed, constructed, and installed in accordance with ASTM F900.

R329.4 Vehicular gates intended for automation. *Vehicular gates* intended for automation shall be designed, constructed and installed to comply with the requirements of ASTM F2200.

R329.5 Vehicular gate openers. *Vehicular gate* openers, where provided, shall be *listed* in accordance with UL 325.

Add new standard(s) as follows:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428

F900-24	Standard Specification for Industrial and Commercial Swing Gates
F1184-23	Standard Specification for Industrial and Commercial Horizontal Slide Gates
F2200-20	Standard Specification for Automated Vehicular Gate Construction

Delete without substitution:

APPENDIX BH
AUTOMATIC VEHICULAR GATES

SECTION BH101
GENERAL

BH101.1 General. The provisions of this appendix shall control the design and construction of automatic *vehicular gates* installed on the *lot* of a one- or two-family dwelling.

VEHICULAR GATE. A gate that is intended for use at a vehicular entrance or exit to the *lot* of a one- or two-family dwelling, and that is not intended for use by pedestrian traffic.

SECTION BH102
DEFINITION

BH102.1 General. The following term shall, for the purposes of this appendix, have the meaning shown herein.

SECTION BH103
AUTOMATIC VEHICULAR GATES

BH103.1 Vehicular gates intended for automation. *Vehicular gates* intended for automation shall be designed, constructed and installed to comply with the requirements of ASTM F2200.

BH103.2 Vehicular gate openers. *Vehicular gate* openers, where provided, shall be *listed* in accordance with UL 325.

~~SECTION BH104~~
~~REFERENCED STANDARDS~~

~~BH104.1 General.~~ ~~See Table BH104.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, the standard title, and the section or sections of this appendix that reference the standard.~~

~~TABLE BH104.1 REFERENCED STANDARDS~~

~~STANDARD ACRONYM~~	~~STANDARD NAME~~	~~SECTIONS HEREIN REFERENCED~~
~~ASTM F2200—20~~	*~~Standard Specification for Automated Vehicular Gate Construction~~*	~~BH103.1~~
~~UL 325—2017~~	*~~Door, Drapery, Gate, Louver and Window Operations and Systems—with Revisions through February 2020~~*	~~BH103.2~~

Reason: Gates are used, and depended on for our safety and security, throughout our society. Be it for residential use, at a sports arena, on schoolgrounds, a public park, in a parking garage, at a factory, in a multi-family dwelling or countless other applications, people are potentially in contact with a gate every day. Gates are so commonplace that most people don't think twice about their ability to operate safely until something goes wrong. This is why it is of paramount importance that gates are designed and installed to the highest safety standard.

The need for safe, functioning gates has been underscored in recent years with stories like that of, Alex Quanbeck, the 7-year-old child who was killed by a poorly maintained gate in his school yard at recess in San Rafael, California. Under deeper review, it has been discovered that numerous fatalities and life-altering injuries have occurred in the United States because of these gate issues. A map of known gate fatalities and serious injuries from gates is provided from the Hummingbird Alliance (www.thehummingbirdalliance.com).

Having knowledge of the scope of this problem, ASTM International's F14 Committee on Fences, (which also holds jurisdiction for gate standards) updated their manual gate standards to reflect new safety requirements on slide gates (ASTM F1184) and swing gates (ASTM F900). ASTM had already updated its electric gate standard (ASTM F2200) to meet new requirements in 2002.

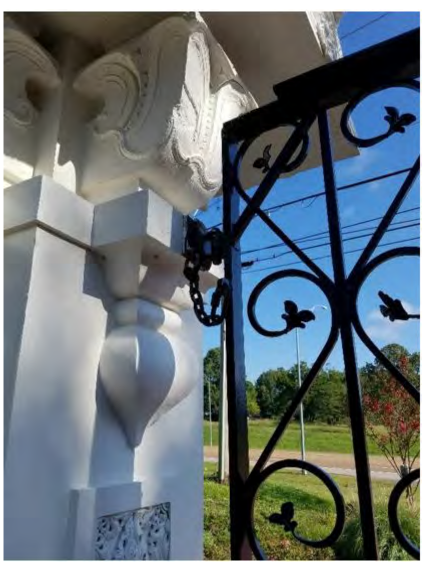
Cal/OSHA is currently reviewing these standards as well, to potentially include them in their own rules. While they do have a rule on gates, (Title 8 section 3324) it does not currently contain the provisions laid out in our proposal. In assessing these potential new standards, they reviewed some of their own accident data and found that their data from 1990 through 2005, showed that 15 out of 31 incidents (48%) involved failed or missing end stops/positive stops of gates. They then compared this data from data collected from 2014 through 2024 and found that 13 out of 16 incidents (81%) involved failed or missing end-stops/positive-stops of gates.

Because of these factors, they determined that, "The relatively low decrease in serious injuries and fatalities per year of only 8.2 percent after the promulgation of section 3324 in 2007 illustrates the need to amend and improve section 3324 to better protect California workers" (DOSH Evaluation, 2024).

The standards we are requesting be adopted would in no way impede first responders in accessing a property, in fact ensuring a gate is functioning properly would only provide them with safer and easier ingress and/or egress. It is when these gates go without the proper safety requirements, they are likely to fail to operate as intended or run the risk of injuring those who use them.

The ICC/AFA Gate Safety Code Development Work Group consists of a wide range of gate and security experts, consumers and code enforcement officials, who have diligently reviewed ASTM standards, current safety standards and the I-Codes to confirm that this addition to the I-Codes is needed and non-duplicative. The work group decided to alter the existing section 3110 to include all gates as well as maintaining the provision currently in place for automatic vehicular gates. The new provision would only apply to gates that are 7' (84 inches) in height or greater OR 4' (48") in length or greater. The code change references industry approved national standards for gate design and construction ASTM F900 for Swing Gates and ASTM F1184 for Slide Gates. The code also includes two new standards to be referenced in Chapter 35 that are necessary for the code change. The group also looked at where gates are required for permitting and inspection and discovered that gates are not specifically referenced in the permit exemption list in Section 105. The group decided to clarify that fences and gates are unique in their own application and as such both need specific permit exceptions. This proposal moves the exiting vehicular gate requirements from the appendix to the body of the code, without substantive modification.

The general requirements for Swing Gates require a keeper in accordance with ASTM F900. The gate keeper is a mechanical device for securing the free end of the gate when in the fully open position. The compliance for swing gates could be a chain connected to both the gate frame and the end post (or column/structure to which the gate is attached), see the pictures below.



The general requirements for slide gates in accordance with ASTM F1184 include:

A performance statement that gates that are installed shall not fall over more than 45 degrees from the vertical plane;

Positive stops to limit travel;

Weight bearing rollers are covered;

Gap no greater then 2-1/4”;

Gates designed for lateral stability; and

Gates design that will not move under the force of gravity.

Please see pictures below of ASTM 1184 compatible gates. Two options for fall post are shown. The first is the standard post cemented in the ground; it is the post with the yellow cap. The second is of an upside-down J bracket that has been welded on.


(Receiver Guide/ Gate Stop Below)

These standards and the code change proposal only address swing and slide gates. Overhead roll down (or up) doors, roll down security type doors (like those at the tenant space and the mall circulation areas), and parking garage entry, exit or point of sale barrier arms are not within the scope of the proposed code change or within the scope of the two reference standards. In addition, we believe that these requirements in no way negatively impact building egress required by Chapter 10 of this code. Any swing or slide gate installed within the means of egress should be in compliance with chapter 10, as well as any other technical provision of the code and compliance with any other code application is referenced in 3110.1, as proposed. Compliance with the ASTM standards will greatly improve safety in and around the built environment by incorporating these simple changes, (like adding fall over protection and gate stops) lives like Alex’s, can be saved. Alex’s father, Eric Quanbeck was an active participant in this work group, as well as the local building official from the city where the tragedy occurred, along with representatives from the American Fence Association, ASTM International, DASMA and UL. After thorough review, we see a need to incorporate these standards through adoption into the I-Codes.

BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and 2024 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC webpage.

Cost Impact: Increase

Estimated Immediate Cost Impact:

Compared to the overall cost of these large gates, which can run anywhere from a couple thousand dollars to tens of thousands of dollars, depending on the size, material used, and whether they have an electric operator, the safety requirement costs are negligible. The material costs for the safety parts mentioned average $50.00, with many being less than that amount. For instance, a metal gate stop can be just a few dollars. Items like a Gate Keeper and the safety chain for swing gates can be found at several retailers, including on Amazon, both for under $50.00. Labor would depend on geographical area, but overall, it would average somewhere between $150.00 to $250.00.

Estimated Immediate Cost Impact Justification (methodology and variables):

Posts for this type of application typically run $50.00 a piece or less.
Example of some product costs on Amazon:

Amazon.com: OKG Heavy Duty Security Chain, 3.9ft x 5/16" Thick Outdoor Gate Chain, Cut Proof Chain Made of Hardened Alloy Steel Chain, Ideal for Fence Gates, Bicycles, Moped, Trailers, Generator, etc : Sports & Outdoors

Amazon.com: Chain Link Fence GATE HOLD BACK: Duck Bill Gate Holdback (1-5/8" to 2-3/8"). Holds The gate open for You while You work! : Tools & Home Improvement

Staff Analysis: A review of the following standards proposed for inclusion in the code regarding some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before April 1, 2025.
ASTM F900-24 Standard Specification for Industrial and Commercial Swing Gates
ASTM F1184-23 Standard Specification for Industrial and Commercial Horizontal Slide Gates
ASTM F2200-20 Standard Specification for Automated Vehicular Gate Construction

G206-25

IBC: APPENDIX Q (New), SECTION Q101 (New), Q101.1 (New), SECTION Q102 (New), Q102.1 (New), SECTION 202 (New), SECTION Q103 (New), Q103.1 (New), Q103.2 (New), Q103.3 (New), Q103.3.1 (New), TABLE Q103.3.1 (New), Q103.3.2 (New), Q103.4 (New), Q103.4.1 (New), Q103.5 (New), Q103.5.1 (New), Q103.5.2 (New), SECTION Q104 (New), Q104.1 (New), Q104.2 (New), SECTION Q105 (New), Q105.1 (New), TABLE Q105.1 (New)

Proponents: Ariel Brenner, New Buildings Institute, representing New Buildings Institute (ariel@newbuildings.org); Amie Lewis, representing New Buildings Institute

2024 International Building Code

Add new text as follows:

APPENDIX Q
EMBODIED GHG EMISSIONS REPORTING AND REDUCTION

SECTION Q101
GENERAL

Q101.1 Scope. The provisions of this appendix promote methods to measure and reduce the environmental impact of building materials and products.

SECTION Q102
DEFINITIONS

Q102.1 General. The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

Add new definition as follows:

COVERED PROJECT. A new building or structure, or an *addition* to an existing building or structure, [INSERT 50,000 OR 100,000] gross square feet or larger, or an *alteration* that impacts a *work area* of [INSERT 50,000 OR 100,000] gross square feet or larger.

EMBODIED GREENHOUSE GAS (GHG) EMISSIONS. The greenhouse gas (GHG) emissions generated by the extraction, production, transport, manufacturing, use, and end of life of a product, as measured using a life cycle assessment. These may include the lifecycle stages A, B, and C as defined by ISO 21931—1 or ISO 21930.

ENVIRONMENTAL PRODUCT DECLARATION (EPD). An environmental claim that provides quantified environmental data using predetermined parameters and, where relevant, additional environmental information. An EPD also includes additional product and company information. An EPD reports at least the product stage, covering the cradle-to-gate phase or life cycle modules A1-A3 as defined by ISO 21931—1 or 21930.

FACILITY-SPECIFIC ENVIRONMENTAL PRODUCT DECLARATION (FACILITY-SPECIFIC EPD). An environmental claim providing quantified environmental impacts based on data from one industrial facility at which a specific product that is represented by the *EPD* is manufactured.

GLOBAL WARMING POTENTIAL (GWP). The metric for tracking *embodied GHG emissions*, which is reported in kg CO_2e/unit. GWP normalizes different gases associated with a product to an equivalent mass of carbon dioxide over a period of 100 years.

PRODUCT-SPECIFIC ENVIRONMENTAL PRODUCT DECLARATION (PRODUCT-SPECIFIC EPD). An *EPD* that represents the impacts of a single product.

SALVAGED AND REUSED PRODUCT. A product reclaimed of reusable materials from the disassembly, deconstruction, or demolition of buildings or structures, sourced from within a radius of 500 mi (800 km) of the project site, and requiring minimal to no processing for reinstallation and use on a different project.

WORK AREA. That portion or portions of a building consisting of all reconfigured spaces as indicated on the construction documents.

Work area excludes other portions of the building where incidental work entailed by the intended work must be performed and portions of the building where work not initially intended by the owner is specifically required by this code.

Add new text as follows:

SECTION Q103
REDUCTION OF EMBODIED GHG EMISSIONS

Q103.1 Embodied GHG emissions. *Covered projects* shall document *embodied GHG emissions* on *construction documents*, which shall be submitted to the *building official.*

Q103.2 Documentation of embodied GHG emissions. Documentation of *embodied GHG emissions* for *covered projects* shall meet one of the following pathways:

1. Product compliance or building compliance pathway; for a new building or structure, or an *addition* to an existing building or structure, **[INSERT 50,000 OR 100,000]** gross square feet or larger.
2. Building reuse compliance pathway; for an *alteration* that impacts a *work area* of **[INSERT 50,000 OR 100,000]** gross square feet or larger.
3. Product compliance, building compliance, or building reuse compliance pathway; for an *addition* to a building or structure that also includes an *alteration*, where the *addition* and *work area* of the *alteration* have a combined area of **[INSERT 50,000 OR 100,000]** gross square feet or larger.

Q103.3 Product compliance pathway. *Covered projects* shall submit Type III *product-specific* or *facility-specific environmental product declarations (EPDs)*, for all covered products per section Q103.3.1. The product compliance pathway shall calculate the *global warming potential (GWP)* for the total mass, volume, or area of the covered products, which shall total no more than **[INSERT 85, 90, 100, 125, OR 150]** percent of the values in Table Q103.3.1 for the same total mass, volume, or area of the covered products. This calculation shall include project-specific product quantities and *product-specific* or *facility-specific EPDs*, and be summed across the entire project based on mass, volume, or area.

Q103.3.1 Covered products. Covered products shall include no less than **[INSERT 90 OR 100]** percent of the total combined mass, volume, or area of all products used in the building project that are included in Table Q103.3.1.

TABLE Q103.3.1 COVERED PRODUCT GWP REFERENCE VALUES[a]

COVERED PRODUCT		GLOBAL WARMING POTENTIAL (A1-A3)	UNIT OF MEASUREMENT
Ready mix concrete products[b]	Up to 2,500 psi	240	kg CO_2e/m^3
	2,501-3,000 psi	262	kg CO_2e/m^3
	3,001-4,000 psi	308	kg CO_2e/m^3
	4,001-5,000 psi	365	kg CO_2e/m^3
	5,001-6,000 psi	385	kg CO_2e/m^3
	6,001-8,000 psi	446	kg CO_2e/m^3
	Lightweight, up to 3,000 psi	492	kg CO_2e/m^3
	Lightweight, 3,001-4,000 psi	540	kg CO_2e/m^3
	Lightweight, 4,001-5,000 psi	588	kg CO_2e/m^3
Concrete masonry unit products	Normal weight, up to 3,249 psi	208	kg CO_2e/m^3
	Normal weight, 3,250-4,499 psi	232	kg CO_2e/m^3
	Normal weight, 4,500 psi and greater	241	kg CO_2e/m^3
	Medium weight, up to 3,249 psi	360	kg CO_2e/m^3

	Medium weight, 3,250 psi and greater	244	kg CO_2e/m^3
	Lightweight, up to 3,249 psi	286	kg CO_2e/m^3
	Lightweight, 3,250 psi and greater	395	kg CO_2e/m^3
Reinforcing steel products	Rebar – unfabricated	753	kg CO_2e/metric ton
Structural steel products	Hot-rolled sections – unfabricated	1,000	kg CO_2e/metric ton
	Hollow structural sections – unfabricated	1,710	kg CO_2e/metric ton
	Decking	2,320	kg CO_2e/metric ton
	Plate – unfabricated	1,480	kg CO_2e/metric ton
	Hot-dipped galvanized cold-formed steel members	2,440	kg CO_2e/metric ton
	Open web steel joists and joist girders	1,430	kg CO_2e/metric ton
Structural wood products	Laminated veneer lumber	361	kg CO_2e/m^3
	Laminated strand lumber	275	kg CO_2e/m^3
	Glue laminated timber	137	kg CO_2e/m^3
	Wood framing	63.1	kg CO_2e/m^3
	Softwood plywood	219	kg CO_2e/m^3
	Oriented strand board	243	kg CO_2e/m^3
	Cross laminated timber[c]	178	kg CO_2e/m^3
	Dowel laminated timber[c]	145.2	kg CO_2e/m^3
	Mass Ply Panel[c]	311	kg CO_2e/m^3
Insulation products	Expanded polystyrene (EPS) – Type I	2.53	kg $CO_2e/1\ m^2$ @ RSI-1
	Polyiso – wall	4.10	kg $CO_2e/1\ m^2$ @ RSI-1
	Polyiso – roof – GRF facer	2.11	kg $CO_2e/1\ m^2$ @ RSI-1
	Polyiso – roof – CFG facer	2.95	kg $CO_2e/1\ m^2$ @ RSI-1
	Extruded polystyrene (XPS)[d]	41	kg $CO_2e/1\ m^2$ @ RSI-1
	Fiberglass board	5.02	kg $CO_2e/1\ m^2$ @ RSI-1
	Heavy-density mineral wool board	6.82	kg $CO_2e/1\ m^2$ @ RSI-1
	Mineral wool blanket (Light-density mineral wool board)	2.68	kg $CO_2e/1\ m^2$ @ RSI-1
	Fiberglass blanket (Fiberglass batt) – unfaced	1.01	kg $CO_2e/1\ m^2$ @ RSI-1
	Fiberglass blanket (Fiberglass batt) – faced	1.06	kg $CO_2e/1\ m^2$ @ RSI-1
	Closed-cell spray polyurethane foam – medium density	3.47	kg $CO_2e/1\ m^2$ @ RSI-1
	Closed-cell spray polyurethane foam – roofing	4.05	kg $CO_2e/1\ m^2$ @ RSI-1
	Closed-cell spray polyurethane foam - 2K-LP	3.12	kg $CO_2e/1\ m^2$ @ RSI-1
	Open-cell spray polyurethane foam	1.05	kg $CO_2e/1\ m^2$ @ RSI-1
	Loose-fill cellulose	0.487	kg $CO_2e/1\ m^2$ @ RSI-1
	Loose-fill mineral wool	1.89	kg $CO_2e/1\ m^2$ @ RSI-1
	Loose-fill fiberglass	0.988	kg $CO_2e/1\ m^2$ @ RSI-1
Flat Glass	Flat glass (clear, tinted, and low-iron products)	1,430	kg CO2e/metric ton

a. GWP values are based on industry averages, sourced from industry-wide EPDs for all products for which there was one available.

b. AHJ to replace with regional ready mix concrete values based on NRMCA's regional benchmarks.

c. Replace with industry-wide average when available.

d. For all product types except XPS in this table, the noted GWP corresponds to A1-A3 life cycle modules (the "product stage"). An exception has been made for XPS board insulation due to the substantial contribution of blowing agent emissions to product life cycle GWP. Since insulation EPDs are required to report these impacts where applicable, the XPS value in this table includes modules A1-A3 (product stage), B1 (to account for blowing agent emissions during building life), and C4 (to account for blowing agent emissions during disposal).

Q103.3.2 Alternative Products. Covered products are permitted to be replaced with a product that is a *salvaged and reused product*. Products are permitted to be procured from onsite or from vendors. If a covered product is *salvaged and reused*, the applicable product category is permitted to assume a *GWP* of 0.

Q103.4 Building compliance pathway. *Covered projects* shall submit a building life cycle assessment (LCA) as part of the *construction documents*, which shall be submitted to the *building official*. The building LCA shall be developed in accordance with section Q103.4.1, and comply with one of the following:

1. For absolute reduction requirements, the *global warming potential (GWP)* of the proposed building shall be no more than **[INSERT 70, 80, OR 90]** percent of 1,102 lbCO_2e/square feet (500 kgCO_2e/m^2).
2. For relative reduction requirements, the *GWP* of the proposed building shall be no more than **[INSERT 70, 80, OR 90]** percent of the *GWP* of a functionally equivalent reference building. The reference building shall be of the same size, geographic location, and thermal performance as the proposed building, shall be subject to the same code requirements as the proposed building, and shall be functionally equivalent to the proposed building per ASTM E2921-22. The products and product quantities in the proposed building are permitted to vary compared to that shown in the reference building. The same LCA tool(s) or software shall be used to complete the building life cycle assessment for both the reference and proposed building designs.

Q103.4.1 Building life cycle assessment. Building LCAs shall comply with the following:

1. ISO 14040 and ISO 14044.
2. Software used to conduct a building LCA shall conform to ISO 21931—1 and/or EN 15978 and shall have a data set compliant with ISO 14044 and ISO 21930 and/or EN 15804. The software shall utilize a calculation methodology that is compliant with EN 15978, ISO 21931—1 and ISO 21929—1. Environmental impact data shall not be sourced from expired or retired data sources, unless no valid alternative data exists.
3. The life cycle scope shall cover cradle-to-grave, including all modules in life cycle stages A, B, and C, as defined by ISO 21931—1 or 21930. The life cycle scope is permitted to exclude modules B6 and B7, covering operating energy and water.
4. The building LCA shall include all of the following building elements: foundations; *exterior wall envelope; primary structural frame; secondary structural members; roof covering; roof deck; fenestration; load-bearing walls;* and insulation. The assessment is permitted to include *non-load-bearing walls;* fireproofing; insulation; interior constructions and *interior finishes.* An assessment submitted for an *addition* and/or *alteration* shall include elements within the boundary of the *addition* and/or the *work area* of the *alteration.*
5. The reference study period shall be 60 years.

6. Existing and *salvaged and reused products* shall be included or excluded at the discretion of the project team. For in-situ reused materials, it is permissible to assume the A1-A4 stages (raw material supply, raw material transport, manufacturing, and transportation to construction site) carry no impact in the proposed building's LCA to show the benefit of reusing materials, while retaining the A1-A4 estimated impacts for these materials in the LCA of the functionally equivalent reference design. For salvaged materials, it is permissible to assume the A1-A3 stages carry no impact in the proposed building's LCA to show the benefit of salvaging materials, while retaining the A1-A3 estimated impacts for these materials in the LCA of the functionally equivalent reference design.
7. Biogenic carbon and carbon sequestration shall be reported separately from fossil *GWP*.

Q103.5 Building reuse pathway. An *alteration* shall retain no less than a combined 45 percent, as calculated per section Q103.5.1, of the *existing building's primary* and *secondary structural frame* and *exterior wall envelope* as part of the *work area.* An *addition* to a building or structure that also includes an *alteration*, where the *addition* and *work area* of the *alteration* have a combined area of **[INSERT 50,000 OR 100,000]** gross square feet or larger, is permitted to use this compliance pathway.

Q103.5.1 Building reuse compliance calculation. The calculation shall include roof and floor areas, and façade area as measured in elevation, for the entire building. Façade areas are permitted to be considered retained even if the existing *exterior wall covering* is repaired, replaced, or modified to increase insulation or airtightness. *Salvaged and reused products* sourced from the project site are permitted to be counted towards the 45 percent building reuse threshold.

Exception: Buildings, or portions of buildings, that are deemed unsafe or *dangerous*, or that have *hazardous materials*, that are remediated as part of the project.

Q103.5.2 Construction documents for building reuse compliance. *Construction documents* for the building reuse compliance pathway shall clearly distinguish the square footage for existing and new elements, and include the following information:

1. Gross floor area of *existing building*(s) in square feet;
2. Gross floor area of the aggregate *addition(s)* in square feet (if applicable);
3. Gross floor area of the *alteration* in square feet;
4. Existing total floor area and retained total floor area of the *primary* and *secondary structural frame* of the *existing building*(s) in square feet; and
5. Existing total *exterior wall* and *fenestration* surface area and total retained *exterior wall* and *fenestration* surface area of the *existing building*(s) in square feet, as well as areas allowed to be excluded from the calculation.

SECTION Q104
DOCUMENTATION OF REDUCTION OF EMBODIED GHG EMISSIONS

Q104.1 Registered design professional. A r*egistered design professional* shall prepare the *construction documents* and provide signature verifying compliance with the requirements of this appendix.

Q104.2 Amended construction documents for embodied GHG emissions. Covered products shall be installed in accordance with the approved *construction documents.* Prior to the issuance of the certificate of occupancy, the r*egistered design professional* that submits documentation per Sections Q103.3, Q103.4, or Q103.5 shall ensure that as-built product selection matches the approved *construction documents.* If as-built products differ from those submitted on the approved construction documents, the r*egistered design professional* shall update the *embodied GHG emissions* calculations based on the updated procured products and attest that they are accurate to the best of the *registered design professional*'s knowledge.

SECTION Q105
REFERENCED STANDARDS

Q105.1 General. See Table Q105.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, standard title, and the section or sections of this appendix that reference the standard.

TABLE Q105.1 REFERENCED STANDARDS

STANDARD ACRONYM	STANDARD NAME	SECTIONS HEREIN REFERENCED
ASTM E2921–2022	*Standard Practice for Minimum Criteria for Comparing Whole Building Life Cycle Assessments for Use with Building Codes, Standards, and Rating Systems*	Q103.4
EN 15804—2022	*Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products*	Q103.4.1
EN 15978—2011	*Sustainability of construction works – Assessment of environmental performance of buildings – Calculation method*	Q103.4.1
ISO 14040—2006	*Environmental management – Life cycle assessment – Principles and framework*	Q103.4.1
ISO 14044—2006	*Environmental management – Life cycle assessment – Requirements and guidelines*	Q103.4.1
ISO 21929-1—2011	*Sustainability in building construction – Sustainability indicators – Part 1: Framework for the development of indicators and a core set of indicators for buildings*	Q103.4.1
ISO 21930—2017	*Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services*	Q102.1, Q103.4.1
ISO 21931-1—2022	*Sustainability in buildings and civil engineering works – Framework for methods of assessment of the environmental, social and economic performance of construction works as a basis for sustainability assessment – Part 1: Buildings*	Q102.1, Q103.4.1

Reason: Overview of Appendix Requirements

This proposal adds a new voluntary appendix to the International Building Code (IBC), which may act as a reference for jurisdictions wishing to establish code methods to measure and reduce the embodied greenhouse gas (GHG) emissions impact of building materials. Appendix Q provides criteria for the production and submission of environmental product declarations, building life cycle assessment, and proof of building reuse for a building project.

In sum, the appendix provides a requirement for construction document submittals to include reporting on the embodied GHG emissions associated with proposed projects over a choice of 50,000 or 100,000 square feet, as determined by the AHJ. Project teams must choose one form of documentation from the following three options:

1. **Product compliance pathway:** submit product- or facility-specific environmental product declarations (EPDs) for covered products that indicate that the global warming potential (GWP) meets a certain percentage – as determined by the AHJ – of the industry-average GWP of the product;
2. **Building compliance pathway:** submit a building life cycle assessment (LCA) for the building's structure and enclosure that indicates a percent-reduction – as determined by the AHJ – in GWP from 102 lbCO_2e/square feet (500 kgCO_2e/m^2) or compared to an industry-average baseline;
3. **Building reuse pathway:** submit proof of reuse of at least 45% of an existing building's structure and enclosure.

Finally, the proposed appendix aims to provide a clear and simple path for code officials to determine compliance at two points along the project timeline: at the initial submission of construction documents and at the subsequent submission of amended construction documents. The role of the code official is to check for the submission of required documentation, confirm that requirements were met, and verify that the registered design professional has signed off on meeting these provisions. These efforts that fall on the design professional as well as the code official are anticipated to require minimal effort.

Problem and Opportunity

Building operations and building construction are responsible for 39% of today's global greenhouse gas (GHG) emissions.[1] About 11% of these emissions are embodied GHG emissions – the emissions associated with the creation of building materials and construction activities.[1] The largest contributors tend to be found in buildings' structures and envelopes due to their high embodied GHG emissions and quantity of use in projects.

The need to confront and reduce embodied GHG is urgent. The IPCC reports that limiting warming to the target set by the Paris Agreement – and avoiding the worst-case impacts of the climate crisis – is contingent on GHG emissions peaking by 2025 at the latest and reducing them by 43% by 2030.[2]

Doing justice to the urgency presented by climate change requires a focus on the embodied emissions associated with the full lifecycle, and especially the early phases of buildings' construction and materials. Unlike operational emissions, which can be improved over the lifespan of a building through deep-energy retrofits and decarbonizing the electric grid, most of a building's embodied GHG emissions occur before a building is occupied and cannot be reduced over time. A joint University of Washington and University of California, Berkeley study found that, on average, 80% of a building's embodied GHG impacts over its lifetime takes place in the phases leading up to a building's completion before occupancy.[3]

Therefore, addressing embodied GHG in the construction of buildings presents an urgent and valuable opportunity to reduce GHG emissions in the built environment. The IBC thus holds critical potential to address this bulk of emissions, as it impacts decisions made early during the design process, which directly and most substantially influence early production and construction activities. Prioritizing these immediate emissions will help to stop the accumulation of GHGs in the atmosphere, improving the likelihood that adopting jurisdictions will reach their GHG peaks sooner.

Finally, the IBC has been in place and used by the design and construction industry to ensure that materials in the built environment preserve public health and safety. This appendix is intended to do just that: to safeguard the public from the hazards associated with the creation of buildings and their materials. This entails reducing emissions in the extraction, manufacturing, and transportation of these products, which can improve air quality and public health in communities located near industrial centers and manufacturing facilities.

Methodology and Reasoning

The IBC is suitable for addressing embodied GHG emissions. First, it is intended to "preserve public health and safety that provides safeguards from hazards associated with the built environment."[4] This proposal protects the public as well as the environment from the hazards associated with the creation of building materials. Second, IBC regulations have a clear focus on materials and building elements, which is consistent with this proposal's approach to addressing the emissions associated with building products. Finally, the wide adoption of the IBC would make this appendix an easily accessible resource for jurisdictions looking to address embodied GHG in their building codes.

This is proposed as a voluntary appendix, available to jurisdictions that are interested in implementing it. For these jurisdictions, this proposal offers a standardized approach and set of requirements, saving them time and effort in potentially developing their own requirements from scratch, or piecemeal from other sources. It is also intended to save practitioners considerable trouble in trying to comply with varying requirements from one jurisdiction to the next. This matters to designers and contractors when they have to navigate these differences. In addition, it saves building department staff considerable trouble when they need to correct permit applicants on how the forms are filled out for their local requirements. Having consistency in voluntary measures benefits everyone.

This proposal is also intended to provide a level of flexibility for jurisdictions and project teams to meet these provisions in ways that are most suited to their own unique needs, goals, and circumstances. Three compliance pathways are included to provide project teams with that flexibility. These pathways are also based in precedent, drawing from California's statewide building code, CALGreen, the latest version of which is now in effect.

The proposed appendix also provides flexibility on the quantitative thresholds that jurisdictions may choose to adopt according to their unique needs and preferences. These jurisdictional options deal with the project size to which the appendix would apply; product-level GWP cap for the product compliance pathway; percentage of products required to submit EPDs for the product compliance pathway; and building-level GWP percentage reduction for the building compliance pathway.

Bibliography: [1] "Bringing Embodied Carbon Upfront," World Green Building Council, 2019, https://worldgbc.org/advancing-net-zero/embodied-carbon/.

[2] Working Group III, "The Evidence Is Clear: The Time for Action Is Now. We Can Halve Emissions by 2030.," The Intergovernmental Panel on Climate Change, April 4, 2022, https://www.ipcc.ch/2022/04/04/ipcc-ar6-wgiii-pressrelease/.

[3] Brad Benke et al., "The California Carbon Report: An Analysis of the Embodied and Operational Carbon Impacts of 30 Buildings" (The Carbon Leadership Forum, May 2024), https://carbonleadershipforum.org/california-carbon/.

[4] ICC, "The International Building Code" (International Code Council), https://www.iccsafe.org/products-and-services/i-codes/2018-i-codes/ibc/#:~:text=The%20International%20Building%20Code%20(IBC)%20is%20the,or%20exceed%20public%20health%20and%20s

[5] California Department of General Services, Building Standards Commission, "Economic and Fiscal Impact Statement (Form 399), Attachment C- CCRC regulations 54day, Amend the 2022 California Green Building Standards Code, CCR, Title 24, Part 11,"

Department of General Services, March 2, 2023, https://www.dgs.ca.gov/-/media/Divisions/BSC/03-Rulemaking/2022-Intervening-Cycle/Public-Comments/GREEN-45-Day/BSC/BSC-04-22-399-PT11-Attachment-C-R1-45day.pdf?la=en&hash=E1121CBF2FEA6D07492DCD1E962D8AA1AFC43618.

[6] State Building Code Council, "Greenhouse Gas Emissions Reduction for Steel Products," State of Washington, 2022, accessed August 9, 2024, https://sbcc.wa.gov/sites/default/files/2022-04/095_Sections%20202%20and%202205_IBC.pdf

[7] "Economic and Fiscal Impact Statement (Form 399) Attachment C – CCRC regulations 45day" (California Department of General Services, 2022), https://www.dgs.ca.gov/-/media/Divisions/BSC/03-Rulemaking/2022-Intervening-Cycle/Public-Comments/GREEN-45-Day/BSC/BSC-04-22-399-PT11-Attachment-C-R1-45day.pdf?la=en&hash=E1121CBF2FEA6D07492DCD1E962D8AA1AFC43618/.

Cost Impact: Increase

Estimated Immediate Cost Impact:

In jurisdictions in which this appendix is adopted, it is anticipated that the economic impact of each of the pathways in this proposal will increase either at an insignificant level or not at all.

A project's embodied GHG emissions can be significantly reduced at little to no additional up-front cost. There are products and solutions available today that can realize embodied GHG reductions with low to no financial burden. In the future, these costs are only anticipated to decrease, and ultimately result in additional cost savings, as the production of low embodied GHG materials, the practice of conducting a building life cycle assessment, and pursuing building reuse scale up and the cost of low embodied GHG materials goes down as a result of increased practice and demand.

As with many code changes, there is an expected short-term cost associated with an initial learning curve, which requires additional time spent on training and learning about how to implement new compliance requirements. This is expected to decrease over time, as code officials, design and development teams, and product manufacturers and suppliers become more familiar with the requirements and the processes needed to comply.

It is also worth noting that jurisdictions that choose to act on embodied GHG emissions and adopt this voluntary appendix would incur many of these costs anyway; having this code language as a resource will ultimately realize savings on needing to develop code from scratch.

In assessing the impact of this proposal, the costs described below were considered.

Estimated Immediate Cost Impact Justification (methodology and variables):

Costs to Design and Development Teams

- **Impact of product compliance pathway:** Designers and developers specifying and procuring materials covered under the first pathway option can use EPD databases to search for, filter, and compare products with GWP limits that comply with code requirements. Users can download EPD documents for code submission and verification. Building Transparency's Embodied Carbon in Construction Calculator (EC3) is a robust EPD database for construction materials that project teams can use at no cost. Requesting EPDs from manufacturers directly is another option.
- **Impact of building compliance pathway:** For developers and design professionals, option 2, requiring a building lifecycle assessment, would be the costliest path, adding an estimated cost in the range of of $15,000.[5] This cost may vary depending on the number of analyses performed throughout the project timeline, whether a baseline is modeled, and the size and complexity of the project. However, for many of the larger projects that would be subject to this appendix, this cost impact is negligible compared to total project costs. Beyond the direct costs of training and LCA software, professionals may take additional time to prepare documents for code review.
- **Building reuse pathway:** Costs will be minimal or nonexistent. The only analysis required to comply is a calculation of square footage.

Costs to Manufacturers and Suppliers

- **Impact of materials-based and building-level pathways:** Material manufacturers can face costs associated with the production of EPDs. EPDs typically expire after five years, at which point manufacturers must repeat the process. There is an expense associated with generating EPDs, but many manufacturers have already made this investment. The total cost of generating an EPD varies depending on the complexity of manufacturing processes for each material type. However, any product cost increase imposed by the manufacturer to alleviate the cost of EPDs is spread across consumers and negligible to individual project costs.[6]

- **Building reuse pathway:** There are no additional requirements placed on materials manufacturers and suppliers in this pathway.

Costs of Code Enforcement

There is no major fiscal impact on local governments to enforce the regulation: local governments would only need to verify results provided by applicants, in a standardized manner, to ensure compliance with the proposed pathways. Additionally, a study published for CALGreen's 2022 embodied GHG requirements, which includes similar materials-based, building-level, and building reuse pathway requirements as this proposal, determined that there was a minor increase of costs to local governments to review and check plans for compliance with one of the three pathways.[7]

Staff Analysis: A review of the following standards proposed for inclusion in the code regarding some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before April 1, 2025:

ASTM E2921–2022 Standard Practice for Minimum Criteria for Comparing Whole Building Life Cycle Assessments for Use with Building Codes, Standards, and Rating Systems
EN 15804—2022 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
EN 15978—2011 Sustainability of construction works – Assessment of environmental performance of buildings – Calculation method
ISO 14040—2006 Environmental management – Life cycle assessment – Principles and framework
ISO 14044—2006 Environmental management – Life cycle assessment – Requirements and guidelines
ISO 21929-1—2011 Sustainability in building construction – Sustainability indicators – Part 1: Framework for the development of indicators and a core set of indicators for buildings
ISO 21930—2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services
ISO 21931-1—2022 Sustainability in buildings and civil engineering works – Framework for methods of assessment of the environmental, social and economic performance of construction works as a basis for sustainability assessment – Part 1: Buildings

G207-25

IBC: APPENDIX Q (New), SECTION Q101 (New), Q101.1 (New), SECTION Q102 (New), Q102.1 (New), SECTION 202 (New), SECTION Q103 (New), Q103.1 (New), Q103.2 (New), Q103.3 (New), Q103.4 (New), Q103.4.1 (New), Q103.4.2 (New), Q103.4.3 (New), Q103.5 (New), SECTION Q104 (New), Q104.1 (New), SECTION Q105 (New), Q105.1 (New), Q105.2 (New), Q105.3 (New), Q105.4 (New), Q105.5 (New), Q105.6 (New), SECTION Q106 (New), Q106.1 (New), Q106.2 (New), Q106.3 (New), Q106.4 (New), Q106.5 (New), SECTION Q107 (New), Q107.1 (New), TABLE Q107.1 (New)

Proponents: Bryan Holland, representing National Electrical Manufacturers Association (NEMA) (bryan.holland@nema.org)

2024 International Building Code

Add new text as follows:

APPENDIX Q
CONNECTED BUILDING MANAGEMENT SYSTEMS PROVISIONS

SECTION Q101
GENERAL

Q101.1 Purpose. To provide safe and effective installation and operation of fully integrated and connected building management systems.

SECTION Q102
DEFINITIONS

Q102.1 General. The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

Add new definition as follows:

CONNECTED BUILDING. A facility equipped with advanced digital technologies to enhance its operational safety and efficiency, energy efficiency, occupant comfort, and environmental sustainability. These technologies include various interconnected systems and devices that are managed through a centralized platform, often utilizing the Internet of Things (IoT), automation, and data analytics.

CONNECTED BUILDING MANAGEMENT SYSTEMS. Equipment that monitors and controls power within an electrical system and may include an energy management system, power control system, automatic load management system, or other building management systems that are connected to the internet and fully integrated.

DATA. Unprocessed values collected from various sensors and devices within a building. These sensors can monitor building and environmental conditions that provide a real-time picture of a building's operational state.

Add new text as follows:

SECTION Q103
CONNECTED BUILDING MANAGEMENT SYSTEMS PERFORMANCE CRITERIA

Q103.1 Referenced standards. Connected building management systems shall comply with all applicable codes and standards.

Q103.2 Installation requirements. Connected building management systems shall comply product's listing and labeling, the manufacturer's installation instructions, and the provisions of this appendix.

Q103.3 Systems integration and communication protocols. The connect building management systems shall include the following features:

1. Utility-interactive for demand response functionality and peak load shaving.
2. Ability to facilitate distinct operating modes in accordance with Q103.4.
3. Fault detection and diagnostics (FDD).
4. Full integration with building life safety, fire safety, and emergency systems.
5. Supervision of communication protocols.
6. Cybersecurity and data privacy protocols.

Exception: Fire, life-safety, security, and emergency communication devices and systems shall not be connected to a demand response or peak load shaving controlled circuit.

Q103.4 Connected building management system operating modes. Connected building management system operating mode shall be capable of optimizing the building performance to mitigate other internal and external conditions as established by the building design team and shall comply with Q103.4.1 through Q103.4.3.

Q103.4.1 Operating modes. Connected building management systems shall be capable to be programed with distinct operating modes as follows:

1. During normal operation, all devices, equipment, and systems are fully operational.
2. During emergency operation, all devices, equipment, and systems are monitored and controlled from the fire command center.
3. For indoor pollutant mitigation, the predetermined threshold for the concentration of pollutants in the occupiable space are lowered by increasing the outdoor airflow rate, overriding supply air filter bypass, or adjusting indoor temperature set points.
4. For outdoor pollutant mitigation, the mechanical system suspends outdoor airflow and override supply air filter bypass to maximize return air filtration.
5. For utility demand response and peak load shaving, energy consumption of the building is decreased, as needed, by reducing lighting power, adjusting indoor temperature set points, shifting non-essential operational loads, discharging of energy storage systems, and suspending the charging of energy storage and electrical vehicles.
6. For reduced occupancy, energy consumption of the building is reduced by setting one or more of the following as a default condition capable of being overridden by an occupant:
    - 6.1. Non-emergency lighting is turned off.
    - 6.2. Indoor temperature set points for non-occupancy schedules are held.
    - 6.3. Ventilation rates are adjusted to minimize outdoor air.
    - 6.4. Nonessential plug loads are switched off.
7. In other operating modes, devices, equipment, and systems are operated and controlled in a distinct mode based on environmental conditions or other changes to building occupancy and use.

Q103.4.2 Password protection. All operating modes shall password protection and issue daily notification to the building owner or other designee when the system is in override.

Q103.4.3 Buildng readiness plan. Where facilities are designed to operate in various modes in response to natural or manmade threat to, and exposure of the building, the following shall be documented through an approved Building Readiness Plan (BRP). The BRP shall include the operations and maintenance (O&M) procedures involved in this operating mode, the mechanical equipment affected, final design drawings, critical asset inventory management plan, maintenance schedules, the maintenance requirements, frequencies, and establish a return to normal mode review period.

Q103.5 Maintenance requirements. Connected building management systems shall be maintained in accordance with the referenced standards and commissioned in accordance with Section Q106.

SECTION Q104
CONNECTED BUILDING MANAGEMENT SYSTEM COMPONENTS

Q104.1 General. Connected building management systems shall operate and control devices, equipment, and systems installed in buildings, including but not limited to:

1. Demand responsive lighting controls.
2. Dynamic shading and automatic glazing coverings.
3. Electric vehicle power transfer system equipment.
4. Demand control ventilation.
5. Fault detection and diagnostics (FDD).
6. Energy storage systems (ESS).
7. Onsite interconnected power production sources.

SECTION Q105
SYSTEM INTEGRATION AND COMMUNICATION PROTOCOLS

Q105.1 General. Connected building management systems shall include system integration and communication protocols in accordance with this section.

Q105.2 Directory. A directory identifying the systems, equipment, circuits, or devices that are controlled by the connected building management system shall be posted on the enclosure of the integrated building system controller, disconnecting means, or branch-circuit overcurrent device.

Q105.3 Cybersecurity. Connected building management systems that are connected to a communication network and controlling any device, appliance, or equipment shall be assessed to address its ability to withstand unauthorized updates and malicious attacks while continuing to perform its intended safety functionality set forth by the building owner or owner's authorized agent.

Q105.4 Privacy. Connected building management systems that are connected to a communication network to store and transmit data shall include protocols for data privacy set forth by the building owner or owner's authorized agent.

Q105.5 System malfunction. When the connected building management system controls are used to reduce the electrical load on an electrical service or feeder, the connected building management system shall use monitoring and controls to automatically deenergize non-essential systems upon malfunction of the connected building system controls.

Q105.6 Monitoring, alarming, scheduling, and trending. The connected building management system shall monitor the connected systems, receive alarms from connected systems, allow scheduling of connected systems, and store trend data from connected systems. Data collected by the connected building management system shall be backed up and stored on an enterprise server or cloud based.

SECTION Q106
MAINTENANCE INFORMATION AND SYSTEM COMMISSIONING

Q106.1 General. Maintenance information and commissioning of the connected building management systems shall comply with this section.

Q106.2 Building operations and maintenance information. The building operations and maintenance documents shall be provided to the owner and shall consist of manufacturers' information, specifications, and recommendations; programming procedures and data points; narratives; and other means of illustrating to the owner how the building, equipment and systems are intended to be installed, maintained and operated. Required regular maintenance actions for equipment and systems shall be clearly stated on a readily visible label. The label shall include the title or publication number for the operation and maintenance manual for that model and type of product.

Q106.3 Emergency and standby source load testing. Where connected building system control setpoints are bypassed for the required annual load testing for emergency and standby sources in accordance with NFPA 110, NFPA 111, NFPA 70, NFPA 855 or other applicable standard, the system controls shall be returned back to the original commissioned setpoints at the conclusion of the load testing.

Q106.4 Commissioning plan and report. A commissioning plan shall be developed by a registered design professional or approved agency and shall include a narrative description of the activities that will be accomplished during each phase of commissioning, including the personnel intended to accomplish each of the activities, a listing of the specific equipment to be tested and a description of the tests to be performed, equipment functions to be tested, conditions under which the test will be performed, and measurable criteria for performance. A report of test procedures and results identified as "Final Commissioning Report" shall be delivered to the building owner or owner's authorized agent. The report shall include the results of functional performance tests, disposition of deficiencies found during testing, including details of corrective measures used or proposed, and functional performance test procedures used during the commissioning process, including measurable criteria for test acceptance, provided herein for repeatability.

Q106.5 Records. Records shall be created and maintained for all connected building system controls inspections, operational tests, repairs, and modifications. Records shall be made available to the code official upon request. Records shall include the date of the maintenance report, identification of the servicing personnel, notation of any unsatisfactory condition and the corrective action taken, including parts replaced, and testing of any repair in the time recommended by the manufacturer. Records shall be retained for a period of time defined by the building owner, facility management, or by the code official.

SECTION Q107
REFERENCED STANDARDS

Q107.1 General. See Table Q107.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, standard title, and the section or sections of this appendix that reference the standard.

TABLE Q107.1 REFERENCED STANDARDS

STANDARD ACRONYM	STANDARD NAME	SECTIONS HEREIN REFERENCED
NFPA 70-23	National Electrical Code	Q106.3
NFPA 110-22	Standard for Emergency and Standby Power Systems	Q106.3
NFPA 111-22	Standard on Stored Electrical Energy Emergency and Standby Power Systems	Q106.3
NFPA 855-23	Standard for the Installation of Stationary Energy Storage Systems	Q106.3

Reason: The purpose of this appendix proposal is to consolidate and integrate isolated devices, equipment, and systems that are required or permitted by the family of I-Codes into a single connected building management system to maximize safety, efficiency and resiliency during the use and occupancy of the building. In addition to installation requirements, the appendix outlines maintenance and commissioning requirements for the connected building management system.

- **Section Q102** provides three new definitions to help users of the appendix understand the meaning and context of these terms.
- **Section Q103** outlines the performance criteria for the connected building management systems. The core requirement is that all devices, equipment, and systems are installed in accordance with their listing and manufacturer's installation instructions. Essential features of the connected building management systems are outlined. Applicable NFPA standards may include but not be limited to NFPA 3, 4, 70, and 72.
- **Section Q104** ensures that other devices, equipment, and systems that are not required, but permitted, to be installed in buildings are integrated into the connected building management systems.
- **Section Q105** outlines system integration and communication protocols to address cybersecurity, data privacy and system malfunction concerns.
- **Section Q106** outlines the system maintenance information and commissioning requirements to ensure the connected building management systems was properly installed, fully operational, and will continue to function as designed for the life of the building.

Cost Impact: Increase

Estimated Immediate Cost Impact:

As an appendix, the impact cost will be $0 since it is only optional unless adopted by the jurisdiction having authority. This proposed appendix will increase the cost of construction for those projects that elect to implement the safe and effective installation and operation of fully integrated and connected building management systems in compliance with this appendix. The additional costs may be offset by energy savings, more efficient operations, increased productivity, and reduced operational downtime.

Estimated Immediate Cost Impact Justification (methodology and variables):

Unknown - No Cost Impact Justification Study Performed

Staff Analysis: The proposed referenced standard, NFPA 855-23 Standard for the Installation of Stationary Energy Storage Systems, is currently referenced in the IFC.

G209-25

IBC: [F] TABLE 509.1

Proponents: Greg Johnson, Johnson & Associates Consulting Services, representing self (gjohnsonconsulting@gmail.com); Robert Buchetto, HED, representing Self (rbuchetto@hed.design); Jay Peters, representing Codes and Standards International (peters.jay@me.com)

2024 International Building Code

Revise as follows:

[F] TABLE 509.1 INCIDENTAL USES

ROOM OR AREA	SEPARATION AND/OR PROTECTION
Electrical installations and transformers	See Sections 110.26 through 110.34 and Sections 450.8 through 450.48 of NFPA 70 for protection and separation requirements.
In Group D, rooms with lithium-ion or lithium metal batteries	2 hours

For SI: 1 square foot = 0.0929 m^2, 1 pound per square inch (psi) = 6.9 kPa, 1 British thermal unit (Btu) per hour = 0.293 watts, 1 horsepower = 746 watts, 1 gallon = 3.785 L, 1 cubic foot = 0.0283 m^3.

Reason: Data centers are unique occupancies and merit their own occupancy classification, as is proposed in a companion change. It is typical in the data center industry for energy storage systems using lithium batteries to be separated by 2 hour fire separations from the data hall and accessory office spaces.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

What is proposed is consistent with current industry practices and should create no additional expense.

Staff Analysis: Provisions for the separtation of rooms containig lithium-ion and lithium metal batteries was added in the 2024 IFC Section 320.4.2.2 by F21-21; and relocated to a new Chapter 42 by F230-24.

S16-25

IBC: TABLE 1507.1.1(3)

Proponents: T. Eric Stafford, representing Insurance Institute for Business and Home Safety (testafford@charter.net); Milad Shabanian, representing Insurance Institute for Business & Home Safety (mshabanian@ibhs.org)

2024 International Building Code

Revise as follows:

TABLE 1507.1.1(3) UNDERLAYMENTFASTENING

ROOF COVERING	SECTION	MAXIMUM BASIC WIND SPEED, *V* < 130 MPH IN HURRICANE-PRONE REGIONS OR *V* < 140 MPH OUTSIDE HURRICANE-PRONE REGIONS	MAXIMUM BASIC WIND SPEED, *V* ≥ 130 MPH IN HURRICANE-PRONE REGIONS OR *V* ≥ 140 MPH OUTSIDE HURRICANE-PRONE REGIONS
Asphalt shingles	1507.2	Fastened sufficiently to hold in place	Mechanically fastened underlayment shall be fastened at 6 inches on center 3 inches from the eave and 6 inches on center at all side and end laps. ~~with corrosion-resistant fasteners~~ Underlayment shall be fastened in a grid pattern of not greater than 12 inches on center horizontally and vertically between side laps ~~with a 6-inch spacing at side and end laps~~. Mechanically fastened underlayment shall be fastened using corrosion-resistant annular ring or deformed shank nails with 1-inch diameter metal or plastic caps. Metal caps shall have a thickness of not less than 32-gage (0.0134 inch) sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch. The cap nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than 3/4 inch into the roof sheathing. Self-adhering polymer modified bitumen underlayment shall be installed in accordance with the underlayment and roof covering manufacturers' installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.
Clay and concrete tile	1507.3		
BIPV roof coverings	1507.16		
Metal roof panels	1507.4	Manufacturer's installation instructions	Mechanically fastened underlayment shall be fastened at 6 inches on center 3 inches from the eave and 6 inches on center at all side and end laps. ~~with corrosion-resistant fasteners~~ Underlayment shall be fastened in a grid pattern of not greater than 12 inches on center horizontally and vertically between side laps ~~with a 6-inch spacing at side and end laps~~. Mechanically fastened underlayment shall be fastened using corrosion-resistant annular ring or deformed shank nails with 1-inch diameter metal or plastic caps. Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch. The cap nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than 3/4 inch into the roof sheathing. Self-adhering polymer modified bitumen underlayment shall be installed in accordance with the underlayment and roof covering manufacturers' installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.
Metal roof shingles	1507.5		
Mineral-surfaced roll roofing	1507.6		
Slate shingles	1507.7		
Wood shingles	1507.8		
Wood shakes	1507.9		

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

Reason: This code change proposal intends to clarify fastening requirements for underlayment at eave locations in areas prone to high winds and hurricanes. The code currently requires corrosion-resistant fasteners in a grid pattern no greater than 12 inches horizontally and vertically, with a 6-inch spacing at side and end laps. However, it does not specifically state how to properly fasten the underlayment at the eave edge, where wind pressures can be significantly higher than on the roof field.

The roof underlayment methods required in high wind areas (V ≥ 130 mph in hurricane-prone regions, and V ≥ 140 mph outside hurricane-prone regions) are intended to provide a secondary barrier against water infiltration through the roof deck if the primary roofing material fails. Given its importance, properly securing underlayment is vital to this function. For many roof configurations, wind pressures are highest along the eave edge, particularly the eave edge corners, due to the wind's interaction with the roof structure.

Considering that underlayment is installed shingle fashion, inadequate fastening at the edge can lead to underlayment failure at the eave during high-wind events, potentially causing a cascading failure across other rows of underlayment and compromise the entire underlayment system. This proposal addresses this vulnerability by specifically requiring the first course of underlayment to be fastened at 6 inches on center 3 inches from the eave edge.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is primarily a clarification and is not expected to add any meaningful cost to construction.

S17-25

IBC: TABLE 1507.1.1(1), TABLE 1507.1.1(2), TABLE 1507.1.1(3), 1507.17.3, 1507.17.4, 1507.17.4.1, 1507.17.4.2

Proponents: T. Eric Stafford, representing Insurance Institute for Business and Home Safety (testafford@charter.net); Milad Shabanian, representing Insurance Institute for Business & Home Safety (mshabanian@ibhs.org)

2024 International Building Code

Revise as follows:

TABLE 1507.1.1(1) UNDERLAYMENT TYPES

ROOF COVERING	SECTION	MAXIMUM BASIC WIND SPEED, *V* < 130 MPH IN HURRICANE-PRONE REGIONS OR *V* < 140 MPH OUTSIDE HURRICANE-PRONE REGIONS	MAXIMUM BASIC WIND SPEED, *V* ≥ 130 MPH IN HURRICANE-PRONE REGIONS OR *V* ≥ 140 MPH OUTSIDE HURRICANE-PRONE REGIONS
Asphalt shingles	1507.2	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D6757 ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Clay and concrete tiles	1507.3	ASTM D226 Type II ASTM D1970 ASTM D2626 ASTM D6380 Class M ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D8257
Metal roof panels applied to a solid or closely fitted deck	1507.4	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Metal roof shingles	1507.5	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Mineral-surfaced roll roofing	1507.6	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Slate shingles	1507.7	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Wood shingles	1507.8	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV	ASTM D226 Type II ASTM D4869 Type III or IV
Wood shakes applied to a solid sheathing roof deck	1507.9	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV	ASTM D226 Type II ASTM D4869 Type III or IV
BIPV roof coverings	1507.16 1507.17	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D6757 ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257

TABLE 1507.1.1(2) UNDERLAYMENT APPLICATION

ROOF COVERING	SECTION	MAXIMUM BASIC WIND SPEED, *V* < 130 MPH IN HURRICANE-PRONE REGIONS OR *V* < 140 MPH OUTSIDE HURRICANE-PRONE REGIONS	MAXIMUM BASIC WIND SPEED, *V* ≥ 130 MPH IN HURRICANE-PRONE REGIONS OR *V* ≥ 140 MPH OUTSIDE HURRICANE-PRONE REGIONS

ROOF COVERING	SECTION	MAXIMUM BASIC WIND SPEED, *V* < 130 MPH IN HURRICANE-PRONE REGIONS OR *V* < 140 MPH OUTSIDE HURRICANE-PRONE REGIONS	MAXIMUM BASIC WIND SPEED, *V* ≥ 130 MPH IN HURRICANE-PRONE REGIONS OR *V* ≥ 140 MPH OUTSIDE HURRICANE-PRONE REGIONS
Asphalt shingles	1507.2	Underlayment shall be one of the following: 1. For roof slopes from 2 units vertical in 12 units horizontal (2:12) to 4 units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied in the following manner: Apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves. Starting at the eaves, apply full-width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. End laps shall be 4 inches and shall be offset by 6 feet. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. 2. For roof slopes of 4 units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied as follows: Underlayment shall be applied shingle fashion, parallel to and starting from the eaves and lapped 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. 3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturers' installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.	Underlayment shall be one of the following: 1. Two layers of mechanically fastened underlayment applied in the following manner: Apply a strip of underlayment felt that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eaves, apply full-width sheets of underlayment overlapping successive sheets half the width of a full sheet plus 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. 2. A strip not less than 4 inches in width of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the manufacturer's installation instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment complying with Table 1507.1.1(1) for the applicable roof covering and basic wind speed shall be applied over the entire roof over the 4-inch-wide membrane strips. Underlayment shall be applied in accordance with this table using the application requirements for where the maximum basic wind speed is less than 130 mph. 3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacurers' installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.
Clay and concrete tile	1507.3	Underlayment shall be one of the following: 1. For roof slopes from 2 1/2 units vertical in 12 units horizontal (2 1/2:12) to 4 units vertical in 12 units horizontal (4:12), underlayment shall be not fewer than two layers applied in the following manner: Apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves. Starting at the eaves, a full-width strip of underlayment felt shall be applied, overlapping successive sheets half the width of a full sheet plus 2 inches. End laps shall be 4 inches and shall be offset by 6 feet. 2. For roof slopes of 4 units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied as follows: Underlayment shall be applied shingle fashion, parallel to and starting from the eaves and lapped 2 inches. End laps shall be 4 inches and shall be offset by 6 feet. 3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturers' installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.	Underlayment shall be one of the following: 1. Two layers of mechanically fastened underlayment applied in the following manner: Apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eaves, apply full-width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. 2. A strip not less than 4 inches in width of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the manufacturer's installation instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment complying with Table 1507.1.1(1) for the applicable roof covering and basic wind speed shall be applied over the entire roof over the 4-inch-wide membrane strips. Underlayment shall be applied in accordance with this table using the application requirements for where the maximum basic wind speed is less than 130 mph. 3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacurers' installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.
Metal roof panels	1507.4	Apply in accordance with the manufacturer's installation instructions	Underlayment shall be one of the following: 1. Two layers of mechanically fastened underlayment applied in the following manner: Apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eaves, apply full-width sheets of underlayment, overlapping successful sheets half the width of a full sheet plus 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. 2. A strip not less than 4 inches in width of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the manufacturer's installation instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment complying with Table 1507.1.1(1) for the applicable roof covering and basic wind speed shall be applied over the entire roof over the 4-inch-wide membrane strips. Underlayment shall be applied in accordance with this table using the application requirements for where the maximum basic wind speed is less than 130 mph. 3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacurers' installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.
Metal roof shingles	1507.5		
Mineral-surfaced roll roofing	1507.6		
Slate shingles	1507.7		
Wood shingles	1507.8		
Wood shakes	1507.9		

ROOF COVERING	SECTION	MAXIMUM BASIC WIND SPEED, *V* < 130 MPH IN HURRICANE-PRONE REGIONS OR *V* < 140 MPH OUTSIDE HURRICANE-PRONE REGIONS	MAXIMUM BASIC WIND SPEED, *V* ≥ 130 MPH IN HURRICANE-PRONE REGIONS OR *V* ≥ 140 MPH OUTSIDE HURRICANE-PRONE REGIONS
BIPV roof coverings	1507.16 1507.17	Underlayment shall be one of the following: 1. For roof slopes from 3 units vertical in 12 units horizontal (3:12) to 4 units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied in the following manner: Apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves. Starting at the eaves, apply full-width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. End laps shall be 4 inches and shall be offset by 6 feet. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. 2. For roof slopes of 4 units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied as follows: Underlayment shall be applied shingle fashion, parallel to and starting from the eaves and lapped 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. 3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturers' installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.	Underlayment shall be one of the following: 1. Two layers of mechanically fastened underlayment applied in the following manner: Apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eaves, apply full-width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. 2. A strip not less than 4 inches in width of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the manufacturer's installation instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment complying with Table 1507.1.1(1) for the applicable roof covering and basic wind speed shall be applied over the entire roof over the 4-inch-wide membrane strips. Underlayment shall be applied in accordance with this table using the application requirements for where the maximum basic wind speed is less than 130 mph. 3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturers' installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.

TABLE 1507.1.1(3) UNDERLAYMENTFASTENING

ROOF COVERING	SECTION	MAXIMUM BASIC WIND SPEED, *V* < 130 MPH IN HURRICANE-PRONE REGIONS OR *V* < 140 MPH OUTSIDE HURRICANE-PRONE REGIONS	MAXIMUM BASIC WIND SPEED, *V* ≥ 130 MPH IN HURRICANE-PRONE REGIONS OR *V* ≥ 140 MPH OUTSIDE HURRICANE-PRONE REGIONS
Asphalt shingles	1507.2	Fastened sufficiently to hold in place	Mechanically fastened underlayment shall be fastened with corrosion-resistant fasteners in a grid pattern of not greater than 12 inches horizontally and vertically between side laps with a 6-inch spacing at side and end laps. Mechanically fastened underlayment shall be fastened using annular ring or deformed shank nails with 1-inch diameter metal or plastic caps. Metal caps shall have a thickness of not less than 32-gage (0.0134 inch) sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch. The cap nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than $^3/_4$ inch into the roof sheathing. Self-adhering polymer modified bitumen underlayment shall be installed in accordance with the underlayment and roof covering manufacturers' installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.
Clay and concrete tile	1507.3		
BIPV roof coverings	1507.16 1507.17		
Metal roof panels	1507.4	Manufacturer's installation instructions	Mechanically fastened underlayment shall be fastened with corrosion-resistant fasteners in a grid pattern of not greater than 12 inches horizontally and vertically between side laps with a 6-inch spacing at side and end laps. Mechanically fastened underlayment shall be fastened using annular ring or deformed shank nails with 1-inch diameter metal or plastic caps. Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch. The cap nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than $^3/_4$ inch into the roof sheathing. Self-adhering polymer modified bitumen underlayment shall be installed in accordance with the underlayment and roof covering manufacturers' installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.
Metal roof shingles	1507.5		
Mineral-surfaced roll roofing	1507.6		
Slate shingles	1507.7		
Wood shingles	1507.8		
Wood shakes	1507.9		

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

1507.17.3 Underlayment. *Underlayment* shall comply with Section 1507.1.1 ~~ASTM D226, ASTM D4869 or ASTM D6757~~.

Delete without substitution:

~~**1507.17.4 Underlayment application.** *Underlayment* shall be applied *shingle fashion*, parallel to and starting from the eave, lapped 2 inches (51 mm) and fastened sufficiently to hold in place.~~

~~**1507.17.4.1 High-wind attachment.** *Underlayment* applied in areas subject to high winds [V_{asd} greater than 110 mph (49 m/s) as determined in accordance with Section 1609.3.1] shall be applied in accordance with the manufacturer's instructions. Fasteners shall be applied along the overlap at not more than 36 inches (914 mm) on center. *Underlayment* installed where V_{asd} is not less than 120 mph (54 m/s) shall comply with ASTM D226, Type III, ASTM D4869, Type IV or ASTM D6757. The *underlayment* shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. The *underlayment* shall be applied in~~

~~accordance with Section 1507.1.1 except all laps shall be not less than 4 inches (102 mm). *Underlayment* shall be attached using cap nails or cap staples. Caps shall be metal or plastic with a nominal head diameter of not less than 1 inch (25.4 mm). Metal caps shall have a thickness of not less than 0.010 inch (0.25 mm). Power-driven metal caps shall have a thickness of not less than 0.010 inch (0.25 mm). Thickness of the outside edge of plastic caps shall be not less than 0.035 inch (0.89 mm). The cap nail shank shall be not less than 0.083 inch (2.11 mm) for ring shank cap nails and 0.091 inch (2.31 mm) for smooth shank cap nails. Staple gage shall be not less than 21 gage [0.0.2 inch (0.81 mm)]. Cap nail shank and cap staple legs shall have a length sufficient to penetrate through the roof sheathing or not less than $^{3}/_{4}$ inch (19.1 mm) into the roof sheathing.~~

~~**Exception:** As an alternative, adhered *underlayment* complying with ASTM D1970 shall be permitted.~~

Revise as follows:

1507.17.4~~.2~~ Ice barrier. Where required, ice barriers shall comply with Section 1507.1.2. ~~In areas where there has been a history of ice forming along the eaves causing a back-up of water, an ice barrier consisting of not fewer than two layers of *underlayment* cemented together or of a self-adhering polymer modified bitumen sheet shall be used instead of normal *underlayment* and extend from the lowest edges of all roof surfaces to a point not less than 24 inches (610 mm) inside the *exterior wall* line of the *building*.~~

~~**Exception:** Detached accessory *structures* that do not contain conditioned floor area.~~

Reason: This proposal integrates the underlayment requirements for Building-Integrated Photovoltaic (BIPV) roof panels into Section 1507.1.1, aligning them with the underlayment requirements specified for all other roofing materials. The 2018 IBC consolidated the underlayment requrements for roofing materials into Section 1507.1.1 and, at the same time, added specifications for BIPV roof panels. However, the underlayment requirements for BIPV roof panels was not updated to reflect this consolidation and has been overlooked since. Additionally, the current underlayment requirements for high winds areas are outdated and inconsistent with those for other roofing materials, including BIPV shingles. Updates to the wind speed triggers and the application and attachment methods have been made. This proposal seeks to update the underlayment requirements for BIPV roof panels to match those of all other roofing materials.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal simply consolidates the underlayment requirements for BIPV roof panels into Section 1507.1.1. Underlayment requirements for all other roof covering material is covered under Section 1507.1.1.

S18-25

IBC: TABLE 1507.1.1(1)

Proponents: T. Eric Stafford, representing Insurance Institute for Business and Home Safety (testafford@charter.net); Milad Shabanian, representing Insurance Institute for Business & Home Safety (mshabanian@ibhs.org)

2024 International Building Code

Revise as follows:

TABLE 1507.1.1(1) UNDERLAYMENT TYPES

ROOF COVERING	SECTION	MAXIMUM BASIC WIND SPEED, *V* < 130 MPH IN HURRICANE-PRONE REGIONS OR *V* < 140 MPH OUTSIDE HURRICANE-PRONE REGIONS	MAXIMUM BASIC WIND SPEED, *V* ≥ 130 MPH IN HURRICANE-PRONE REGIONS OR *V* ≥ 140 MPH OUTSIDE HURRICANE-PRONE REGIONS
Asphalt shingles	1507.2	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D6757 ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257 <u>ASTM D6757</u>
Clay and concrete tiles	1507.3	ASTM D226 Type II ASTM D1970 ASTM D2626 ASTM D6380 Class M ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D8257
Metal roof panels applied to a solid or closely fitted deck	1507.4	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Metal roof shingles	1507.5	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Mineral-surfaced roll roofing	1507.6	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Slate shingles	1507.7	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Wood shingles	1507.8	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV	ASTM D226 Type II ASTM D4869 Type III or IV
Wood shakes applied to a solid sheathing roof deck	1507.9	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV	ASTM D226 Type II ASTM D4869 Type III or IV
BIPV roof coverings	1507.16	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D6757 ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257 <u>ASTM D6757</u>

Reason: This code change proposal adds an additional underlayment material for use in high wind areas (V ≥ 130 mph in hurricane-prone regions and V ≥ 140 mph outside hurricane-prone regions) of the IBC. Underlayment complying with ASTM D6757 has long been permitted for asphalt shingle roof coverings in the International Codes and is currently permitted to be used in areas where V < 130 mph in hurricane-prone regions and V < 140 mph outside hurricane-prone regions. In the 2024 IBC, the underlayment requirements high wind areas was updated to be consistent with the 2021 IRC and the IBHS Fortified requirements for a sealed roof deck (SRD). Fortified has been updated and now specifically permits the use of underlayment complying with ASTM D6757 to create a SRD. This proposal simply adds underlayment material complying with ASTM D6757 as an option in high wind areas. Support of this proposal will align the underlayment requirements in high wind areas in the IBC with the IBHS Fortified SRD and add an additional underlayment option to be used in these areas.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal adds an additional underlayment material for use in high wind areas.

S22-25

IBC: 1507.2.1, 1507.3.1, 1507.4.1, 1507.5.1, 1507.6.1, 1507.7.1, 1507.8.1, 1507.8.1.1, 1507.9.1, 1507.9.1.1, 2308.11.9, 2308.11.10, TABLE 2304.8(1), TABLE 2304.8(2)

Proponents: David Tyree, representing American Wood Council (dtyree@awc.org)

2024 International Building Code

Revise as follows:

1507.2.1 Deck requirements. Asphalt shingles shall be installed on wood structural panels or closely fitted sawn lumber sheathing ~~fastened to solidly sheathed decks~~.

1507.3.1 Deck requirements. Concrete and clay tile shall be installed ~~only over solid~~ on wood structural panels or closely fitted sawn lumber sheathing.

Exception: Spaced sawn lumber sheathing shall be permitted in *Seismic Design Categories* A, B and C.

1507.4.1 Deck requirements. *Metal roof panel roof coverings* shall be installed on wood structural panels or closely fitted sawn lumber sheathing~~applied to a solid or closely fitted deck~~, except where the *roof covering* is specifically designed to be applied to spaced supports.

1507.5.1 Deck requirements. *Metal roof shingles* shall be installed on wood structural panels or closely fitted sawn lumber sheathing ~~applied to a solid or closely fitted deck~~, except where the *roof covering* is specifically designed to be applied to spaced sawn lumber sheathing.

1507.6.1 Deck requirements. Mineral-surfaced roll roofing shall be installed on wood structural panels or closely fitted sawn lumber sheathing~~fastened to solidly sheathed roofs~~.

1507.7.1 Deck requirements. Slate shingles shall be installed on wood structural panels or closely fitted lumber sheathing~~fastened to solidly sheathed roofs~~.

1507.8.1 Deck requirements. Wood shingles shall be installed on ~~solid~~ wood structural panels, closely fitted sawn lumber sheathing or spaced sawn lumber sheathing. Where spaced sawn lumber sheathing is used, sheathing boards shall be not less than 1-inch by 4-inch (25 mm by 102 mm) nominal dimensions and shall be spaced on centers equal to the weather exposure from Table 1507.8.7 to coincide with the placement of fasteners. Where 1-inch × 4-inch (25 mm × 102 mm) spaced sawn lumber sheathing is installed at 10 inches (254 mm) on center or greater, additional 1-inch × 4-inch (25 mm × 102 mm) boards shall be installed between the sheathing boards. When wood shingles are installed over spaced sawn lumber sheathing and the underside of the shingles ~~are~~is exposed to the *attic* space, the *attic* shall be ventilated in accordance with Section 1202.2. The shingles shall not be backed with materials that will occupy the required air gap space and prevent the free movement of air on the interior side of the spaced sawn lumber sheathing.

1507.8.1.1 ~~Solid sheathing required~~ Sheathing under ice barrier. ~~Solid~~ Wood structural panel sheathing or closely fitted sawn lumber sheathing shall be provided for portions of the roof deck requiring an ice barrier in accordance with Section 1507.1.2~~is required in areas where the average daily temperature in January is 25°F (-4°C) or less or where there is a possibility of ice forming along the eaves causing a backup of water~~.

1507.9.1 Deck requirements. Wood shakes shall ~~only~~ be ~~used~~ installed on ~~solid~~wood structural panel sheathing, closely fitted sawn lumber sheathing, or spaced sawn lumber sheathing. Where spaced sawn lumber sheathing is used, sheathing boards shall be not less than 1-inch by 4-inch (25 mm by 102 mm) nominal dimensions and shall be spaced on centers equal to the weather exposure from Table 1507.9.8 to coincide with the placement of fasteners. Where 1-inch by 4-inch (25 mm by 102 mm) spaced sawn lumber sheathing is installed at 10 inches (254 mm) on center, additional 1-inch by 4-inch (25 mm by 102 mm) boards shall be installed between the sheathing boards. Where wood shakes are installed over spaced sawn lumber sheathing and the underside of the shakes ~~are~~ is exposed to the *attic* space, the *attic* shall be ventilated in accordance with Section 1202.2. The shakes shall not be backed with materials that will occupy the required air gap space and prevent the free movement of air on the interior side of the spaced sawn lumber sheathing.

1507.9.1.1 ~~Solid sheathing required~~ Sheathing under ice barrier. ~~Solid~~Wood structural panels or closely fitted sawn lumber sheathing shall be provided for portions of the roof deck requiring an ice barrier in accordance with Section 1507.1.2.~~is required in areas where the average daily temperature in January is 25°F (-4°C) or less or where there is a possibility of ice forming along the eaves causing a backup of water.~~

2308.11.9 Roof sheathing. Roof sheathing shall be in accordance with Tables 2304.8(3) and 2304.8(5) for *wood structural panels*, and Tables 2304.8(1) and 2304.8(2) for sawn lumber and shall comply with Section 2304.8.2.

2308.11.10 Joints. Joints in sawn lumber sheathing shall occur over supports unless *approved* end-matched lumber is used, in which case each piece shall bear on not fewer than two supports.

TABLE 2304.8(1) ALLOWABLE SPANS FOR SAWN LUMBER FLOOR AND ROOF SHEATHING

Portions of table not shown remain unchanged.

SPAN (inches)	MINIMUM NET THICKNESS (inches) OF SAWN LUMBER PLACED			
	Perpendicular to supports		Diagonally to supports	
	Surfaced dry[a]	Surfaced unseasoned	Surfaced dry[a]	Surfaced unseasoned

TABLE 2304.8(2) SAWN LUMBER SHEATHING ~~LUMBER~~, MINIMUM GRADE REQUIREMENTS: BOARD GRADE

Portions of table not shown remain unchanged.

~~SOLID~~ CLOSELY FITTED FLOOR OR ROOF SHEATHING	SPACED SAWN LUMBER ROOF SHEATHING	GRADING RULES

Reason: Code users have questioned if "lumber sheathing" is the same thing as "wood structural panels". This code change is intended to make a clearer distinction between the two by changing "lumber sheathing" to "sawn lumber sheathing" throughout. Sawn lumber is the appropriate terminology that refers to structural wood members that are not a composite and are rather sawn from a log.

Additionally, the phrase "solid sheathing" is misleading where sawn lumber is used as it leaves the code user to question if any gaps are permitted. The code also recognizes "closely fitted" as a phrase to indicate that sawn lumber used as sheathing is permitted to be installed with necessary gaps due to construction tolerances, provided they are closely fitted. Therefore the language has been cleaned up to only refer to "closely fitted" in the context of sawn lumber sheathing.

Lastly, a change has been made to the provisions for decking requirements of wood shakes and shingles to appropriately indicate Section 1507.1.2 for the requirement to install an ice barrier, rather than have duplicated language in that section and the decking sections.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There are no technical changes proposed in this code change.

S30-25 Part II

IRC: R905.9.2, TABLE R909.2, ASTM Chapter 44

Proponents: Aaron Phillips, representing Asphalt Roofing Manufacturers Association (aphillips@asphaltroofing.org)

2024 International Residential Code

Revise as follows:

R905.9.2 Material standards. *Built-up roof covering* materials shall comply with the standards in Table R905.9.2 or UL 55A.

TABLE R905.9.2BUILT-UP ROOFING MATERIAL STANDARDS

MATERIAL STANDARD	STANDARD
Acrylic coatings used in roofing	ASTM D6083
Aggregate surfacing	ASTM D1863
Asphalt adhesive used in roofing	ASTM D3747
Asphalt cements used in roofing	ASTM ~~D2822;~~ D3019; D4586
Asphalt-coated glass fiber base sheet	ASTM D4601
Asphalt coatings used in roofing	ASTM D1227; ~~D2823;~~ D2824; D4479
Asphalt glass felt	ASTM D2178
Asphalt primer used in roofing	ASTM D41
Asphalt-saturated and asphalt-coated organic felt base sheet	ASTM D2626
Asphalt-saturated organic felt (perforated)	ASTM D2626
Asphalt used in roofing	ASTM D312
Coal-tar cements used in roofing	ASTM D4022; D5643
Coal-tar primer used in roofing, dampproofing and waterproofing	ASTM D43
Coal-tar saturated organic felt	ASTM D227
Coal-tar used in roofing	ASTM D450, Type I or II
Glass mat, coal tar	ASTM D4990
Glass mat, venting type	ASTM D4897
Mineral-surfaced inorganic cap sheet	ASTM D3909
Thermoplastic fabrics used in roofing	ASTM D5665; D5726

TABLE R909.2 ROOF COATING MATERIAL STANDARDS

COATING MATERIAL	STANDARD
Acrylic coating	ASTM D6083
Asphaltic emulsion coating	ASTM D1227
~~Asphalt coating~~	~~ASTM D2823~~
Asphalt roof coating	ASTM D4479
Aluminum-pigmented asphalt coating	ASTM D2824
Silicone coating	ASTM D6694
Moisture-cured polyurethane coating	ASTM D6947

Delete without substitution:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428

~~D2822/D2822M—2005(2011)e1~~	~~Specification for Asphalt Roof Cement, Asbestos Containing~~
~~D2823/D2823M—05(2011)e1~~	~~Specification for Asphalt Roof Coatings, Asbestos Containing~~

Reason: ASTM D2822 (Specification for Asphalt Roof Cement, Asbestos Containing) was withdrawn as an ASTM standard in 2016. ASTM D2823 (Specification for Asphalt Roof Coatings, Asbestos Containing) was withdrawn as an ASTM standard in 2014. No products complying with these standards are known, so the standards are proposed for removal from the IBC and the IRC.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposed removal of standards representing materials no longer used will have no impact on cost of construction.

S36-25

IBC: SECTION 1512 (New), 1512.1 (New), 1512.1.1 (New), 1512.1.2 (New), [BG] 1511.3, [BG] 1511.3.1, [BG] 1511.3.2, [BG] 1511.3.3, [BG] 1511.4, [BG] 1511.7.6, [BG] 1511.7.6.1, [BG] 1511.7.6.2, 1512.5 (New), 1512.6 (New), TABLE 1512.6 (New), 1512.7 (New), 1512.7.1 (New), 1512.7.2 (New), 1512.7.3 (New)

Proponents: John Taecker, Taecker Codes & Technical Services, representing Taecker Codes & Technical Services (john@taeckercodes.com)

THIS CODE CHANGE WILL BE HEARD BY THE IBC GENERAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THAT COMMITTEE.

2024 International Building Code

Add new text as follows:

SECTION 1512
ROOFTOP MOUNTED EQUIPMENT AND SYSTEMS

1512.1 General. Rooftop-mounted equipment and systems shall be installed in accordance with this section and the code applicable to the equipment or system. The installation shall not impact the integrity of the roof assembly or roof covering.

1512.1.1 Structural loads. The structural frame and roof construction supporting loads imposed upon the roof by any rooftop mounted equipment or system shall comply with Chapter 16.

1512.1.2 Flashing. Flashing shall be installed for rooftop-mounted equipment in accordance with Section 1503.2 and 1503.2.1.

Revise as follows:

[BG] ~~1511.3~~ 1512.2 Tanks. Tanks having a capacity of more than 500 gallons (1893 L) located on the *roof deck* of a *building* shall be supported on *masonry*, reinforced concrete, steel or heavy timber construction complying with Section 2304.11 provided that, where such supports are located in the *building* above the lowest *story*, the support shall be fire-resistance rated as required for Type IA construction.

[BG] ~~1511.3.1~~ 1512.2.1 Valve and drain. In the bottom or on the side near the bottom of the tank, a pipe or outlet, fitted with a suitable quick-opening valve for discharging the contents into a drain in an emergency shall be provided.

[BG] ~~1511.3.2~~ 1512.2.2 Location. Tanks shall not be placed over or near a *stairway* or an elevator *shaft*, unless there is a solid roof or floor underneath the tank.

[BG] ~~1511.3.3~~ 1512.2.3 Tank cover. Unenclosed roof tanks shall have covers sloping toward the perimeter of the tanks.

[BG] ~~1511.4~~ 1512.3 Cooling towers. Cooling towers located on the *roof deck* of a *building* and greater than 250 square feet (23.2 m^2) in base area or greater than 15 feet (4572 mm) in height above the *roof deck*, as measured to the highest point on the cooling tower, where the roof is greater than 50 feet (15 240 mm) in height above *grade plane* shall be constructed of noncombustible materials. The base area of cooling towers shall not exceed one-third the area of the supporting *roof deck*.

> **Exception:** Drip boards and the enclosing construction shall be permitted to be of wood not less than 1 inch (25 mm) nominal thickness, provided that the wood is covered on the exterior of the tower with noncombustible material.

[BG] ~~1511.7.6~~ 1512.4 Lightning protection systems. Lightning protection system components shall be installed in accordance with Sections ~~1511.7.6.1, 1511.7.6.2~~ 1512.4.1, 1512.4.2 and 2703.

[BG] ~~1511.7.6.1~~ 1512.4.1 Installation on metal edge systems or gutters. Lightning protection system components attached to

ANSI/SPRI/FM 4435/ES-1 or ANSI/SPRI GT-1 tested metal edge systems or gutters shall be installed with compatible brackets, fasteners or adhesives, in accordance with the metal edge systems or gutter manufacturer's installation instructions. Where the metal edge system or gutter manufacturer is unknown, installation shall be as directed by a *registered design professional*.

[BG] ~~1511.7.6.2~~ 1512.4.2 Installation on roof coverings. Lightning protection system components directly attached to or through the *roof covering* shall be installed in accordance with this chapter and the *roof covering* manufacturer's installation instructions. Flashing shall be installed in accordance with the *roof assembly* manufacturer's installation instructions and Sections 1503.2 and 1507 where the lightning protection system installation results in a penetration through the *roof covering*. Where the *roof covering* manufacturer is unknown, installation shall be as directed by a *registered design professional*.

Add new text as follows:

1512.5 Solar energy systems.. Rooftop-mounted photovoltaic panel systems and solar thermal systems shall be installed in accordance with Section 3111.

1512.6 Mechanical equipment.. Rooftop mounted mechanical equipment shall be mounted on curbs raised a minimum of 8 inches (203 mm) above the roof surface, or where roofing materials extend beneath the equipment, on raised equipment supports providing a minimum clearance height in accordance with Table 1512.6.

> **Exception**: Where the existing rooftop equipment provides sufficient clearance to repair, recover, replace or maintain the roofing system or any of its components, and where approved, such existing equipment need not comply with Table 1512.6.

TABLE 1512.6 CLEARNCE BELOW RAISED ROOFTOP-MOUNTED MECHANICAL EQUIPMENT

Width of Mechanical Equipment	Minimum clearance above roof surface
< 24 inches (610 mm)	14 inches (356 mm)
24 inches (610 mm) < 36 inches (914 mm)	18 inches (457 mm)
36 inches (914 mm) < 48 inches (1219 mm)	24 inches (610 mm)
48 inches (1219 mm) < 60 inches (1525 mm)	30 inches (762 mm)
> 60 inches (1525 mm)	48 inches (1219 mm)

1512.7 Electrical, plumbing and mechanical systems. Electrical, plumbing and mechanical systems shall be installed in accordance with Sections 1512.7.1 through 1512.7.3, and this code.

1512.7.1 Electrical wiring methods. Electrical wiring methods installed on rooftops and not encased in structural concrete shall be installed above the roof system in accordance with all of the following:

1. Electrical wiring methods installed in locations under metal-corrugated sheet roof decking shall be supported so there is not less than 1 ½ inch (38 mm) clearance measured from the lowest surface of the roof covering to the top of the cable or raceway.
2. A cable or raceway shall not be installed in concealed locations in roofs with metal-corrugated sheet roof decks.
3. Support systems for electrical wiring shall not diminish the fire classification of the roofassembly
4. A minimum of 1 ½ inch (38 mm) of clearance shall be provided between the roofassembly and the cable or raceway, or other clearance as required by other sections of this code and NFPA 70.
5. All penetrations of the roof covering shall be flashed in accordance with one of the following methods:
   - 5.1. The roof covering manufacturer's installation instructions.
   - 5.2. Where the roof covering manufacturer is unknown, installation shall be as directed by a registered design professional.
   - 5.3. Listed and labeled flashing materials or systems specific for what is penetrating the roof covering.

1512.7.2 Mechanical and plumbing systems. Mechanical and plumbing system piping and tubing installed on rooftops and not encased in structural concrete shall be supported above the roof system and covering, in accordance with the following:

1. A pipe or tube shall not be installed in concealed locations in roofs with metal-corrugated sheet roof decks.
2 Support systems for piping and tubing shall not diminish the fire classification of the roof assembly
3 A minimum of 1 ½ inch (38 mm) of clearance shall be provided between the roof assembly and the pipe or tube or other clearance as required by other sections of this code and the *International Mechanical Code*, *International Plumbing Code*, or *International Fuel Gas Code*, as applicable.
4 All penetrations of the roof covering shall be flashed in accordance with one of the following methods:
    - 4.1. The roof covering manufacturer's installation instructions.
    - 4.2. Where the roof covering manufacturer is unknown, installation shall be as directed by a registered design professional.
    - 4.3. Listed and labeled flashing materials or systems specific for what is penetrating the roof covering.

1512.7.3 Line sets, piping, tubing, raceways and cables under roof decks. Line sets, piping, tubing, raceways and cables installed below the roof deck shall have a minimum clearance of 1 ½ inch (38 mm) from the lowest surface of the roof deck except where they penetrate the roof deck.

Exception: Line sets, pipes, conduit and cables installed under structural concrete decks.

Reason: A new dedicated section is proposed to address the ever-increasing installation of rooftop-mounted electrical, mechanical and plumbing equipment and systems.

There are no specific requirements in the code to:

1. Ensure that these installations do not impact the integrity of the roof,
2. Provide clearance of obstacles above the finished roof for maintenance or replacement of the roofing materials,
3. Address the potential impact of these installations on firefighting operations, or
4. Address the potential damage to the fire classification of the roof assemblies and roof coverings.

Requirements for clearance of rooftop mounted electrical wiring exist in NFPA 70, however, these requirements are related to temperature and heating of the conductors. There are requirements for some equipment and systems (tanks, cooling towers and lightning protection systems) that are currently located under the section for rooftop structures (Section 1511), even though they are not structures.

This proposal does the following:

- Relocate sections for equipment and systems that are currently within Section 1511, Rooftop Structures
- Use requirements taken from the current edition of the Florida Building code which has had this wording for several code cycles and has been field-proven to be effective and usable.
- Provide additional direction for other equipment and systems mounted on the rooftop not covered by the Florida Building Code.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Good construction practices would address proper installation of rooftop-mounted equipment and systems to not impact the integrity of the roof, so the increase has the potential to be minimal, if at all. There may be a slight increase for those installers who have not done this practice. Calculating what, if any, additional cost is very difficult due to the location and the environment. For most of the country the cost would be minimal, if at all. Where there might be an increase in cost would be in high wind areas for the additional engineering involved, however engineering is already required in those situations, so the increase in cost would be negligible.

S53-25 Part I

IBC: SECTION 202 (New), TABLE 1604.3

Proponents: Jennifer Hatfield, J. Hatfield & Associates, representing Fenestration & Glazing Industry Alliance (formerly AAMA) (jen@jhatfieldandassociates.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IBC STRUCTURAL CODE COMMITTEE. PART II WILL BE HEARD BY THE IRC-B CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2024 International Building Code

Add new definition as follows:

PATIO COVER. A structure with open or glazed walls that is used for recreational, outdoor living purposes associated with a *dwelling unit.*

Revise as follows:

TABLE 1604.3 DEFLECTION LIMITS[a, b, c, h, i]

CONSTRUCTION	*L or L_r*	*S[j] or W[f]*	*D + L[d, g]*
Roof members:[e]			
Supporting plaster or stucco ceiling	*l*/360	*l*/360	*l*/240
Supporting nonplaster ceiling	*l*/240	*l*/240	*l*/180
Not supporting ceiling	*l*/180	*l*/180	*l*/120
Floor members	*l*/360	—	*l*/240
Exterior walls:			
With plaster or stucco finishes	—	*l*/360	—
With other brittle finishes	—	*l*/240	—
With flexible finishes	—	*l*/120	—
Interior partitions:[b]			
With plaster or stucco finishes	*l*/360	—	—
With other brittle finishes	*l*/240	—	—
With flexible finishes	*l*/120	—	—
Farm buildings	—	—	*l*/180
Greenhouses	—	—	*l*/120

For SI: 1 foot = 304.8 mm.

a. For structural roofing and siding made of formed metal sheets, the total load deflection shall not exceed *l*/60. For secondary roof structural members supporting formed metal roofing, the live load deflection shall not exceed *l*/150. For secondary wall members supporting formed metal siding, the design wind load deflection shall not exceed *l*/90. For roofs, this exception only applies when the metal sheets have no roof covering.

b. Flexible, folding and portable partitions are not governed by the provisions of this section. The deflection criterion for interior partitions is based on the horizontal load defined in Section 1607.16.

c. See Section 2403 for glass supports.

d. The deflection limit for the $D + (L$ or $L_r)$ load combination only applies to the deflection due to the creep component of long-term dead load deflection plus the short-term live load deflection. For lumber, structural glued laminated timber, prefabricated wood I-joists and structural composite lumber members that are dry at time of installation and used under dry conditions in accordance with the ANSI/AWC NDS, the creep component of the long-term deflection shall be permitted to be estimated as the immediate dead load deflection resulting from 0.5*D*. For lumber and glued laminated timber members installed or used at all other moisture conditions or cross laminated timber and wood structural panels that are dry at time of installation and used under dry conditions in accordance with the ANSI/AWC NDS, the creep component of the long-term deflection is permitted to be estimated as the immediate dead load deflection resulting from *D*. The value of 0.5*D* shall not be used in combination with ANSI/AWC NDS provisions for long-term loading.

e. The preceding deflections do not ensure against ponding. Roofs that do not have sufficient slope or camber to ensure adequate drainage shall be investigated for ponding. See Chapter 8 of ASCE 7.

f. The wind load shall be permitted to be taken as 0.42 times the "component and cladding" loads or directly calculated using the 10-year mean return interval basic wind speed, *V*, for the purpose of determining deflection limits in Table 1604.3. Where framing members support glass, the deflection limit therein shall not exceed that specified in Section 1604.3.7

g. For steel structural members, the deflection due to creep component of long-term dead load shall be permitted to be taken as zero.

h. For aluminum structural members or aluminum panels used in skylights and sloped glazing framing, roofs or walls of sunroom *additions* or patio covers, and not supporting edge of glass or ~~aluminum~~ sandwich panels, the total load deflection shall not exceed *l*/60. For continuous aluminum structural members supporting edge of glass, the total load deflection shall not exceed the lesser of 3/4 in (19 mm) or *l*/175 for each glass lite or, *l*/60 for the entire length of the member, whichever is more stringent. For ~~aluminum~~ sandwich panels used in roofs or walls of sunroom *additions* or patio covers, the total load deflection shall not exceed *l*/120.

i. *l* = Length of the member between supports. For cantilever members, *l* shall be taken as twice the length of the cantilever.

j. The snow load shall be permitted to be taken as 0.7 times the design snow load determined in accordance with Section 1608.1 for the purpose of determining deflection limits in Table 1604.3.

Reason: The term "patio cover" is currently used in the main content of the IBC, in Sections 1202.5.1.1, 1204.2.1, 2606.10 and Table 1604.3. It therefore needs a definition in Section 202. The proposed definition is consistent with the one currently in Appendix I.

This proposal then provides edits to Footnote h of Table 1604.3, for the following reasons:

- The insertion of the word "and" is to clarify that "not supporting edge of glass or sandwich panels" applies to "aluminum structural members of aluminum panels".
- Removes the word "aluminum" in front of "sandwich panels" as they can be constructed of materials other than aluminum. This is also consistent with the same wording in Footnote c of the IRC.
- Insertion of "the lesser of 3/4 in (19 mm) or..." is to provide clarification that aligns with the industry standard, AAMA/NSA 2100-22, Specifications for Sunrooms, as to what is needed when a glass lite span exceeds 11 feet.
- The L/60, L/120, and L/175 are just to correct the capitalization, as it is supposed to be a capital L, which is also reflected in Footnote c of the IRC.

This proposal and its corresponding IRC proposal is editorial in nature by aligning the wording of the footnotes in both codes, as well as making it clear in the definitions what is a "patio cover" versus a "sunroom", the latter already found in Section 202.

Bibliography: Section 6.3.2 of AAMA/NSA 2100-22, Specifications for Sunrooms

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The changes are editorial and clarifying in nature, and meant to align language in both the IRC and IBC. Therefore, the proposal will not increase or decrease the cost of construction.

S53-25 Part II

IRC: SECTION 202 (New), TABLE R301.7

Proponents: Jennifer Hatfield, J. Hatfield & Associates, representing Fenestration & Glazing Industry Alliance (formerly AAMA) (jen@jhatfieldandassociates.com)

2024 International Residential Code

Add new definition as follows:

PATIO COVER. A structure with open or glazed walls that is used for recreational, outdoor living purposes associated with a *dwelling unit*.

SECTION R301
DESIGN CRITERIA

Revise as follows:

TABLE R301.7 ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS[b, c]

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Rafters having slopes greater than 3:12 with finished ceiling not attached to rafters	*L*/180
Interior walls and partitions	*H*/180
Floors	*L*/360
Ceilings with brittle finishes (including plaster and stucco)	*L*/360
Ceilings with flexible finishes (including gypsum board)	*L*/240
All other structural members excluding guards and handrails	*L*/240
Exterior walls—wind loads[a] with plaster or stucco finish	*H*/360
Exterior walls—wind loads[a] with other brittle finishes	*H*/240
Exterior walls—wind loads[a] with flexible finishes	*H*/120[d]
Lintels supporting masonry veneer walls[e]	*L*/600

Note: *L* = span length, *H* = span height.

a. For the purpose of the determining deflection limits herein, the wind load shall be permitted to be taken as 0.7 times the component and cladding (ASD) loads obtained from Table R301.2.1(1).

b. For cantilever members, *L* shall be taken as twice the length of the cantilever.

c. For aluminum structural members or aluminum panels used in skylights and sloped glazing framing, roofs or walls of sunroom *additions* or patio covers, and not supporting edge of glass or sandwich panels, the total load deflection shall not exceed *L*/60. For continuous aluminum structural members supporting edge of glass, the total load deflection shall not exceed the lesser of 3/4 in (19 mm) or *L*/175 for each glass lite, or *L*/60 for the entire length of the member, whichever is more stringent. For sandwich panels used in roofs or walls of sunroom *additions* or patio covers, the total load deflection shall not exceed *L*/120.

d. Deflection for exterior walls with interior gypsum board finish shall be limited to an allowable deflection of *H*/180.

e. Refer to Section R703.8.2. The *dead load* of supported materials shall be included when calculating the deflection of these members.

Reason: The term "patio cover" is currently used in the main content of the IRC, in Table R301.7, and needs a definition in Section R202. The proposed definition is consistent with the one currently in Appendix BF.

This proposal then provides edits to Footnote c of Table R301.7, for the following reasons:

- The reference to "aluminum" panels and "skylights and sloped glazing" is editorial and is for consistency with the verbiage used in the same footnote found in the IBC.
- The insertion of the word "and" is to clarify that "not supporting edge of glass or sandwich panels" applies to "aluminum structural

members or aluminum panels."

- Insertion of "the lesser of 3/4 in (19 mm) or..." is to provide clarification that aligns with the industry standard, AAMA/NSA 2100-22, Specifications for Sunrooms, as to what is needed when a glass lite span exceeds 11 feet. Per R301.2.1.1.1, Sunrooms currently must comply with this Standard.

This proposal and its corresponding IBC proposal is editorial in nature by aligning the wording of the footnotes in both codes, as well as making it clear in the definitions what is a "patio cover" versus a "sunroom", the latter already found in Section R202.

Bibliography: Section 6.3.2 of AAMA/NSA 2100-22, Specifications for Sunrooms

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The changes are editorial and clarifying in nature, and meant to align language in both the IRC and IBC. Therefore, the proposal will not increase or decrease the cost of construction.

S54-25

IBC: TABLE 1604.3

Proponents: John O'Brien, NCSEA Code Advisory Committee Wind Subcommittee Chair, representing NCSEA (jobrien@pesengineers.com); Emily Guglielmo, representing NCSEA (eguglielmo@martinmartin.com)

2024 International Building Code

Revise as follows:

TABLE 1604.3 DEFLECTION LIMITS[a, b, c, h, i]

CONSTRUCTION	*L* or L_r	*S*[j] or *W*[f]	*D* + *L*[d, g]
Roof members:[e]			
Supporting plaster or stucco ceiling	*l*/360	*l*/360	*l*/240
Supporting nonplaster ceiling	*l*/240	*l*/240	*l*/180
Not supporting ceiling	*l*/180	*l*/180	*l*/120
Floor members	*l*/360	—	*l*/240
Exterior walls:			
With plaster or stucco finishes	—	*l*/360	—
With other brittle finishes	—	*l*/240	—
With flexible finishes	—	*l*/120	—
Interior partitions:[b]			
With plaster or stucco finishes	*l*/360	—	—
With other brittle finishes	*l*/240	—	—
With flexible finishes	*l*/120	—	—
Farm buildings	—	—	*l*/180
Greenhouses	—	—	*l*/120

For SI: 1 foot = 304.8 mm.

a. For structural roofing and siding made of formed metal sheets, the total load deflection shall not exceed *l*/60. For secondary roof structural members supporting formed metal roofing, the live load deflection shall not exceed *l*/150. For secondary wall members supporting formed metal siding, the design wind load deflection shall not exceed *l*/90. For roofs, this exception only applies when the metal sheets have no roof covering.

b. Flexible, folding and portable partitions are not governed by the provisions of this section. The deflection criterion for interior partitions is based on the horizontal load defined in Section 1607.16.

c. See Section 2403 for glass supports.

d. The deflection limit for the *D* + (*L* or L_r) load combination only applies to the deflection due to the creep component of long-term dead load deflection plus the short-term live load deflection. For lumber, structural glued laminated timber, prefabricated wood I-joists and structural composite lumber members that are dry at time of installation and used under dry conditions in accordance with the ANSI/AWC NDS, the creep component of the long-term deflection shall be permitted to be estimated as the immediate dead load deflection resulting from 0.5*D*. For lumber and glued laminated timber members installed or used at all other moisture conditions or cross laminated timber and wood structural panels that are dry at time of installation and used under dry conditions in accordance with the ANSI/AWC NDS, the creep component of the long-term deflection is permitted to be estimated as the immediate dead load deflection resulting from *D*. The value of 0.5*D* shall not be used in combination with ANSI/AWC NDS provisions for long-term loading.

e. The preceding deflections do not ensure against ponding. Roofs that do not have sufficient slope or camber to ensure adequate drainage shall be investigated for ponding. See Chapter 8 of ASCE 7.

f. The wind load shall be permitted to be taken as 0.42 times the "component and cladding" loads ~~or directly calculated using the 10-year mean return interval basic wind speed, *V*,~~ for the purpose of determining deflection limits in Table 1604.3. Where framing members support glass, the deflection limit therein shall not exceed that specified in Section 1604.3.7

g. For steel structural members, the deflection due to creep component of long-term dead load shall be permitted to be taken as zero.

h. For aluminum structural members or aluminum panels used in skylights and sloped glazing framing, roofs or walls of sunroom *additions* or patio covers not supporting edge of glass or aluminum sandwich panels, the total load deflection shall not exceed *l*/60. For continuous aluminum structural members supporting edge of glass, the total load deflection shall not exceed *l*/175 for each glass lite or *l*/60 for the entire length of the member, whichever is more stringent. For aluminum sandwich panels used in roofs or walls of sunroom *additions* or patio covers, the total load deflection shall not exceed *l*/120.

i. *l* = Length of the member between supports. For cantilever members, *l* shall be taken as twice the length of the cantilever.

j. The snow load shall be permitted to be taken as 0.7 times the design snow load determined in accordance with Section 1608.1 for the purpose of determining deflection limits in Table 1604.3.

Reason: **Code history:**

The current ratio of 0.42 for serviceability deflections due to wind loads in footnote f was based on an approximate ratio of 10-year mean recurrence interval (MRI) wind pressures to risk category II wind pressures in non-hurricane regions (ASCE 7-05, Equation CC-3 and Table C6-7; ASCE 7-22, Commentary Section CC.2.2). For hurricane regions, the 0.42 ratio was understood to be conservative for 10-year winds, and unconservative for some locations such as Anchorage, Alaska. Using the same ratio for all risk categories resulted in longer serviceability return periods for higher risk categories, but not specific or uniform ones.

In the 2018 IBC, the option was added to use 10-year MRI wind speeds for all locations and all risk categories.

Problems with current requirements:

There are several problems with the current wind load serviceability deflection windspeed requirements, the most notable of which pertains to the use of the 10-year wind speed for all risk categories. that can be seen in the table in Exhibit 1. Unlike the historic 0.42 reduction factor (IBC 2012 and 2015 for strength-based wind loads) and the 0.7 reduction factor (IBC 2009 and earlier editions), the 10-year MRI wind speed alternative does not increase deflection serviceability wind pressures and achieve the higher performance intended for higher risk categories. This is illustrated in Exhibit 1.

Recommended code change proposal:

This code change proposes to delete the option to utilize the 10-year MRI wind speeds while retaining the historic 0.42 reduction factor.

Potential future considerations:

In 2019 ASCE published the *Prestandard for Performance-Based Wind Design* which addressed the serviceability issue from a performance perspective. The Prestandard recommends that, to remain operational (i.e., serviceable) with the performance objective that the building envelope remain attached to the structure and maintain wind-driven rain resistance, the following MRI's be utilized:

- Risk Category II 10-year MRI
- Risk Category III 25-year MRI
- Risk Category IV 50-year MRI

As this is only a Prestandard at this time, it could be considered premature to incorporate these deflection limitations in the IBC. As the performance-based standard evolves, the IBC deflection limitations can be reassessed.

2024 IBC - Table 1604.3 - Deflection Limits

Exhibit 1

Footnote f - Comparison Between 0.42 Reduction Factor and 10-year MRI Equivalent Reduction

Municipality	ASCE 7-22 - Basic Design Wind Speed, *V* (mph)			10-year MRI Wind Speed (mph)	RC II / 10-year MRI Comparison		RC III / 10-year MRI Comparison		RC IV / 10-year MRI Comparison	
	Risk Category II	Risk Category III	Risk Category IV		Effective Wind Pressure Reduction Factor	Variation from 0.42	Effective Wind Pressure Reduction Factor	Variation from 0.42	Effective Wind Pressure Reduction Factor	Variation from 0.42
Atlanta, GA	105	113	118	71	0.46	9%	0.39	-6%	0.36	-14%
Denver, CO	107	113	117	77	0.52	23%	0.46	11%	0.43	3%
Orlando, FL	137	144	150	80	0.34	-19%	0.31	-27%	0.28	-32%
Raleigh, NC	115	123	127	75	0.43	1%	0.37	-11%	0.35	-17%
Washington DC	113	120	125	75	0.44	5%	0.39	-7%	0.36	-14%
New York, NY	116	125	130	75	0.42	0%	0.36	-14%	0.33	-21%
Cleveland, OH	109	116	121	75	0.47	13%	0.42	0%	0.38	-9%
Boston, MA	116	124	129	74	0.41	-3%	0.36	-15%	0.33	-22%
Milwaukee, WI	106	114	119	73	0.47	13%	0.41	-2%	0.38	-10%
Chicago, IL	107	114	119	74	0.48	14%	0.42	0%	0.39	-8%
Omaha, NE	111	119	124	77	0.48	15%	0.42	0%	0.39	-8%
Dallas, TX	105	115	117	75	0.51	21%	0.43	1%	0.41	-2%
Phoenix, AZ	101	108	112	71	0.49	18%	0.43	3%	0.40	-4%
Los Angeles, CA	95	101	105	65	0.47	11%	0.41	-1%	0.38	-9%
Seattle, WA	98	104	109	67	0.47	11%	0.42	-1%	0.38	-10%
New Orleans, LA	138	147	153	78	0.32	-24%	0.28	-33%	0.26	-38%
Jacksonville, FL	125	135	143	75	0.36	-14%	0.31	-27%	0.28	-35%
Charleston, SC	147	156	163	78	0.28	-33%	0.25	-40%	0.23	-45%
Savannah, GA	135	147	154	75	0.31	-27%	0.26	-38%	0.24	-44%
Anchorage, AK	128	133	139	90	0.49	18%	0.46	9%	0.42	0%

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

In practice, most designers are defaulting to the 0.42 factor for determining component and cladding deflection. The 10-year mean return period option does not appear to be widely adopted by the industry. Thus, there is no change in practice and construction cost.

S55-25

IBC: 1604.5, TABLE 1604.5

Proponents: David Bonowitz, representing David Bonowitz, S.E. (dbonowitz@att.net); Robert Bachman, RE Bachman Consulting Structural Engineer, representing Myself (rebachmanse@aol.com); Chris Kimball, Building Code Solutions, representing Self (chris@bcscodegroup.com)

2024 International Building Code

Revise as follows:

1604.5 Risk category. Each *building* and *structure* shall be assigned a *risk category* in accordance with Table 1604.5. Where a referenced standard specifies an occupancy category, the *risk category* shall not be taken as lower than the occupancy category specified therein. Where a referenced standard specifies that the assignment of a *risk category* be in accordance with ASCE 7, Table 1.5-1, Table 1604.5 shall be used in lieu of ASCE 7, Table 1.5-1.

Exceptions:

1. The assignment of *buildings* and *structures* to Tsunami *Risk Categories* III and IV is permitted to be in accordance with Section 6.4 of ASCE 7.
2. Freestanding parking garages not used for the storage of emergency services vehicles or not providing means of egress for *buildings* or *structures* assigned to a higher risk category shall be assigned to Risk Category II.
3. Battery energy storage systems are permitted to be assigned to Risk Category II where the *owner* has submitted and the *building official* has approved a plan to provide an alternative equivalent source of stored energy to the same energy consumers within one hour of the system's failure due to a design level wind, earthquake, snow, flood, or tornado event, considering the regional effects of any such event.

TABLE 1604.5 RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES

RISK CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities.
II	Buildings and other structures except those listed in Risk Categories I, III and IV.

III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to:
	• Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300.
	• Buildings and other structures containing one or more public assembly spaces, each having an occupant load greater than 300 and a cumulative occupant load of these public assembly spaces of greater than 2,500.
	• Buildings and other structures containing Group E or Group I-4 occupancies or combination thereof, with an occupant load greater than 250.
	• Buildings and other structures containing educational occupancies for students above the 12th grade with an occupant load greater than 500.
	• Group I-3, Condition 1 occupancies.
	• Any other occupancy with an occupant load greater than 5,000.[a]
	• Power-generating stations with individual power units rated 75 MW_{AC} (megawatts, alternating current) or greater, water treatment facilities for potable water, wastewater treatment facilities and other public utility facilities not included in Risk Category IV.
	• Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that:
	  • Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the *International Fire Code* ; and
	  • Are sufficient to pose a threat to the public if released.[b]

RISK CATEGORY	NATURE OF OCCUPANCY
IV	Buildings and other structures designated as essential facilities and buildings or structures where loss of function represents a substantial hazard to occupants or users, including but not limited to:
	• Group I-2 occupancies.
	• Ambulatory care facilities having emergency surgery or emergency treatment facilities.
	• Group I-3 occupancies other than Condition 1.
	• Fire, rescue, ambulance and police stations and emergency vehicle garages
	• Designated earthquake, hurricane or other emergency shelters.
	• Designated emergency preparedness, communications and operations centers and other facilities required for emergency response.
	• Public utility facilities providing power generation, potable water treatment, or wastewater treatment.
	• Power-generating stations and other public utility facilities required as emergency backup facilities for *Risk Category* IV structures.
	Battery energy storage systems providing ancillary services to a power plant, power-generating station or power generation facility that has a total capacity of 20 MW or more or is assigned to Risk Category IV.
	Battery energy storage systems for which the system's total energy capable of being stored is 80 MWh or more.
	Battery energy storage system components, cabinets, containers, enclosures, equipment platforms, foundations, shelters, and sheltering buildings for dedicated-use or nondedicated-use, where the battery energy storage system is assigned to Risk Category IV.
	• Buildings and other structures containing quantities of highly toxic materials that: • Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the *International Fire Code* ; and • Are sufficient to pose a threat to the public if released.[b]
	• Aviation control towers, air traffic control centers and emergency aircraft hangars.
	• Buildings and other structures having critical national defense functions.
	• Water storage facilities and pump structures required to maintain water pressure for fire suppression.

a. For purposes of occupant load calculation, occupancies required by Table 1004.5 to use *gross floor area* calculations shall be permitted to use *net floor areas* to determine the total occupant load. The floor area for vehicular drive aisles shall be permitted to be excluded in the determination of net floor area in parking garages.

b. Where approved by the building official, the classification of buildings and other structures as Risk Category III or IV based on their quantities of toxic, highly toxic or explosive materials is permitted to be reduced to Risk Category II, provided that it can be demonstrated by a hazard assessment in accordance with Section 1.5.3 of ASCE 7 that a release of the toxic, highly toxic or explosive materials is not sufficient to pose a threat to the public.

Reason: This proposal fills a hole in Table 1604.5 related to a relatively new, and increasingly common and newly essential, energy installation: **large-scale battery energy storage systems, or BESS** (see the Terminology section below for precedent definitions).

As illustrated below, BESS installations involve modular units that combine nonstructural components with a non-building structure. BESS are often built as customized containers or equipment frames, filled with batteries and related electrical and HVAC equipment, and mounted on a platform, a slab on ground, or a set of isolated footings. From the structural perspective, a BESS installation is basically a bunch of boxes anchored to a foundation, but these new features of our built environment are as important to our energy future as any piece of high tech public-serving infrastructure.

The proposal does three basic things:

- It adds three line items to Table 1604.5 for two categories of BESS and for their support structures: one item for "ancillary" BESS, paired or co-located with a generator; one for standalone BESS facilities; and one for the support or shelter structures that go with either of the first two.
- It assigns large-scale BESS to Risk Category IV as essential facilities and as structures where loss of function would represent a substantial hazard.
- It allows an alternative means of maintaining BESS' essential functionality through planning, recognizing the interconnectedness and redundancy of large, networked energy grids. This is consistent in principle with footnote b to the current Table 1604.5.

The proposal derives from the following three points. (Details and supplemental information on each of these points is available in the "BESS" pdf in the "2027 I-codes Bonowitz" dropbox link):
https://www.dropbox.com/scl/fo/bsmcosw9sr4bgrxapeg8h/AB5Y1Wb8KbMpz2BUhmPpAT4?rlkey=mj232e5p1nmnpfrqgrw7apd29&dl=0.)

1. Current Table 1604.5 does not give clear guidance about BESS, so current practice is inconsistent. Consider current Table 1604.5:

- BESS is definitely energy infrastructure, but it's not a "power-generating station." It's also not power transmission and distribution, which is explicitly outside the scope of some IBC provisions, including Sec 1613.

- Some BESS (usually on-site) provides direct “emergency backup” to distinct Risk Category IV facilities, in which case it should be clearly designed as RC IV. BESS that supports the grid might indirectly support RC IV facilities in the community, but for these cases, Table 1604.5 is unclear, since off-site BESS is not obviously “required for emergency response.” Even where BESS is meant to assist the “black start” of a downed power station, not all power stations are public utilities currently assigned to RC IV.
- Some BESS facilities are owned, operated, or co-located with a public utility, but many are not.
- Depending on the battery type, BESS can involve toxic or hazardous materials, but not always at RC III or IV levels. Even so, IFC provisions for energy storage focus on fire safety and hazmat containment, not on structural performance or functionality.

Thus, the derivation of proper design criteria, which depends on the Risk Category assignment, is prone to inconsistency. Our review of seven recent BESS installations in California found three that designed for RC IV, each co-located with a gas peaker plant; two assigned to RC III, but using different importance factors; one assigned to RC II; and one that did not report a risk category but used an importance factor of 1.0. (Kimball, 2024). The cases we reviewed were all designed with the 2019 or 2022 *California Building Code*, neither of which included the 2024 IBC’s new provision assigning public utility power generation to RC IV. (For details, see the file at the dropbox link above.)

As new, specialized buildings and structures become common within the built environment, or where the code’s broad categories need more nuance, it is entirely appropriate to add new line items to Table 1604.5. New items have been added, split, and moved in each of the last two code cycles.

Beyond Section 1604.5, I-codes provisions for energy storage systems are found primarily in IFC Section 1207 and IECC Appendix CJ, but those provisions are primarily for “behind-the-meter” systems at residential or commercial scale (discussed in point 2), and they focus primarily on fire and hazmat safety, not on loss of function due to damage from environmental loads. For example, 2024 IFC Section 1207.4.4, regarding seismic and structural design, says only, “Stationary ESS shall comply with the seismic design requirements in Chapter 16 of the *International Building Code*, and shall not exceed the floor loading limitation of the building.”

2. BESS installations have various characteristics and functions, some of which deserve special attention in the code.

BESS facilities can serve multiple functions; typically, the different functions are related to the facility’s size and ownership. (See the examples in photos below.)

Residential and commercial scale BESS are relatively small (storing around 10 kWh for residential, up to about 8 MWh for large commercial) and “behind the meter,” or dedicated to just one or a few buildings. They mostly provide backup power, performing the same role as a traditional battery rack, but they have become more common as a means of managing a facility’s rooftop solar output, allowing energy to be stored during the day and discharged at night. Because of their size and use by specific consumers, residential and commercial-scale BESS are NOT the subject of this proposal.

Large-scale BESS, also called grid-scale or utility-scale, is the subject of this proposal. A large-scale BESS facility is a grouping of modular BESS containers or frames covering an area from a few thousand square feet to several acres. A large-scale BESS facility can store and discharge tens or hundreds of MWh of energy.

The large-scale BESS of interest here are “front of the meter” and have a larger role to play with respect to the regional electricity grid or a community’s micro-grid. Large-scale BESS can be stand-alone facilities connected to the grid, or they can be linked directly, i.e. co-located with, a power generator itself. Over the last few years, the combination of “solar + storage,” meaning a large PV farm combined with a yard of BESS containers and inverters, has become a common project type for independent power producers (IPPs), who then sell the power they generate and store to public utilities, municipal utilities (cities and towns), and sometimes to especially large private power consumers (though customers can switch from private to public and back over time).

Where BESS is part of a larger electricity grid, it has a broader role and importance, beyond merely providing backup power – whether or not the BESS facility or its co-located generator is regulated as a public utility. This is discussed in point 3.

Thus, BESS installations can be categorized by their ownership, by their consumers, by how they are connected to power generators, by their capacity, or in other ways. Current Table 1604.5 distinguishes between power generators that are or are not regulated as public utilities. This distinction indicates a heightened importance for power delivered to and consumed by the general public. But the energy market is far more complex now than it was when the IBC first used the term “public utility.” Now, utilities of many types and sizes can be connected to each other in a variety of ways that change over time (independent BESS facilities can be both energy customers and providers), and in which new technologies at new scales, such as large-scale BESS, can create interdependencies that require designation primarily by size and metering. (EIA stats, 2022; Colthorpe, 2022)

In other words, the importance of reliable power for the general public is now indicated more by the capacity and grid connectivity of generators and BESS, not by public utility status. Therefore, this proposal makes distinctions by BESS size, with an exception that recognizes a well-planned whole-grid response to an unexpected outage.

How large is large? Nearly every week now brings reports of a new large-scale BESS facility that can store 10, 20, 50, or more MW of power, though only the largest ones usually make the news. Some precedents are worth considering.

- The Department of Energy’s (DOE) U.S. Energy Information Administration (EIA) defines “large-scale solar” as “solar thermal and photovoltaic generating units at power plants larger than or equal to one megawatt” (EIA, 2024). DOE also uses this threshold in its study of siting issues for PV installations (DOE, 2025). A 1 MW solar power plant typically covers 5 to 10 acres and can power 100 to 200 homes (SEIA, 2024). Typically, a BESS co-located with a generator would discharge the full generator capacity over about four hours (consistent with IECC Section CJ101.1.1), so at this scale, the BESS would have a capacity of 1 MW or 4 MWh.

- The Federal Energy Regulatory Commission (FERC, an independent agency within DOE) sets different rules for generators of different sizes, drawing a line at 20 MW capacity (FERC, 2024b). The associated BESS would have a capacity of about 80 MWh.
- FERC also sets certain fees based on generator size, drawing lines at 20 MW, 80 MW, and 200 MW. Regional system operators are sometimes allowed to modify these rules; Southwest Power Pool, for example, draws lines at 2 MW, 20 MW, and 75 MW. (FERC, 2024a)
- The benchmark cost study by DOE's National Renewable Energy Laboratory (NREL), cited in our cost impact statement below, assumes a BESS facility of 60 MW or 240 MWh (NREL, 2024).
- While all public utility generators are assigned to RC IV, current Table 1604.5 assigns other generators to RC III if they have a capacity of 75 MW or more (though it dubiously associates that threshold with individual power "units," a separate issue).

These precedents are useful in drawing the kinds of lines the building code needs to draw. Here, there are obvious precedents at 20 MW and 75 MW. The DOE definition set at 1 MW is probably too low to reflect the code's emphasis on public risk. But 75 MW is probably too high, as it would miss an enormous portion of public-serving BESS. In 2019, more than half of solar PV plants in the U.S. were rated between 20 and 75 MW (NERC, 2019). Further, there is evidence that the 75 MW precedent has already influenced how independent power providers plan their facilities (Ludt, 2023; Misbrener, 2025). Therefore, based on these precedents, this proposal draws a line at 20 MW for the capacity of a plant at which the BESS is co-located, or 80 MWh for a stand-alone BESS.

This proposed threshold – 20 MW or 80 MWh – already represents a fairly large BESS facility. For example:

- In 2022, a large PV plant in Florida, built in 2019, added an 18 MW co-located BESS facility (Weaver, 2024), so if built under this proposal, it would still be below the RC IV level.
- The largest "second life" BESS facility in the world, co-located with a wind farm in Texas, has a capacity of 53 MWh, below the proposed RC IV level (Spector, 2024a).
- Microgrids, which DOE calls "essential building blocks" of a strong energy system, will often use BESS below the proposed RC IV level (Sisson, 2024). A microgrid for the 535 residents of Hot Springs, NC provides only 4.4 MWh of backup energy but is sufficient for their needs and helped with recovery after Hurricane Helene (St. John, 2024).
- Rural coops often develop BESS facilities that would fall under the proposed RC IV level. The largest coop in Minnesota is using a federal grant to develop renewable energy and is still planning only a 20 MW BESS (Fischer, 2024).
- A 25 MW (100 MWh) BESS announced last year – thus just over the proposed RC IV level – would be "the largest standalone battery project to date in the Pacific Northwest" (Gerke, 2024).
- A 30 MW BESS in Escondido, CA was "the largest of its kind" when it was built in 2017 (Elmer, 2024).

By comparison, if we were to draw a line at 75 MW (300 MWh), this proposal would apply only to BESS big enough to support a solar plant that covers a full square mile (Electrify America, 2023) or a wind farm with at least 30 large turbines (Certrec, 2025).

3. Large-scale BESS merits assignment to Risk Category IV.

As backup power

. As backup power for a community (or for the community's power provider), large-scale BESS already qualifies for RC IV status because its loss could represent a substantial hazard to users. In addition to meeting energy demands at peak times, BESS "can supply backup power during natural disasters and other emergencies" (NFPA, 2024). Heat is a growing threat nationwide, and an extremely effective solution, air conditioning, requires power. But extreme heat can also cause power outages or require rolling blackouts. BESS helps solve that problem (Spector, 2024b), as long as the BESS components themselves are not knocked out by earthquake or hurricane.

SEIA, the leading trade organization for the solar power industry, recognized the growing importance of BESS to public health and safety in testimony in the last code cycle: "[T]he addition of Energy Storage Systems (ESS) is changing" the degree to which power outages can "cause substantial economic losses and disruption to civilian life." "[W]ith increasing adoption of Energy Storage Systems (ESS), it is conceivable that PV paired with ESS could be a sole source of required backup power. Where PV plus ESS is the only direct source of backup power for an essential services facility [which, with the 2024 IBC, now includes any public utility power provider] ... it shall be assigned as Risk Category IV" (SEIA, 2022).

Backup power provided directly to other RC IV facilities is already assigned to RC IV. To the extent that a BESS installation also provides backup power to the grid, which then serves various RC IV facilities, it should also be considered RC IV. Further, even for uses that are *not* assigned to RC IV, such as housing for vulnerable populations, community-supporting businesses, etc., a prolonged power outage with no backup absolutely represents a substantial hazard to users. If a BESS facility is planned with the goal of providing backup power, then its design criteria, including its risk category assignment, should be suited to that plan.

As grid stabilization and to enable the growth of renewable energy.

Large-scale BESS is more than just backup power. Increasingly, large-scale BESS facilities are being developed to help manage and stabilize the grid itself, as well as the demand and price of the energy it delivers. From this perspective, BESS is (or soon will be) as essential to the overall functioning of a local, regional, or even national grid as a thermostat, pressure release valve, warning system, or auto-shutoff is to an expensive and essential piece of mechanical or electrical equipment.

BESS is particularly important for reaching the full potential of renewable energy sources such as wind and solar. Because these sources are intermittent, and because the demand for power varies throughout the day, wind and solar power generators cannot match demand on their own. They can even *over*-generate, leading to grid volatility and requiring generation to be "curtailed" temporarily. For this reason, the output of large wind and solar generators is typically coordinated with that of a traditional fossil fuel power plant. As we wean ourselves from fossil fuels and come to rely more on renewables, the problem of capacity being out of sync with demand becomes ever more pronounced; the graphic representation of this discrepancy is often called the "duck curve" (because it resembles a duck).

The duck curve is a problem for renewables. But BESS is expected to solve much of it, effectively flattening the duck curve (DOE, 2017; DOE, 2023; SEAM, 2025). As DOE noted eight years ago, "solar coupled with storage technologies could alleviate, and possibly eliminate, the risk of over-generation" (DOE, 2017).

NFPA (2024) is even clearer, noting that the need for storage should also motivate changes in how we design generation and BESS facilities: "Growing concerns about the use of fossil fuels and greater demand for a cleaner, more efficient, and more resilient energy grid has led to the use of energy storage systems, and that use has increased substantially over the past decade. ... However, the rise in the number of [BESS] installations requires the need for a heightened understanding of the hazards involved and more extensive measures to reduce the risks."

Thus, if we want to transition more fully away from fossil fuels, we will need more renewable power generators like wind and solar. But to make those intermittent sources work at large scale, we will need more large-scale BESS just to make the grid function.

To summarize: Large-scale BESS is a relatively new, but increasingly common and increasingly important, addition to the built environment throughout the country, but it is not clearly addressed in the building code. Considering its importance as both backup power and the future of a renewable energy system, large-scale BESS installations should be considered essential facilities and assigned to Risk Category IV.

Finally, we anticipate the opposition of the energy industry – and, it must be said, of industry's well-intentioned cheerleaders in government, who are too slow to get in front of this wave of development already affecting city councils, land use committees, and building officials across the country.

Argument 1: How do we know the benefits exceed the costs?

It's true, we have not produced a comprehensive benefit-cost analysis for this relatively simple proposal. However:

- Practically all of the policy judgments inherent in risk category assignment are just that – judgments, made by the good faith consensus of building officials and stakeholders in the interest of the public. Practically none of the current risk category assignments came into the code with a comprehensive benefit-cost analysis, nor should that be necessary.
- Lack of a comprehensive BCA has not stopped enlightened utilities from voluntarily using RC IV criteria even though the current code is silent (Kimball, 2024). Nor has it stopped the State of Florida, which routinely applies RC IV wind loads – a decision that served it well when its solar facilities recovered quickly after recent hurricanes and even a direct hit from a tornado (Byrd, 2024; Weaver, 2024).
- Even if we wanted to produce a BCA, a DOE-funded study has shown that estimating the benefits of proposed changes to energy infrastructure design is practically impossible (Sanstad et al., 2020).
- If the benefits are hard to quantify, however, the question is largely moot if the cost is extremely low, which it is. As we show in our cost impact statement, the construction cost premium relative to RC II is definitely less than 1% and probably much closer to 0.3%.
- Further, the cost of BESS installation has dropped so much over the last several years (and is projected to continue dropping), that any cost premium due to this proposal is already paid for many times over by savings elsewhere. The price of battery packs (by far the most costly BESS component) dropped over 80 percent from 2013 to 2023, and fell another 20 percent relative to the 2023 price in 2024 alone (Bloomberg, 2024). Overall capital expenditure costs for BESS installations are projected to fall 18 percent between 2025 and 2030 (NREL, 2024).

Argument 2: Any *perceived* increase in cost or disruption to the status quo will stop developers from entering the BESS market.

With respect, this is laughable, given the explosive growth in BESS, both standalone and in "solar + storage" developments. California and Texas are actively encouraging BESS development (even if they have different objectives and are largely silent with respect to design criteria and natural hazards). (ERCOT, 2023; CPUC, 2024).

This trend was foreseeable even five years ago, before any federal or state agencies stepped in: "The electric power grid in North America is undergoing a significant transformation in technology, design, control, planning, and operation, and these changes are occurring more rapidly than ever before" (NERC, 2019). With respect to BESS in particular: "U.S. battery storage capacity will increase significantly by 2025. ... Battery storage capacity in the United States was negligible prior to 2020, when electricity storage capacity began growing rapidly. As of October 2022, 7.8 GW of utility-scale battery storage was operating in the United States; developers and power plant operators expect to be using 1.4 GW more battery capacity by the end of the year. From 2023 to 2025, they expect to add another 20.8 GW of battery storage capacity." (EIA, 2022) This pattern is effectively visualized by Cleveland and Ni (2023): https://visualizingenergy.org/watch-the-history-of-battery-storage-in-the-united-states/

Further, all this growth in renewables has happened despite hurdles thrown up by local regulations, not the building code, related to noise, fire safety, loss of agricultural land, planning and zoning, etc. – hurdles fought and overcome by developers and their expensive lawyers. So a new code provision that costs almost nothing and is already satisfied in many cases is hardly likely to stop this train.

Even if one suspects that the recent growth was only possible with heavy state and federal subsidies, the attitude of the incoming administration, which derides renewable energy at every opportunity, is actually another reason to ramp up design criteria. If subsidies for new installations dry up, so will funds to quickly repair any facilities that happen to be damaged in the near future. If no repair funds are coming, the best strategy is stronger design for those facilities now in the pipeline. (Surprisingly, it's even possible that some in industry are over-relying on government, i.e. all of us, to bail them out when their under-designed products fail. One expert we consulted actually voiced potential opposition to this proposal by saying that they didn't want to require seismic certification testing because the BESS components might fail the test. Let that sink in.)

Bottom line: If this proposal is approved, and BESS development slows down as a result between now and 2030, I will personally propose to undo the proposal for the 2033 code.

<u>Argument 3: Actual power loss from BESS failure can't happen because of grid redundancy.</u>

This is a fair argument about the complex interconnectedness of the electricity grid, something the building code does not account for – or it would be if there were any plans published that explicitly discussed applicable building code provisions, the likelihood of failures, and how the current grid will respond, given how much BESS capacity is newly in place.

Even so, the proposed Exception to Section 1604.5 is meant to acknowledge these circumstances and provide relief to BESS developers who really want to avoid the 0.3% cost premium and the potential damage reduction benefits it buys. Bring your plan – presumably one produced or at least adopted by DOE, FERC, NERC, or your state's PUC, PSC, ISO, or RTO, or even your city's resilience officer or recovery planner – to the building official, and you may design using RC II criteria.

The proposed exception is consistent in principle with footnote b to current Table 1604.5, which allows a lower risk category assignment for certain hazardous materials if an assessment in accordance with ASCE 7 Section 1.5.3 indicates a low risk. The exception proposed here might read as qualitative and open to judgment, but so is ASCE 7 Section 1.5.3.

<u>Argument 4: Even if power loss occurs due to BESS failure, it's not important except for "essential facilities" like hospitals, and they're already assigned to RC IV.</u>

First, this ignores the importance of BESS to an electricity grid that relies on renewable energy sources, an importance recognized by DOE (2017; 2023) and discussed at point 3 above.

Second, even if BESS is primarily about backup power, this attitude represents obsolete thinking about what counts as important, and the role of electric power in restoring normalcy after a damaging event. This attitude effectively says that providing power to your house, your office, your grocery store, you child's school, or your mom's care facility isn't really important. Even if the code does not yet recognize any of those buildings and uses as needing RC IV design criteria, it can still be true that the chief obstacle to their recovery should not be in the power or water service over which they have no control. The electricity grid, with BESS as a critical piece, is still essential to "non-essential" buildings.

A BESS developer, engineer, building official, or recovery planner who does not see the facility as essential is effectively rationalizing its failure by saying at least one of the following:

- The only things that are truly essential are the emergency response and public safety services that have always been assigned to RC IV.
- The failed BESS facility actually performed exactly as expected, incurring substantial damage in a design-level event.
- Repair of this $50-million BESS facility will take weeks and a lot of money (including more tax dollars) because we didn't think it was worth using a slightly bigger $5 rod anchor.

In summary, this proposal comes as close as any to embodying the proverb, "For want of a nail."

Terminology

This proposal uses terminology with precedents in industry publications, the I-codes (especially the IFC), and the Department of Energy's U.S. Energy Information Administration glossary (EIA, 2025).

Battery energy storage system(s), or BESS, has emerged as an industry standard term. It is not yet explicitly defined by the I-codes, but a number of related terms are, and BESS is indirectly defined by them. The following related terms are already defined:

- IFC: "**Battery system, stationary storage.** A rechargeable energy storage system consisting of electrochemical storage batteries, battery chargers, controls and associated electrical equipment designed to provide electrical power to a building. The system is typically used to provide standby or emergency power, an uninterruptible power supply, load shedding, load sharing or similar capabilities."
- IECC, IFC: "**Energy storage system (ESS).** One or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time."
- IBC, IFC: "**Energy storage system, electrochemical.** An energy storage system that stores energy and produced electricity using chemical reactions. It includes, among others, **battery ESS** and capacitor ESS."

By using "battery," as opposed to just ESS, the proposal distinguishes its scope from capacitor ESS (per the definition of electrochemical ESS above) and from other ESS such as pumped hydro or compressed air. The IFC also defines several "battery types," but the proposal would apply to all types, including some newer types (e.g. sodium-ion or iron-air) not yet defined in the IFC.

Ancillary services is an industry standard term defined by EIA (2025): "Services that ensure reliability and support the transmission of electricity from generation sites to customer loads. Such services may include load regulation, spinning reserve, non-spinning reserve, replacement reserve, and voltage support." By providing load regulation, BESS provides an ancillary service when paired with or co-located with a power generator.

Power plant is used in the following EIA definitions:

- **Electric power plant:** A station containing prime movers, electric generators, and auxiliary equipment for converting mechanical, chemical, and/or fission energy into electric energy.
- **Large-scale solar:** Solar thermal and photovoltaic generating units at power plants larger than or equal to one megawatt.

Power-generating station is not defined in the I-codes, but it has been used in Table 1604.5 since the 2003 edition.

Facilities providing power generation (that is, a power generation facility) was used in a change made to the 2024 code to replace the undefined "station" with the broader (and defined) "facility."

Total energy capable of being stored is borrowed from IFC Table 1207.1.3, where it is used specifically to denote the capacity of energy storage systems. Other relevant I-code precedents that might apply to BESS capacity or size come from IECC Appendix CJ, which uses, but does not define, the terms "energy capacity" (in kW or MW) and "power capacity" (in kWh or MWh). The EIA glossary contains several terms that define or use capacity in various ways.

The various BESS components, supports, and shelters listed in the third proposed new RC IV line item reference, and are generally consistent with, terms defined or cited in IFC Section 1207:

- **"Energy storage system, walk-in unit.** A prefabricated building that contains energy storage systems. It includes doors that provide walk-in access for personnel to maintain, test and service the equipment, and is typically used in outdoor and mobile ESS applications."
- **"Energy storage system cabinet.** An enclosure containing an energy storage system and meeting the applicable requirements of the listing for the system. Personnel are not able to enter the enclosure other than reaching in to access components for maintenance purposes."
- **"Equipment platform.** An unoccupied, elevated platform used exclusively for mechanical systems or industrial process equipment, including the associated elevated walkways, stairways, alternating tread devices and ladders necessary to access the platform (see Section 505.3 of the International Building Code)."

IFC Sections 1207.7.1 and 1207.7.2 provide requirements for "dedicated-use buildings" and "nondedicated-use buildings" that house BESS. Per Section 1207.7.1, a dedicated-use building is effectively defined as one used exclusively for "ESS, electrical energy generation and other electrical grid-related operations."

Representative BESS examples

The following photographs (sources credited as shown) offer representative examples of BESS installations of different scales. They are provided as background reference for readers not familiar with BESS. Nothing in this proposal, including the reason statement and cost impact data, is necessarily meant to apply to any of the specific cases shown.

<table>
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Residential-scale

https://www.wsj.com/articles/your-next-home-could-run-on-batteries-1508065205

Typically "behind the meter" (owned and used by a single- or multi-unit building to manage that building's supply and costs) and installed on or within the building.

These are *not* the focus of this proposal, and their capacities are well under the threshold capacities proposed for assignment to RC IV.

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Facility- or Commercial-scale

https://insideclimatenews.org/news/19052022/inside-clean-energy-flow-battery/

Also "behind the meter," but typically for a commercial or institutional facility. Often installed on site but in a separate cabinet or enclosure similar to a shipping container. The enclosure is not part of the BESS, but the performance of the BESS and the performance of its container or enclosure are clearly linked.

These are *not* the focus of this proposal, and their capacities are well under the threshold capacities proposed for assignment to RC IV.

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Large-scale (also called Grid-scale or Utility-scale)

Note the variety of facility sizes and types, one- and two-tiered configurations, foundation conditions, outdoor and indoor facilities, etc.

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A 20 MW BESS installation in New York State. Inverters in the foreground, batteries in the background.

https://www.renewableenergyworld.com/storage/evlo-vermont-utilities-team-up-on-unique-bess/

Installation of BESS containers for a 3MW (12MWh) facility in Vermont. Note the isolated footings.

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Cost Impact: Increase

Estimated Immediate Cost Impact:

Where BESS is already assigned to RC IV, there will be no cost impact.
Where BESS is already conservatively designed to facilitate use at multiple locations subject to a range of wind and earthquake loads, there will be no construction cost impact in many cases, but there could be a one-time design cost (by the manufacturer or vendor) of $30,000 for seismic certification testing of each active component, but this would only apply to installations in locations of moderate or high seismicity, and only where the specific components have not been certified previously.

In other cases, accounting for worst case changes in wind and earthquake loads, inclusion of tornado loads (which only apply to RC III and RC IV), and inclusion of seismic certification, and with additional conservative assumptions and rounding up, assignment to RC IV might raise the cost of BESS development just 0.9% (from $1907/kW to $1924/kW using the NREL benchmark).

More reasonable, but still conservative assumptions (a structural factor of 1.5, indirect cost factors of 1.0, and no seismic testing) would raise the cost only 0.3%.

The NREL (2024) cost data on which this assessment is based do not include the substantial cost of land acquisition or of ongoing operations and maintenance. If those were included in the baseline RC II cost, the impact of a change to RC IV would be even smaller.

Estimated Immediate Cost Impact Justification (methodology and variables):

Cost impacts reflect four main design changes that would apply if a BESS that might otherwise be assigned to RC II is instead required to use design criteria for RC IV:

- Higher earthquake loads, and fewer exemptions for nonstructural protection
- Inclusion of seismic certification testing costs
- Higher straight line wind loads
- Inclusion of tornado loads (which apply only in RC III and RC IV)

Factors for each of these effects were derived for different regions of the U.S. (because no one place has worst-case wind, and seismic, and tornado) through a comprehensive review of current IBC and ASCE 7 provisions for structural design, non-building structure design, and nonstructural component protection. (Details are provided in the supplemental materials available at the dropbox link given above.) Overall, the changes result in a design increase factor of 1.2 to 1.5, plus a cost for seismic certification. These were then *very conservatively* translated into a direct cost increase factors of 2.0 on the structural portion of the BESS benchmark construction cost (NREL, 2024). The NREL benchmark costs were the latest available, reflecting 2023 data, for a BESS system of 60 MW (or 240 MWh) capacity, for which the total cost is $1,907 per kW (or $477/kWh).

In the NREL benchmark, "Structural Balance of System" includes every design and construction hard cost (engineering, foundation, anchorage, etc.), and its total cost is $11/kW, or just 0.6% of the total benchmark cost. We factored this up by the conservative RC IV premium factor of 2.0. Other benchmark costs (taxes, profit, overhead, etc.) are based on the total hard cost, so those were also factored up by the Structural BOS portion with a conservative factor of 1.01. With each benchmark line item thus factored, and a cost for seismic certification added, the total cost increased from $1,907/kW to $1,924/kW.

S56-25

IBC: TABLE 1604.5

Proponents: David Bonowitz, representing David Bonowitz, S.E. (dbonowitz@att.net)

2024 International Building Code

Revise as follows:

TABLE 1604.5 RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES

RISK CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities.
II	Buildings and other structures except those listed in Risk Categories I, III and IV.

III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to:
	• Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300.
	• Buildings and other structures containing one or more public assembly spaces, each having an occupant load greater than 300 and a cumulative occupant load of these public assembly spaces of greater than 2,500.
	• Buildings and other structures containing Group E or Group I-4 occupancies or combination thereof, with an occupant load greater than 250.
	• Buildings and other structures containing educational occupancies for students above the 12th grade with an occupant load greater than 500.
	• Group I-3, Condition 1 occupancies.
	• Any other occupancy with an occupant load greater than 5,000.[a]
	• Power-generating stations with individual power units rated 75 MW_{AC} (megawatts, alternating current) or greater, water treatment facilities for potable water, wastewater treatment facilities and other public utility facilities not included in Risk Category IV.
	• Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that:
	  • Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the *International Fire Code* ; and
	  • Are sufficient to pose a threat to the public if released.[b]

IV	Buildings and other structures designated as essential facilities and buildings where loss of function represents a substantial hazard to occupants or users, including but not limited to:
	Group I-1, Condition 2 occupancies
	• Group I-2 occupancies.
	• Ambulatory care facilities having emergency surgery or emergency treatment facilities.
	• Group I-3 occupancies other than Condition 1.
	• Fire, rescue, ambulance and police stations and emergency vehicle garages
	• Designated earthquake, hurricane or other emergency shelters.
	• Designated emergency preparedness, communications and operations centers and other facilities required for emergency response.
	• Public utility facilities providing power generation, potable water treatment, or wastewater treatment.
	• Power-generating stations and other public utility facilities required as emergency backup facilities for *Risk Category* IV structures.
	• Buildings and other structures containing quantities of highly toxic materials that:
	  • Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the *International Fire Code* ; and
	  • Are sufficient to pose a threat to the public if released.[b]
	• Aviation control towers, air traffic control centers and emergency aircraft hangars.
	• Buildings and other structures having critical national defense functions.
	• Water storage facilities and pump structures required to maintain water pressure for fire suppression.

a. For purposes of occupant load calculation, occupancies required by Table 1004.5 to use *gross floor area* calculations shall be permitted to use *net floor areas* to determine the total occupant load. The floor area for vehicular drive aisles shall be permitted to be excluded in the determination of net floor area in parking garages.

b. Where approved by the building official, the classification of buildings and other structures as Risk Category III or IV based on their quantities of toxic, highly toxic or explosive materials is permitted to be reduced to Risk Category II, provided that it can be demonstrated by a hazard assessment in accordance with Section 1.5.3 of ASCE 7 that a release of the toxic, highly toxic or explosive materials is not sufficient to pose a threat to the public.

Reason: Group I-1 Condition 2 facilities are large facilities specially designed for people who need help with everyday tasks (*custodial care*), and even need help evacuating in an emergency (*limited verbal or physical assistance*). Because of the residents' special needs, expected structural damage to one of these buildings will almost certainly lead to a "loss of function [that] represents a substantial hazard," requiring these buildings to be assigned to Risk Category IV.

With the current code, Chapter 4 requires these buildings to have special design features suited to the residents' disabilities. But Chapter 16 assigns them to Risk Category II, just like any market-rate housing, just like any house, condo, or apartment building. Further, because Group I-1 is currently assigned to RC II, it means that even a highly deficient existing building (like an old apartment building) can be converted to one of these facilities with essentially no structural review. This is more of a concern than in the past, as housing shortages throughout the country have led to calls for "adaptive reuse" of market housing, hotels, motels, and even office buildings into Group I-1 care facilities, and in some cases the shortage is acute enough that proponents are willing to overlook existing deficiencies (SFBOS, 2023). The answer is not to look the other way, but to discourage the conversion of deficient buildings unless they're retrofitted and to ensure that new buildings are given as much thought in Chapter 16 as they are in Chapter 4. This proposal does both.

Under current code, if a Group I-1 Condition 2 building is damaged in a design-level hurricane or earthquake – as we structural engineers expect – these vulnerable residents will have nowhere to go that can provide the design features and expert staff care they need.

Instead, assigning these buildings to RC IV will ensure, at minimal additional cost (see below):

- A stronger, more damage-resistant lateral system, and much higher likelihood of immediate reoccupancy
- More complete protection for nonstructural components and systems, including the special conditions and systems required of Group I-1 Condition 2 buildings but not found in normal multi-unit housing.
- Backup utilities, including backup power so necessary for protecting vulnerable seniors against life-threatening power outages.

We know from experience that while developers (or private equity buyers) could provide these RC IV features voluntarily, they won't. On the contrary, assisted living, senior housing, and memory care facilities, all of which could be Group I-1 Condition 2, are a growth industry, and many developers are looking to provide nothing more than what the code requires.

Private equity is increasingly buying and building assisted living (I-1) and nursing home (I-2) facilities (MEDPAC, 2021; Senate Budget Committee, 2025). Nursing homes and assisted living facilities are especially vulnerable to these new market conditions: "The past two decades have seen a rapid increase in Private Equity (PE) investment in healthcare, a sector in which intensive government subsidy and market frictions could lead high-powered **for-profit incentives to be misaligned with the social goal of affordable, quality care**. ... PE's success in other sectors may not be relevant to healthcare, which suffers from unique market frictions. For example, patients cannot accurately assess provider quality, they typically do not pay for services directly, and a web of government agencies act as both payers and regulators (Cutler, 2011; Skinner, 2011). **These features weaken the natural ability of a market to align firm incentives with consumer welfare and could mean that high-powered incentives to maximize profits have detrimental implications for consumer welfare** (Hansmann, 1980; Hart et al., 1997; Chandra et al., 2016)." (Gupta et al., 2021, emphasis added)

If the owners of these vital facilities are now more willing than ever to cut costs, cut care, and walk away from losses – at the direct expense of the vulnerable occupants and at the indirect expense of the community – the least the building code can do is ensure that a major earthquake, hurricane, or winter storm does not add to the problem by giving them yet another excuse. The building code provides essentially one tool to express the importance of natural hazard resistance and recovery through design, and that tool is assignment to Risk Category IV. While design for RC IV can be more expensive than design for RC II, the premium can be surprisingly low -- as little as 1%, or even less for some thoughtfully-designed facilities (see the Cost Impact and Justification statements). Just as important, the design requirements and the needs of tenants in Group I-1 Condition 2 facilities mean that the benefits of a RC IV design are even more likely to outweigh any additional costs. In addition to the normal benefits of reduced damage, which in turn reduces repair costs (which are also at a premium following a natural hazard event) and downtime operating losses, benefits for these special facilities would include reductions in the cost of relocating vulnerable tenants, the premium cost for suitable alternative space (which is rare), the premium cost for specialized staff, and any additional liability for losses by especially vulnerable tenant-clients.

As we consider what the appropriate performance ought to be for a large, new care facility, it might be useful to review actual performance from the last year or two. Consider these examples that demonstrate over and over the difficulty of finding appropriate buildings for care facilities and senior housing among the existing building stock, and the vulnerability that is sure to arise if we don't take the opportunity to make *new* care facilities more damage resistant:

- The country faces a potential "gray wave" of homeless seniors. The solution, of course, is to build more affordable housing, but "that housing will have to be accessible too. Older homeless peoples ... need homes they can safely navigate." (Bolton, 2024)
- If the code doesn't mandate better buildings, including appropriate fire safety for seniors and custodial care recipients, insurers will walk away. "Industry experts say increasing premiums are the result of greater weariness on the part of insurance carriers to take on what they consider to be riskier properties, especially as they also confront higher rebuilding costs, more frequent losses from natural disasters, and other challenges." (Baldassari, 2024)
- If landlords, tenants, city emergency planners, and code officials don't want to see more eviction bans, we need to be designing more damage-resistant housing. (Sisson, 2024)
- Risk Category IV ensures backup power, which might have prevented some deaths linked to power outages. "The deaths could have been caused by many dangers of power outages: people not being able to charge medical equipment, not being able to use air conditioning on hot days, or experiencing increased physical and mental stress and isolation of living without elevators or subways. ... Weather-related power outages are increasing, as climate change brings more frequent, more powerful storms that threaten our power grid and other physical infrastructure." (Siegel, 2012; NYC.gov, 2022)
- Relying on facilities to voluntarily provide backup power for vulnerable residents doesn't work, and state regulation varies considerably. "[W]hile nursing homes face such federal oversight, lower-care-level facilities that provide some medical care — known as assisted living — are regulated at the state level, so the rules for emergency preparedness vary widely. ... Maryland adopted rules for generators in assisted living facilities following Hurricane Isabel, which left more than 1.2 million residents in the state without power in 2003. Florida did so for nursing homes and assisted living facilities in 2018, after Hurricane Irma led to deaths at one facility. But Texas has not. And no requirements for generators exist in Texas for the roughly 2,000 assisted living facilities or the even less regulated independent living sites." (West, 2024)
- Texas will now require backup power, after unacceptable losses in recent years. "[D]uring Winter Storm Uri in February 2021, 10% of nursing homes and 33% of the assisted living facilities in Texas lost power. During Hurricane Beryl in July [2024], 14 nursing homes and 30 assisted living facilities lost power." (Dominguez, 2025)

I made a similar proposal last cycle (S77-22). This proposal has made changes in response to comments offered then. I also respond here to some misunderstandings voiced during last cycle's testimony.

- S77-22 was written to apply only where at least half the care recipients would qualify as Condition 2. That was consistent in concept with the exception in IEBC Sec 1002.3, which waives code upgrades when less than half of the building area is changed to Group I-1. But some felt that the proposal drew an unnecessary line, so I have removed it.
- Some felt that the proposal covered too many types of buildings, but I believe they were misled by the list of uses (mostly undefined) in IBC 308.2. In fact, both S77-22 and this proposal apply to just one type of facility – Condition 2 (Sec 308.2.2), where at least some residents need assistance with egress. ICC's Healthcare Committee already recognizes profound differences between Condition 1 and Condition 2, which is why IEBC Sec 1002.3 waives upgrade for a change from Condition 2 to Condition 1, but not the other way.
- Some were concerned that RC IV was too much to ask of a small care facility. In fact, this proposal only applies to the large care facilities in Group I-1. Smaller facilities are either Group R-3 or R-4 and would not be affected by this proposal.
- Some expressed concern about what would happen if an existing care recipient were to transition over time from Condition 1 to Condition 2, and the feasibility of enforcement. This is a good question, but it's a question for the IEBC, and the IEBC requirements for change of use within Group I-1 already present the same issues (e.g. IEBC Sec 1002.3). If a patient changes from Condition 1 to Condition 2, the IEBC already triggers compliance of egress, smoke and fire safety, room layouts, etc. to meet the IBC *as a new building*. That's already onerous enough to probably discourage the change – but again, that's an IEBC issue. Developers of new care facilities should definitely be thinking about these possibilities during design. This proposal does not change the designer's and developer's interest in looking forward to potential changes in their tenant-client base.

For reference:

Group I-1 Condition 2 buildings include ONLY:

- Buildings designed for more than 16 *custodial care* recipients, plus staff. (The same use with 1 to 5 residents is R-3, not I-1. The same use with 6 to 16 residents is R-4, not I-1.)
- Buildings where at least some of the care recipients require *limited verbal or physical assistance* to respond to an emergency. This is a lower level

of disability than being fully *incapable of self-preservation* (such I-2 facilities are already assigned to RC IV). But its design requirements are still different from even brand new market housing.

This proposal does NOT apply to R-3. Therefore, a converted dwelling or any small building converting to a care facility is not affected.

This proposal does NOT apply to R-4. Therefore, even a smaller care facility that needs flexibility as its residents' care needs change is not affected.

This proposal is only for large buildings intentionally and specifically designed as care facilities.

Compared with a normal R-2 multi-unit building (or even a similar but smaller R-4 care facility), the current code requires Group I-1 Condition 2 buildings to meet special requirements and limits regarding:

- IBC 420.6: Smoke barriers, with refuge areas and limits on smoke compartment size and maximum travel distance.
- IBC 420.7: Walls, ceilings, sprinklers, and space planning related to common areas and activity rooms.
- IBC 420.8: Kitchens and cooking areas.
- IBC 420.9: Kitchen appliances, regarding shutoffs, timers, etc. in shared cooking areas.

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Cost Impact: Increase

Estimated Immediate Cost Impact:

The initial construction cost premium to design for RC IV instead of RC II will vary significantly with the building location, size, architecture, and program. That said, premium is often surprisingly low, between 1% and 2%. Though rare, it can even be zero if the designer is thoughtful about structural system selection and nonstructural system detailing. (If the cost of land acquisition, operations, and maintenance are also considered, the construction cost premium would be even smaller relative to the total project long-term cost.)

For a new assisted living facility, assuming a construction cost between $272/sf and $444/sf (see Justification) and a conservative 1.5% cost premium, the immediate cost impact would range from $4.10/sf to $6.70/sf.

See the reason statement for a brief discussion of likely benefits that would offset any immediate construction cost premium.

Estimated Immediate Cost Impact Justification (methodology and variables):

The construction cost for a new assisted living facility is from Gaivin (2024), citing data from The Weitz Company. For a city index of 100, 2024 construction cost was expected to range from $272/sf to $347/sf for a "mid-level" building (wood-frame) and from $356/sf to $444/sf for a "high-level" building (steel or concrete).

The estimate of 1% to 2% is based on case studies of voluntary design of nominally RC II buildings for RC IV in regions of high seismicity: Almufti (2016), Bade (2014), Berkowitz (2021), Haselton et al. (2021), Lizundia (2021), Mar (2021), Moore (2021), SEFT (2015), Westermeyer (2021), and Zimmerman (2021).

This estimate stands to reason: Wind, snow, and earthquake loads can already vary significantly within a jurisdiction, but the building designs and unit costs don't change wildly from one side of the county to the other. For example, the seismic design force in Berkeley is about 1.5 times that in downtown San Francisco; so with respect to the structure, any care facility you can build as RC II in Berkeley you can also build as RC IV in San Francisco with no change to the design. The same is likely true for snow design, for example, in Vail v. Boulder and for wind design in Galveston v. the west side of Houston. On the nonstructural side, a facility's nonstructural systems might need more bracing or support when assigned to RC IV, but the number and size of the components themselves don't suddenly look

like a hospital just because the risk category has changed.

S57-25

IBC: 1604.5, TABLE 1604.5

Proponents: David Bonowitz, representing David Bonowitz, S.E. (dbonowitz@att.net)

2024 International Building Code

Revise as follows:

1604.5 Risk category. Each *building* and *structure* shall be assigned a *risk category* in accordance with Table 1604.5. Where a referenced standard specifies an occupancy category, the *risk category* shall not be taken as lower than the occupancy category specified therein. Where a referenced standard specifies that the assignment of a *risk category* be in accordance with ASCE 7, Table 1.5-1, Table 1604.5 shall be used in lieu of ASCE 7, Table 1.5-1.

Exceptions:

1. The assignment of *buildings* and *structures* to Tsunami *Risk Categories* III and IV is permitted to be in accordance with Section 6.4 of ASCE 7.
2. Freestanding parking garages not used for the storage of emergency services vehicles or not providing means of egress for *buildings* or *structures* assigned to a higher risk category shall be assigned to Risk Category II.
3. Power-generating facilities are permitted to be assigned to Risk Category II where the *owner* has submitted and the *building official* has approved a plan to provide an alternative equivalent source of energy to the same energy consumers within one hour of the facility's outage due to a design level wind, earthquake, snow, flood, or tornado event, considering the regional effects of any such event.

TABLE 1604.5 RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES

RISK CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities.
II	Buildings and other structures except those listed in Risk Categories I, III and IV.

III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to:
	• Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300.
	• Buildings and other structures containing one or more public assembly spaces, each having an occupant load greater than 300 and a cumulative occupant load of these public assembly spaces of greater than 2,500.
	• Buildings and other structures containing Group E or Group I-4 occupancies or combination thereof, with an occupant load greater than 250.
	• Buildings and other structures containing educational occupancies for students above the 12th grade with an occupant load greater than 500.
	• Group I-3, Condition 1 occupancies.
	• Any other occupancy with an occupant load greater than 5,000.[a]
	• ~~Power-generating stations with individual power units rated 75 MW_{AC} (megawatts, alternating current) or greater, water~~ Water treatment facilities for potable water, wastewater treatment facilities and other public utility facilities not included in Risk Category IV.
	• Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that:
	  • Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the *International Fire Code*; and
	  • Are sufficient to pose a threat to the public if released.[b]

RISK CATEGORY	NATURE OF OCCUPANCY
IV	Buildings and other structures designated as essential facilities and buildings or structures where loss of function represents a substantial hazard to occupants or users, including but not limited to:
	• Group I-2 occupancies.
	• Ambulatory care facilities having emergency surgery or emergency treatment facilities.
	• Group I-3 occupancies other than Condition 1.
	• Fire, rescue, ambulance and police stations and emergency vehicle garages
	• Designated earthquake, hurricane or other emergency shelters.
	• Designated emergency preparedness, communications and operations centers and other facilities required for emergency response.
	Power-generating facilities with total capacity of 20 MW_{AC} or greater.
	• Public utility facilities providing power generation, potable water treatment, or wastewater treatment.
	• Power-generating stations and other public utility facilities required as emergency backup facilities for *Risk Category* IV structures.
	• Buildings and other structures containing quantities of highly toxic materials that: • Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the *International Fire Code*; and • Are sufficient to pose a threat to the public if released.[b]
	• Aviation control towers, air traffic control centers and emergency aircraft hangars.
	• Buildings and other structures having critical national defense functions.
	• Water storage facilities and pump structures required to maintain water pressure for fire suppression.

a. For purposes of occupant load calculation, occupancies required by Table 1004.5 to use *gross floor area* calculations shall be permitted to use *net floor areas* to determine the total occupant load. The floor area for vehicular drive aisles shall be permitted to be excluded in the determination of net floor area in parking garages.

b. Where approved by the building official, the classification of buildings and other structures as Risk Category III or IV based on their quantities of toxic, highly toxic or explosive materials is permitted to be reduced to Risk Category II, provided that it can be demonstrated by a hazard assessment in accordance with Section 1.5.3 of ASCE 7 that a release of the toxic, highly toxic or explosive materials is not sufficient to pose a threat to the public.

Reason: No doubt some will open this proposal and immediately accuse me of trying to kill the wind and solar industries. Either that, or I am just too stupid for words.

But stay with me. What I'm trying to do is have a conversation about how we are going to ensure the fast recovery of electric power for the general public after a damaging natural hazard event, and the role of the building code and of building officials in doing so. In general, "grid reliability" is an increasingly complex issue, and there are lots of experts doing excellent, good-faith work on it, but they don't read our code, and we don't read their industry standards. But as long as the IBC is going to address "power-generating stations" or "public utilities" (and from what I've seen, it probably shouldn't any more), we need to get some consensus on what we expect this book to deliver.

Some recent history: Everyone agrees that a facility providing backup power to a RC IV building ought to be in RC IV too. That's flawed, but it's easy. Beyond that, the 2021 IBC had one important line about power in Table 1604.5: All other "power-generating stations" were assigned to RC III. No size limits, no distinctions by fuel source or ownership, just one broad rule. Basically it was the code saying "Electric power is important, so we want a little more strength in those structures, but not RC IV-level important."

Now, Section 1604.5 of the 2024 IBC reflects the results of three approved proposals from the last cycle:

- S76-22 (driven by me) said that power produced and delivered to the general public is so important during and after a hurricane, earthquake, or winter storm that the facilities who make and sell it -- presented as "public utility facilities providing power generation" -- need to be in RC IV. The wind and solar industry fought it, but ICC members approved it at every step.
- S81-22 (driven by the solar industry) laid out a set of requirements, now in 1604.5.2, for generally small PV installations (residential and commercial scale). But that general rule from the 2021 code about RC III? Forget it. Industry said "We don't care what the code says, we've been designing for RC II or even RC I for years, and we need the code to let us keep doing that." ICC members said ok.
- S79-22 (driven by the wind industry) said "We want/need to keep ignoring the code too." So at the Public Comment hearing they changed the RC III line to exempt all but the largest generators: 75 MW or bigger. Did any code official or building designer in the room know how big 75 MW is? I sure didn't (and I said so). Well, it turns out that the biggest wind turbine in the world is only 22 MW,

and most of the big on-shore ones are only 2 or 3 MW. So S79 effectively guarantees that no wind turbine will ever be assigned to RC III, meaning that every wind farm that isn't a public utility now defaults to RC II. 2021 IBC we hardly knew ye.

As I said, the energy industry doesn't read our code, so when shown the RC III provision from 2021, they just ignored it. (Interestingly, oil, gas, hydro, and nuclear reps didn't even come to the hearings. They *really* don't care what we do.)

And in all the discussion of those three proposals, nobody from industry came out and said that good performance and fast recovery after nat haz events is bad. They just weren't going to lift a finger to help get there. Solar had to acknowledge that wind actually does rip up solar farms, that FL has voluntarily implemented higher standards that work, that DOE has guidelines for high-wind installations, and that a couple of vendors are now specifically pushing high wind-resistant trackers. But actually require design for functionality and fast recovery? No way. And all Wind kept saying was that they've always done it their way and no turbine has ever had a foundation failure. What they failed to mention is that typical turbines today are twice as big as they were 20 years ago, so the track record for the new stuff is pretty short. Also, a slightly heftier foundation and tower would cost pennies compared with the high-tech nacelle and blades. But no, anything but RC II would kill renewables dead. Come on.

Anyway, here's where things stand:

- Pretty much all solar (unless public utility): RC II
- Pretty much all wind (unless public utility): RC II
- Oil, gas, nuclear, hydro (unless public utility?): RC III, I guess?
- Public utility generators: RC IV.

So at least the big installations, the public utility-owned generators, are designed for low damage and fast recovery. Right? Well, not really, because public utilities for electric power are not what they used to be. They're not even what they were three years ago when we used that term (which has been in Table 1604.5 since 2003) as a proxy for power that normal people and normal buildings use. Yes, the big investor-owned public utilities like PG&E, Duke Energy, and Con Edison are still around, but they all buy power from independent wind and solar providers, to the point where it's nearly impossible to say whether a new proposed wind or solar farm, no matter the size, is regulated as a public utility or not. I was a little naive on this point back in 2022, but in my defense, the web of relationships between the various players is WAY more complicated now, as construction of renewables (boosted even more by post-pandemic Fed subsidies) has really exploded.

Which leaves us with the question S76 was trying to answer: **How do we make sure that the most substantial power providers, the ones normal people absolutely rely on, are properly designing for wind, earthquake, snow, and flood?** (And we should probably throw in high heat, drought, and WUI fire too.)

From a building code perspective, we have a tested, if blunt, tool: Risk Category. Who cares how wind and solar did their work when they were little alternative sources. Now they're the big boys too, and we need them to see their own end product as important, even essential, as we do. It's not about selling panels or turbines, it's about delivering power and keeping the lights, the heat, the food cold chain, and the air conditioning on.

So that's the first part of this surprisingly serious proposal: Put any big power plant in RC IV. (And by the way, the cutoff should be 20 MW, not 75, and it should be based on the whole facility, not "individual power units." The key agencies, FERC and NERC, are actually pretty clear about those metrics.)

But won't that just rehash the arguments from last cycle? Yeah, but I'm acknowledging, as I did then, that their best argument against S76 was that the very nature of the grid provides redundancy and reliability already, so a power outage is not like a building collapse.

I get it, and I accept it, and that's **the second part of this proposal: RC II is fine if there's a real plan, grid-wide as needed, to shorten outages and help the community recover.**

Three years ago, wind and solar industry reps swore this was already doable. Ok, show us the plan. You (and DOE) have until 2028 when states start enforcing this next edition, to get it done.

(The alternative to all this, which maybe someone will propose as a floor mod: Strike all mention of power from Table 1604.5. The grid is not a building, and the building code is just not the right tool for that job.)

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposal is obviously not just editorial or a clarification, but with the proposed Exception, it provides a means for any power industry stakeholder to keep using RC II just as they're doing now, if they just have a plan to keep the energy flowing.

Staff Analysis: CC # S57-25 and CC # 58-25 addresses requirements in a different or contradicting manner. The committee is urged to make their intensions clear with their actions on these proposals.

S58-25

IBC: TABLE 1604.5

Proponents: Joseph H. Cain, P.E., representing Solar Energy Industries Association (SEIA) (joecainpe@gmail.com)

2024 International Building Code

Revise as follows:

TABLE 1604.5 RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES

RISK CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to:
	• Agricultural facilities.
	• Certain temporary facilities.
	• Minor storage facilities.
II	Buildings and other structures except those listed in Risk Categories I, III and IV.
III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to:
	• Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300.
	• Buildings and other structures containing one or more public assembly spaces, each having an occupant load greater than 300 and a cumulative occupant load of these public assembly spaces of greater than 2,500.
	• Buildings and other structures containing Group E or Group I-4 occupancies or combination thereof, with an occupant load greater than 250.
	• Buildings and other structures containing educational occupancies for students above the 12th grade with an occupant load greater than 500.
	• Group I-3, Condition 1 occupancies.
	• Any other occupancy with an occupant load greater than 5,000.[a]
	• Power-generating stations with individual power units rated 75 MW_{AC} (megawatts, alternating current) or greater, water treatment facilities for potable water, wastewater treatment facilities and other public utility facilities not included in Risk Category IV.
	• Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that:
	• Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the *International Fire Code* ; and
	• Are sufficient to pose a threat to the public if released.[b]
IV	Buildings and other structures designated as essential facilities and buildings where loss of function represents a substantial hazard to occupants or users, including but not limited to:
	• Group I-2 occupancies.
	• Ambulatory care facilities having emergency surgery or emergency treatment facilities.
	• Group I-3 occupancies other than Condition 1.
	• Fire, rescue, ambulance and police stations and emergency vehicle garages
	• Designated earthquake, hurricane or other emergency shelters.
	• Designated emergency preparedness, communications and operations centers and other facilities required for emergency response.
	• Public utility facilities providing power generation with individual power units rated 75 MW_{AC} (megawatts, alternating current) or greater, potable water treatment, or wastewater treatment.
	• Power-generating stations and other public utility facilities required as emergency backup facilities for *Risk Category* IV structures.
	• Buildings and other structures containing quantities of highly toxic materials that:
	• Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the *International Fire Code* ; and
	• Are sufficient to pose a threat to the public if released.[b]
	• Aviation control towers, air traffic control centers and emergency aircraft hangars.
	• Buildings and other structures having critical national defense functions.
	• Water storage facilities and pump structures required to maintain water pressure for fire suppression.

a. For purposes of occupant load calculation, occupancies required by Table 1004.5 to use *gross floor area* calculations shall be permitted to use *net floor areas* to determine the total occupant load. The floor area for vehicular drive aisles shall be permitted to be excluded in the determination of net floor area in parking garages.

b. Where approved by the building official, the classification of buildings and other structures as Risk Category III or IV based on their quantities of toxic, highly toxic or explosive materials is permitted to be reduced to Risk Category II, provided that it can be demonstrated by a hazard assessment in accordance with Section 1.5.3 of ASCE 7 that a release of the toxic, highly toxic or explosive materials is not sufficient to pose a threat to the public.

Reason: During the Public Comment Hearings for ICC Group B in 2022, Proposal S79-22 was Approved As Modified by Public Comment 1. This public comment created a threshold of 75 MW_{AC} or greater for power-generating stations in Risk Category III. This proposal seeks to include the same 75 MW_{AC} threshold in Risk Category IV as presently exists in 2024 IBC Table 1604.5 for Risk Category III.

The proponent offers the same reason statement for adding the threshold to RC IV as in the previous cycle for RC III, as in S79-22 Public Comment 1.

"ASCE 7-22 Section 15.5.4 states: “Electrical power-generating facilities are power plants that generate electricity by steam turbines, combustion turbines, diesel generators, or similar turbomachinery.” Commentary to Section 15.5.4 states: “Electrical power plants closely resemble building structures, and their performance in seismic events has been good.” It is clear that IBC Table 1604.5 and ASCE Section 15.5.4 were not written with renewable energy facilities in mind. The term "power generating station" is undefined and ambiguous in the 2021 IBC, and it has no threshold assigned to it. This PC seeks to establish a threshold on the term "power generating station" that is consistent with the original intent of the term in the IBC and in ASCE 7. Note 75 MWac is a better threshold than 100 MW for the smallest power-producing unit of a power generating station, as 75 MW is established in North American Electric Reliability Corporation Docket No. RR15-4-000, Order on Electric Reliability Organization Risk Based Registration Initiative and Requiring Compliance Filing (Issued March 19, 2015). The smallest power-producing unit of a renewable energy facility could be considered as one inverter, or could be one wind turbine."

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal only seeks to apply the same 75 MWAC threshold to Risk Category IV power generation as was approved for Risk Category III power generation.

Staff Analysis: CC # S58-25 and CC # 57-25 addresses requirements in a different or contradicting manner. The committee is urged to make their intensions clear with their actions on these proposals.

S59-25

IBC: TABLE 1604.5

Proponents: Jeff O'Neill, Chair, representing Committee on Healthcare (ahc@iccsafe.org)

2024 International Building Code

Revise as follows:

TABLE 1604.5 RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES

RISK CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities.
II	Buildings and other structures except those listed in Risk Categories I, III and IV.

III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to:
	• Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300.
	• Buildings and other structures containing one or more public assembly spaces, each having an occupant load greater than 300 and a cumulative occupant load of these public assembly spaces of greater than 2,500.
	• Buildings and other structures containing Group E or Group I-4 occupancies or combination thereof, with an occupant load greater than 250.
	• Buildings and other structures containing educational occupancies for students above the 12th grade with an occupant load greater than 500.
	• Group I-3, Condition 1 occupancies.
	Group I-2 Condition 1 occupancies with 50 or more care recipients
	• Any other occupancy with an occupant load greater than 5,000.[a]
	• Power-generating stations with individual power units rated 75 MW_{AC} (megawatts, alternating current) or greater, water treatment facilities for potable water, wastewater treatment facilities and other public utility facilities not included in Risk Category IV.
	• Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that:
	  • Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the *International Fire Code* ; and
	  • Are sufficient to pose a threat to the public if released.[b]

IV	Buildings and other structures designated as essential facilities and buildings where loss of function represents a substantial hazard to occupants or users, including but not limited to:
	• Group I-2, Condition 2 occupancies.
	• Ambulatory care facilities having emergency surgery or emergency treatment facilities.
	• Group I-3 occupancies other than Condition 1.
	• Fire, rescue, ambulance and police stations and emergency vehicle garages
	• Designated earthquake, hurricane or other emergency shelters.
	• Designated emergency preparedness, communications and operations centers and other facilities required for emergency response.
	• Public utility facilities providing power generation, potable water treatment, or wastewater treatment.
	• Power-generating stations and other public utility facilities required as emergency backup facilities for *Risk Category* IV structures.
	• Buildings and other structures containing quantities of highly toxic materials that:
	  • Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the *International Fire Code* ; and
	  • Are sufficient to pose a threat to the public if released.[b]
	• Aviation control towers, air traffic control centers and emergency aircraft hangars.
	• Buildings and other structures having critical national defense functions.
	• Water storage facilities and pump structures required to maintain water pressure for fire suppression.

a. For purposes of occupant load calculation, occupancies required by Table 1004.5 to use *gross floor area* calculations shall be permitted to use *net floor areas* to determine the total occupant load. The floor area for vehicular drive aisles shall be permitted to be excluded in the determination of net floor area in parking garages.

b. Where approved by the building official, the classification of buildings and other structures as Risk Category III or IV based on their quantities of toxic, highly toxic or explosive materials is permitted to be reduced to Risk Category II, provided that it can be demonstrated by a hazard assessment in accordance with Section 1.5.3 of ASCE 7 that a release of the toxic, highly toxic or explosive materials is not sufficient to pose a threat to the public.

Reason: The intent of this proposal is to return Nursing Homes (Group I-2 Condition 1) to Risk Category 3. There is another change to address Hospitals (Group I-2 Condition 2). The description text and Group I-2 occupancies were revised in S74-22.

This proposal has three serious problems.

The added language in the description for Risk Category IV could be read that any of the current occupancies in this list could sustain loss of function as long as that damage did not represent a substantial hazard to the occupants. The list of facilities is a listing of essential facilities that are intended to be operational after an event for the safety and recovery of the entire community. Hospitals that have emergency surgery or emergency treatment facilities are intended to be operational after an emergency. There could be a lot of damage to the building that would not be a substantial hazard to occupants, but would stop impact the functionality of the emergency room. During normal operations there are times that emergency rooms divert additional patients to other facilities that are available hence the true intention of an ER is to address a set amount of emergent patients and not to address every possible patient within the community. It is also common practice within a community to develop emergency operation plans to allow for facilities to coordinate services across the community. Hence hospitals and ER's are expected to be functional during an emergency and to address a set amount of patients and efforts are coordinated across a community to provide essential services as needed.

If all nursing homes and hospitals are relocated to Risk Category IV with the beginning language - how would a 'substantial hazard' to the occupants be determined. Would this require protection for power and water supplies? What if the windows break? Is that a hazard in the summer or winter? That depends on the season and where in the country you are located. This language will not be uniformly understood or enforced.

This language would move all nursing homes and hospitals to Risk Category IV. Currently nursing homes with between 6 and 50 occupants can be Risk Category II; and nursing homes with more than 50 occupants and hospitals without emergency surgery or emergency treatment can be Risk Category III. While these are a vulnerable population., however, there has been no history of issues with these facilities that justifies this increase in design for higher winds, seismic and snow loads for all such facilities. Hospitals and nursing homes already include additional safety features for residents and have a high level of oversite. If the concern is to remain operational as expressed in the proponents' reasons, there are many emergency planning options that can address this outside of a substantial increase in building construction (added cost). These facilities have staff trained in emergency care and operations and have detailed emergency operation plans. If a building has damage, the residents can be relocated to other parts of the building or to another facility. Such facilities typically have emergency generators. Operational plans for emergencies can address early evacuation plans; potable water supplies; etc.

This proposal is submitted by the ICC Committee for Healthcare (CHC). The Committee on Healthcare (CHC) was established by the ICC Board of Directors in 2011 to pursue opportunities to study and develop effective and efficient provisions for Hospital, Nursing Homes, Assisted Living and Ambulatory Care Facilities. This committee was formed in cooperation with the American Society for Healthcare Engineering (ASHE). In July of 2017, the ICC Board made CHC a standing committee. In 2023 and 2024 the CHC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the CHC website at CHC webpage.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

Per RS Means data including the 2024 year, hospital construction is approximately $500 per square foot for hospital construction. This change added 15% to 20% of construction costs, resulting in $575 to $600 per square foot. Reversing this change will reverse this increase.

Estimated Immediate Cost Impact Justification (methodology and variables):

This pricing considers the need to provide N+1 redundancy in a central utility plant for power and full air conditioning, plus additional structural scope. It does not consider premium sits such as California, New York or Gulf Coast, but a national average square footage cost. In these locations, the savings would be more.

S60-25

IBC: TABLE 1604.5

Proponents: Jeff O'Neill, Chair, representing Committee on Healthcare (ahc@iccsafe.org)

2024 International Building Code

Revise as follows:

TABLE 1604.5 RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES

RISK CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities.
II	Buildings and other structures except those listed in Risk Categories I, III and IV.

III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to:
	• Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300.
	• Buildings and other structures containing one or more public assembly spaces, each having an occupant load greater than 300 and a cumulative occupant load of these public assembly spaces of greater than 2,500.
	• Buildings and other structures containing Group E or Group I-4 occupancies or combination thereof, with an occupant load greater than 250.
	• Buildings and other structures containing educational occupancies for students above the 12th grade with an occupant load greater than 500.
	Group I-2, Condition 2 occupancies not having emergency surgery or emergency treatment facilities.
	• Group I-3, Condition 1 occupancies.
	• Any other occupancy with an occupant load greater than 5,000.[a]
	• Power-generating stations with individual power units rated 75 MW_{AC} (megawatts, alternating current) or greater, water treatment facilities for potable water, wastewater treatment facilities and other public utility facilities not included in Risk Category IV.
	• Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that:
	  • Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the *International Fire Code* ; and
	  • Are sufficient to pose a threat to the public if released.[b]

IV	Buildings and other structures designated as essential facilities and buildings where loss of function represents a substantial hazard to occupants or users, including but not limited to:
	Group I-2 Condition 1
	• Group I-2, Condition 2 occupancies having emergency surgery or emergency treatment facilites.
	• Ambulatory care facilities having emergency surgery or emergency treatment facilities.
	• Group I-3 occupancies other than Condition 1.
	• Fire, rescue, ambulance and police stations and emergency vehicle garages
	• Designated earthquake, hurricane or other emergency shelters.
	• Designated emergency preparedness, communications and operations centers and other facilities required for emergency response.
	• Public utility facilities providing power generation, potable water treatment, or wastewater treatment.
	• Power-generating stations and other public utility facilities required as emergency backup facilities for *Risk Category* IV structures.
	• Buildings and other structures containing quantities of highly toxic materials that:
	  • Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the *International Fire Code* ; and
	  • Are sufficient to pose a threat to the public if released.[b]
	• Aviation control towers, air traffic control centers and emergency aircraft hangars.
	• Buildings and other structures having critical national defense functions.
	• Water storage facilities and pump structures required to maintain water pressure for fire suppression.

a. For purposes of occupant load calculation, occupancies required by Table 1004.5 to use *gross floor area* calculations shall be permitted to use *net floor areas* to determine the total occupant load. The floor area for vehicular drive aisles shall be permitted to be excluded in the determination of net floor area in parking garages.

b. Where approved by the building official, the classification of buildings and other structures as Risk Category III or IV based on their quantities of toxic, highly toxic or explosive materials is permitted to be reduced to Risk Category II, provided that it can be demonstrated by a hazard assessment in accordance with Section 1.5.3 of ASCE 7 that a release of the toxic, highly toxic or explosive materials is not sufficient to pose a threat to the public.

Reason: The intent of this proposal is to restore the Group I-2 hospitals without emergency surgery or emergency treatment areas to Risk Category 3. The change for Group I-2 Nursing homes is a separate proposal. The description text and Group I-2 occupancies were revised in S74-22.

This proposal has three serious problems.

The added language in the description for Risk Category IV could be read that any of the current occupancies in this list could sustain loss of function as long as that damage did not represent a substantial hazard to the occupants. The list of facilities is a listing of essential facilities that are intended to be operational after an event for the safety and recovery of the entire community. Hospitals that have emergency surgery or emergency treatment facilities are intended to be operational after an emergency. There could be a lot of damage to the building that would not be a substantial hazard to occupants, but would impact the functionality of the emergency room. During normal operations there are times that emergency rooms divert additional patients to other facilities that are available hence the true intention of an ER is to address a set amount of emergent patients and not to address every possible patient within the community. It is also common practice within a community to develop emergency operation plans to allow for facilities to coordinate services across the community. Hence hospitals and ER's are expected to be functional during an emergency and to address a set amount of patients and efforts are coordinated across a community to provide essential services as needed.

If all nursing homes and hospitals are relocated to Risk Category IV with the beginning language - how would a 'substantial hazard' to the occupants be determined. Would this require protection for power and water supplies? What if the windows break? Is that a hazard in the summer or winter? That depends on the season and where in the country you are located. This language will not be uniformly understood or enforced. This language would move all nursing homes and hospitals to Risk Category IV.

Currently nursing homes with between 6 and 50 occupants can be Risk Category II; and nursing homes with more than 50 occupants and hospitals without emergency surgery or emergency treatment can be Risk Category III. While these are a vulnerable population., however, there has been no history of issues with these facilities that justifies this increase in design for higher winds, seismic and snow loads for all such facilities. Hospitals and nursing homes already include additional safety features for residents and have a high level of oversite. If the concern is to remain operational as expressed in the proponents' reasons, there are many emergency planning options that can address this outside of a substantial increase in building construction (added cost). These facilities have staff trained in emergency care and operations and have detailed emergency operation plans. If a building has damage, the residents can be relocated to other parts of the building or to another facility. Such facilities typically have emergency generators. Operational plans for emergencies can address early evacuation plans; potable water supplies; etc.

Note: Group I-2, Condition 1 is addressed by another proposal by this proponent.

This proposal is submitted by the ICC Committee for Healthcare (CHC). The Committee on Healthcare (CHC) was established by the ICC Board of Directors in 2011 to pursue opportunities to study and develop effective and efficient provisions for Hospital, Nursing Homes, Assisted Living and Ambulatory Care Facilities. This committee was formed in cooperation with the American Society for Healthcare Engineering (ASHE). In July of 2017, the ICC Board made CHC a standing committee. In 2023 and 2024 the CHC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the CHC website at CHC webpage.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

Per RS Means data including the 2024 year, hospital construction is approximately $500 per square foot for hospital construction. This change added 15% to 20% of construction costs, resulting in $575 to $600 per square foot. Reversing this change will reverse this increase.

Estimated Immediate Cost Impact Justification (methodology and variables):

This pricing considers the need to provide N+1 redundancy in a central utility plant for power and full air conditioning, plus additional structural scope. It does not consider premium sits such as California, New York or Gulf Coast, but a national average square footage cost. In these locations, the savings would be more.

S61-25

IBC: TABLE 1604.5

Proponents: Jeff O'Neill, Chair, representing Committee on Healthcare (ahc@iccsafe.org); Jeff Grove, Chair, representing BCAC (bcac@iccsafe.org)

2024 International Building Code

Revise as follows:

TABLE 1604.5 RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES

RISK CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities.
II	Buildings and other structures except those listed in Risk Categories I, III and IV.

III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to:
	• Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300.
	• Buildings and other structures containing one or more public assembly spaces, each having an occupant load greater than 300 and a cumulative occupant load of these public assembly spaces of greater than 2,500.
	• Buildings and other structures containing Group E or Group I-4 occupancies or combination thereof, with an occupant load greater than 250.
	• Buildings and other structures containing educational occupancies for students above the 12th grade with an occupant load greater than 500.
	• Group I-3, Condition 1 occupancies.
	• Any other occupancy with an occupant load greater than 5,000.[a]
	• Power-generating stations with individual power units rated 75 MW_{AC} (megawatts, alternating current) or greater, water treatment facilities for potable water, wastewater treatment facilities and other public utility facilities not included in Risk Category IV.
	• Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that:
	  • Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the *International Fire Code* ; and
	  • Are sufficient to pose a threat to the public if released.[b]

IV	Buildings and other structures designated as essential facilities ~~and buildings where loss of function represents a substantial hazard to occupants or users~~, including but not limited to:
	• Group I-2 occupancies.
	• Ambulatory care facilities having emergency surgery or emergency treatment facilities.
	• Group I-3 occupancies other than Condition 1.
	• Fire, rescue, ambulance and police stations and emergency vehicle garages
	• Designated earthquake, hurricane or other emergency shelters.
	• Designated emergency preparedness, communications and operations centers and other facilities required for emergency response.
	• Public utility facilities providing power generation, potable water treatment, or wastewater treatment.
	• Power-generating stations and other public utility facilities required as emergency backup facilities for *Risk Category* IV structures.
	• Buildings and other structures containing quantities of highly toxic materials that:
	  • Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the *International Fire Code* ; and
	  • Are sufficient to pose a threat to the public if released.[b]
	• Aviation control towers, air traffic control centers and emergency aircraft hangars.
	• Buildings and other structures having critical national defense functions.
	• Water storage facilities and pump structures required to maintain water pressure for fire suppression.

a. For purposes of occupant load calculation, occupancies required by Table 1004.5 to use *gross floor area* calculations shall be permitted to use *net floor areas* to determine the total occupant load. The floor area for vehicular drive aisles shall be permitted to be excluded in the determination of net floor area in parking garages.

b. Where approved by the building official, the classification of buildings and other structures as Risk Category III or IV based on their quantities of toxic, highly toxic or explosive materials is permitted to be reduced to Risk Category II, provided that it can be demonstrated by a hazard assessment in accordance with Section 1.5.3 of ASCE 7 that a release of the toxic, highly toxic or explosive materials is not sufficient to pose a threat to the public.

Reason: The intent of this proposal is to review the description in Risk Category IV. Revisions to Group I-2 are address in two other code changes. The description text and Group I-2 occupancies were revised in S74-22.

The scope of the Healthcare committee is for healthcare facilities, such as ambulatory care facilities, clinics, nursing homes and hospitals. Therefore, this public comment is limited to the effect of the new language to the description of Risk Category IV and how it would effect the 1st and 2nd item in the list.

- Group I-2 occupancies .
- Ambulatory care facilities having emergency surgery or emergency treatment facilities.

The added language in the description for Risk Category IV could be read that any of the current occupancies in this list could sustain loss of function as long as that damage did not represent a substantial hazard to the occupants. These are a list of essential facilities that must be operational after an event for the safety and recovery of the entire community. Hospitals that have emergency surgery or emergency treatment facilities need to be operational and functional after an emergency. There could be a lot of damage to the building that would not be a substantial hazard to occupants, but would stop the emergency room from functioning. During normal operations there are times that emergency rooms divert additional patients to other facilities that are available hence the true intention of an ER is to address a set amount of emergent patients and not to address every possible patient within the community. It is also common practice within a community to develop emergency operation plans to allow for facilities to coordinate services across the community. Hence hospitals and ER's are expected to be functional during an emergency and to address a set amount of patients and efforts are coordinated across a community to provide essential services as needed.

Additionally, the language in question could also be read to include other buildings that are not considered as essential facilities but when the loss of the function of the building is a substantial hazard to the occupants or users such as a dialysis center which loss could put those users at risk but during an emergency these services could be provided in an alternate facility. This language could cause the mis-application of Risk Category IV to facilities that were not intended to be included.

The Committee on Healthcare (CHC) was established by the ICC Board of Directors in 2011 to pursue opportunities to study and develop effective and efficient provisions for Hospital, Nursing Homes, Assisted Living and Ambulatory Care Facilities. This committee was formed in cooperation with the American Society for Healthcare Engineering (ASHE). In July of 2017, the ICC Board made CHC a standing committee. In 2023 and 2024 the CHC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the CHC website at CHC webpage.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

Per RS Means data including the 2024 year, hospital construction is approximately $500 per square foot for hospital construction. This change added 15% to 20% of construction costs, resulting in $575 to $600 per square foot. Reversing this change will reverse this increase.

Estimated Immediate Cost Impact Justification (methodology and variables):

This pricing considers the need to provide N+1 redundancy in a central utility plant for power and full air conditioning, plus additional structural scope. It does not consider premium sits such as California, New York or Gulf Coast, but a national average square footage cost. In these locations, the savings would be more.

S69-25

IBC: 1607.1, TABLE 1607.1, 1607.20

Proponents: David Cooper, Stair Manufacturing and Design Consultants, representing Stairbuilders and Manufacturers Association (coderep@stairways.org)

2024 International Building Code

1607.1 General. *Buildings*, *structures*, and parts thereof shall be designed to resist the effects of *live loads*.

Revise as follows:

TABLE 1607.1 MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_0 , AND MINIMUM CONCENTRATED LIVE LOADS

	OCCUPANCY OR USE		UNIFORM (psf)	CONCENTRATED (pounds)	ALSO SEE SECTION
1.	Apartments (see residential)		—	—	—
2.	Access floor systems	Office use	50	2,000	—
		Computer use	100	2,000	—
3.	Armories and drill rooms		150[a]	—	—
4.	Assembly areas	Fixed seats (fastened to floor)	60[a]	—	—
		Lobbies	100[a]		
		Movable seats	100[a]		
		Stage floors	150[a]		
		Platforms (assembly)	100[a]		
		Bleachers, folding and telescopic seating and grandstands	100[a] (See Section 1607.18)		
		Stadiums and arenas with fixed seats (fastened to the floor)	60[a] (See Section 1607.18)		
		Other assembly areas	100[a]		
5.	Balconies and decks		1.5 times the live load for the area served, not required to exceed 100	—	—
6.	Catwalks for maintenance and service access		40	300	—
7.	Cornices		60	—	—
8.	Corridors	First floor	100	—	—
		Other floors	Same as occupancy served except as indicated		
9.	Dining rooms and restaurants		100[a]	—	—
10.	Dwellings (see residential)		—	—	—
11.	Elevator machine room and control room grating (on area of 2 inches by 2 inches)		—	300	—
12.	Finish light floor plate construction (on area of 1 inch by 1 inch)		—	200	—
13.	Fire escapes		100	—	—
		On single-family dwellings only	40		
14.	Fixed ladders		See Section 1607.10		—
15.	Garages and vehicle floors	Passenger vehicle garages	40[c]	See Section 1607.7	—
		Trucks and buses	See Section 1607.8		
		Fire trucks and emergency vehicles	See Section 1607.8		
		Forklifts and movable equipment	See Section 1607.8		
16.	Handrails, guards and grab bars		See Section 1607.9		—
17.	Helipads	Helicopter takeoff weight 3,000 pounds or less	40[a]	See Section 1607.6.1	Section 1607.6
		Helicopter takeoff weight more than 3,000 pounds	60[a]	See Section 1607.6.1	Section 1607.6
18.	Hospitals	Corridors above first floor	80	1,000	—
		Operating rooms, laboratories	60	1,000	
		Patient rooms	40	1,000	
19.	Hotels (see residential)		—	—	—
20.	Libraries	Corridors above first floor	80	1,000	—
		Reading rooms	60	1,000	—
		Stack rooms	150[b]	1,000	Section 1607.17
21.	Manufacturing	Heavy	250[b]	3,000	—
		Light	125[b]	2,000	
22.	Marquees, except one- and two-family dwellings		75	—	—

OCCUPANCY OR USE			UNIFORM (psf)	CONCENTRATED (pounds)	ALSO SEE SECTION
23.	Office buildings	Corridors above first floor	80	2,000	—
		File and computer rooms shall be designed for heavier loads based on anticipated occupancy	—	—	
		Lobbies and first-floor corridors	100	2,000	
		Offices	50	2,000	
24.	Penal institutions	Cell blocks	40	—	—
		Corridors	100		
25.	Public restrooms		Same as live load for area served but not required to exceed 60 psf	—	—
26.	Recreational uses	Bowling alleys, poolrooms and similar uses	75[a]	—	—
		Dance halls and ballrooms	100[a]		
		Gymnasiums	100[a]		
		Theater projection, control, and follow spot rooms	50		
		Ice skating rinks	250[b]		
		Roller skating rinks	100[a]		
27.	Residential	One- and two-family dwellings:		—	Section 1607.21
		Uninhabitable attics without storage	10		
		Uninhabitable attics with storage	20		
		Habitable attics and sleeping areas	30		
		Canopies, including marquees	20		
		All other areas	40		
		Hotels and multifamily dwellings:			
		Private rooms and corridors serving them	40		
		Public rooms	100 [a]		
		Corridors serving public rooms	100		
28.	Roofs	Ordinary flat, pitched, and curved roofs (that are not occupiable)	20	—	Section 1607.14
		Roof areas used for assembly purposes	100[a]	—	
		Roof areas used for occupancies other than assembly	Same as occupancy served	—	
		Vegetative and landscaped roofs:			
		Roof areas not intended for occupancy	20	—	
		Roof areas used for assembly purposes	100[a]	—	
		Roof areas used for occupancies other than assembly	Same as occupancy served	—	
		Awnings and canopies:			
		Fabric construction supported by a skeleton structure	5[a]	—	
		All other construction, except one- and two-family dwellings	20	—	
		Primary roof members exposed to a work floor:			Section 1607.15
		Single panel point of lower chord of roof trusses or any point along primary structural members supporting roofs over manufacturing, storage warehouses, and repair garages	—	2,000	
		All other primary roof members	—	300	
		All roof surfaces subject to maintenance workers	—	300	
29.	Schools	Classrooms	40	1,000	—
		Corridors above first floor	80	1,000	
		First-floor corridors	100	1,000	
30.	Scuttles, skylight ribs and accessible ceilings		—	200	—
31.	Sidewalks, vehicular driveways and yards, subject to trucking		250[b]	8,000	Section 1607.19
32.	Stairs and exits	One- and two-family dwellings and within dwelling units of R2 and R3 occupancies	40	300	Section 1607.20
		All other	100	300	Section 1607.20
33.	Storage areas above ceilings		20	—	—
34.	Storage warehouses (shall be designed for heavier loads if required for anticipated storage)	Heavy	250[b]	—	—
		Light	125[b]		
35.	Stores	Retail:			—
		First floor	100	1,000	
		Upper floors	75	1,000	
		Wholesale, all floors	125[b]	1,000	
36.	Vehicle barriers		See Section 1607.11		—
37.	Walkways and elevated platforms (other than exitways)		60	—	—
38.	Yards and terraces, pedestrian		100[a]	—	—

For SI: 1 inch = 25.4 mm, 1 square inch = 645.16 mm^2, 1 square foot = 0.0929 m^2, 1 pound per square foot = 0.0479 kN/m^2, 1 pound = 0.004448 kN.

a. Live load reduction is not permitted.

b. Live load reduction is only permitted in accordance with Section 1607.13.1.2 or Item 1 of Section 1607.13.2.

c. Live load reduction is only permitted in accordance with Section 1607.13.1.3 or Item 2 of Section 1607.13.2.

1607.20 Stair treads. The concentrated *load* indicated in Table 1607.1 for *stair* treads shall be applied on an area of 2 inches by 2 inches (51 mm by 51 mm). This *load* need not be assumed to act concurrently with the uniform *load*.

Reason: As in One and two-family dwellings the live loads within R2 and R3 Residential units are considerably lower due to the limited occupancy. Currently the code is contradictive. In Table 1607.1 line 10 Dwellings sends you to line 27 Residential. Line 27 Residential is divided in two sections; One- and two-family dwellings and Hotels and multifamily dwellings. In both “All other areas” of One- and two-family dwellings and “Private rooms and corridors serving them” of Hotels and multifamily dwellings, the same minimum 40 psf load is required. Stairs are listed on line 32 “Stairs and Exits” but only one- and two-family dwellings have the 40 psf load leaving some to interpret that the 100 psf minimum must be applied within R2 and R3 dwellings. Obviously a 100 psf load limit on stairs within any dwelling unit is unnecessary if private rooms and corridors in R2 and R3 occupancies are allowed a 40 psf minimum. I believe this is an unintended oversight in need of the clarification provided in this proposal. The text added to the table clarifies that the 40 psf uniform load would be applicable within the dwelling units of R2 and R3 occupancies with similar occupant limitations.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$1000 Minimum savings in wood construction could be realized., Clearly a stair designed to meet a 40 psf will be lower in cost compared to a 100 psf design. Regardless of the materials used tread, stringer and riser cross-sections could be reduces significantly.

Estimated Immediate Cost Impact Justification (methodology and variables):

Based on a typical $3000 wood 14 riser staircase built to meet the 100 pond per square foot design load a savings of approximately $1000 in labor and material would be achieved if the design load were reduced to 40 pounds per square foot. Depending upon the materials used a 25% to 50% savings in the cost of stair construction could be achieved. The change in the cost of labor would not be as significant however shipping an handling costs of thinner and lighter materials could represent further cost reductions..

S70-25

IBC: TABLE 1607.1

Proponents: Jeff Gonzales, representing Joby Aviation; Chris Hazell, representing Joby Aviation (chris.hazell@jobyaviation.com)

2024 International Building Code

Revise as follows:

TABLE 1607.1 MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_0 , AND MINIMUM CONCENTRATED LIVE LOADS

	OCCUPANCY OR USE		UNIFORM (psf)	CONCENTRATED (pounds)	ALSO SEE SECTION
1.	Apartments (see residential)		—	—	—
2.	Access floor systems	Office use	50	2,000	—
		Computer use	100	2,000	—
3.	Armories and drill rooms		150[a]	—	—
4.	Assembly areas	Fixed seats (fastened to floor)	60[a]	—	—
		Lobbies	100[a]		
		Movable seats	100[a]		
		Stage floors	150[a]		
		Platforms (assembly)	100[a]		
		Bleachers, folding and telescopic seating and grandstands	100[a] (See Section 1607.18)		
		Stadiums and arenas with fixed seats (fastened to the floor)	60[a] (See Section 1607.18)		
		Other assembly areas	100[a]		
5.	Balconies and decks		1.5 times the live load for the area served, not required to exceed 100	—	—
6.	Catwalks for maintenance and service access		40	300	—
7.	Cornices		60	—	—
8.	Corridors	First floor	100	—	—
		Other floors	Same as occupancy served except as indicated		
9.	Dining rooms and restaurants		100[a]	—	—
10.	Dwellings (see residential)		—	—	—
11.	Elevator machine room and control room grating (on area of 2 inches by 2 inches)		—	300	—
12.	Finish light floor plate construction (on area of 1 inch by 1 inch)		—	200	—
13.	Fire escapes		100	—	—
		On single-family dwellings only	40		
14.	Fixed ladders		See Section 1607.10		—
15.	Garages and vehicle floors	Passenger vehicle garages	40[c]	See Section 1607.7	—
		Trucks and buses	See Section 1607.8		
		Fire trucks and emergency vehicles	See Section 1607.8		
		Forklifts and movable equipment	See Section 1607.8		
16.	Handrails, guards and grab bars		See Section 1607.9		—
17.	Helipads	Helicopter and powered-lift aircrafttakeoff weight ~~3~~6,000 pounds or less	40[~~a~~b]	See Section 1607.6.1	Section 1607.6
		Helicopter and powered-lift aircrafttakeoff weight more than ~~3~~6,000 pounds	60[~~a~~b]	See Section 1607.6.1	Section 1607.6
18.	Hospitals	Corridors above first floor	80	1,000	—
		Operating rooms, laboratories	60	1,000	
		Patient rooms	40	1,000	
19.	Hotels (see residential)		—	—	—
20.	Libraries	Corridors above first floor	80	1,000	—
		Reading rooms	60	1,000	—
		Stack rooms	150[b]	1,000	Section 1607.17
21.	Manufacturing	Heavy	250[b]	3,000	—
		Light	125[b]	2,000	
22.	Marquees, except one- and two-family dwellings		75	—	—
23.	Office buildings	Corridors above first floor	80	2,000	—
		File and computer rooms shall be designed for heavier loads based on anticipated occupancy	—	—	
		Lobbies and first-floor corridors	100	2,000	
		Offices	50	2,000	

		OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (pounds)	ALSO SEE SECTION
24.	Penal institutions	Cell blocks	40	—	—
		Corridors	100		
25.	Public restrooms		Same as live load for area served but not required to exceed 60 psf	—	—
26.	Recreational uses	Bowling alleys, poolrooms and similar uses	75[a]	—	—
		Dance halls and ballrooms	100[a]		
		Gymnasiums	100[a]		
		Theater projection, control, and follow spot rooms	50		
		Ice skating rinks	250[b]		
		Roller skating rinks	100[a]		
27.	Residential	One- and two-family dwellings:		—	Section 1607.21
		Uninhabitable attics without storage	10		
		Uninhabitable attics with storage	20		
		Habitable attics and sleeping areas	30		
		Canopies, including marquees	20		
		All other areas	40		
		Hotels and multifamily dwellings:			
		Private rooms and corridors serving them	40		
		Public rooms	100 [a]		
		Corridors serving public rooms	100		
28.	Roofs	Ordinary flat, pitched, and curved roofs (that are not occupiable)	20	—	Section 1607.14
		Roof areas used for assembly purposes	100[a]	—	
		Roof areas used for occupancies other than assembly	Same as occupancy served	—	
		Vegetative and landscaped roofs:			
		Roof areas not intended for occupancy	20	—	
		Roof areas used for assembly purposes	100[a]	—	
		Roof areas used for occupancies other than assembly	Same as occupancy served	—	
		Awnings and canopies:			
		Fabric construction supported by a skeleton structure	5[a]	—	
		All other construction, except one- and two-family dwellings	20	—	
		Primary roof members exposed to a work floor:			Section 1607.15
		Single panel point of lower chord of roof trusses or any point along primary structural members supporting roofs over manufacturing, storage warehouses, and repair garages	—	2,000	
		All other primary roof members	—	300	
		All roof surfaces subject to maintenance workers	—	300	
29.	Schools	Classrooms	40	1,000	—
		Corridors above first floor	80	1,000	
		First-floor corridors	100	1,000	
30.	Scuttles, skylight ribs and accessible ceilings		—	200	—
31.	Sidewalks, vehicular driveways and yards, subject to trucking		250[b]	8,000	Section 1607.19
32.	Stairs and exits	One- and two-family dwellings	40	300	Section 1607.20
		All other	100	300	Section 1607.20
33.	Storage areas above ceilings		20	—	—
34.	Storage warehouses (shall be designed for heavier loads if required for anticipated storage)	Heavy	250[b]	—	—
		Light	125[b]		
35.	Stores	Retail:			—
		First floor	100	1,000	
		Upper floors	75	1,000	
		Wholesale, all floors	125[b]	1,000	
36.	Vehicle barriers		See Section 1607.11		—
37.	Walkways and elevated platforms (other than exitways)		60	—	—
38.	Yards and terraces, pedestrian		100[a]	—	—

For SI: 1 inch = 25.4 mm, 1 square inch = 645.16 mm^2, 1 square foot = 0.0929 m^2, 1 pound per square foot = 0.0479 kN/m^2, 1 pound = 0.004448 kN.

a. Live load reduction is not permitted.

b. Live load reduction is only permitted in accordance with Section 1607.13.1.2 or Item 1 of Section 1607.13.2.

c. Live load reduction is only permitted in accordance with Section 1607.13.1.3 or Item 2 of Section 1607.13.2.

Reason: Overview

This code change proposal focuses on components of IBC Chapter 16 that are related to helicopter and powered-lift infrastructure. The primary intention of this code change submittal is to ensure that emergent aircraft technologies within the advanced air mobility (AAM) sector are accounted for within the IBC prior to widespread adoption of these technologies and the associated buildout of infrastructure. This is accomplished through the following change.

1. Modifying structural live load requirements for helicopters and powered-lift aircraft.

Introduction to Advanced Air Mobility

Per the National Aeronautics and Space Administration (NASA), Advanced Air Mobility (AAM) is a movement within the air travel sector that seeks to provide "safe, accessible, automated, and affordable air transportation system for passengers and cargo capable of serving previously hard-to-reach urban and rural locations." Emergent technologies that support this mission include electric vertical takeoff and landing (eVTOL) aircraft, which are lithium-ion battery powered aircraft that have been developed by various manufacturers (e.g., Joby Aviation, BETA Technologies, and Archer Aviation) to provide intracity aerial taxi services, cargo transportation, and other air travel needs. In order to facilitate widespread adoption of eVTOL and other powered-lift aircraft, it is necessary to develop a safe and robust infrastructure network. A key component of facilitating this infrastructure development is ensuring that the IBC is updated to account for this emergent technology. The code change proposal below describes an update to Chapter 16 to better account for powered-lift aircraft use of helipads.

Chapter 16: Structural Live Load for Helipads Justification

Live load reduction footnote in Table 1607.1: Helipad live loads (primarily VTOL aircraft taking off and landing) have the similar transient nature of passenger vehicle garages in that local horizontal and vertical support members must be designed to support the full specified live load assuming full occupancy occurs for limited durations at a time. However, for a multi-story structure, it is unlikely that structural members supporting two or more floors will have full occupancy for sustained periods of time simultaneously at every floor. This revision avoids an overly conservative penalty on foundations and lower-level columns supporting multi-story garages and building structures with rooftop helipads.

Helicopter takeoff weights in Table 1607.1: The existing helicopter takeoff weight threshold of 3,000 pounds is outdated when compared to passenger vehicle garage live loads, since many passenger vehicles weigh more than 6,000 pounds with a smaller footprint (and thus closer spacing capability and higher equivalent uniform loading) than helicopters, yet passenger vehicle garage live loads are prescribed as 40 psf. Updating the threshold from 3,000 pounds to 6,000 pounds will enable new and existing helipads to support additional aircraft without the overly conservative current restriction. The footprint of a helicopter weighing 6,000 pounds that is subject to the 40 psf requirement would require a governing rotor diameter of less than 14 ft diameter, which is so extremely small that a helicopter with this rotor size would never get off the ground. As an additional justification for this update, when comparing the ASCE 7 Section 4.11 Helipad Loads for concentrated loads based on the maximum takeoff weight of the aircraft there is parity between an equivalent 40psf live load compared to a 6,000 pound aircraft with a 1.5x dynamic amplification factor applied for peak bending demand in framing members. Assuming a typical 10ft beam spacing and 40ft beam span, 40 psf results in a peak bending demand of 80,000 ft-lbs, which is greater than the two amplified concentrated loads for a 6,000 pound aircraft with 7ft wide landing gear which results in 74,250 ft-lbs. As beam spans go up to 50ft, 60 ft, or longer, the 40 psf live load becomes increasingly conservative.

Bibliography: NASA: Advanced Air Mobility (AAM): An Overview and Brief History

https://ntrs.nasa.gov/api/citations/20210024608/downloads/2021-12-10%20AAM%20for%20PSU%20Tran%20Eng%20and%20Safety%20Conf%20v2%20compressed.pdf

Simple Helipad Cost

https://bjtonline.com/business-jet-news/everything-you-need-to-know-about-adding-a-heliport-to-your-home

Cost Impact: Decrease

Estimated Immediate Cost Impact:

It is estimated that this code change may decrease the cost of construction by a minimum of $0.00.

Estimated Immediate Cost Impact Justification (methodology and variables):

The proposed change suggests an increase in weight of helicopter and powered-lift aircraft from 3,000 pounds to 6,000 pounds while maintaining the same uniform live load requirement (i.e., 40 pounds per square foot) that is currently in Table 1607.1. This may result in a decrease in construction cost since aircraft between 3,000 pounds and 6,000 pounds will now be subject to a lower uniform live load than was previously specified, meaning that less robust, and potentially less costly, construction is required for aircraft of this size as a result of this code change proposal.

This change can be examined using an example case where a heliport is constructed to accommodate a common lightweight helicopter, such as the Bell 206, which is commonly used by news departments and hospitals. The Bell 206 aircraft has a maximum takeoff weight of 3,200 pounds, which would current require a live load rating of 60 pounds per square foot. The new code requirement would require a live load rating of 40 pounds per square foot. Assuming that the the increase in live load also results in a linear increase in construction material required to support the load, the reduction of a 60 psf load to a 40 psf load requirement would decrease the cost of material by 33% for the construction elements used to support the live load, such as columns, beams, and slabs. As such, every new helipad that is constructed to accommodate an aircraft of this type would likely see a decrease in construction costs.

One simple estimate for the construction of a "lighted concrete [heli]pad" is $15,000. Using a 33% reduction in cost based on decreasing the live load from 60 psf to 40 psf may result in the cost of construction decreasing to $10,000 due to the reduction of material required to support the decreased live load requirement.

Staff Analysis: CC # S70-25 and CC # S71-25 addresses requirements in a different or contradicting manner. The committee is urged to make their intensions clear with their actions on these proposals.

S71-25

IBC: TABLE 1607.1, 1607.6, 1607.6.1, 1607.13, 1607.13.1, TABLE 1607.13.1, 1607.13.1.1, 1607.13.1.2, 1607.13.1.3, 1607.13.1.4 (New)

Proponents: Jennifer Goupil, American Society of Civil Engineers and Structural Engineering Institute, representing American Society of Civil Engineers (jgoupil@asce.org)

2024 International Building Code

Revise as follows:

TABLE 1607.1 MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_0, AND MINIMUM CONCENTRATED LIVE LOADS

OCCUPANCY OR USE			UNIFORM (psf)	Live Load Reduction Permitted? (Section No.)	Multiple-Story Live Load Reduction Permitted? (Section No.)	CONCENTRATED (pounds)	ALSO SEE SECTION
1.	Apartments (see residential)		—	—	—	—	—
2.	Access floor systems	Office use	50	Yes (1607.13.1)	Yes (1607.13.1)	2,000	—
		Computer use	100	Yes (1607.13.1)	Yes (1607.13.1)	2,000	—
3.	Armories and drill rooms		150~~[a]~~	No (1607.13.1.4)	No (1607.13.1.4)	—	—
4.	Assembly areas	Fixed seats (fastened to floor)	60~~[a]~~	No (1607.13.1.4)	No (1607.13.1.4)	—	—
		Lobbies	100~~[a]~~	No (1607.13.1.4)	No (1607.13.1.4)		—
		Movable seats	100~~[a]~~	No (1607.13.1.4)	No (1607.13.1.4)		—
		Stage floors	150~~[a]~~	No (1607.13.1.4)	No (1607.13.1.4)		—
		Platforms (assembly)	100~~[a]~~	No (1607.13.1.4)	No (1607.13.1.4)		—
		Bleachers, folding and telescopic seating and grandstands	100~~[a]~~ ~~(See Section 1607.18)~~	No (1607.13.1.4)	No (1607.13.1.4)		1607.18
		Stadiums and arenas with fixed seats (fastened to the floor)	60~~[a]~~ ~~(See Section 1607.18)~~	No (1607.13.1.4)	No (1607.13.1.4)		1607.18
		Other assembly areas	100~~[a]~~	No (1607.13.1.4)	No (1607.13.1.4)		
5.	Balconies and decks		1.5 times the live load for the area served, not required to exceed 100	Yes (1607.13.1)	Yes (1607.13.1)	—	—
6.	Catwalks for maintenance and service access		40	Yes (1607.13.1)	Yes (1607.13.1)	300	—
7.	Cornices		60	Yes (1607.13.1)	Yes (1607.13.1)	—	—
8.	Corridors	First floor	100	Yes (1607.13.1)	Yes (1607.13.1)	—	—
		Other floors	Same as occupancy served except as indicated				
9.	Dining rooms and restaurants		100~~[a]~~	No (1607.13.1.4)	No (1607.13.1.4)	—	—
10.	Dwellings (see residential)		—	—	—	—	—
11.	Elevator machine room and control room grating (on area of 2 inches by 2 inches)		—	—	—	300	—
12.	Finish light floor plate construction (on area of 1 inch by 1 inch)		—	—	—	200	—
13.	Fire escapes		100	Yes (1607.13.1)	Yes (1607.13.1)	—	—
		On single-family dwellings only	40	Yes (1607.13.1)	Yes (1607.13.1)		
14.	Fixed ladders		~~See Section 1607.10~~ —	—	—	—	1607.10
15.	Garages and vehicle floors	Passenger vehicle garages	40~~[e]~~	No (1607.13.1.3)	Yes (1607.13.1.3)	See Section 1607.7	—
		Trucks and buses	See Section 1607.8				
		Fire trucks and emergency vehicles	See Section 1607.8				
		Forklifts and movable equipment	See Section 1607.8				
16.	Handrails, guards and grab bars		See Section 1607.9				—

OCCUPANCY OR USE			UNIFORM (psf)	Live Load Reduction Permitted? (Section No.)	Multiple-Story Live Load Reduction Permitted? (Section No.)	CONCENTRATED (pounds)	ALSO SEE SECTION
17.	Helipads	Helicopter takeoff weight 3,000 pounds or less	40~~a~~	No (1607.6)	No (1607.6)	See Section 1607.6.1	~~Section~~ 1607.6
		Helicopter takeoff weight more than 3,000 pounds	60~~a~~	No (1607.6)	No (1607.6)	See Section 1607.6.1	~~Section~~ 1607.6
18.	Hospitals	Corridors above first floor	80	Yes (1607.13.1)	Yes (1607.13.1)	1,000	—
		Operating rooms, laboratories	60	Yes (1607.13.1)	Yes (1607.13.1)	1,000	
		Patient rooms	40	Yes (1607.13.1)	Yes (1607.13.1)	1,000	
19.	Hotels (see residential)		—	—	—	—	—
20.	Libraries	Corridors above first floor	80	Yes (1607.13.1)	Yes (1607.13.1)	1,000	—
		Reading rooms	60	Yes (1607.13.1)	Yes (1607.13.1)	1,000	—
		Stack rooms	150~~b~~	No (1607.13.1.2)	Yes (1607.13.1.2)	1,000	~~Section~~ 1607.17
21.	Manufacturing	Heavy	250~~b~~	No (1607.13.1.2)	Yes (1607.13.1.2)	3,000	—
		Light	125~~b~~	No (1607.13.1.2)	Yes (1607.13.1.2)	2,000	
22.	Marquees, except one- and two-family dwellings		75	Yes (1607.13.1)	Yes (1607.13.1)	—	—
23.	Office buildings	Corridors above first floor	80	Yes (1607.13.1)	Yes (1607.13.1)	2,000	—
		File and computer rooms shall be designed for heavier loads based on anticipated occupancy	—	—	—	—	
		Lobbies and first-floor corridors	100	Yes (1607.13.1)	Yes (1607.13.1)	2,000	
		Offices	50	Yes (1607.13.1)	Yes (1607.13.1)	2,000	
24.	Penal institutions	Cell blocks	40	Yes (1607.13.1)	Yes (1607.13.1)	—	—
		Corridors	100	Yes (1607.13.1)	Yes (1607.13.1)		
25.	Public restrooms		Same as live load for area served but not required to exceed 60 psf	Yes (1607.13.1)	Yes (1607.13.1)	—	—
26.	Recreational uses	Bowling alleys, poolrooms and similar uses	75~~a~~	No (1607.13.1.4)	No (1607.13.1.4)	—	—
		Dance halls and ballrooms	100~~a~~	No (1607.13.1.4)	No (1607.13.1.4)		
		Gymnasiums	100[a]	No (1607.13.1.4)	No (1607.13.1.4)		
		Theater projection, control, and follow spot rooms	50	Yes (1607.13.1)	Yes (1607.13.1)		
		Ice skating rinks	250~~b~~	No (1607.13.1.4)	No (1607.13.1.4)		
		Roller skating rinks	100~~a~~	No (1607.13.1.4)	No (1607.13.1.4)		
27.	Residential	One- and two-family dwellings:				—	~~Section~~ 1607.21
		Uninhabitable attics without storage	10	Yes (1607.13.1)	Yes (1607.13.1)		
		Uninhabitable attics with storage	20	Yes (1607.13.1)	Yes (1607.13.1)		
		Habitable attics and sleeping areas	30	Yes (1607.13.1)	Yes (1607.13.1)		
		Canopies, including marquees	20	Yes (1607.13.1)	Yes (1607.13.1)		
		All other areas	40	Yes (1607.13.1)	Yes (1607.13.1)		
		Hotels and multifamily dwellings:					
		Private rooms and corridors serving them	40	Yes (1607.13.1)	Yes (1607.13.1)		
		Public rooms	100~~a~~	No (1607.13.1.4)	No (1607.13.1.4)		
		Corridors serving public rooms	100	Yes (1607.13.1)	Yes (1607.13.1)		

	OCCUPANCY OR USE		UNIFORM (psf)	Live Load Reduction Permitted? (Section No.)	Multiple-Story Live Load Reduction Permitted? (Section No.)	CONCENTRATED (pounds)	ALSO SEE SECTION
28.	Roofs	Ordinary flat, pitched, and curved roofs (that are not occupiable)	20	Yes (1607.14.1)	—	—	~~Section~~ 1607.14
		Roof areas used for assembly purposes	100~~[a]~~	No (1607.13.1.4)	—	—	
		Roof areas used for occupancies other than assembly	Same as occupancy served	Yes (1607.14.2)	—	—	
		Vegetative and landscaped roofs:					
		Roof areas not intended for occupancy	20	Yes (1607.14.1)	—	—	
		Roof areas used for assembly purposes	100~~[a]~~	No (1607.13.1.4)	—	—	
		Roof areas used for occupancies other than assembly	Same as occupancy served	Yes (1607.14.2)	—	—	
		Awnings and canopies:					
		Fabric construction supported by a skeleton structure	5~~[a]~~	No (1607.14.1)	—	—	
		All other construction, except one- and two-family dwellings	20	Yes (1607.14.1)	—	—	
		Primary roof members exposed to a work floor:					~~Section~~ 1607.15
		Single panel point of lower chord of roof trusses or any point along primary structural members supporting roofs over manufacturing, storage warehouses, and repair garages	—	—	—	2,000	
		All other primary roof members	—	—	—	300	
		All roof surfaces subject to maintenance workers	—	—	—	300	
29.	Schools	Classrooms	40	Yes (1607.13.1)	Yes (1607.13.1)	1,000	—
		Corridors above first floor	80	Yes (1607.13.1)	Yes (1607.13.1)	1,000	
		First-floor corridors	100	Yes (1607.13.1)	Yes (1607.13.1)	1,000	
30.	Scuttles, skylight ribs and accessible ceilings		—	—	—	200	—
31.	Sidewalks, vehicular driveways and yards, subject to trucking		250~~[b]~~	No (1607.13.1.2)	Yes (1607.13.1.2)	8,000	~~Section~~ 1607.19
32.	Stairs and exits	One- and two-family dwellings	40	Yes (1607.13.1)	Yes (1607.13.1)	300	~~Section~~ 1607.20
		All other	100	Yes (1607.13.1)	Yes (1607.13.1)	300	~~Section~~ 1607.20
33.	Storage areas above ceilings		20	Yes (1607.13.1)	Yes (1607.13.1)	—	—
34.	Storage warehouses (shall be designed for heavier loads if required for anticipated storage)	Heavy	250~~[b]~~	No (1607.13.1.2)	Yes (1607.13.1.2)	—	—
		Light	125~~[b]~~	No (1607.13.1.2)	Yes (1607.13.1.2)		
35.	Stores	Retail:					—
		First floor	100	Yes (1607.13.1)	Yes (1607.13.1)	1,000	
		Upper floors	75	Yes (1607.13.1)	Yes (1607.13.1)	1,000	
		Wholesale, all floors	125~~[b]~~	No (1607.13.1.2)	Yes (1607.13.1.2)	1,000	
36.	Vehicle barriers		—	—	—	See Section 1607.11	—
37.	Walkways and elevated platforms (other than exitways)		60	Yes (1607.13.1)	Yes (1607.13.1)	—	—
38.	Yards and terraces, pedestrian		100~~[a]~~	No (1607.13.1.4)	No (1607.13.1.4)	—	—

For SI: 1 inch = 25.4 mm, 1 square inch = 645.16 mm^2, 1 square foot = 0.0929 m^2, 1 pound per square foot = 0.0479 kN/m^2, 1 pound = 0.004448 kN.

~~a. Live load reduction is not permitted.~~

~~b. Live load reduction is only permitted in accordance with Section 1607.13.1.2 or Item 1 of Section 1607.13.2.~~

~~c. Live load reduction is only permitted in accordance with Section 1607.13.1.3 or Item 2 of Section 1607.13.2.~~

1607.6 Helipads. Helipad live loads shall not be reduced. *Helipads* shall be marked to indicate the maximum takeoff weight. The takeoff weight limitation shall be indicated in units of thousands of pounds and placed in a box that is located in the bottom right corner of the landing area as viewed from the primary approach path. The box shall be not less than 5 feet (1524 mm) in height.

1607.6.1 Concentrated loads.. *Helipads* shall be designed for the following concentrated *live loads* :

1. A single concentrated *live load*, *L*, of 3,000 pounds (13.35 kN) applied over an area of 4.5 inches by 4.5 inches (114 mm by 114 mm) and located so as to produce the maximum *load effects* on the structural elements under consideration. The concentrated load is not required to act concurrently with other uniform or concentrated *live loads*.
2. Two single concentrated *live loads*, *L*, 8 feet (2438 mm) apart applied on the landing pad (representing the helicopter's two main landing gear, whether skid type or wheeled type), each having a magnitude of 0.75 times the maximum takeoff weight of the helicopter, and located so as to produce the maximum *load effects* on the structural elements under consideration. The concentrated loads shall be applied over an area of 8 inches by 8 inches (203 mm by 203 mm) and are not required to act concurrently with other uniform or concentrated *live loads*.

1607.13 Reduction in uniform live loads. Except for uniform roof live loads, all other minimum uniformly distributed *live loads*, L_o, in Table 1607.1 are permitted to be reduced in accordance with Section 1607.13.1 or 1607.13.2. Uniform roof *live loads* are permitted to be reduced in accordance with Section 1607.14.

1607.13.1 Basic uniform live load reduction. Subject to the limitations of Sections 1607.13.1.1 through 1607.13.1.3 and Table 1607.1, members for which a value of $K_{LL}A_T$ is 400 square feet (37.16 m^2) or more are permitted to be designed for a reduced uniformly distributed *live load*, *L*, in accordance with the following equation:

$$L = L_o\left(0.25 + \frac{15}{\sqrt{K_{LL}A_T}}\right)$$

(Equation 16-7)

$$L = L_o\left(0.25 + \frac{15}{\sqrt{K_{LL}A_T}}\right)$$

where:

L = Reduced design *live load* per square foot (m^2) of area supported by the member. L_o = Unreduced design *live load* per square foot (m^2) of area supported by the member (see Table 1607.1). K_{LL} = *Live load* element factor (see Table 1607.13.1). A_T = Tributary area, in square feet (m^2).

L shall be not less than $0.50L_o$ for members supporting one floor and *L* shall be not less than $0.40L_o$ for members supporting two or more floors.

TABLE 1607.13.1 LIVE LOAD ELEMENT FACTOR, K_{LL}

ELEMENT	K_{LL}
Interior columns	4
Exterior columns without cantilever slabs	4
Edge columns with cantilever slabs	3
Corner columns with cantilever slabs	2
Edge beams without cantilever slabs	2
Interior beams	2
Members not previously identified including:	1
Edge beams with cantilever slabs	
Cantilever beams	
One-way slabs	
Two-way slabs	
Members without provisions for continuous shear transfer normal to their span	

1607.13.1.1 One-way slabs. The tributary area, A_T, for use in Equation 16-7 for one-way slabs shall not exceed an area defined by the slab span times a width normal to the span of 1.5 times the slab span.

1607.13.1.2 Heavy live loads. *Live loads* that exceed 100 psf (4.79 kN/m^2) shall not be reduced.

Exceptions:

1. The *live loads* for members supporting two or more floors are permitted to be reduced by not greater than 20 percent, but the reduced *live load* shall be not less than *L* as calculated in Section 1607.13.1.
2. For uses other than storage, where *approved*, additional *live load* reductions shall be permitted where shown by the *registered design professional* that a rational approach has been used and that such reductions are warranted.

1607.13.1.3 Passenger vehicle garages. The *live loads* shall not be reduced in passenger vehicle garages.

Exception: The *live loads* for members supporting two or more floors are permitted to be reduced by not greater than 20 percent, but the reduced *live load* shall be not less than *L* as calculated in Section 1607.13.1.

Add new text as follows:

1607.13.1.4 Assembly Area Loads. Live loads shall not be reduced in assembly areas.

Reason: This proposal is a coordination proposal to bring the 2027 IBC up to date with the provisions of the 2022 edition of ASCE/SEI 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE/SEI 7-22). This proposal improves the coordination between the IBC and ASCE 7 by aligning the format of the Live Load Table in the IBC with the format of the ASCE 7 Live Load Table. Specifically two columns are added to the IBC table and three footnotes are removed. No requirements are changed, only the way in which the requirements are presented are changed.

This proposal completes the format alignment of the live load tables which was started, and mostly accomplished, in the 2021 IBC. The tables were not completely aligned in the 2021 IBC due to the existence of the Alternative Live Load Reduction provisions in the IBC (which are not in ASCE 7). With the removal of the Alternative Live Load Reduction provisions, which is proposed in a separate ASCE sponsored code change proposal, the format alignment of the IBC and ASCE 7 tables can now be completed.

Ultimately these changes go back to the removal of the sixteen footnotes to the live load table, which occurred for the 2016 edition of ASCE 7. In general having this many footnotes to a single table was unwieldy and resulted in requirements being difficult to find. The footnote information was either moved into the table itself or into new live load sections. However when this update was attempted in the IBC, for the 2021 edition, the existence of the Alternative Live Load Reduction provisions made the table changes related to live load reduction more complicated as two methods needed to be addressed. Therefore the footnotes related to live load reduction were left in place and the new columns related to live load reduction were not added.

The new text that is added in 1607.6 and 1607.13.1.4 mirrors text in ASCE 7 and is necessary to provide the reason why live load reduction is, or is not, permitted for certain uses and to provide a section to reference in the new columns. Again, no technical requirements are changed by this proposal.

The layout and look of the table was difficult to work with in cdpAccess as the column widths and text positioning do not look the same in the website preview mode and the downloaded/printed PDF version. ICC staff indicated that this is a limitation of the cdpAccess website. The existing text indents and centering/justification of text within cells are not changed by this proposal. In addition the column widths should be such that all text is readable.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The modification to the live load table is a clarification that is not expected to impact the cost of construction.

Staff Analysis: CC # S71-25 and CC # S70-25 addresses requirements in a different or contradicting manner. The committee is urged to make their intensions clear with their actions on these proposals.

S74-25

IBC: 1607.9, TABLE 1607.9 (New), 1607.9.1, 1607.9.1.1, 1607.9.1.2

Proponents: Richard Green, representing Green Facades PLLC (richard@greenfacadesllc.com); R. Scott Douglas, Douglas Engineering, representing Structural Engineers Association of Washington (sdouglasscott@gmail.com)

2024 International Building Code

Revise as follows:

1607.9 Loads on handrails, guards, grab bars and seats. *Handrails* and *guards* shall be designed and constructed for the structural loading conditions set forth in Section 1607.9.1. Grab bars, shower seats and *accessible* benches shall be designed and constructed for the structural loading conditions set forth in Section 1607.9.2. Glass *handrail* assemblies and guards shall also comply with Section 2407.

Add new text as follows:

TABLE 1607.9 LIVE LOAD TO HANDRAILS AND GUARDS

Handrail and Guard Design Category		Occupancy	Use examples	Handrail, top rail and guards		Components
				Concentrated Load (Pounds)	Uniform Load (plf)	Concentrated Load (Pounds)
A	Limited access	Areas with limited or controlled access	Group I-3, F, H and S occupancies, for areas that are not accessible to the general public and have an occupancy load less than 50	200	20	50
B	Basic	Areas not subject to assembly or overcrowding	Areas and occupancies not in Categories A, C or D.	200	50	50
C	Assembly	Areas where assembly and congregation may be anticipated and are not subject to over-crowding	Occupancies A-1, A-2, A-3, A-4, and public assembly areas including areas of banks/credit unions, shopping malls, restaurants, bars, theatres, cinemas, night clubs etc. (See also D for areas where over-crowding is reasonably anticipated); and assembly egress paths less than 9ft wide adjacent to sunken areas.	200	100	100
D	Crowd	Areas susceptible to over-crowding.	All A-5 occupancy areas including, Amusement park structures, Bleachers, Grandstands, and Stadiums; and the following where subject to over-crowding is reasonably anticipated: Theaters, cinemas, night clubs, bars, auditoria, assembly areas, schools, universities, studios, shopping malls (see also C); and assembly egress paths exceeding 9ft width (perpendicular to the direction of handrail or guard) adjacent to sunken areas.	300	200	100

Revise as follows:

1607.9.1 Concentrated load. *Handrails* and *guards* shall be designed to resist ~~a concentrated *load* of 200 pounds (0.89 kN) in accordance with Section 4.5.1 of ASCE 7. Glass *handrail* assemblies and guards shall comply with Section 2407.~~ the maximum loads expected by the intended use or occupancy but shall not be less than the minimum concentrated *live loads* given in Table 1607.9. This load need not be assumed to act concurrently with the uniform load specified in Sections 1607.9.1.1 and guard component load in Section 1607.9.1.2.

1607.9.1.1 Uniform load. *Handrails* and *guards* shall be designed to resist the maximum loads expected by the intended use or occupancy but shall not be less than the minimum uniformly distributed *live loads* given in Table 1607.9.~~a linear *load* of 50 pounds per linear foot (plf) (0.73 kN/m) in accordance with Section 4.5.1.1 of ASCE 7.~~ This load need not be assumed to act concurrently with the concentrated load specified in Sections 1607.9.1.1 or the guard component load specified in 1607.9.1.2.

Exceptions:

1. For one- and two-family *dwellings*, only the single concentrated *load* required by Section 1607.9.1 shall be applied.

~~2. In Group I-3, F, H and S occupancies, for areas that are not accessible to the general public and that have an *occupant load* less than 50, the minimum *load* shall be 20 pounds per foot (0.29 kN/m).~~

2 ~~3.~~ For roofs not intended for occupancy, only the single concentrated load required by Section 1607.9.1 shall be applied.

1607.9.1.2 Guard component loads. Balusters, panel fillers and guard infill components, including all rails except the *handrail, post* and the top rail, shall be designed to resist ~~a concentrated load of 50 pounds (0.22 kN) in accordance with Section 4.5.1.2 of ASCE 7.~~ the maximum loads expected by the intended use or occupancy but shall not be less than the component concentrated *live loads* given in Table 1607.9. This load need not be assumed to act concurrently with the concentrated load specified in Sections 1607.9.1 or uniform load specified in Section 1607.9.1.1.

Reason: 1607.9: Reference to 2407 for glass rails is moved up a level from 1607.9.1 because it applies to all load types, not just concentrated load. (Glass handrails and components are also used in occupancies that require uniform load.) The word "also" was added because 2407 does not replace these load requirements, it has additional requirements.

1607.9.1:Prior to 1985, guard loading criteria were consistent between the US and other international codes with uniform lateral loads of ~50lbf/ft (~0.75 kN/m). However, following a number of stadium and crowd disasters with multiple fatalities, guard design load for areas of public assembly was researched. This research included post-failure analysis and full-scale human testing, and concluded that loads on guards in areas of public assembly should be increased.

This recommendation for increased guard loading in areas of public assembly was widely adopted and is part of the following international standards and codes:

- National Building Code of Canada (for grandstands and stadiums),
- Eurocode EN 1991-1,
- Australian and New Zealand Standards AS 1170.1,
- British Standard BS6399 ,
- Brazilian Standard ABNT NBR 6120
- Indian Standard IS 875 pt 2
- etc.

Research has also been undertaken in 'crowd crush' and the resulting loads. Barrier collapse is a known cause of crowd collapse. The work of Prof G. Keith Still is available at Crowdrisks.com.

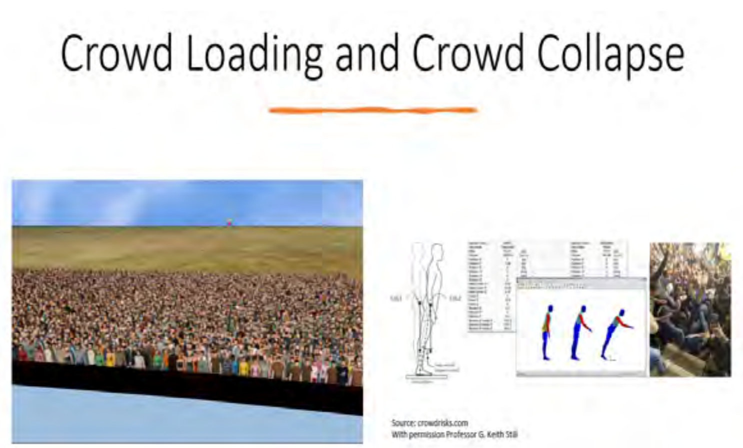

Figure 1: source https://www.crowdrisks.com/research.html

Behaviour and Mechanics of Crowd Crush Disasters - RISK FRONTIERS

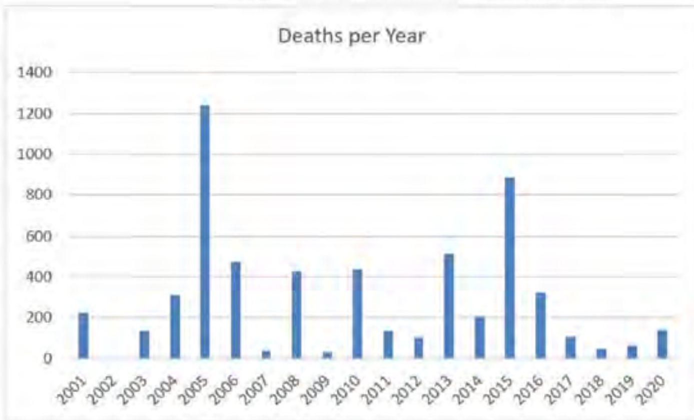

Figure 2. Crowd crush deaths per year from Wikipedia (2021) catalogue

Figure 2: source https://riskfrontiers.com/insights/behaviour-and-mechanics-of-crowd-crush-disasters/

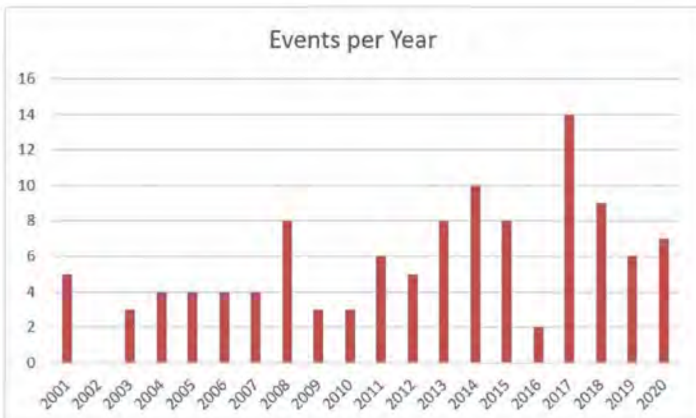

Figure 3. Crowd crush events per year from Wikipedia (2021) catalogue

Figure 3: source https://riskfrontiers.com/insights/behaviour-and-mechanics-of-crowd-crush-disasters/

Loads to guards have been validated by full-scale testing in the following study (by Styan, Masia and Kleeman 2007, Australian Journal of Structural Engineering.)

Are the Loads Valid?

Full-scale testing by Styan, Masia and Kleeman

- **Single Person**
- Design loads
  - **0.6 (AS/NZS)**
  - 0.75 (EN non assembly)
  - 0.89 kN (ASCE)

Table 1: Summary of maximum values attained for individual tests – single rail barrier.

Subject No.	Mass (kg)	Peak values attained (N)							
		A1	B1	C1	D1	E1	F1	G1	H1
1	71	623	1090	313	222	604	–	980	378
2	72	553	790	170	300	339	–	410	487
3	72	358	712	196	170	429	–	390	436
4	75	706	860	287	248	300	–	604	500
5	76	693	1025	481	339	623	–	751	584
6	84	429	667	196	118	345	–	765	718
7	96	783	896	326	294	417	–	590	693
8	97	559	725	468	449	351	2450	707	770
9	106	539	999	287	157	332	–	840	527
10	107	1032	1411	384	378	313	–	1102	1298
11	109	436	718	209	300	293	–	507	410
	Average	610	898	302	270	395	2450	660	618
	Maximum	**1032**	**1411**	**481**	**449**	**623**	**2450**	**1102**	**1298**

Source: Styan, C.T., Masia, M.J., Kleeman, P.W., (2007) **Human Loadings on Handrails**, Australian Journal of Structural Engineering

Figure 5: Typical subject configuration for individual test (a) A1, (b) B1 and (c) C1.

Figure 6: Typical subject configuration for individual test (a) D1, (b) E1 and (c) G1.

Figure 7: Typical subject configuration for individual test (a) H1 and (b) A2.

Note: 200 lbf = 890N

Figure 4 - Single Person Loading

Are the Loads Valid?

- **Full-scale testing**
- **Line Loading - Single row**
- Design Load
  - 1500 N/m (AS/NZS, EN)
  - ~750 N/m (50 lbf/ft) (ASCE)

Table 2: Summary of maximum values attained for single row group tests – single rail barrier.

Description		Test value (N/m)				Average (N/m)	Maximum (N/m)
		1	2	3	4		
A1	Push	1476	1398	1453	1453	1445	1476
C1b	Lean sideways with push	650	862	812	–	775	862
A1	Push	1287	1328	1259	–	1291	1328
A1	Push	1266	1210	1301	–	1259	1301
C1a	Lean sideways	387	436	472	–	432	472
C1b	Lean sideways with push	726	797	790	–	771	797
D1	Lean forwards	428	578	428	–	478	578
E1a	Lean backwards	435	443	727	–	535	727
E1b	Lean backwards with push	1129	1213	1338	–	1227	1338
H1	Pull	1716	1210	1175	–	1367	1716

Source: Styan, C.T., Masia, M.J., Kleeman, P.W., (2007) **Human Loadings on Handrails**, Australian Journal of Structural Engineering

Figure 8: Typical subject configuration for group test C1.

Figure 5: Single Row Loading

Are the Loads Valid?

- **Full-scale testing**
- **Line Loading - Multiple rows of people**
- Design Load
  - 3000 N/m (AS/NZS, EN)
  - ~750 N/m (50 lbf/ft) (ASCE)

Table 4: Summary of maximum values attained for multiple row group test A1.

Description	Test value (N/m)				Average (N/m)	Maximum (N/m)
	1	2	3	4		
1 Deep – 72 kg average	1265	1279	1286	–	1277	1286
1 Deep – 78 kg average	1429	1268	1212	–	1303	1429
1 Deep – 85 kg average	1323	1426	1399	–	1383	1426
2 Deep – 100 & 78 kg	2121	2052	1914	1849	1984	2121
2 Deep – 78 & 72 kg	1914	1887	1883	–	1895	1914
3 Deep – 100, 78 & 85 kg	2342	2657	2379	–	2459	2657
4 Deep – 100, 85, 78 & 72 kg	2244	2430	–	–	2337	2430

Source: Styan, C.T., Masia, M.J., Kleeman, P.W., (2007) **Human Loadings on Handrails**, Australian Journal of Structural Engineering

Figure 9: Typical subject configuration for multiple row group test for (a) two deep and (b) three deep.

Figure 6: Crowd Loading - Multiple rows

NEWS

Video shows balcony railing collapse that killed 7 college students in Bolivia

By Tamar Lapin

March 3, 2021 | 9:13pm | Updated

El Alto, Bolivia

MORE ON: BOLIVIA

Seven college students died and four were injured during a tragic incident in Bolivia when a railing collapsed, sending them falling from a fourth-floor balcony.

Figure 7: Fatal railing collapse at university https://nypost.com/2021/03/03/video-shows-balcony-railing-collapse-that-killed-7-bolivian-students/

In crowd collapse, the push of the crowd behind the row at the handrail results in multiple people loading the guard rail, resulting in over-loading the guard. Then multiple people are pushed over the failed guard.

Design loading for balustrades in this jurisdiction is 1 kN/m = ~70lbf/ft or ***33% greater** t**han currently in IBC***. Research predicts design loads 3kN/m which is 3x the regional design load for this circumstance (4x the current IBC design load) and when the loading occurred the guard failed.**It appears evident that crowd loading on guards is greater than typical residential and office loading, thus justifying additional categories specifying greater design loads.**

Figure 8: FedEx Field Barrier Collapse 2022

Railing collapse at Lists of fatalities do not include other serious injuries, such as broken necks, which can occur, such as at the Army-Navy game at Veterans Stadium in 1998. (Styan, et.al 2007)

The changes and research that began in England following Hillsborough Disaster in 1989, where 96 people died and many more injured following the collapse of a crowd control barrier. Post-failure analysis reported by RA Smith in "Engineering Failure Analysis", found failure of the system under extreme crowding to be at

8kN/m (550 lbf/ft), so the proposed design load of 200 lbf/ft is not extreme and is reasonable. EN 1991-1 suggests a range of 3-5 kN/m (~200-340kN/m)

Figure 8: Hillsborough Braced railing collapse (Smith Report 1994)

IBC is not just used in the United States, and these failures do not just happen in 'other jurisdictions'.

THE UNIVERSITY OF TENNESSEE KNOXVILLE

Journal of Applied Sport Management

Volume 15
Issue 4 *Sport Facilities Planning, Design, Operation, and Management Trends* — Article 5

History of Railing Dangers

From 1969 to 2011, there were 22 fall-related fatalities at major league ballparks (Gorman & Weeks, 2015); Dunne et al. (2019) identified 20 incidents and 12 deaths between 1981 and 2017. More specifically, Steinbach (2009) highlighted three deaths and eight serious injuries associated with railing-related incidents from 2000 to 2009. The injuries primarily involved men in their early 20s, but some people who were injured in these incidents were those on a level below who had no warning someone might fall on them. Incidents included five falls at professional baseball games, one each at college and professional football games, one at a professional hockey game, as well as during two concerts staged at sports venues (Steinbach, 2009).

Parting Thoughts – Smith Report

Lord Justice Taylor [5] drew attention to the fact that prior to his report there had been eight official reports covering crowd safety and control at football grounds. These include the Shorth Report of 1924 (following disorder at the 1923 Cup Final), the Moelwyn Hughes Report of 1946 (following 33 deaths at Bolton Wanderers' ground), Lord Wheatley's Report of 1972 (66 deaths at Ibrox) and the Popplewell Report of 1986 (after a fire caused 56 deaths at the Bradford City ground). Taylor drew attention to the fact that 'previous reports went unheeded' and management complacency caused the attitude 'it couldn't happen here'. Certainly, after the initial reactions of horror after a disaster have subsided, there is a tendency to forget the lessons which should have been learned.

The proposed changes for assembly and crowd guard loading reflect international common practice based on a clear need and well researched science of human loading for specific occupancies that include assembly and areas with a potential for over-crowding.

- **Appendices - International Balustrade Loading-sml.pdf**
  https://www.cdpaccess.com/proposal/11759/35934/documentation/186794/attachments/download/9100/
- **Balustrade Pages from Structure August2024.pdf**
  https://www.cdpaccess.com/proposal/11759/35934/documentation/186794/attachments/download/9099/
- **Crowd Risks - Research Projects-sml.pdf**
  https://www.cdpaccess.com/proposal/11759/35934/documentation/186794/attachments/download/9096/

Bibliography: ASCE/SEI 7 – 22 Minimum Design Loads and Associated Criteria for Buildings and Other Structures

EN BS 1991-1-1: 2002 Eurocode 1: Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings

BS 6399-1: 1996 Loading for Buildings

BS 6180:2011 Barriers in and about buildings

AS/NZS 1170.1 – 2002 Structural design actions - Part 1: Permanent, imposed and other actions

National Building Code of Canada, 2015

NB 1225002-1 Norma Boliviana - Actions on Structures - Part 1(translated)

ABNT NBR 6120:2010 Norma Brasileira - Design Loads for Structures (translated)

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https://riskfrontiers.com/insights/behaviour-and-mechanics-of-crowd-crush-disasters/

Philadelphia railing collapse*:* https://www.youtube.com/watch?v=cBqyJPGZcdc

Rogers Arena collapse June 2023: https://globalnews.ca/video/9761158/railing-collapse-at-ufc-289-caught-on-video*;* https://www.youtube.com/watch?v=_tg0_23SgkI

“Off the Rails” National Center for Spectator Sports Safety and Security- Dr Gil Fried, Dr Aneurin Grant Dr Salih Kocak: https://ncs4.usm.edu/research/research-seminar-series/#popup-2

El Alto University balustrade collapse:

https://en.wikipedia.org/wiki/Public_University_of_El_Alto

https://www.infobae.com/america/america-latina/2021/03/02/el-presidente-de-bolivia-lamento-la-tragedia-ocurrida-en-la-universidad-de-el-alto-y-aseguro-que-espera-el-pronto-esclarecimiento-de-los-hechos/

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https://www.chicagotribune.com/espanol/sns-es-mueren-7-universitarios-al-caer-de-un-cuarto-piso-en-bolivia-20210302-6t2fwen3wjdifbczw7hyaaknde-story.html

https://metro.co.uk/2021/03/03/seven-students-dead-and-five-injured-after-university-railing-collapses-14182288/

Cost Impact: Increase

Estimated Immediate Cost Impact:

For typical use categories without assembly or over-crowding there is no cost impact and the changes are editorial in nature to account for assembly categories.

In major cities, the total cost of guard railing is approximately $550 per linear foot, being approximately 15% materials ($82.50), 30% fabrication ($165) and 45% site installation ($247.50).

For Category C, areas subject to assembly +3%

For Category D, areas subject to overcrowding +8%

Estimated Immediate Cost Impact Justification (methodology and variables):

Basis of Design - Steel balustrade post

Current load = 50 lbf/ft

$w := 50\ \frac{lbf}{ft}$ Uniform Load to Guard/Handrail

$s := 5\ ft$ Spacing of posts

$h := 42\ in$ Height of posts

$M := w \cdot s \cdot h = 10.5\ kip \cdot in$ Base moment

$M_u := M \cdot 1.5 = 15.75\ kip \cdot in$ Ultimate Design Moment (Required)

$F_y := 36\ ksi$ Yield Strength - Assuming a steel post

$b := 0.75\ in \quad d := 1.625\ in$ Assumed post size

$S_x := b \cdot \frac{d^2}{6} = 0.33\ in^3$

$\phi_b M_n := 0.9 \cdot 1.6 \cdot F_y \cdot S_x = 17.111\ kip \cdot in$ Capacity greater than demand OK

Category C, areas subject to assembly Assembly load = 100lbf/ft

$w := 100\ \frac{lbf}{ft}$ Uniform Load to Guard/Handrail

$s := 5\ ft$ Spacing of posts

$h := 42\ in$ Height of posts

$M := w \cdot s \cdot h = 21\ kip \cdot in$ Base moment

$M_u := M \cdot 1.5 = 31.5\ kip \cdot in$ Ultimate Design Moment (Required)

$F_y := 36\ ksi$ Yield Strength - Assuming a steel post

$b := 0.75\ in \quad d := 2.25\ in$ Assumed post size

$S_x := b \cdot \frac{d^2}{6} = 0.633\ in^3$

$\phi_b M_n := 0.9 \cdot 1.6 \cdot F_y \cdot S_x = 32.805\ kip \cdot in$ Capacity greater than demand OK

Material ratio relative to 50 lbf/ft $\frac{b \cdot d}{0.75\ in \cdot 1.625\ in} = 1.385$

Assume top rail and anchors increases by a similar proportion while infill elements remain unchanged.

Post, top rail and anchors as portion of materials 50%
(Post at 5ft on center, infill at 4in on center.)

Materials cost $82.50 \cdot 0.5 \cdot 1.385 + 82.50 \cdot 0.5 \cdot 1.0 = 98.381$

Materials increase $98.381 - 82.50 = 15.881$

Site Labor assumed to be similar and fabrication assumed to be similar

$New\_Cost := 550 + 15.88 = 565.88$

$Increase := \frac{New\_Cost}{550} = 1.029$ approx 3% increase.

Material

Category D, areas subject to assembly Crowd load = 200lbf/ft

$w := 200\ \frac{lbf}{ft}$	Uniform Load to Guard/Handrail
$s := 5\ ft$	Spacing of posts
$h := 42\ in$	Height of posts
$M := w \cdot s \cdot h = 42\ kip \cdot in$	Base moment
$M_u := M \cdot 1.5 = 63\ kip \cdot in$	Ultimate Design Moment (Required)
$F_y := 36\ ksi$	Yield Strength - Assuming a steel post
$b := 0.75\ in \quad d := 3.25\ in$	Assumed post size
$S_x := b \cdot \frac{d^2}{6} = 1.32\ in^3$	
$\phi_b M_n := 0.9 \cdot 1.6 \cdot F_y \cdot S_x = 68.445\ kip \cdot in$	Capacity greater than demand OK
Material ratio relative to 50 lbf/ft	$\frac{b \cdot d}{0.75\ in \cdot 1.625\ in} = 2$

Assume top rail and anchors increases by a similar proportion while infill elements remain unchanged.

Post, top rail and anchors as portion of materials 50%
(Post at 5ft on center, infill at 4in on center.)

Materials cost $82.50 \cdot 0.5 \cdot 2.0 + 82.50 \cdot 0.5 \cdot 1.0 = 123.75$

Materials increase $123.75 - 82.50 = 41.25$

Site Labor assumed to be similar and fabrication assumed to be similar

$$New\_Cost := 550 + 41.25 = 591.25$$

$$Increase := \frac{New\_Cost}{550} = 1.075$$ approx 8% increase.

Estimated Life Cycle Cost Impact:

Maintenance is unchanged.

For typical use categories without assembly or over-crowding there is no cost impact and the changes are editorial in nature to account for assembly categories.

For Category C, areas subject to assembly +3%

For Category D, areas subject to overcrowding +8%

Estimated Life Cycle Cost Impact Justification (methodology and variables):

The changes are consistent with changes made in Canada (crowd loading) and Europe, Britain, Australasia, Brazil, India and many other parts of the world (assembly and crowd loading.) In each case code boards, with similar cost objectives ("one added dollar of cost is one less person that can afford a home") found that the type of applications that this applies to do not affect typical construction and that the loadings are based on significant research into actual loads and were found to be necessary by many events resulting in multiple deaths and injuries.

Injury events result in extensive cost to the facility operator (often hundreds of thousands of dollars or millions of dollars per event.) Insurance costs affect the entire community. Injuries to the victims may be permanent.

Codes should provide realistic loads based on best knowledge to facilitate appropriate design and prevent catastrophic collapse.

Staff Analysis: CC # S76-25/CC #S77-25, CC S80-25 and CC # S74-25 addresses requirements in a different or contradicting manner.

The committee is urged to make their intensions clear with their actions on these proposals.

S91-25

IBC: 1609.8 (New), Figure 1609.8 (New), TABLE 1609.8 (New)

Proponents: Jay Crandell, P.E., ABTG / ARES Consulting, representing Self (jcrandell@aresconsulting.biz); Art DeGaetano, representing Northeast Regional Climate Center, Cornell University (atd2@cornell.edu)

2024 International Building Code

Add new text as follows:

1609.8 Wind-driven rain. Minimum design wind pressures used to evaluate the wind-driven rain resistance of building assemblies and components shall be permitted to be determined in accordance with Figure 1609.8 and Table 1609.8.

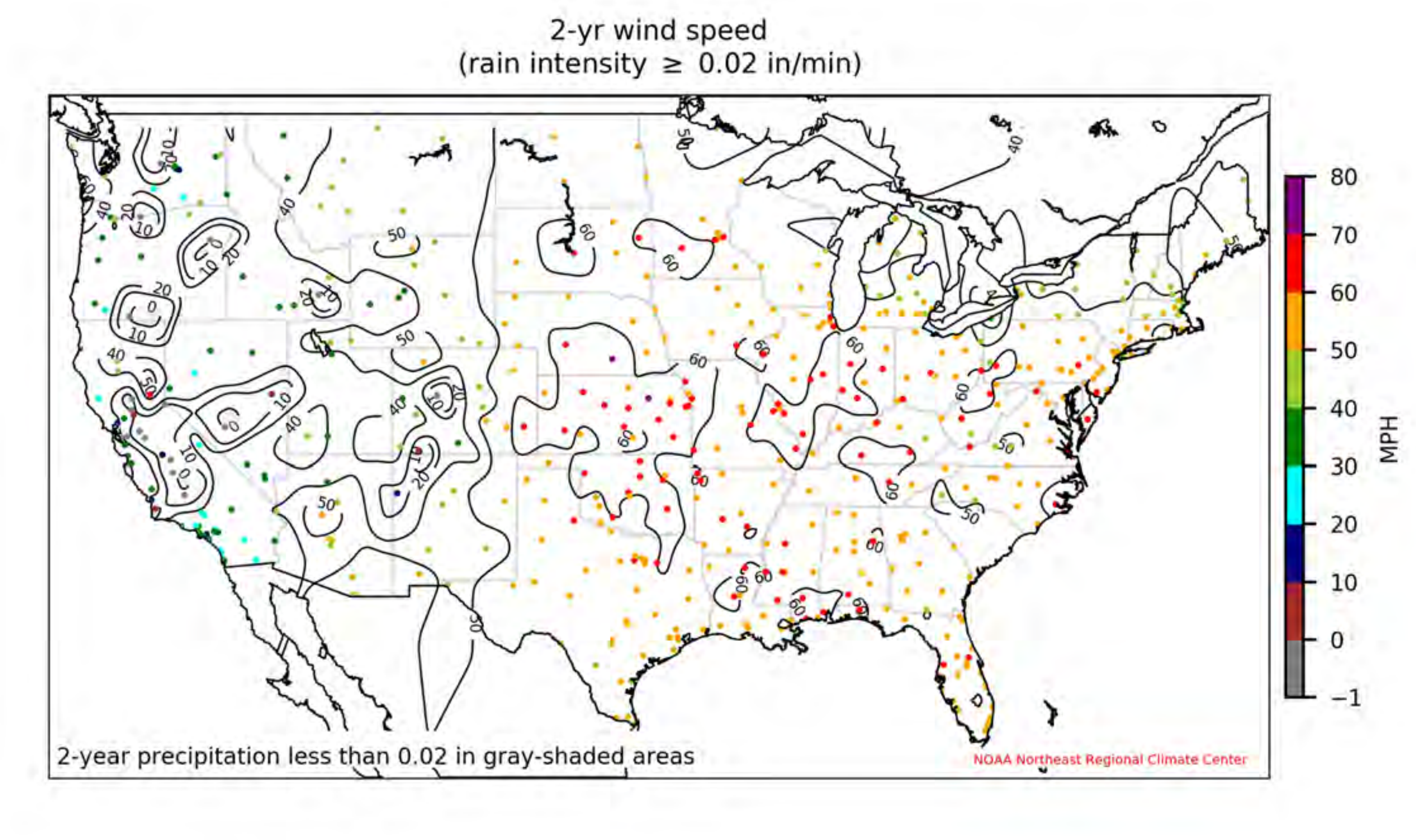

Figure 1609.8 Wind-driven rain wind speed (mph, 3 sec gust)
[For SI: 1 mph = 0.447 m/s]

TABLE 1609.8 MINIMUM WIND-DRIVEN RAIN DESIGN PRESSURE (PSF)[a,b]

Wind Exposure	Mean Roof Height (ft)	Wind-driven Rain Wind Speed (mph, 3-sec gust) from Figure 1609.8					
		≤ 30	40	50	60	70	80

B	15	2.86	2.86	2.86	3.21	4.37	5.71
	20	2.86	2.86	2.86	3.50	4.76	6.21
	25	2.86	2.86	2.86	3.72	5.06	6.61
	30	2.86	2.86	2.86	3.95	5.37	7.02
	40	2.86	2.86	2.98	4.28	5.83	7.62
	50	2.86	2.86	3.17	4.57	6.22	8.12
	60	2.86	2.86	3.33	4.79	6.52	8.52
C	15	2.86	2.86	4.01	5.77	7.85	10.3
	20	2.86	2.86	4.24	6.11	8.31	10.9
	25	2.86	2.86	4.43	6.38	8.68	11.3
	30	2.86	2.96	4.62	6.65	9.05	11.8
	40	2.86	3.14	4.90	7.06	9.61	12.6
	50	2.86	3.29	5.14	7.40	10.1	13.2
	60	2.86	3.41	5.33	7.67	10.4	13.6
D	15	2.86	3.35	5.23	7.53	10.3	13.4
	20	2.86	3.51	5.48	7.90	10.8	14.0
	25	2.86	3.64	5.69	8.19	11.2	14.6
	30	2.86	3.77	5.89	8.48	11.6	15.0
	40	2.86	3.96	6.20	8.92	12.1	15.0
	50	2.86	4.13	6.45	9.29	12.6	15.0
	60	2.86	4.26	6.65	9.58	13.0	15.0

For SI: 1 psf = 47.9 Pa; 1 mph = 0.447 m/s; 1 ft = 0.305 m

a. Wind-driven rain wind speed is to be obtained from Figure 1609.8 which provides 3-second gust wind speeds at standard conditions of wind exposure C (open, flat terrain) at a height of 33 ft (10m) above ground.

b. The tabulated pressures are positive components and cladding pressures calculated in accordance with ASCE 7 for a windward wall for the indicated exposure condition and building mean roof height. Wind directionality is not used to reduce the wind-driven rain pressure. The wind speed obtained from Figure 1609.8 used for this pressure calculation is adjusted from a 3-sec gust basis to a 1-min average wind speed using the following wind speed averaging time conversion factors: 0.72 (Exposure B), 0.79 (Exposure C), and 0.82 (Exposure D). Wind-driven rain pressures for different exposure and mean roof height conditions shall be permitted to be calculated in a consistent manner in accordance with ASCE 7 and Figure 1609.8. The calculated pressure shall not be less than 2.86 psf and need not exceed 15.0 psf.

Reason: The code lacks a risk-consistent basis for addressing wind-driven rain and resistance to water intrusion. This proposal provides a wind-driven rain hazard map (i.e., annual extreme 3-sec gust wind speeds coincidental with a minimum rainfall rate threshold) to properly characterize the hazard as it varies across wind-driven rain climatology of the U.S. Coordinating proposals have been submitted for the IBC and IRC.

First, the proposal “permits” and does not mandate use of these wind-driven rain wind speeds and associated minimum design pressures for evaluation water penetration resistance. This approach is necessary because various other code referenced product standards will need time to consider and re-align with this new hazard-based approach to wind-driven rain resistance. The proposed map and table requirements are somewhat more conservative than, but generally consistent with, current industry minimum and maximum pressure values used in practice. But now the selection of a design pressure for specification of water penetration resistance is properly related to variation in actual hazard across the US (and variation in fundamental wind load parameters such as exposure and building height).

The two key components of this proposal are further explained as follows:

Figure 1609.8 / R301.2.1.6 - The wind-driven rain wind speed map is based on the JAMC article referenced in the Bibliography as a joint effort of the University of Florida and Cornell University's Northeast Climate Data Center with support from other interested parties, including the Insurance Institute for Business and Home Safety (IBHS). Additional work to extend the research to develop a US map was funded by NOAA at Cornell University. The climatology of wind-driven rain is developed from recently available 1-min weather observations from National Weather Service Automated Surface Observing Systems (ASOS). One-minute data better represent the joint occurrence of the extremes that define wind-driven rain occurrence than hourly data, which previously was the shortest available temporal resolution. After adjusting the winds speeds to standardize for exposure and anemometer type, the wind data corresponding to specific rainfall thresholds were fit to a statistical distribution to obtain estimates of the recurrence of wind speeds associated with different rainfall intensities. The values serve as the basis for a wind-driven rain climatology for the United States that is analogous to climatologies that exist and inform building codes in Europe and Canada. The wind-driven rain map represents a 3-sec gust wind speed (miles per hour) for a 2-yr mean recurrence interval with a threshold coincidental rainfall rate of 0.02 in/min (0.5 mm/min). For additional information, refer to the JAMC article referenced in Bibliography.

Table 1609.8 / **R301.2.1.6** - The main purpose of the mapped wind-driven rain hazard is to provide a wind-driven rain wind speed from which an appropriate, risk-consistent pressure differential can be determined as a means to specify or evaluate water-resistance of wall assemblies and exterior wall covering assemblies or components. The pressure differential may be determined in two ways. One way is to use pre-calculated values as shown in the table. The other way is to calculate the pressure using the ASCE 7 provisions for wind loads, but substituting the appropriate wind-driven rain wind speed from Figure 1609.8 / R301.2.1.6 for the basic wind speed used for structural design purposes in ASCE 7.

The latter method was how the table values were generated (as detailed for transparency and repeatability in the table footnotes). An example of calculating the wind-driven rain wind pressure using Figure 1609.8 / R301.2.1.6 and the wind load provisions of ASCE 7 is as follows:

Wind-driven rain wind speed: 60 mph, 3sec gust (Figure 1609.8 / R301.2.1.6)

Wind Exposure: B (suburban/wooded)

Building Height: 30 feet

Wall Pressure coefficients – GCp = 1.0 (positive); GCpi = -0.18 (negative internal pressure)

Kz = 0.7 (exposure B, 30' height)

Kd = 1.0 (directionality not considered)

Kzt = 1.0 (no topographic wind speed up effects considered)

Ke = 1.0 (no elevation effects considered w/r to lower density of air at higher elevations)

V1-min/V3-sec conversion factor: 0.72

$p = [0.00256\ Kz\ Kzt\ Kd\ Ke\ (0.72 \times V)^2] \times [GCp - GCpi]$

$= 0.00256(0.7)(1.0)(1.0)(1.0)(0.72 \times 60)^2 \times [1.0 + 0.18]$

= (3.34 psf) x [1.18] = **3.95 psf**

The range of calculated pressures are shown in the following supplemental table without inclusion of the minimum and maximum pressure values consistent with the extremes of current practice as discussed later below. This table is provided for transparency and informational purposes.

Pressures (psf) for Water Resistance Evaluation (based on conversion to 1-min average wind speed)

Wind Exposure	Mean Roof Height (ft)	WDR Wind Speed (MPH - 3 sec gust) 10	20	30	40	50	60	70	80	90	100
	15	0.09	0.36	0.80	1.43	2.23	3.21	4.37	5.71	7.23	8.93
	20	0.10	0.39	0.87	1.55	2.43	3.50	4.76	6.21	7.86	9.71
	25	0.10	0.41	0.93	1.65	2.58	3.72	5.06	6.61	8.37	10.34
B	30	0.11	0.44	0.99	1.75	2.74	3.95	5.37	7.02	8.88	10.96
	40	0.12	0.48	1.07	1.90	2.98	4.28	5.83	7.62	9.64	11.90
	50	0.13	0.51	1.14	2.03	3.17	4.57	6.22	8.12	10.27	12.68
	60	0.13	0.53	1.20	2.13	3.33	4.79	6.52	8.52	10.78	13.31
	15	0.16	0.64	1.44	2.56	4.01	5.77	7.85	10.26	12.98	16.02
	20	0.17	0.68	1.53	2.71	4.24	6.11	8.31	10.86	13.74	16.97
	25	0.18	0.71	1.59	2.84	4.43	6.38	8.68	11.34	14.35	17.72
C	30	0.18	0.74	1.66	2.96	4.62	6.65	9.05	11.82	14.97	18.48
	40	0.20	0.78	1.76	3.14	4.90	7.06	9.61	12.55	15.88	19.61
	50	0.21	0.82	1.85	3.29	5.14	7.40	10.07	13.15	16.65	20.55
	60	0.21	0.85	1.92	3.41	5.33	7.67	10.44	13.63	17.26	21.30
	15	0.21	0.84	1.88	3.35	5.23	7.53	10.25	13.39	16.95	20.92
	20	0.22	0.88	1.97	3.51	5.48	7.90	10.75	14.04	17.77	21.94
	25	0.23	0.91	2.05	3.64	5.69	8.19	11.15	14.56	18.43	22.75
D	30	0.24	0.94	2.12	3.77	5.89	8.48	11.55	15.08	19.09	23.56
	40	0.25	0.99	2.23	3.96	6.20	8.92	12.14	15.86	20.07	24.78
	50	0.26	1.03	2.32	4.13	6.45	9.29	12.64	16.51	20.89	25.80
	60	0.27	1.06	2.39	4.26	6.65	9.58	13.04	17.03	21.55	26.61

Second, it is important to note that the failure mode that this proposal addresses is the initiation of a leak (onset of water intrusion) at the most extreme (worst) 1-minute of coincidental wind and rain that would typically occur in a given year on average. Therefore, it provides protection for routine and lesser extreme events that have equal or lower wind-driven rain wind speed (even if the rainfall rate is substantially greater than the threshold used to develop the map). Events that exceed the wind-driven rain wind speed tend to have lower coincidental rainfall rates as based on the natural tendency or shape of the hazard curves in the climatological data (see JAMC article referenced in Bibliography).

Finally, as shown in the tabulated pressure values in the proposal, the lower limit of 2.86 psf (137 Pa) for test pressure is used to correspond with the minimum test pressure used in recognized standards addressing wind-driven rain resistance (e.g., ASTM E331) despite the table above showing that lower pressure could be justified in regions of low wind-driven rain hazard. The upper limit of 15.0 psf (718 Pa) also is based on current accepted practice for worst-case wind-driven rain climate conditions in the U.S. and ensures the availability of solutions (it also ensures equivalency with current accepted practices for regions or conditions considered to have high wind-driven rain hazard). This range of WDR pressures also is consistent with that used in Canada. These limits ensure that this new approach is “calibrated” to accepted practice and that solutions are available while also better aligning solutions with actual variation in U.S. wind-driven rain hazard. Even so, the 15 psfcap will provide substantial protection against significant water intrusion and contents damage in greater wind-driven rain hazard conditions or events (higher wind speed at greater return periods) up to the point where structural failures begin to occur and the general integrity of the building envelope is compromised. Such extreme structural safety-level events are beyond the scope of a serviceability concern underlying the current and proposed approach to water resistance. Regardless, the proposed approach deals with the matter of wind-driven rainwater resistance in a much more risk-consistent fashion based on the variation in hazard across the U.S. (wind-driven rain wind speed) and for different building conditions (e.g., wind exposure and building height).

Bibliography: Belcher, B.N., DeGaetano, A.T., Masters, F.J., Crandell, J., and Morrison, M.J. (2023). Development of an Extreme Wind-Driven Rain Climatology for the Southeastern United States Using 1-Min Rainfall and Peak Wind Speed Data. Journal of Applied Meteorology and Climatology, American Meteorological Society, DOI: https://doi.org/10.1175/JAMC-D-22-0156.1

Cost Impact: Increase

Estimated Immediate Cost Impact:

$0 - While the cost impact indicates “increased cost” (there was no suitable default answer in cdpACCESS), the proposal does not mandate any new requirements. It provides a new means or option to evaluate building wall assemblies and components for water resistance using an improved methodology based on actual wind-driven rain hazard. If voluntarily used, it could result in an increase or decrease cost for material or assembly qualification purposes relative to existing practices. But, the increase or decrease in cost to the end user may be very small. This proposal also does not require any existing materials or methods recognized in the code to alter current requirements, methods, or standards. So, it should be considered cost neutral.

Estimated Immediate Cost Impact Justification (methodology and variables):

$0 - see cost impact statement above.

Estimated Life Cycle Cost Impact:

$0 - see cost impact statement above (although improved risk-consistency of wind-driven rain performance can result in improved durability and reduced life-cycle cost impacts).

Estimated Life Cycle Cost Impact Justification (methodology and variables):

See cost impact statement.

S92-25

IBC: 1609.8 (New), TABLE 1609.8(1) (New), TABLE 1609.8(2) (New)

Proponents: Dave Monsour, THOMAS ASSOCIATES, INC. (DASMA), representing DASMA (Door & Access Systems Manufacturers Assoc.) (dmonsour@thomasamc.com)

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Add new text as follows:

1609.8 Vehicle Access Doors. For buildings designed as enclosed, design wind pressures for vehicle access doors shall be obtained using Table 1609.8(1). Table values shall be adjusted for height and exposure by multiplying by the adjustment coefficient in Table 1609.8(2). The resulting positive and negative design wind pressures shall not be less than 10 psf.

TABLE 1609.8(1) VEHICLE ACCESS DOOR WIND LOADS FOR AN ENCLOSED BUILDING WITH A MEAN ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B (ASD) (psf)[a, b, c, d, e, f, g]

DOOR SIZE		DOOR AREA (ft^2)	BASIC DESIGN WIND SPEED, V (mph)																							
			90		100		110		120		130		140		150		160		170		180		190		200	
WIDTH (ft)	HEIGHT (ft)		Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg
ROOF ANGLE 0-10 DEGREES																										
8	8	64	6.9	-7.9	8.6	-9.7	10.4	-11.7	12.3	-14.0	14.5	-16.4	16.8	-19.0	19.3	-21.8	21.9	-24.8	24.8	-28.0	27.8	-31.4	30.9	-35.0	34.3	-38.8
10	10	100	6.7	-7.5	8.3	-9.3	10.0	-11.2	11.9	-13.4	14.0	-15.7	16.2	-18.2	18.6	-20.9	21.2	-23.8	24.0	-26.9	26.9	-30.1	29.9	-33.6	33.2	-37.2
14	14	196	6.4	-7.1	7.9	-8.8	9.5	-10.6	11.3	-12.6	13.3	-14.8	15.4	-17.2	17.7	-19.7	20.1	-22.4	22.7	-25.3	25.5	-28.4	28.4	-31.6	31.5	-35.1
ROOF ANGLE > 10 DEGREES																										
9	7	63	7.6	-8.6	9.3	-10.6	11.3	-12.8	13.5	-15.2	15.8	-17.9	18.3	-20.7	21.0	-23.8	23.9	-27.0	27.0	-30.5	30.3	-34.2	33.7	-38.1	37.4	-42.3
16	7	112	7.2	-8.1	9.0	-10.0	10.8	-12.1	12.9	-14.4	15.1	-16.9	17.5	-19.6	20.1	-22.5	22.9	-25.5	25.9	-28.8	29.0	-32.3	32.3	-36.0	35.8	-39.9

For SI: 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = .0479 kPa

a. Interpolation shall be permitted for door areas or basic design wind speeds between those given above. For larger door areas, the values in this table shall be used.

b. Positive and negative values signify, respectively, pressures acting toward and away from the exterior surface of the door

c. Negative pressures assume the door overlaps the building's end zone by 2 feet. For overlaps less than 2 feet, the values in this table shall be used.

d. For Risk Category III and IV structures in the tornado prone region, the door shall meet the load requirements of this table or the design tornado pressure determined in accordance with Section 1609.5, whichever is greater

e. Tabulated values are calculated in accordance with ASCE 7 using the 0.6 factor for ASD and an elevation factor of 1.0. Lower elevation factors shall be permitted to be used in accordance with ASCE 7 Table 26.9-1.

f. Design wind pressures shall be determined in accordance with ASCE 7 in the following cases:

   1. Buildings designed as open, partially open, or partially enclosed.
   2. Door areas less than 63 ft^2.
   3. Basic wind speeds greater than 200 mph.
   4. Doors overlapping the building end zone more than 2 feet.
   5. Building mean roof height greater than 60 feet.
   6. Building types and conditions not within the scope (Section 30.1) of Chapter 30 of ASCE 7.

g. Topographic Factor, Kzt, is taken as 1. Determine design wind pressure in accordance with ASCE 7 where the topographic conditions of ASCE 7 Section 26.8 apply.

TABLE 1609.8(2) ADJUSTMENT FACTOR FOR BUILDING HEIGHT AND EXPOSURE

MEAN ROOFHEIGHT (ft)	EXPOSURE CATEGORY		
	B	C	D
15	0.82	1.21	1.47
20	0.89	1.29	1.55
25	0.94	1.35	1.61
30	1.00	1.40	1.66
35	1.05	1.45	1.70
40	1.06	1.49	1.74
45	1.10	1.53	1.78
50	1.13	1.56	1.81
55	1.16	1.59	1.84
60	1.19	1.62	1.87

For SI:1 foot= 304.8 mm

Reason: Vehicle access doors (e.g., sectional garage doors, rolling doors, and high-speed doors) are critical in maintaining building structural integrity during windstorms. If a vehicle access door gives way, internal pressure can build up on the roof, leading to building collapse. This phenomenon has been demonstrated in many field and laboratory studies over the years by NIST, IBHS, FEMA, and others. Yet these same organizations, as well as DASMA, report a general lack of wind-rated doors being specified and enforced in many regions throughout the country. This proposal requests a new table for vehicle access door design wind pressures. The table highlights and simplifies existing design wind pressure requirements for vehicle access doors, currently subsumed under “wall components & cladding.” The new table does not create any new requirements. We believe this new table will foster greater compliance with existing provisions of the code. A version of this table has been used for the past several editions of the Florida Building Code and in several residential codes, such as ICC 600-2020 Standard for Residential Construction in High-Wind Regions.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal only clarifies existing requirements, and does not change them. The tabulated pressures are calculated in accordance with existing IBC requirements.

S97-25 Part III

IBC: G101.1, G101.2, G101.3, G103.1, G103.2, G104.3, G104.4, G104.8, G104.9, G104.10, G105.1, G105.2, G106.4, G107.1, G107.2, G109.1, G109.3, G109.4, G110.2, G112.1, G112.3, G114.2, G114.4, G114.5, G114.6, TABLE G115.1, J101.2

Proponents: Jennifer Goupil, American Society of Civil Engineers and Structural Engineering Institute, representing American Society of Civil Engineers (jgoupil@asce.org); Chad Berginnis, representing Association of State Floodplain Managers (cberginnis@floods.org); Natalie Enclade, representing BuildStrong America (natalie@buildstrongamerica.com); Jiqiu yuan, representing National Institute of Building Sciences (jyuan@nibs.org); Joel Scata, representing NRDC (jscata@nrdc.org)

2024 International Building Code

APPENDIX G
FLOOD-RESISTANT CONSTRUCTION

SECTION G101
ADMINISTRATION

Revise as follows:

G101.1 Purpose. The purpose of this appendix is to promote the public health, safety and general welfare and to minimize public and private losses due to *flood* conditions in specific *flood hazard areas*, including *special flood hazard areas* and *500-year floodplains*, through the establishment of comprehensive regulations for management of *flood hazard areas* designed to:

1. Prevent unnecessary disruption of commerce, access and public service during times of *flooding*.
2. Manage the alteration of natural flood plains, stream channels and shorelines.
3. Manage filling, grading, dredging and other *development* that may increase flood damage or erosion potential.
4. Prevent or regulate the construction of flood barriers that will divert floodwaters or that can increase flood hazards.
5. Contribute to improved construction techniques in the flood plain.

G101.2 Objectives. The objectives of this appendix are to protect human life, minimize the expenditure of public money for flood control projects, minimize the need for rescue and relief efforts associated with *flooding*, minimize prolonged business interruption, minimize damage to public *facilities* and utilities, help maintain a stable tax base by providing for the sound use and *development* of flood-prone areas, contribute to improved construction techniques in the flood plain and ensure that potential *owners* and occupants are notified that property is within *flood hazard areas*, including *special flood hazard areas* and *500-year floodplains*.

G101.3 Scope. The provisions of this appendix shall apply to all proposed *development* in ~~a~~ *flood hazard areas*, including *special flood hazard areas* and *500-year floodplains*, established in Section 1612 of this code, including certain building work exempt from *permit* under Section 105.2.

SECTION G103
APPLICABILITY

G103.1 General. This appendix, in conjunction with this code, provides minimum requirements for *development* located in *flood hazard areas*, including *special flood hazard areas* and *500-year floodplains*,including:

1. The subdivision of land.
2. Site improvements and installation of utilities.
3. Placement and replacement of *manufactured homes*.

4. Placement of *recreational vehicles*.
5. New construction and *repair*, reconstruction, rehabilitation or *additions* to new construction.
6. *Substantial improvement* of *existing buildings* and *structures*, including restoration after damage.
7. Installation of tanks.
8. *Temporary structures*.
9. Temporary or permanent storage, utility and miscellaneous Group U *buildings* and *structures*.
10. Certain building work exempt from *permit* under Section 105.2 and other *buildings* and *development* activities.

G103.2 Establishment of flood hazard areas. *Flood hazard areas*, including *special flood hazard areas* and *500-year floodplains*, are established in Section 1612.3 of this code, adopted by the applicable governing authority on **[INSERT DATE]**.

SECTION G104
POWERS AND DUTIES

G104.3 Determination of ~~design~~ base flood elevations. If ~~*design*~~ *base flood elevations* are not specified for *special flood hazard areas*, the floodplain administrator is authorized to require the applicant to ~~meet~~ do one of the following:

1. Obtain, review and reasonably utilize *base flood elevation* data available from a federal, state or other source.
2. Determine the ~~*design*~~ *base flood elevation* in accordance with accepted hydrologic and hydraulic engineering ~~techniques~~ practices used to define *special flood hazard areas*. Such analyses shall be performed and sealed by a *registered design professional*. Studies, analyses and computations shall be submitted in sufficient detail to allow review and approval by the floodplain administrator. The accuracy of data submitted for such determination shall be the responsibility of the applicant.

G104.4 Activities in riverine flood hazard areas. In riverine *special flood hazard areas* where ~~*design*~~ *base flood elevations* are specified but *floodways* have not been designated, the floodplain administrator shall not permit any new construction, *substantial improvement* or other *development*, including fill, unless the applicant submits an engineering analysis prepared by a *registered design professional*, demonstrating that the cumulative effect of the proposed *development*, when combined with all other existing and anticipated *special flood hazard area* encroachment, will not increase the ~~*design*~~ *base flood elevation* more than 1 foot (305 mm) at any point within the community.

G104.8 Records. The floodplain administrator shall maintain a permanent record of all *permits* issued in *flood hazard areas*, including *special flood hazard areas* and *500-year floodplains*, including supporting certifications and documentation required by this appendix and copies of inspection reports, design certifications and documentation of elevations required in Section 1612 of this code and Section R306of the *International Residential Code*.

G104.9 Inspections. *Development* for which a *permit*under this appendix is required shall be subject to inspection. The floodplain administrator or the floodplain administrator’s designee shall make, or cause to be made, inspections of all *development* in *flood hazard areas*, including *special flood hazard areas* and *500-year floodplains*, authorized by issuance of a *permit*under this appendix.

G104.10 Use of changed technical data. The floodplain administrator and the applicant shall not use changed *flood hazard area* boundaries, or changed *base flood elevations* or 500-year flood elevations, for proposed *buildings* or *developments* unless the floodplain administrator or applicant has applied for a conditional *Flood Insurance Rate Map* (*FIRM*) revision and has received the approval of the Federal Emergency Management Agency (FEMA).

SECTION G105
PERMITS

G105.1 Required. Any *person*, *owner* or *owner*'s authorized agent who intends to conduct any *development* in a *flood hazard area*, including *special flood hazard areas* and *500-year floodplains*, shall first make application to the floodplain administrator and shall obtain the required *permit*.

G105.2 Application for permit. The applicant shall file an application in writing on a form furnished by the floodplain administrator. Such application shall:

1. Identify and describe the *development* to be covered by the *permit*.
2. Describe the land on which the proposed *development* is to be conducted by legal description, street address or similar description that will readily identify and definitely locate the *site*.
3. Include a site plan showing the delineation of *special flood hazard areas*, *500-year floodplains*, *floodway* boundaries, *flood* zones, ~~design~~ base *flood elevations*, ground elevations, proposed fill and excavation and drainage patterns and *facilities*.
4. Include in subdivision proposals and other proposed *developments* with more than 50 *lots* or larger than 5 acres (20 234 m^2), *base flood elevation* data in accordance with Section 1612.3.~~1~~ 2 if such data are not identified for the *flood hazard areas* established in Section G103.2.
5. Indicate the use and occupancy for which the proposed *development* is intended.
6. Be accompanied by *construction documents*, grading and filling plans and other information deemed appropriate by the floodplain administrator.
7. State the valuation of the proposed work.
8. Be signed by the applicant or the applicant's authorized agent.

SECTION G106 VARIANCES

G106.4 Functionally dependent facilities. A *variance* is authorized to be issued for the construction or *substantial improvement* of a *functionally dependent facility* provided that the criteria in Section 1612.1 are met and the *variance* is the minimum necessary to allow the construction or *substantial improvement*, and that all due consideration has been given to methods and materials that minimize *flood* damages during the ~~design~~ base *flood* and do not create additional threats to public safety.

SECTION G107 SUBDIVISIONS

G107.1 General. Any subdivision proposal, including proposals for manufactured home parks and subdivisions, or other proposed new *development* in a *flood hazard area*, including *special flood hazard areas* and *500-year floodplains*, shall be reviewed to verify all of the following:

1. Such proposals are consistent with the need to minimize *flood* damage.
2. Public utilities and *facilities*, such as sewer, gas, electric and water systems, are located and constructed to minimize or eliminate *flood* damage.
3. Adequate drainage is provided to reduce exposure to *flood* hazards.

G107.2 Subdivision requirements. The following requirements shall apply in the case of any proposed subdivision, including proposals for manufactured home parks and subdivisions, any portion of which lies within a *flood hazard area*, including *special flood hazard areas* and *500-year floodplains*:

1. The *special flood hazard area* and *500-year floodplain*, including *floodways*, *coastal high-hazard areas* and coastal A zones, as appropriate, shall be delineated on tentative and final subdivision plats.

2. ~~*Design*~~ *Base flood elevations* and flood elevations in *500-year floodplains* shall be shown on tentative and final subdivision plats.
3. Residential *building lots* shall be provided with adequate buildable area outside the *floodway*.
4. The design criteria for utilities and *facilities* set forth in this appendix and appropriate International Codes shall be met.

SECTION G109 MANUFACTURED HOMES

G109.1 Required elevation ~~Elevation~~. All new and replacement *manufactured homes* to be placed or substantially improved in a *flood hazard area*, including *special flood hazard areas* and *500-year floodplains*, shall be elevated such that the top of the foundation for the *manufactured home* is at or above the ~~*design*~~ *base flood elevation* plus 2 feet.

G109.3 Anchoring. All new and replacement *manufactured homes* to be placed or substantially improved ~~in a *flood hazard area*~~ shall be installed using methods and practices that minimize *flood* damage. *Manufactured homes* shall be securely anchored to an adequately anchored foundation system to resist flotation, collapse and lateral movement. Methods of anchoring are authorized to include, but are not limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable state and local anchoring requirements for resisting wind forces.

G109.4 Protection of mechanical equipment and outside appliances. Mechanical equipment and outside appliances shall be elevated to or above the required elevation. ~~*design flood elevation*.~~

Exception: Where such equipment and appliances are designed and installed to prevent water from entering or accumulating within their components and the systems are constructed to resist hydrostatic and hydrodynamic *loads* and stresses, including the effects of buoyancy, during the occurrence of *flooding* up to the elevation required by Section R306 of the *International Residential Code*, the systems and equipment shall be permitted to be located below the elevation required by Section R306 of the *International Residential Code*. Electrical wiring systems shall be permitted below the required elevation ~~design *flood* elevation~~ provided that they conform to the provisions of NFPA 70.

SECTION G110 RECREATIONAL VEHICLES

G110.2 Temporary placement. *Recreational vehicles* ~~in *flood hazard areas*~~ shall be fully licensed and ready for highway use, or shall be placed on a *site* for less than 180 consecutive days.

SECTION G112 OTHER BUILDING WORK

G112.1 Garages and accessory structures. Garages and accessory *structures* shall be designed and constructed in accordance with ASCE 24, subject to the following limitations:

1. In *special flood hazard areas* and *500-year floodplains* other than *coastal high-hazard areas* and coastal A Zones, the floors of detached garages and detached accessory storage *structures* are permitted below the elevations specified in ASCE 24, provided that such *structures* are used solely for parking or storage, are one *story* and not larger than 600 square feet (55.75 m^2).
2. In *coastal high-hazard areas* and coastal A Zones, the floors of detached garages and detached accessory storage *structures* are permitted below the elevations specified in ASCE 24, provided that such *structures* are used solely for parking or storage, are one *story* and are not larger than 100 square feet (9.29 m^2). Such *structures* shall not be required to have breakaway walls or flood openings.

G112.3 Oil derricks. Oil derricks l~~ocated in *flood hazard areas*~~ shall be designed in conformance with the *flood loads* in Sections 1603.1.7 and 1612.

SECTION G114 UTILITY AND MISCELLANEOUS GROUP U

G114.2 Flood loads. Utility and miscellaneous Group U *buildings* and *structures*, including *substantial improvement* of such *buildings* and *structures*, shall be anchored to prevent flotation, collapse or lateral movement resulting from *flood loads*, including the effects of buoyancy, during conditions of the ~~*design*~~ base *flood*.

G114.3 Required elevation ~~Elevation~~. Utility and miscellaneous Group U *buildings* and *structures*, including *substantial improvement* of such *buildings* and *structures*, shall be elevated such that the *lowest floor*, including *basement*, is elevated to or above the elevation required by ASCE 24 ~~*design flood elevation* in accordance with Section 1612 of this code~~.

G114.4 Enclosures below ~~design flood~~ the required elevation. Fully enclosed areas below the required elevation ~~*design flood elevation*~~ shall be constructed in accordance with ASCE 24.

G114.5 Flood-damage-resistant materials. *Flood-damage-resistant materials* shall be used below the required elevation ~~*design flood elevation*~~.

G114.6 Protection of mechanical, plumbing and electrical systems. Mechanical, plumbing and electrical systems, including plumbing fixtures, shall be elevated to or above the required elevation ~~*design flood elevation*~~.

> **Exception:** Electrical systems, equipment and components; heating, ventilating, air conditioning and plumbing appliances; plumbing fixtures, duct systems and other service equipment shall be permitted to be located below the required elevation ~~*design flood elevation*~~ provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic *loads* and stresses, including the effects of buoyancy, during the occurrence of flooding to the required elevation ~~*design flood elevation*~~ in compliance with the flood-resistant construction requirements of this code. Electrical wiring systems shall be permitted to be located below the required elevation ~~*design flood elevation*~~ provided that they conform to the provisions of NFPA 70.

SECTION G115 REFERENCED STANDARDS

G115.1 General. See Table G115.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, standard title, and the section or sections of this appendix referenced in the standard.

TABLE G115.1 REFERENCED STANDARDS

STANDARD ACRONYM	STANDARD NAME	SECTIONS HEREIN REFERENCED
ASCE 24— ~~14~~ 24	*Flood Resistant Design and Construction*	G104.1, G108.3, G108.4, G111.1, G112.1, G112.5, G112.6, G112.7, G113.1, G114.4
HUD 24 CFR Part 3285 (2008)	*Manufactured Home Construction and Safety Standards*	G102
IBC—24	*International Building Code®*	G103.2, G114.1, G114.3
IRC—24	*International Residential Code®*	G109.2, G109.4, G109.5
NFPA 70—23	*National Electric Code®*	G109.4, G114.6

APPENDIX J GRADING

SECTION J101 GENERAL

J101.2 Flood hazard areas. Unless the applicant has submitted an engineering analysis, prepared in accordance with standard engineering practice by a *registered design professional*, that demonstrates the proposed work will not result in any increase in the level of the *base flood*, *grading*, *excavation* and earthwork construction, including fills and embankments, shall not be permitted in *floodways* that are in *flood hazard areas* established in Section 1612.3 or in *flood hazard areas* where ~~*design*~~ *base* *flood elevations* are specified but *floodways* have not been designated.

Reason: REASON STATEMENT:

This proposal is a coordination proposal to bring the 2027 edition of the I-Codes up to date with the provisions in the 2022 edition of *ASCE/SEI 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures, Supplement 2* (ASCE/SEI 7-22, Supplement 2) as well as the 2024 edition of *ASCE/SEI 24 Flood Resistant Design and Construction* (ASCE/SEI 24-24) --- specifically for the codes primarily affected such as the International Building Code (IBC), the International Residential Code (IRC), and the International Existing Building Code (IEBC), in Group B, but also every I-Code affected by a coordinating code change that will need to be updated. ASCE/SEI 7-22 is the current reference in 2024 I-Codes and Supplement 2 has been submitted as an Administrative Update. ASCE/SEI 24-24 has also been submitted as an Administrative Update to the 2027 I-Codes.

This proposal has been organized into Part I to Part VII and includes technical updates as well as editorial coordination. The specific changes to each section included in this proposal are outlined in Overview below, and a detailed summary of the technical updates are explained in Technical Rationale below that. In addition to the strike out/underline for the code change proposals, the MS Word documents for each affected I-Code have been provided as Attached Files for clarity.

Overview:

All Codes, All Chapter: Add phase "including special flood hazard areas and 500-year floodplain" following flood area for clarity. And change to clarify term definitions and when "base flood" applies and when "design flood" applies. Also aligns definitions of "base flood elevation" and "design flood elevations". "Flood Hazard Area" is updated with a new definition. These two changes are carried out throughout the series of these comprehensive code change proposal for clarification and consistency.

Appendix G and J: These changes are provided in a separate Code Change Proposal but must be included for a comprehensive proposal. The proposed changes align with the IBC proposed changes including the following: differentiate between base and desgin flood; specifying that the flood hazard area includes the special flood hazard areas and the 500-year floodplain; and updates to pointers.

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Technical Rationale:

The American Society of Civil Engineers (ASCE) is proposing revisions to the International Code Council's I-Codes for the 2027 Cycle to align the national codes with the current ASCE/SEI design standards including:

ASCE/SEI 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures, 2022 edition; Supplement 2 (ASCE/SEI 7-22 S2)

ASCE/SEI 24 Flood Resistant Design and Construction, 2024 edition (ASCE/SEI 24-24)

The loading standard ASCE/SEI 7-22 S2 and the design standard ASCE/SEI 24-24 work together – these documents have been developed to be consistent and coordinated so they can be required and used together. There are three significant changes in the national loading standard ASCE/SEI 7-22 S2 including (1) an extension of the defined Flood Hazard Area to the 500-year floodplain for Rick Category II, III, and IV structures, (2) an inclusion of risk-based design for loads, and (3) requirements to include relative sea level change into design load calculations for coastal sites; see below for more technical details. There are three significant changes in the national design standard ASCE/SEI 24-24 including (1) alignment with ASCE/SEI 7-22 S2, (2) alignment with FEMA Technical Bulletins, and (3) updates for elevations, materials, and floodproofing.

Both ASCE/SEI Standards are available for purchase and the Supplement available as a free download from the ASCE Library:

ASCE/SEI 7-22 (https://doi.org/10.1061/9780784415788)

ASCE/SEI 7-22 Supplement 2 (https://doi.org/10.1061/9780784415788.sup2)

ASCE/SEI 24-24 (https://doi.org/10.1061/9780784485781)

Flood Hazard:

The ASCE 7-22 S2 updates the design requirements to define the flood hazard area for the given Risk Category of structure. Addionally, the flood hazard depth is tied to the mean recurrence interval for a given Risk Category of structure. The design flood hazard is related to Risk Category (e.g., RC II will be designed to 500-year MRI), which is consistent with the way other environmental hazards (such as wind and snow loads) relate the hazard to Risk Category. This is in contrast to the current code requirements, which only considers only 100-year MRI flood for all structures regardless of Risk Category. In some areas in the U.S., the Authority Having Jurisdiction is already requiring a higher design requirement for the flood hazard. The city of Houston, for example, moved to requiring use of the 500-year MRI as the design basis for flood following the devastation from Hurricane Harvey. At a national level, FEMA is considering the use of the 500-year flood as the basis for floodplain management.

The coordinated code change proposals submitted for Group B are drafted to bring the IBC, IRC, and IEBC into alignment with the recent changes in ASCE 7-22 Supplement 2 and ASCE 24-24. The significant changes from the updates to these standards are to differentiate between the base flood (also described as the 100-year flood, or the 1% or greater chance of flooding in any given year) and the design flood, which could be different, and is defined in the standards for each Risk Category. The design flood must include considerations for loading specified in ASCE/SEI 7-22 S2 and design specified in ASCE/SEI 24-24.

Flood damage, and associated loss dollars, has significantly expanded since the last major updates of ASCE 7 Chapter 5 and ASCE 24. Their revisions attempt to close that gap and align the risks across other hazards.

FEMA cites that flood damage cost approximately $17 billion each year between 2010 and 2018, and with rising sea levels and extreme weather could cause $20 billion of flood damage to at-risk US homes this year, rising to $32 billion by 2051. Data from 2018 Hurricane Michael shows that 42% of claimed damage amounts were in the Shaded X-Zone (500-year floodplain), exceeding the amounts in both the A and V-Zones. (FEMA. Mitigation Assessment Team Report Hurricane Michael in Florida (FEMA P-2077), February 2020).

This is further supported by FEMA's recent report "A Cost and Benefits Analysis of Increased Elevation Requirements for Public and Nonresidential Buildings in Riverine and Coastal Floodplains," which evaluated the potential avoided losses (benefits) for 8 building types in 19 coastal floodplains and 14 riverine floodplains in the 100-year floodplain and the Shaded X Zone. The report shows that there are significant benefits to most buildings in the 100-year floodplain, particularly in steep/narrow floodplains. There were also significant benefits to buildings in the Shaded X Zone where there are currently no elevation requirements. These findings are supported by evidence from the National Flood Insurance Program (NFIP), which stated, "People outside of high-risk areas file more than 25 percent of NFIP claims and receive one-third of disaster assistance for flooding. The NFIP's preferred risk policies are designed for residential properties located in low- to moderate-risk flood zones." Additional reports from the NFIP indicate that 40% of companies fail to reopen after a disaster, with another 25% closing within a year. These problems are only further exacerbated by the influence of development and associated runoff, changes in precipitation rates, local subsidence, and sea level change. All of which are not accounted for by FEMA's flood maps, which only account for historic flood data and not future projections. All of this data supports the need to move from a fixed freeboard approach to a risk-based elevation approach that provides consistent protection from flat/wide floodplains to steep/narrow floodplains and more appropriately addresses the influence of wave action in coastal floodplains. This recognizes that true resiliency for communities is continuity of local businesses and making sure that public services are maintained and that adaptation to changes in precipitation, development, and sea level change must be incorporated into new buildings rather than relying on often prohibitively expensive retrofit options.

The ASCE changes consider the frequency of recent and predicted events and the significant damage recorded in the Shaded X-Zone. But, while significant, the addition of the Shaded X-Zone to the standards represents a change to only 4% of the U.S. population.

This proposal reflects the latest flood hazard science, but in general does not represent a fundamental increase in loads, resulting in higher construction costs. However, with the introduction of a higher flood design return period and future considerations for Sea Level Change, the design flood loads have increased for structures currently located in a designated flood hazard area. The ASCE revisions do not add structures to the currently defined flood hazard area, but do add small-depth flood loads for new construction in the Shaded X-Zone where there currently are none.

ASCE Consensus Process:

ASCE established and maintains an ANSI-accredited, consensus process for standard development. The open process includes selection of a balanced committee, including representation of all affected stakeholders, and public review of the draft standard prior to publication. The ASCE consensus process follows the *ASCE Rules for Standards Committees*, which is published on the ASCE website. The ASCE/SEI 7-22 S2 was developed by the ASCE 7-22 Standard Committee, which included approximately 50 voting members and hundreds more associate members. The ASCE/SEI 24-24 standard was developed by the ASCE 24-24 Standard Committee, which included approximately 25 voting members and 15 associate members.

Supporting Organizations:

This code change proposal has many supporters, included but not limited to the following organizations:

American Flood Coalition

Association of State Flood Plain Managers (ASFPM)

BuildStrong America

Federal Emergency Management Association

Flood Mitigation Industry Association (FMIA)

National Institute of Building Science (NIBS)

Registered Designer Professionals and planners of buildings and other infrastructure projects, Code Officials, and Authorities Having Jurisdiction owe it to the public and have an ethical obligation to provide a framework for safe, reliable structures. The public expects that the buildings in which they live, work, and play are designed consistently, with the same risk approach for all environmental hazards. Flooding is disruptive to families, businesses, and communities and it takes years to recover from these devastating disasters and overcome the losses incurred. The flood hazard must be taken seriously and incorporated into our design standards and building codes in a manner that is consistent with all of the other environmental hazards.

- **2025 Cost and Benefits Analysis for ASCE 24-24**
  https://www.cdpaccess.com/proposal/11724/35914/documentation/186653/attachments/download/9870/

Bibliography: FEMA. A Cost and Benefits Analysis of Increased Elevation Requirements for Public and Nonresidential Buildings in Riverine and Coastal Floodplains. January 2025
(https://www.researchgate.net/publication/388556202_A_Cost_and_Benefits_Analysis_of_Increased_Elevation_Requirements_for_Publ
FEMA. Mitigation Assessment Team Report Hurricane Michael in Florida (FEMA P-2077), February 2020
(https://www.fema.gov/sites/default/files/2020-07/mat-report_hurricane-michael_florida.pdf)

Cost Impact: Increase

- **2025 Cost and Benefits Analysis for ASCE 24-24.PDF**
  https://www.cdpaccess.com/proposal/11724/35914/documentation/186656/attachments/download/9871/

Estimated Immediate Cost Impact:

ASCE 7 and ASCE 24 are national minimum design standards. The effects will vary depending upon the local flood conditions and flood risk across the country and among building types. For nearly 90% of all affected structures in Numbered A Zones, the estimated immediate costs impact can be understood in analysis of the mitigation cost as a percentage of building replacement value from 0.2-6.6% for coastal sites and 0.0-4.0% for riverine sites. Additionally, average benefits per square foot range from $51-$336 for both riverine and coastal flooding, which are dependent on building type and location. See the attached “Cost and Benefits Analysis” for additional information.

This proposal reflects the latest flood hazard science, but in general does not represent a fundamental increase in loads, resulting in higher construction costs. However, with the introduction of a higher flood design return period and future considerations for Sea Level Change, the design flood loads have increased for structures currently located in a designated flood hazard area. The ASCE revisions do not add structures to the currently defined flood hazard area, but do add small-depth flood loads for new construction in the Shaded X-Zone where there currently are none.

Estimated Immediate Cost Impact Justification (methodology and variables):

A building cost study was considered for 14 riverine locations and 19 coastal locations. Examples consider A Zone and X Zone conditions to understand how the ASCE changes impact the overall cost. However, since most buildings are riverine, the study focused there, but similar trends appear in coastal buildings.

Table 1 is a summary of the buildings that were considered in the study, accounting for the building type, building sizes (and average), and Flood Design Classes. The difference between commercial and government office building plays a larger role in the losses avoided portion of the study. The cost analysis is grouped by Flood Design Class since this is the grouping used in ASCE 24 for elevation criteria.

Table 1 - Building Types Considered in Study

Building Type	Flood Design Class	Small SF	Medium SF	Large SF	Average SF
Hospital 2-3 Stories	4	25,000	70,000	145,000	80,000
Elementary School	3	25,000	40,000	65,000	43,333
Police Station	4	7,000	13,000	23,000	14,333
Office 1-Story (Government)	2	2,000	7,000	25,000	11,333
Office 3-Story (Government)	2	5,000	16,000	80,000	33,667
Office 1-Story (Commercial)	2	2,000	7,000	25,000	11,333
Office 3-Story (Commercial)	2	5,000	16,000	80,000	33,667
Retail Store	2	4,000	10,000	22,000	12,000

Table 2 provides an overview of A Zone conditions for increased building costs within the 100-yr floodplain. The values represent the breakdown of example floodplains using the numbered A Zone range to categorize how much rise there is between the various flood events. A low numbered A Zone represents a flat floodplain and a high number represents a steeper floodplain where there can be a large difference in flood elevations. The percent of numbered A Zones throughout the country based on an NFIP flood insurance policy analysis per census tract.

This provides a breakdown of how various floodplains impact the increased building cost. It's important to note that in A01-A03 the freeboard requirements equal or exceed the MRI based design flood event. Since ASCE did not change the minimum freeboard requirements for FDC 2 and FDC 4, those values are the same for ASCE 24-14 and ASCE 24-24 and therefore there is no cost increase. Additionally, for FDC 4 the analysis selected the higher of the 500-yr and BFE+2, so the delta between the ASCE 24-14 and ASCE 24-24 wasn't as high in the higher numbered A Zones as it would have been with FDC 2 and 3 where they were locked with ASCE 24-14 at BFE+1.

Table 2 - Average Building Cost Increase Percentage for Riverine A Zones Per Numbered A Zone

Numbered A Zone	Percentile of Numbered A Zones	FDC 2	FDC3	FDC4
A01-A03	26%	0.00%	1.20%	0.00%
A04-A06	41%	1.50%	1.90%	0.50%
A07-A10	20%	2.40%	2.90%	0.60%
A11-A14	9%	4.80%	5.50%	1.00%
A15-A17	2%	8.90%	10.00%	1.60%
A18-A30	2%	11.90%	13.20%	2.10%
	Weighted Average:	1.97%	2.65%	0.49%

Table 3 provides an overview of X Zone conditions for increased building costs within the 500-yr floodplain. The 500-year floodplain represents the area between the 100-year floodplain and the 500-year flood extent, this therefore represents protection from the 101-year to the 500-year flood. In X Zones it is assumed that buildings are built on the ground as compared to elevated foundations in Zone A. Since the X Zone represents the difference between the 100-year and the 500-year flood, the 300-year flood elevation was used as an average ground elevation. The ASCE 24-24 elevations represent the minimum required elevations required per the standard. The increased elevation is therefore the difference between ground (at the 300-year flood elevation) and the ASCE 24-24 elevation requirements. Similar to Table 2, Table 3 data is provided per Flood Design Class per grouped numbered A Zone designation.

Table 3 - Average Building Cost Increase Percentage for Riverine X Zones Per Numbered A Zone

Numbered A Zone	Percentile of Numbered A Zones	FDC 2	FDC 3	FDC 4
A01-A03	26%	0.60%	1.80%	0.70%
A04-A06	41%	1.00%	1.50%	0.80%
A07-A10	20%	1.20%	1.80%	1.00%
A11-A14	9%	1.90%	3.00%	1.70%
A15-A17	2%	3.20%	5.00%	2.80%
A18-A30	2%	4.40%	6.70%	3.70%
	Weighted Average:	1.14%	1.93%	1.00%

It is believed that the presentation of percent increase in building cost provided a better representation of the overall cost impacts rather than providing dollar values. While the percent increase does get rather large in those areas with high numbered A Zones, this is a much smaller overall percentage of land area, so this represents a smaller portion of the floodplains in the US. However, recent events have shown that when these areas experience a flood event above the 100-year or 1% annual chance flood, that they often experience deep flooding. Experience from Western NC following Hurricane Helene demonstrated that when floods occur in areas with high numbered A Zones that significant flood damage occurs in the X Zone. There were examples of buildings elevated in the X Zone that performed very well in Hurricane Helene and had little to no observed damage. But many buildings in the X Zone that were constructed at grade were severely damaged or destroyed. While this is observational, there is substantial evidence to suggest that the percent cost increase is offset by the avoided losses. Two key factors that impact the avoided loss calculation is the impact of when the original flood insurance studies and associated maps were created (older mapping data), which can mean that the mapped risk is underestimated (increased runoff due to development and updated precipitation data) and then looking forward the impact of future changes in precipitation rates over the 50-year life of riverine buildings. Similarly, these impacts can impact coastal flooding heights as well as the impact of sea level change.

Staff Analysis: CC # S97-25 Part III and CC # S180-25 Part I/CC #S181-25 addresses requirements in a different or contradicting manner. The committee is urged to make their intensions clear with their actions on these proposals.

S97-25 Part VII

IRC: R104.2.3.1, R104.3.1, R106.1.4, R109.1.3, R301.2.4, R306.1, R306.1.4, R306.1.4 (New), R306.1.4.1, R306.1.4.2, R306.1.9, R306.2, R306.2.1, R306.2.2, R306.2.2.1, R306.2.4, R306.3.2, R306.3.7, R317.3, R401.1, R404.1.9.5, R408.7, M1301.1.1, M1401.5, M1601.4.10, M1701.2, M2001.4, M2101.29.1, M2201.6, P2601.3, P2602.2, P2705.1, P3001.3, P3101.5, CHAPTER 44 ASCE/SEI, BA101.2, BI101.2, BJ101.3, BO102.7,

Proponents: Jennifer Goupil, American Society of Civil Engineers and Structural Engineering Institute, representing American Society of Civil Engineers (jgoupil@asce.org); Chad Berginnis, representing Association of State Floodplain Managers (cberginnis@floods.org); Natalie Enclade, representing BuildStrong America (natalie@buildstrongamerica.com); Jiqiu yuan, representing National Institute of Building Sciences (jyuan@nibs.org); Joel Scata, representing NRDC (jscata@nrdc.org); Roderick Scott, Board Chair, representing Flood Mitigation Industry Association (roderick.scott75@aol.com)

2024 International Residential Code

SECTION R104
DUTIES AND POWERS OF THE BUILDING OFFICIAL

Revise as follows:

R104.2.3.1 Flood hazard areas. The *building official* shall not grant modifications to any provisions required in flood hazard areas as established ~~by~~ in the flood hazard maps identified Table R301.2 unless a determination has been made that:

1. There is good and sufficient cause showing that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section R306 inappropriate.
2. Failure to grant the modification would result in exceptional hardship by rendering the lot undevelopable.
3. The granting of modification will not result in increased flood heights, additional threats to public safety or extraordinary public expense; cause fraud on or victimization of the public; or conflict with existing laws or ordinances.
4. The modification is the minimum necessary to afford relief, considering the flood hazard.
5. Written notice specifying the difference between the ~~design~~ base flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation and stating that construction below the ~~design~~ base flood elevation increases risks to life and property, has been submitted to the applicant.

R104.3.1 Determination of substantially improved or substantially damaged existing buildings in flood hazard areas. For applications for reconstruction, rehabilitation, *addition, alteration*, *repair* or other improvement of *existing buildings* or structures located in a flood hazard ~~area~~ areas, including special flood hazard areas and 500-year floodplains, as established ~~by~~ in the flood hazard maps identified in Table R301.2, the *building official* shall examine or cause to be examined the *construction documents* and shall make a determination with regard to the value of the proposed work. For *buildings* that have sustained damage of any origin, the value of the proposed work shall include the cost to *repair* the *building* or structure to its predamaged condition. If the *building official* finds that the value of proposed work equals or exceeds 50 percent of the market value of the building or structure before the damage has occurred or the improvement is started, the proposed work is a *substantial improvement* or *repair* of *substantial damage* and the *building official* shall require existing portions of the entire building or structure to meet the requirements of Section R306.

SECTION R106
CONSTRUCTION DOCUMENTS

R106.1.4 Information for construction in flood hazard areas. For *buildings* and structures located in whole or in part in flood hazard areas, including special flood hazard areas and 500-year floodplains, as established ~~by~~ in the flood hazard maps identified Table R301.2, *construction documents* shall include:

1. Delineation of flood hazard areas, including special flood hazard areas and 500-year floodplains, floodway boundaries, ~~and~~ flood zones , base flood elevations, and the design flood elevation, as appropriate.
2. The elevation of the proposed lowest floor, including *basement*; in areas of shallow flooding (AO Zones), the height of the proposed lowest floor, including *basement*, above the highest adjacent *grade*.
3. The elevation of the bottom of the lowest horizontal structural member in coastal high-hazard areas (V Zone) and in Coastal A Zones where such zones are delineated on flood hazard maps identified in Table R301.2 or otherwise delineated by the *jurisdiction*.
4. If ~~design~~ base flood elevations are not included on the community's Flood Insurance Rate Map (FIRM), the *building official* and the applicant shall obtain and reasonably utilize any ~~design~~ base flood elevation and floodway data available from other sources.

SECTION R109
INSPECTIONS

R109.1.3 Floodplain inspections. For construction in flood hazard areas as established ~~by~~ on the flood hazard maps identified in Table Table R301.2, upon placement of the lowest floor, including *basement*, and prior to further vertical construction, the *building official* shall require submission of documentation, prepared and sealed by a *registered design professional*, of the elevation of the lowest floor, including *basement*, required in Section R306.

SECTION R301
DESIGN CRITERIA

R301.2.4 Floodplain construction. *Buildings* and structures constructed in whole or in part in flood hazard areas, including special flood hazard areas and 500-year floodplains, as established on the flood hazard maps identified Table R301.2, and *substantial improvement* and *repair* of *substantial damage* of *buildings* and structures located in whole or in part in flood hazard areas, including special flood hazard areas and 500-year floodplains, shall be designed and constructed in accordance with Section R306. *Buildings* and structures that are located in more than one flood hazard area, including A Zones, Coastal A Zones and V Zones, shall comply with the provisions associated with the most restrictive flood hazard area. *Buildings* and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

SECTION R306
FLOOD-RESISTANT CONSTRUCTION

R306.1 General. *Buildings* and structures constructed in whole or in part in flood hazard areas, including special flood hazard areas and 500-year floodplains, established on the flood hazard maps identified in Table R301.2, and *substantial improvement* and *repair* of *substantial damage* of *buildings* and structures located in whole or in part in flood hazard areas, including special flood hazard areas and 500-year floodplains, shall be designed and constructed in accordance with the provisions contained in this section. *Buildings* and structures that are located in more than one flood hazard area, including A Zones, Coastal A Zones and V Zones, shall comply with the provisions associated with the most restrictive flood hazard area. *Buildings* and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

R306.1.4 Establishing the design flood elevation. The design flood elevation shall be used to define flood hazardareas, including special flood hazard areas and 500-year floodplains. At a minimum, the design flood elevation shall be the higher of the following:

1. The base flood elevation at the depth of peak elevation of flooding, including wave height, that has a 1-percent (100-year flood) or greater chance of being equaled or exceeded in any given year.

2. The elevation of the design flood associated with the area designated on a flood hazard map adopted by the community, or otherwise legally designated.
3. The 500-year flood elevation determined in accordance with Table R306.1.4 or ASCE 24.

In no case shall the elevation of the design flood be lower than the elevation of the base flood.

Add new text as follows:

Table R306.1.4 Determination of 500-Year Flood Elevations

Flood Data Provided for Project Location	FIRM shows riverine cross sections[a] for the flood source	FIRM does not show riverine cross sections[a] for the flood source	FIRM shows coastal transects[b] for the flood source	FIRM shows riverine cross sections[a] and coastal transects[b] for the flood source
The FIRM shows a Shaded Zone X[e] and 500-year Flood Data is provided	Use the elevation for 500-year flood provided in the FIS Flood Profile[e].	Not Applicable	Use the 500-year wave envelope elevation.	Use the more restrictive of the 500-year flood profile elevation or the 500-year wave envelope elevation.
The FIRM shows a Shaded Zone X[e] and only a 500-year stillwater elevation is provided	Not Applicable to Riverine Conditions	Not Applicable to Riverine Conditions	For A Zones[d], use the higher of BFE plus 2.1 feet or the 500-year stillwater elevation for the nearest transect. For CHHA[f] and CAZ[g], use the higher of BFE plus 2.6 feet or the 500-year stillwater elevation for the nearest transect.	Use the more restrictive of the 500-year flood profile or: - For A Zones[d], use the higher of BFE plus 2.1 feet or the 500-year stillwater elevation for the nearest transect. - For CHHA[f] and CAZ[g], use the higher of BFE plus 2.6 feet or the 500-year stillwater elevation for the nearest transect.
The FIRM does not show a Shaded Zone X[e] and 500-year flood elevation is provided	Use the elevation for 500-year flood provided in the FIS Flood Profile[3]	Not Applicable	Not Applicable	Use the more restrictive of the 500-year flood profile or: - For A Zones[d], use the higher of BFE plus 2.1 feet. - For CHHA[f] and CAZ[g], use the higher of BFE plus 2.6 feet.
The FIRM does not show a Shaded Zone X[e] and only Base Flood Elevation is provided	Use the BFE plus 2.1 feet.	Use the BFE plus 2.1 feet.	For A Zones[d], use the BFE plus 2.1 feet. For CHHA[f] and CAZ[g], use the BFE plus 2.6 feet.	For A Zones[d], use the BFE plus 2.1 feet. For CHHA[f] and CAZ[g], use the BFE plus 2.6 feet.

a. Riverine cross sections are shown on Flood Insurance Rate Maps (FIRMs) using a line and a number or letter surrounded by a hexagon to indicate the cross section along the flood source. The same designations are used on Flood Profiles included in Flood Insurance Studies (FISs).

b. Coastal transect lines are shown on FIRMs using a line and a number surrounded by a circle, which indicates the transect number on the FIRM. The same designations are used in Stillwater Tables and Wave Envelope Profiles in FISs.

c. Flood profiles are provided in FISs for riverine flood sources studied using detailed methods. Project locations are identified by measuring up or downstream from the nearest cross section along the centerline of the flood source.

d. A Zones refer to those areas identified on FIRMs as Zone A, AE, A1-A30, A99, AR, AO and AH. Areas identified as A Zones that are located seaward of the Limit of Moderate Wave Action (LiMWA) are Coastal A Zones (CAZs).

e. Shaded Zone X includes those areas within 500-year floodplains identified on FIRMs as Zone X with shading. Shaded Zone X includes Zone B shown on older FIRMs.

f. Coastal High Hazard Areas (CHHAs) include those areas identified on FIRMS as Zone V.

g. Coastal A Zones (CAZs) include A Zones on FIRMS that are seaward of the LiMWA or otherwise designated by the jurisdiction.

Revise as follows:

R306.1.4.1 Determination of ~~design~~ base flood elevations. ~~If design~~ Where base flood elevations are not specified, the *building official* is authorized to require the applicant to comply with either of the following:

1. Obtain and reasonably use data available from a federal, state or other source.

2. Determine the ~~design~~ base flood elevation in accordance with accepted hydrologic and hydraulic engineering practices used to define special flood hazard areas. Determinations shall be undertaken by a *registered design professional* who shall document that the technical methods used reflect currently accepted engineering practice. Studies, analyses and computations shall be submitted in sufficient detail to allow thorough review and *approval*.

R306.1.4.2 Determination of impacts. In riverine special flood hazard areas where ~~design~~ base flood elevations are specified but floodways have not been designated, the applicant shall demonstrate that the effect of the proposed *buildings* and structures on ~~design~~ baseflood elevations, including fill, when combined with other existing and anticipated special flood hazard area encroachments, will not increase the ~~design~~ base flood elevation more than 1 foot (305 mm) at any point within the *jurisdiction*.

R306.1.9 Manufactured homes. The bottom of the frame of new and replacement *manufactured homes* on foundations that conform to the requirements of Section R306.2 or R306.3, as applicable, shall be elevated to or above the elevations specified in Section R306.2 (flood hazard areas including A Zones and the 500-year floodplain) or R306.3 in coastal high-hazard areas (V Zones and Coastal A Zones). The anchor and tie-down requirements of the applicable state or federal requirements shall apply. The foundation and anchorage of *manufactured homes* to be located in identified floodways shall be designed and constructed in accordance with ASCE 24.

R306.2 Flood hazard areas ~~(including A Zones)~~. Areas that have been determined to be prone to flooding and that are not subject to high-velocity wave action shall be designated as flood hazard areas. Flood hazard areas that have been delineated as subject to wave heights between $1^{1}/_{2}$ feet (457 mm) and 3 feet (914 mm) or otherwise designated by the *jurisdiction* shall be designated as Coastal A Zones and are subject to the requirements of Section R306.3. *Buildings* and structures constructed in whole or in part in flood hazard areas, including special flood hazard areas and 500-year floodplains, but not including coastal high hazard areas and Coastal A Zones shall be designed and constructed in accordance with Sections R306.2.1 through R306.2.4.

R306.2.1 Elevation requirements.

1. Buildings and structures in flood hazard areas, not including flood hazard areas designated as Coastal A Zones, shall have the lowest floors elevated to or above the base flood elevation plus 1 foot (305 mm), or the design flood elevation determined in Section R306.1.4, whichever is higher.
2. In areas of shallow flooding (AO Zones), *buildings* and structures shall have the lowest floor (including *basement*) elevated to a height above the highest adjacent *grade* of not less than the depth number specified in feet (mm) on the FIRM plus 1 foot (305 mm), or not less than 3 feet (915 mm) if a depth number is not specified.
3. *Basement* floors that are below *grade* on all sides shall be elevated to or above base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher.
4. Attached garages and carports shall comply with one of the following:
   4.1. The floors shall be elevated to or above the elevations required in Item 1 or Item 2, as applicable.
   4.2. The floors shall be at or above *grade* on not less than one side. Where an attached garage or carport is enclosed by walls, the walls shall have flood openings that comply with Section R306.2.2 and the attached garage or carport shall be used only for parking, building access or storage.

5. Detached *accessory structures* and detached garages shall comply with one of the following:
   5.1. The floors shall be elevated to or above the elevations required in Item 1 or Item 2, as applicable.
   5.2. Floors below the elevations required in Item 1 or 2, as applicable, must be:
      5.2.1. Used only for parking or storage.
      5.2.2. One story and not larger than 600 square feet (55.74 m^2).
      5.2.3. Anchored to resist flotation, collapse or lateral movement resulting from design flood loads.
      5.2.4. Equipped with flood openings that comply with Section R306.2.2.
      5.2.5. Constructed of flood-damage-resistant materials that comply with Section R306.1.8. Have mechanical, plumbing and electrical systems, if applicable, that comply with Section R306.1.6.

Exception: Enclosed areas below the elevation required in this section, including *basements* with floors that are not below *grade* on all sides, shall meet the requirements of Section R306.2.2.

R306.2.2 Enclosed area below required elevation. Enclosed areas, including *crawl spaces*, that are below the elevation required in Section R306.2.1 shall:

1. Be used solely for parking of vehicles, building access or storage.
2. Be provided with flood openings that meet the following criteria and are installed in accordance with Section R306.2.2.1:
   2.1. The total net area of nonengineered openings shall be not less than 1 square inch (645 mm^2) for each square foot (0.093 m^2) of enclosed area where the enclosed area is measured on the exterior of the enclosure walls, or the openings shall be designed as engineered openings and the *construction documents* shall include a statement by a *registered design professional* that the design of the openings will provide for equalization of hydrostatic flood forces on exterior walls by allowing for the automatic entry and exit of floodwaters as specified in Section 2.7.2.2 of ASCE 24.
   2.2. Openings shall be not less than 3 inches (76 mm) in any direction in the plane of the wall.
   2.3. The presence of louvers, blades, screens and faceplates or other covers and devices shall allow the automatic flow of floodwater into and out of the enclosed areas and shall be accounted for in the determination of the net open area.
3. An exterior door that meets the requirements of Section R609 shall be installed at the top of *stairs* that provide access to the *building*.

Exceptions: The following shall not be required to comply with this section:

1. Elevator shafts.
2. Utility chases that protect utility lines from freezing, provided that the utility chases are the minimum size necessary to protect the utility lines and do not provide access for a *person* to enter the space.

R306.2.2.1 Installation of openings. The walls of enclosed areas shall have openings installed such that:

1. There shall be not less than two openings on different sides of each enclosed area; if a *building* has more than one enclosed area, each area shall have openings.
2. The bottom of each opening shall be not more than 1 foot (305 mm) above the higher of the final interior grade or floor and the finished exterior *grade* immediately under each opening.
3. Openings shall be permitted to be installed in doors and windows; doors and windows without installed openings do not meet the requirements of this section.

Exception:

1. For enclosed areas with only one exterior wall, flood openings in only that one exterior wall shall be permitted.

2. For buildings on sloped sites where the exterior grade is below the elevation required in Section R306.2.1 on only one exterior wall, the flood openings required for the enclosed area shall be located on that exterior wall.

R306.2.4 Tanks. Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R306.2.1 or shall be anchored to prevent flotation, collapse and lateral movement under conditions of the design ~~base~~ flood.

R306.3.2 Elevation requirements.

1. *Buildings* and structures erected within coastal high-hazard areas and Coastal A Zones, shall be elevated so that the bottom of the lowest horizontal structural members supporting the lowest floor, with the exception of piling, pile caps, columns, grade beams and bracing, is elevated to or above the base flood elevation plus 1 foot (305 mm) or the design flood elevation determined in Section R306.1.4 , whichever is higher. Where stem wall foundations are permitted in Coastal A Zones in accordance with Section R306.3.3, the bottom of the lowest horizontal structural member supporting the lowest floor is the top of the foundation wall, or top of the portion of the foundation wall, supporting the slab.
2. *Basement* floors that are below *grade*on all sides are prohibited.
3. Attached garages used only for parking, building access or storage, and carports shall comply with Item 1 or shall be at or above *grade* on not less than one side and, if enclosed with walls, such walls shall comply with Item 7.
4. Detached *accessory structures* and detached garages shall comply with either of the following:
   - 4.1. The bottom of the lowest horizontal structural member supporting the floors shall be elevated to or above the elevation required in Item 1.
   - 4.2. Floors below the elevations required in Item 1 must be:
     - 4.2.1. Used only for parking or storage.
     - 4.2.2. One *story* and not larger than 100 square feet (9.29 m^2).
     - 4.2.3. Anchored to resist flotation, collapse or lateral movement resulting from design flood loads.
     - 4.2.4. Constructed of flood damage-resistant materials that comply with Section R306.1.8.
     - 4.2.5. Equipped with mechanical, plumbing and electrical systems, if applicable, that comply with Section R306.1.6.
5. The use of fill for structural support is prohibited.
6. Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings and for support of parking slabs, pool decks, patios and walkways.
7. Walls and partitions enclosing areas below the elevation required in this section shall meet the requirements of Sections R306.3.5 and R306.3.6.

R306.3.7 Stairways and ramps. *Stairways* and *ramps* that are located below the lowest floor elevations specified in Section R306.3.2 shall comply with one or more of the following:

1. Be designed and constructed with open or partially open *risers* and *guards*.
2. *Stairways* and *ramps* not part of the required means of egress shall be designed and constructed to break away during design flood conditions without causing damage to the *building* or structure, including foundation.
3. Be retractable, or able to be raised to or above the lowest floor elevation, provided that the ability to be retracted or raised prior to the onset of flooding is not contrary to the means of egress requirements of the code and the stairs and ramps are capable of resisting code-required wind loads in the retracted or raised position.
4. Be designed and constructed to resist flood loads and minimize transfer of flood loads to the *building* or structure, including foundation.

Areas below *stairways* and *ramps* shall not be enclosed with walls below the elevation required in Section R306.3.2 unless such walls are constructed in accordance with Section R306.3.5.

SECTION R317
GARAGES AND CARPORTS

R317.3 Flood hazard areas. Garages and carports located in flood hazard areas, including special flood hazard areas and 500-year floodplains, as established ~~by~~ on the flood hazard maps identified in Table R301.2 shall be constructed in accordance with Section R306.

SECTION R401
GENERAL

R401.1 Application. The provisions of this chapter shall control the design and construction of the foundation and foundation spaces for *buildings*. In addition to the provisions of this chapter, the design and construction of foundations in flood hazard areas, including special flood hazard areas and 500-year floodplains, as established ~~by~~ on the flood hazard maps identified in Table R301.2 shall meet the provisions of Section R306. Wood foundations shall be designed and installed in accordance with AWC PWF.

Exception: The provisions of this chapter shall be permitted to be used for wood foundations only in the following situations:

1. In *buildings* that have not more than two floors and a roof.
2. Where interior *basement* and foundation walls are constructed at intervals not exceeding 50 feet (15 240 mm).

Wood foundations in *Seismic Design Category* D_0, D_1 or D_2 shall be designed in accordance with accepted engineering practice.

SECTION R404
FOUNDATION AND RETAINING WALLS

R404.1.9.5 Masonry piers in flood hazard areas. Masonry piers for *dwellings* in flood hazard areas, including special flood hazard areas and 500-year floodplains, shall be designed in accordance with Section R306.

SECTION R408
UNDER-FLOOR SPACE

R408.7 Flood resistance. For *buildings* located in flood hazard areas, including special flood hazard areas and 500-year floodplains, as established on the flood hazard maps identified in Table R301.2:

1. Walls enclosing the under-floor space shall be provided with flood openings in accordance with Section R306.2.2.
2. The finished ground level of the under-floor space shall be equal to or higher than the outside finished ground level on at least one side.

Exception: Under-floor spaces that meet the requirements of FEMA TB 11.

CHAPTER 13
GENERAL MECHANICAL SYSTEM REQUIREMENTS

SECTION M1301
GENERAL

M1301.1.1 Flood-resistant installation. In flood hazard areas, including special flood hazard areas and 500-year floodplains, as established ~~by~~ on the flood hazard maps identified in Table R301.2, mechanical *appliances, equipment* and systems shall be located or installed in accordance with Section R306.1.6.

CHAPTER 14
HEATING AND COOLING EQUIPMENT AND APPLIANCES

SECTION M1401
GENERAL

M1401.5 Flood hazard. In flood hazard areas, including special flood hazard areas and 500-year floodplains, as established ~~by~~ on the flood hazard maps identified in Table R301.2, heating and cooling *equipment* and *appliances* shall be located or installed in accordance with Section R306.1.6.

CHAPTER 16
DUCT SYSTEMS

SECTION M1601
DUCT CONSTRUCTION

M1601.4.10 Flood hazard areas. In flood hazard areas, including special flood hazard areas and 500-year floodplains, as established ~~by~~ on the flood hazard maps identified in Table R301.2, *duct systems* shall be located or installed in accordance with Section R306.1.6.

CHAPTER 17
COMBUSTION AIR

SECTION M1701
GENERAL

M1701.2 Opening location. In flood hazard areas, including special flood hazard areas and 500-year floodplains, as established on the flood hazard maps identified in Table R301.2, *combustion air* openings shall be located at or above the elevation required in Section R306.2.1 or R306.3.2.

CHAPTER 20
BOILERS AND WATER HEATERS

SECTION M2001
BOILERS

M2001.4 Flood-resistant installation. In flood hazard areas, including special flood hazard areas and 500-year floodplains, established on the flood hazard maps identified in Table R301.2, boilers, water heaters and their control systems shall be located or installed in accordance with Section R306.1.6.

CHAPTER 21
HYDRONIC PIPING

SECTION M2101
HYDRONIC PIPING SYSTEMS INSTALLATION

M2101.29.1 Flood hazard. Piping located in ~~a~~ flood hazard areas, including special flood hazard areas and 500-year floodplains, shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the design flood elevation.

CHAPTER 22
SPECIAL PIPING AND STORAGE SYSTEMS

SECTION M2201
OIL TANKS

M2201.6 Flood-resistant installation. In flood hazard areas, including special flood hazard areas and 500-year floodplains, as established ~~by~~ on the flood hazard maps identified in Table R301.2, tanks shall be installed in accordance with Section R306.2.4 or R306.3.10.

CHAPTER 26
GENERAL PLUMBING REQUIREMENTS

SECTION P2601
GENERAL

P2601.3 Flood hazard areas. In flood hazard areas, including special flood hazard areas and 500-year floodplains, as established ~~by~~ on the flood hazard maps identified in Table R301.2, plumbing fixtures, drains, and *appliances* shall be located or installed in accordance with Section R306.1.6.

SECTION P2602
INDIVIDUAL WATER SUPPLY AND SEWAGE DISPOSAL

P2602.2 Flood-resistant installation. In flood hazard areas, including special flood hazard areas and 500-year floodplains, as established ~~by~~ on the flood hazard maps identified in Table R301.2:

1. Water supply systems shall be designed and constructed to prevent infiltration of floodwaters.
2. Pipes for sewage disposal systems shall be designed and constructed to prevent infiltration of floodwaters into the systems and discharges from the systems into floodwaters.

CHAPTER 27
PLUMBING FIXTURES

SECTION P2705

INSTALLATION

P2705.1 General. The installation of fixtures shall conform to the following:

1. Floor-outlet or floor-mounted fixtures shall be secured to the drainage connection and to the floor, where so designed, by screws, bolts, washers, nuts and similar fasteners of copper, copper alloy or other corrosion-resistant material.
2. Wall-hung fixtures shall be rigidly supported so that strain is not transmitted to the plumbing system.
3. Where fixtures come in contact with walls and floors, the contact area shall be watertight.
4. Plumbing fixtures shall be usable.
5. Water closets, lavatories and bidets. A water closet, lavatory or bidet shall not be set closer than 15 inches (381 mm) from its center to any side wall, partition or vanity or closer than 30 inches (762 mm) center-to-center between adjacent fixtures. There shall be a clearance of not less than 21 inches (533 mm) in front of a water closet, lavatory or bidet to any wall, fixture or door.
6. The location of piping, fixtures or equipment shall not interfere with the operation of windows or doors.
7. In flood hazard areas, including special flood hazard areas and 500-year floodplains, as established ~~by~~ on the flood hazard maps identified in Table R301.2, plumbing fixtures shall be located or installed in accordance with Section R306.1.6.
8. Integral fixture-fitting mounting surfaces on manufactured plumbing fixtures or plumbing fixtures constructed on site, shall meet the design requirements of ASME A112.19.2/CSA B45.1 or ASME A112.19.3/CSA B45.4.

CHAPTER 30
SANITARY DRAINAGE

SECTION P3001
GENERAL

P3001.3 Flood-resistant installation. In flood hazard areas, including special flood hazard areas and 500-year floodplains, as established ~~by~~ on the flood hazard maps identified in Table R301.2, drainage, waste and vent systems shall be located and installed to prevent infiltration of floodwaters into the systems and discharges from the systems into floodwaters.

CHAPTER 31
VENTS

SECTION P3101
VENT SYSTEMS

P3101.5 Flood resistance. In flood hazard areas, including special flood hazard areas and 500-year floodplains, as established ~~by~~ on the flood hazard maps identified in Table R301.2, vents shall be located at or above the elevation required in Section R306.2 (flood hazard areas including A Zones and 500-year floodplains) or R306.3 (coastal high-hazard areas including V Zones and Coastal A Zones, where designated).

CHAPTER 44
REFERENCED STANDARDS

ASCE/SEI

American Society of Civil Engineers
Structural Engineering Institute
Reston, VA 20191-4400

7—2022 Supplement 1, 2, 3	Minimum Design Loads and Associated Criteria for Buildings and Other Structures
24—~~14~~ 24	Flood Resistant Design and Construction

APPENDIX BA
MANUFACTURED HOUSING USED AS DWELLINGS

SECTION BA101
SCOPE

BA101.2 Flood hazard areas. New and replacement *manufactured homes* to be installed in flood hazard areas, including special flood hazard areas and 500-year floodplains as established on the flood hazard maps identified in Table R301.2 shall meet the applicable requirements of Section R306.

APPENDIX BI
LIGHT STRAW-CLAY CONSTRUCTION

SECTION BI101
GENERAL

BI101.2 Flood hazard areas. In flood hazard areas, including special flood hazard areas and 500-year floodplains, established on the flood hazard maps identified in Table R301.2, *buildings* using *light* straw-clay *infill* shall meet the requirements of Section R306.

APPENDIX BJ
STRAWBALE CONSTRUCTION

SECTION BJ101
GENERAL

BJ101.3 Flood hazard areas. In flood hazard areas, including special flood hazard areas and 500-year floodplains established on the flood hazard maps identified in Table R301.2, *buildings* using *strawbale* wall systems shall meet the requirements of Section R306.

APPENDIX BO
EXISTING BUILDINGS AND STRUCTURES

SECTION BO102
COMPLIANCE

BO102.7 Flood hazard areas. Work performed in existing buildings located in a flood hazard area, including special flood hazard areas and 500-year floodplains, as established ~~by~~ on the flood hazard maps identified in Table R301.2 shall be subject to the provisions of Section R104.3.1.

Reason: This proposal is a coordination proposal to bring the 2027 edition of the I-Codes up to date with the provisions in the 2022 edition of *ASCE/SEI 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures, Supplement 2* (ASCE/SEI 7-

22, Supplement 2) as well as the 2024 edition of *ASCE/SEI 24 Flood Resistant Design and Construction* (ASCE/SEI 24-24) --- specifically for the codes primarily affected such as the International Building Code (IBC), the International Residential Code (IRC), and the International Existing Building Code (IEBC), in Group B, but also every I-Code affected by a coordinating code change that will need to be updated. ASCE/SEI 7-22 is the current reference in 2024 I-Codes and Supplement 2 has been submitted as an Administrative Update. ASCE/SEI 24-24 has also been submitted as an Administrative Update to the 2027 I-Codes.

This proposal has been organized into Part I to Part VII and includes technical updates as well as editorial coordination. The specific changes to each section included in this proposal are outlined in Overview below, and a detailed summary of the technical updates are explained in Technical Rationale below that. In addition to the strike out/underline for the code change proposals, the MS Word documents for each affected I-Code have been provided as Attached Files for clarity.

Overview:

IRC Sections: These changes for the IRC provide similar updates to the IBC and IEBC, just provided in a separate Code Change Proposal. However, all changes must be included across all I-Codes for a comprehensive proposal - IBC, IRC and IEBC are included in Group B; the others will need to be addressed in the next Group A cycle.

Chapter 1 Scope: Add phase “including special flood hazard areas” for clarity. And change to “base flood elevations” from “design flood elevations” to clarify the applicable requirements for the two separate terms. See Section 202 for the updated definitions. These two changes are carried out throughout the code change proposal for clarification and consistency.

Chapter 2 Definitions: Adds a new definition for “500-year Floodplain” to distinguish it from the existing definition. While “Base Flood” remains the same, “Base Flood Elevation” is updated along with “Design Flood” and “Design Flood Elevation”. “Flood Hazard Area” is updated and a new definition for “Special Flood Hazard Area” is added.

Chapter 3: changes included to align with standards including add phase “including special flood hazard areas” following flood hazard area for clarity.

Table R306.1.4 Determination of 500-Year Flood Provisions: This new Table is added to provide a prescriptive method for determining the elevation of the 500-year flood given the scenarios of how the flood data is provided for the flood location.

Section 306.2.2.1: Provides a clarification to the requirement and clear exceptions for how requirements are applied.

Chapter 4: changes included to align with standards including add phase “including special flood hazard areas” following flood hazard area for clarity.
Chapter 44: Illustrates the updates that will be made to the reference standards ASCE 7-22 and ASCE/SEI 24-24; updates to reference standards have been submitted to Group B Admin. **Appendix BA, BI, BJ, BO:** Consistent updates made throughout these relevant Appendices.

Mechanical: changes included to align with standards including add phase “including special flood hazard areas and 500-year floodplains” following flood hazard area for clarity.

Plumbing: changes included to align with standards including add phase “including special flood hazard areas and 500-year floodplains” following flood hazard area for clarity.

Technical Rationale:

The American Society of Civil Engineers (ASCE) is proposing revisions to the International Code Council’s I-Codes for the 2027 Cycle to align the national codes with the current ASCE/SEI design standards including:

ASCE/SEI 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures, 2022 edition; Supplement 2 (ASCE/SEI 7-22 S2)

ASCE/SEI 24 Flood Resistant Design and Construction, 2024 edition (ASCE/SEI 24-24)

The loading standard ASCE/SEI 7-22 S2 and the design standard ASCE/SEI 24-24 work together – these documents have been developed to be consistent and coordinated so they can be required and used together. There are three significant changes in the national loading standard ASCE/SEI 7-22 S2 including (1) an extension of the defined Flood Hazard Area to the 500-year floodplain for Rick Category II, III, and IV structures, (2) an inclusion of risk-based design for loads, and (3) requirements to include relative sea level change into design load calculations for coastal sites; see below for more technical details. There are three significant changes in the national design standard ASCE/SEI 24-24 including (1) alignment with ASCE/SEI 7-22 S2, (2) alignment with FEMA Technical Bulletins, and (3) updates for elevations, materials, and floodproofing.

Both ASCE/SEI Standards are available for purchase and the Supplement available as a free download from the ASCE Library:

ASCE/SEI 7-22 (https://doi.org/10.1061/9780784415788)

ASCE/SEI 7-22 Supplement 2 (https://doi.org/10.1061/9780784415788.sup2)

ASCE/SEI 24-24 (https://doi.org/10.1061/9780784485781)

Flood Hazard:

The ASCE 7-22 S2 updates the design requirements to define the flood hazard area for the given Risk Category of structure. Addionally, the flood hazard depth is tied to the mean recurrence interval for a given Risk Category of structure. The design flood hazard is related to Risk Category (e.g., RC II will be designed to 500-year MRI), which is consistent with the way other environmental hazards (such as wind and snow loads) relate the hazard to Risk Category. This is in contrast to the current code requirements, which only considers only 100-year MRI flood for all structures regardless of Risk Category. In some areas in the U.S., the Authority Having Jurisdiction is already requiring a higher design requirement for the flood hazard. The city of Houston, for example, moved to requiring use of the 500-year MRI as the design basis for flood following the devastation from Hurricane Harvey. At a national level, FEMA is considering the use of the 500-year flood as the basis for floodplain management.

The coordinated code change proposals submitted for Group B are drafted to bring the IBC, IRC, and IEBC into alignment with the recent changes in ASCE 7-22 Supplement 2 and ASCE 24-24. The significant changes from the updates to these standards are to differentiate between the base flood (also described as the 100-year flood, or the 1% or greater chance of flooding in any given year) and the design flood, which could be different, and is defined in the standards for each Risk Category. The design flood must include considerations for loading specified in ASCE/SEI 7-22 S2 and design specified in ASCE/SEI 24-24.

Flood damage, and associated loss dollars, has significantly expanded since the last major updates of ASCE 7 Chapter 5 and ASCE 24. Their revisions attempt to close that gap and align the risks across other hazards.

FEMA cites that flood damage cost approximately $17 billion each year between 2010 and 2018, and with rising sea levels and extreme weather could cause $20 billion of flood damage to at-risk US homes this year, rising to $32 billion by 2051. Data from 2018 Hurricane Michael shows that 42% of claimed damage amounts were in the Shaded X-Zone (500-year floodplain), exceeding the amounts in both the A and V-Zones. (FEMA. Mitigation Assessment Team Report Hurricane Michael in Florida (FEMA P-2077), February 2020).

This is further supported by FEMA's recent report "A Cost and Benefits Analysis of Increased Elevation Requirements for Public and Nonresidential Buildings in Riverine and Coastal Floodplains," which evaluated the potential avoided losses (benefits) for 8 building types in 19 coastal floodplains and 14 riverine floodplains in the 100-year floodplain and the Shaded X Zone. The report shows that there are significant benefits to most buildings in the 100-year floodplain, particularly in steep/narrow floodplains. There were also significant benefits to buildings in the Shaded X Zone where there are currently no elevation requirements. These findings are supported by evidence from the National Flood Insurance Program (NFIP), which stated, "People outside of high-risk areas file more than 25 percent of NFIP claims and receive one-third of disaster assistance for flooding. The NFIP's preferred risk policies are designed for residential properties located in low- to moderate-risk flood zones." Additional reports from the NFIP indicate that 40% of companies fail to reopen after a disaster, with another 25% closing within a year. These problems are only further exacerbated by the influence of development and associated runoff, changes in precipitation rates, local subsidence, and sea level change. All of which are not accounted for by FEMA's flood maps, which only account for historic flood data and not future projections. All of this data supports the need to move from a fixed freeboard approach to a risk-based elevation approach that provides consistent protection from flat/wide floodplains to steep/narrow floodplains and more appropriately addresses the influence of wave action in coastal floodplains. This recognizes that true resiliency for communities is continuity of local businesses and making sure that public services are maintained and that adaptation to changes in precipitation, development, and sea level change must be incorporated into new buildings rather than relying on often prohibitively expensive retrofit options.

The ASCE changes consider the frequency of recent and predicted events and the significant damage recorded in the Shaded X-Zone. But, while significant, the addition of the Shaded X-Zone to the standards represents a change to only 4% of the U.S. population. The additional elevation requirements to raise homes within the special flood hazard area to above the 500-year flood elevation will affect an additional 3% of the US population. The total US population affected by the flood resistant construction requirements in this proposal would be 7% per FEMA estimates. The NYU Furman Center estimates that nearly 10% of the nation's population live in the combined 100-year and 500-year floodplain. A study from the University of Bristol argues that outdated FEMA maps underestimate the flood risk and pin the percent of the US population who reside in the 100-year floodplain to as high as 13%.

This proposal reflects the latest flood hazard science, but in general does not represent a fundamental increase in loads, resulting in higher construction costs. However, with the introduction of a higher flood design return period and future considerations for Sea Level Change, the design flood loads have increased for structures currently located in a designated flood hazard area. The ASCE revisions do not add structures to the currently defined flood hazard area, but do add small-depth flood loads for new construction in the Shaded X-Zone where there currently are none.

ASCE Consensus Process:

ASCE established and maintains an ANSI-accredited, consensus process for standard development. The open process includes selection of a balanced committee, including representation of all affected stakeholders, and public review of the draft standard prior to publication. The ASCE consensus process follows the *ASCE Rules for Standards Committees*, which is published on the ASCE website. The ASCE/SEI 7-22 S2 was developed by the ASCE 7-22 Standard Committee, which included approximately 50 voting members and hundreds more associate members. The ASCE/SEI 24-24 standard was developed by the ASCE 24-24 Standard Committee, which included approximately 25 voting members and 15 associate members.

Supporting Organizations:

This code change proposal has many supporters, included but not limited to the following organizations:

American Flood Coalition

Association of State Flood Plain Managers (ASFPM)

BuildStrong America

Federal Emergency Management Association

Flood Mitigation Industry Association (FMIA)

National Institute of Building Science (NIBS)

Registered Designer Professionals and planners of buildings and other infrastructure projects, Code Officials, and Authorities Having Jurisdiction owe it to the public and have an ethical obligation to provide a framework for safe, reliable structures. The public expects that the buildings in which they live, work, and play are designed consistently, with the same risk approach for all environmental hazards. Flooding is disruptive to families, businesses, and communities and it takes years to recover from these devastating disasters and overcome the losses incurred. The flood hazard must be taken seriously and incorporated into our design standards and building codes in a manner that is consistent with all of the other environmental hazards.

- **2025 Cost and Benefit Analysis for ASCE 24-24.PDF**
  https://www.cdpaccess.com/proposal/12230/35915/documentation/186660/attachments/download/9877/

Bibliography: Cited references:

Kodavatiganti Y, Rahim MA, Friedland CJ, Mostafiz RB, Taghinezhad A and Heil S (2023), Material quantities and estimated construction costs for new elevated IRC 2015-compliant single-family home foundations. Front. Built Environ. 9:1111563. doi: 10.3389/fbuild.2023.1111563

Al Assi A, Mostafiz RB, Friedland CJ, and Rohli, RV (2024). Theoretical Boundaries of Annual Flood Risk for Single-Family Homes Within the 100-Year Floodplain. Int J Environ Res. 18:29. https://doi.org/10.1007/s41742-024-00577-7.

Al Assi A, Mostafiz RB, Friedland CJ, Rohli RV, and Rahim MA (2023). Homeowner flood risk and risk reduction from home elevation between the limits of the 100- and 500- year floodplains. Front. Earth Sci. 11:1051546. Doi: 10.3389/feart.2023.1051546.Estimated Flood Loss Potential. National Flood Services, https://www.floodsmart.gov/sites/default/files/flood-loss-potential_jul19.pdf

FEMA. A Cost and Benefits Analysis of Increased Elevation Requirements for Public and Nonresidential Buildings in Riverine and Coastal Floodplains. January 2025 (https://www.researchgate.net/publication/388556202_A_Cost_and_Benefits_Analysis_of_Increased_Elevation_Requirements_for_Publ

FEMA. Mitigation Assessment Team Report Hurricane Michael in Florida (FEMA P-2077), February 2020 (https://www.fema.gov/sites/default/files/2020-07/mat-report_hurricane-michael_florida.pdf)

Cost Impact: Increase

- **2025 Cost and Benefits Analysis for ASCE 24-24.PDF**
  https://www.cdpaccess.com/proposal/12230/35915/documentation/186663/attachments/download/9878/

Estimated Immediate Cost Impact:

ASCE 7 and ASCE 24 are national minimum design standards. The effects will vary depending upon the local flood conditions and flood risk across the country and among building types. For nearly 90% of all affected structures in Numbered A Zones, the estimated immediate costs impact can be understood in analysis of the mitigation cost as a percentage of building replacement value from 0.2-6.6% for coastal sites and 0.0-4.0% for riverine sites. Additionally, average benefits per square foot range from $51-$336 for both riverine and coastal flooding, which are dependent on building type and location. See the attached “Cost and Benefits Analysis” for additional information.

This proposal reflects the latest flood hazard science, but in general does not represent a fundamental increase in loads, resulting in higher construction costs. However, with the introduction of a higher flood design return period and future considerations for Sea Level Change, the design flood loads have increased for structures currently located in a designated flood hazard area. The ASCE revisions do not add structures to the currently defined flood hazard area, but do add small-depth flood loads for new construction in the Shaded X-Zone where there currently are none.

Estimated Immediate Cost Impact Justification (methodology and variables):

The following analysis was conducted using the cost data from the attached peer reviewed journal paper ***Material quantities and estimated construction costs for new elevated IRC 2015-compliant single-family home foundations*** (published in 2023) and using a national NFIP flood dataset to approximate the average freeboard height for all A Zones in the US.

The increase in foundation height was calculated using the NFIP flood dataset that provides the average numbered A Zone per US census tract. Numbered A Zones represent groupings of floodplains that are sorted based on the average height difference between the 10-year flood and the 100-year flood. The floodplains are sorted into categories from A01 through A30. Each increment A01 through A20 are differentiated by 6-inch increments, meaning that the difference between the 10-year flood and the 100-year flood is 6 inches for an A01 and the difference between the 10-year flood and 100-year flood is 10 feet for an A20. Between A20 and A30 the difference between the 10-year and 100-year flood is differentiated by 1-foot increments, meaning that an A30 has a difference of 20 feet between the 10-year flood and the 100-year flood.

For A Zones, calculations were done to determine the difference between the 2024 IRC requirement of BFE+1 foot and the proposed ASCE 24-24 elevation requirements for Flood Design Class 2. In situations where the 2024 IRC and ASCE 24-24 were the same a value of 0 was assigned. For each numbered A Zone where ASCE 24-24 exceeded the 2024 IRC the difference in elevation was calculated. A weighting factor was assigned to each numbered A Zone based on the US census tract data and represented as a percentage value of how many times that numbered A Zone is the most likely A Zone across the US. This provided a percentage breakdown for all numbered A Zones. This weighting factor was then applied to the difference in elevation between the ASCE 24-24 elevation and the 2024 IRC elevation values. The national average of increased elevation between the 2024 IRC and ASCE 24-24 compliance was approximately **1.2 feet** of additional elevation.

For Shaded X Zones (the 500-year floodplain) the same weighting factor for each numbered A Zone was applied. This is applicable because the numbered A Zones can roughly represent the overall floodplain cross section rather than just the cross section in the Special Flood Hazard Area (100-year floodplain). Since Shaded X Zones represent the land area between the 100-year flood elevation and the 500-year flood elevation a different technique for calculating elevation needed to be applied. In these areas there has historically been no elevation requirements. Since buildings could be constructed anywhere between the 101-year flood elevation and the 500-year flood elevation the mid-point was selected as the most likely elevation for the hypothetical building. In the Shaded X Zone this would be the ground elevation for the 300-year flood elevation. For each numbered A Zone the 300-year flood elevation was calculated to represent the ground elevation. A comparison was conducted to determine the greater of BFE+1 or the 500-year flood elevation for each numbered A Zone. The larger elevation was then subtracted from the 300-year flood elevation (ground elevation). The weighting factors for each numbered A Zone were then applied to the calculated elevation and a national average for compliance with ASCE 24-24 was determined to be approximately **0.74 feet** of additional elevation.

Data was pulled from **Table 6. Unit foundation cost increase with elevation** of the journal article in order to approximate the increase in foundation costs. Costs were provided on a $/m^2 basis for a variety of building sizes, aspect ratios of foundations and unit foundation costs for multiple heights of foundation. The costs, areas, and heights were adjusted from metric to US customary units. Within each aspect ratio the unit costs for a range of heights were compiled to create a line equation to approximate the cost between foundation heights. For A Zones and Shaded X Zones a square foot cost was calculated for each foundation type at the national average height of foundation (1.2 feet for A Zones and 0.74 feet for Shaded X Zones). The increase in foundation costs were the averaged across the different aspect ratios for each foundation type for each building size. An additional average was created across the four crawlspace foundation types represented in the journal article. This provides an approximate cost increase for three different size buildings for two different foundation types (slab on fill and crawlspace) for A Zones and Shaded X Zones. The 2,002 square foot building is indicated in the journal article to best represent the national average size single family house. According to the journal article the costs represent 2022 dollars.

	A Zone		Shaded X Zone	
Building Area (SF)	Slab On Fill Foundation	Crawlspace Foundation	Slab On Fill Foundation	Crawlspace Foundation
1496	$ 2,721	$ 2,903	$ 1,412	$ 1,761
2002	$ 3,087	$ 3,581	$ 1,526	$ 2,170
2497	$ 3,702	$ 3,981	$ 1,887	$ 2,406

Avoided Loses:

The increase in foundation cost due to additional elevation helps to avoid losses due to flooding for homes in special flood hazard areas and Shaded Zone X. It also avoids costs associated with displacement and temporary housing following storm damage. Additional elevation increases the likelihood that a home is liveable after a storm, decreases property damage and the need for replacement, and reduces risk. There is no FDIC or federally regulated lender requirement to maintain flood insurance in the Shaded Zone X. This lack of requirements to maintain an NFIP policy is coupled with high losses in the Shaded Zone X. Homeowners within the 500-year floodplain that don’t add the optional cost of a policy are left with little support when flood events exceed a Base Flood (100-year) event which has a 26 percent chance of being exceeded over a 30 year mortgage.

Staff Analysis: This proposal includes technical revisions to the code text to coordinate with an update of an existing referenced standard. This standard must be completed and readily available prior to the Public Comment Hearing. See CP28 Section 4.6.3.1.2.
CC # S97-25 Part VII and CC # S99-25 Part II addresses requirements in a different or contradicting manner. The committee is urged to make their intensions clear with their actions on these proposals.

Attached Files

- **ATT - IRC.docx**
  https://www.cdpaccess.com/proposal/12230/36062/files/download/9719/

S106-25

IBC: 1704.2.1, 1704.3, 1704.3.1, TABLE 1705.7, 1705.9

Proponents: Emily Dunham, Gresham Smith, representing NCSEA Code Advisory Committee Special Inspections/Quality Assurance Subcommittee (emily.dunham@greshamsmith.com); Emily Guglielmo, representing NCSEA (eguglielmo@martinmartin.com)

2024 International Building Code

Revise as follows:

1704.2.1 Special inspector qualifications. Prior to the start of the construction, the *approved agencies* shall provide written documentation to the *building official* demonstrating the competence and relevant experience or training of the *special inspectors* who will perform the *special inspections* and tests during construction. Experience or training shall be considered to be relevant where the documented experience or training is related in complexity to the same type of *special inspection* or testing activities for projects of similar complexity and material qualities. These qualifications are in addition to qualifications specified in other sections of this code.

The *registered design professional<u>s</u>* ~~*in responsible charge* and engineers of record~~ involved in the design of the project are permitted to act as an *approved agency* and their personnel are permitted to act as *special inspectors* for the work designed by them, provided they qualify as *special inspectors*.

1704.3 Statement of special inspections. Where *special inspections* or tests are required by Section 1705, the *registered design professional in responsible charge* shall ~~prepare~~ <u>review and coordinate</u> a statement of *special inspections* <u>prepared by one or more *registered design professionals*</u> in accordance with Section 1704.3.1 for submittal by the applicant in accordance with Section 1704.2.3.

Exception: The statement of *special inspections* is permitted to be prepared by a qualified *person approved* by the *building official* for construction not designed by a *registered design professional*.

1704.3.1 Content of statement of special inspections. The statement of *special inspections* shall identify the following:

1. The materials, systems, components and work required to have *special inspections* or tests by the *building official* or by the *registered design professional* responsible for each portion of the work.
2. The type and extent of each *special inspection*.
3. The type and extent of each test.
4. Additional requirements for *special inspections* or tests for seismic or wind resistance as specified in Sections 1705.12, 1705.13 and 1705.14.
5. For each type of *special inspection*, identification as to whether it will be continuous *special inspection*, periodic *special inspection* or performed in accordance with the notation used in the referenced standard where the inspections are defined.
6. *Deferred submittal* items that require a supplemental statement of special inspections.

TABLE 1705.7 REQUIRED SPECIAL INSPECTIONS AND TESTS OF DRIVEN DEEP FOUNDATION ELEMENTS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Verify element materials, sizes and lengths comply with the requirements.	X	—
2. Determine capacities of test elements and conduct additional load tests, as required.	X	—
3. Inspect driving operations and maintain complete and accurate records for each element.	X	—
4. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document any damage to foundation element.	X	—
5. For steel elements, perform additional special inspections in accordance with Section 1705.2.	In accordance with Section 1705.2	
6. For concrete elements and concrete-filled elements, perform tests and additional special inspections in accordance with Section 1705.3.	In accordance with Section 1705.3	
7.For specialty elements, perform additional inspections as determined by the registered design professional ~~in responsible charge~~.	In accordance with Statement of Special Inspections	

1705.9 Helical pile foundations. *Continuous special inspections* shall be performed during installation of *helical pile* foundations. The information recorded shall include installation equipment used, pile dimensions, tip elevations, final depth, final installation torque and other pertinent installation data as required by the *registered design professional* ~~*in responsible charge*~~. The *approved* geotechnical report and the *construction documents* prepared by the *registered design professional* shall be used to determine compliance.

Reason: This proposal is intended to clarify the role of the registered design professional in responsible charge (RDPIRC), the individual who coordinates the design team and liaises with the building official, and the role of the registered design professionals (RDP), those individuals whose technical expertise contribute to the project. The revisions in this proposal place the administrative tasks on the registered design professional in responsible charge and technical related tasks on the registered design professional.

1704.2.1: RDP's may serve as approved agencies for work they designed. However "engineers of record" is not an IBC term and reference to "RDPIRC" contributes to confusion regarding roles and responsibilities. It is more straightforward to simply say that RDP's may serve as an approved agency for work they designed subject to the noted qualifications, so text is proposed for deletion.

1704.3: Structural engineers often mistakenly equate the "RDPIRC" code language to the commonly used term structural "Engineer of Record," which is a contractual or project team role - not a role recognized by the IBC. The IBC does not specifically define or assign disciplinary roles because practice laws vary between jurisdictions. The IBC uses the generic term "registered design professional" in reference to any licensed/registered/certified/etc. entity that is responsible for a certain aspect of work. A structural engineer, a mechanical engineer, an architect, and a geotechnical engineer are all examples of "registered design professionals." A structural engineer who is responsible for the structural design aspects of a project is not necessarily the "registered-design-professional-in-responsible-charge."

As proposed, 1704.3 clarifies and differentiates three distinct roles and responsibilities:

1. The RDP (one or more), who authors portions of the statement of special inspections related to their work per 1704.3.1
2. The RDPIRC, who reviews and coordinates all of those portions in accordance with their duties defined in 107.3.4 and the Chapter 2 definition.
3. The applicant, who submits the statement of special inspections to the building official per their responsibility identified in 1704.2.3

1704.3.1 is included for context.

Table 1705.7 - Item 7: RDP's are responsible for specifying special inspection tasks, but those RDP's are not necessarily the RDPIRC. Thus the table should reference a "RDP," not the "RDPIRC."

1705.9: RDP's are responsible for specifying special inspection tasks, but those RDP's are not necessarily the RDPIRC. Thus the section should reference a "RDP," not the "RDPIRC."

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The tasks will still be performed, the proposal is clarifying which individual will be performing the task.

S108-25

IBC: SECTION 1705, 1705.1, 1705.1.1, 1705.1.2 (New), 1705.2.4, TABLE 1705.2.4, 1705.5.3, TABLE 1705.5.3, 1705.12, 1705.12.1, 1705.12.2, 1705.12.3, 1705.13.2, 1705.13.3, 1705.13.4, 1705.13.5, 1705.13.5.1, 1705.13.6

Proponents: Emily Dunham, representing NCSEA Code Advisory Committee Special Inspections/Quality Assurance Subcommittee (emily.dunham@greshamsmith.com); Emily Guglielmo, representing NCSEA (eguglielmo@martinmartin.com)

2024 International Building Code

SECTION 1705
REQUIRED SPECIAL INSPECTIONS AND TESTS

1705.1 General. *Special inspections* and tests of elements and nonstructural components of *buildings* and *structures* shall meet the applicable requirements of this section.

1705.1.1 Special cases. *Special inspections* and tests shall be required for proposed work that is, in the opinion of the *building official*, unusual in its nature, such as, but not limited to, the following examples:

1. Construction materials and systems that are alternatives to materials and systems prescribed by this code.
2. Unusual design applications of materials described in this code.
3. Materials and systems required to be installed in accordance with additional manufacturer's instructions that prescribe requirements not contained in this code or in standards referenced by this code.

Add new text as follows:

1705.1.2 Special inspection of connections, fastening, and anchorages. Where this section is specified in Section 1705, s*pecial inspection* of connections, fastening, and anchorages shall be performed in accordance with this section. The following applicable items shall be verified to comply with *construction documents*, valid evaluation reports and manufacturer's printed installation instructions.

1. Materials of members being connected.
2. Component materials, coatings, and surface preparation.
3. Component geometry, thicknesses, clearances, and material cover.
4. Fastener type, quantity, layout, size, length, edge distances, critical spacing, seating or bearing conditions, and embedment depths or thread engagement.
5. Fastener installation torques, pre-tension loads, or other special procedures.
6. Accommodation of specified allowable movements including length, direction, freedom of slip, and clearances.
7. Pretensioned bolts and other similar connectors achieve specified contact between connected members.

1705.2.4 Open-web steel joists and joist girders. *Special inspections* of open-web *steel joists* and joist girders in *buildings*, *structures* and portions thereof shall be in accordance with Table 1705.2.4.

Revise as follows:

TABLE 1705.2.4 REQUIRED SPECIAL INSPECTIONS OF OPEN-WEB STEEL JOISTS AND JOIST GIRDERS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION	REFERENCED STANDARD[a]
1. Installation of open-web steel joists and joist girders.			

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION	REFERENCED STANDARD
a. End connections – welding or bolted.	—	X	~~SJI specifications listed in Section 2207.1.~~ 1705.1.2
b. Bridging – horizontal or diagonal.	—	—	—
1.Standard bridging.	—	X	SJI specifications listed in Section 2207.1.
2.Bridging that differs from the SJI specifications listed in Section 2207.1.	—	X	—

a. Where applicable, see Section 1705.13.

1705.5.3 Mass timber construction. *Special inspections* of *mass timber* elements in Types IV-A, IV-B and IV-C construction shall be in accordance with Table 1705.5.3.

TABLE 1705.5.3 REQUIRED SPECIAL INSPECTIONS OF MASS TIMBER CONSTRUCTION

TYPE			CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1.	Inspection of anchorage and connections of mass timber construction to timber deep foundation systems. Inspect per section 1705.1.2.		—	X
2.	Inspect erection of mass timber construction.		—	X
3.	Inspection of connections where installation methods are required to meet design loads.			
	Threaded fasteners.	Verify use of proper installation equipment.	—	X
		Verify use of pre-drilled holes where required.	—	X
		Inspect screws, including diameter, length, head type, spacing, installation angle and depth.	—	X
	Adhesive anchors installed in horizontal or upwardly inclined orientation to resist sustained tension loads. Inspect per section 1705.1.2.		X	—
	Adhesive anchors not defined in preceding cell. Inspect per section 1705.1.2.		—	X
	Bolted connections. Inspect per section 1705.1.2.		—	X
	Concealed connections. Inspect per section 1705.1.2.		—	X

1705.12 Special inspections for wind resistance. *Special inspections* for wind resistance specified in Sections 1705.12.1 through 1705.12.3, unless exempted by the exceptions to Section 1704.2, are required for *buildings* and *structures* constructed in the following areas:

1. In wind Exposure Category B, where *basic wind speed*, *V,* is 150 mph (67 m/sec) or greater.
2. In wind Exposure Category C or D, where *basic wind speed*, *V,* is 140 mph (62.6 m/sec) or greater.

1705.12.1 Structural wood. *Continuous special inspection* is required during field gluing operations of elements of the *main windforce-resisting system*. *Periodic special inspection* per section 1705.1.2 is required for nailing, bolting, anchoring and other fastening of elements of the *main windforce-resisting system*, including wood shear walls, wood *diaphragms*, *drag struts*, braces and *hold-downs*.

Exception: *Special inspections* are not required for wood shear walls, shear panels and *diaphragms*, including nailing, bolting, anchoring and other fastening to other elements of the *main windforce-resisting system*, where the lateral resistance is provided by structural sheathing and the specified fastener spacing at panel edges is more than 4 inches (102 mm) on center.

1705.12.2 Cold-formed steel light-frame construction. *Periodic special inspection* is required for welding operations of elements of the *main windforce-resisting system*. *Periodic special inspection* is required for screw attachment, bolting, anchoring and other fastening of elements of the *main windforce-resisting system*, including shear walls, braces, *diaphragms*, *collectors* (*drag struts*) and *hold-downs*. Inspection tasks shall be as follows:

1. Special inspections for screw and bolt attachments to the items above shall be per the quality assurance inspector tasks listed in AISI S240 Section D6.10.
2. Special inspections for welding operations to fasten the items above shall be per the quality assurance inspector tasks listed in AISI S240 Tables D6.7-2 and D6.7-3.

Exception: *Special inspections* are not required for cold-formed steel light-frame shear walls and *diaphragms*, including screwing, bolting, anchoring and other fastening to components of the windforce-resisting system, where either of the following applies:

1. The sheathing is *gypsum board* or *fiberboard*.
2. The sheathing is *wood structural panel* or steel sheets on only one side of the shear wall, shear panel or *diaphragm* assembly and the specified fastener spacing at the panel or sheet edges is more than 4 inches (102 mm) on center (o.c.).

1705.12.3 Wind-resisting components. *Periodic special inspection* per section 1705.1.2 is required for fastening of the following systems and components:

1. *Roof covering*, *roof deck* and roof framing connections.
2. *Exterior wall covering* and wall connections to roof and floor *diaphragms* and framing.

Exceptions: Special inspections for the following items shall be performed in accordance with the referenced section rather than section 1705.1.2.

1. *Special inspections* for sidelaps of cold-formed steel deck panels and for fastening of cold-formed steel decks to roof framing and to exterior wall framing shall be performed in accordance with section 1705.2.3.
2. *Special inspections* for structural steel connections shall be performed in accordance with section 1705.2.1.
3. *Special inspections* for concrete roof deck, concrete roof framing connections, and concrete wall connections to roof and floor diaphragms and framing shall be performed in accordance with section 1705.3.
4. *Special inspections* for connections of high-load wood roof *diaphragms* to roof framing shall be performed in accordance with section 1705.5.1.
5. *Special inspections* for threaded fastener *mass timber* connections shall be performed in accordance with Table 1705.5.3.

1705.13.2 Structural wood. For the *seismic force-resisting systems* of *structures* assigned to *Seismic Design Category* C, D, E or F:

1. *Continuous special inspection* shall be required during field gluing operations of elements of the *seismic force-resisting system*.
2. *Periodic special inspection* per section 1705.1.2 shall be required for nailing, bolting, anchoring and other fastening of elements of the *seismic force-resisting system*, including wood shear walls, wood *diaphragms*, *drag struts*, braces, shear panels and *hold-downs*.

Exception: *Special inspections* are not required for wood shear walls, shear panels and *diaphragms*, including nailing, bolting, anchoring and other fastening to other elements of the *seismic force-resisting system*, where the lateral resistance is provided by structural sheathing, and the specified fastener spacing at the panel edges is more than 4 inches (102 mm) on center.

1705.13.3 Cold-formed steel light-frame construction. For the *seismic force-resisting systems* of *structures* assigned to *Seismic Design Category* C, D, E or F, *periodic special inspection* shall be required for both:

1. Welding operations of elements of the *seismic force-resisting system*.
2. Screw attachment, bolting, anchoring and other fastening of elements of the *seismic force-resisting system*, including shear walls, braces, *diaphragms*, *collectors* (*drag struts*) and *hold-downs*.

Inspection tasks shall be as follows:

1. Special inspections for screw and bolt attachments to the items above shall be per the quality assurance inspector tasks listed in AISI S240 Section D6.10.
2. Special inspections for welding operations to fasten the items above shall be per the quality assurance inspector tasks listed in AISI S240 Tables D6.7-2 and D6.7-3.

Exception: *Special inspections* are not required for cold-formed steel light-frame shear walls and *diaphragms*, including screw installation, bolting, anchoring and other fastening to components of the *seismic force-resisting system*, where either of the following applies:

1. The sheathing is *gypsum board* or *fiberboard*.
2. The sheathing is *wood structural panel* or steel sheets on only one side of the shear wall, shear panel or *diaphragm* assembly and the specified fastener spacing at the panel or sheet edge is more than 4 inches (102 mm) on center.

1705.13.4 Designated seismic systems. For *structures* assigned to *Seismic Design Category* C, D, E or F, the *special inspector* shall examine *designated seismic systems* requiring seismic qualification in accordance with Section 13.2.3 of ASCE 7 and verify that the *label*, anchorage and mounting conform to the *certificate of compliance*.

1705.13.5 Architectural components. *Periodic special inspection* per section 1705.1.2 is required for the erection and fastening of exterior cladding, interior and exterior nonbearing walls and interior and exterior *veneer* in structures assigned to *Seismic Design Category* D, E or F.

Exception: *Periodic special inspection* is not required for the following:

1. Exterior cladding, interior and exterior nonbearing walls and interior and exterior *veneer* 30 feet (9144 mm) or less in height above grade or walking surface.
2. Exterior cladding and interior and exterior *veneer* weighing 5 psf (0.24 kN/m^2) or less.
3. Interior nonbearing walls weighing 15 psf (0.72 kN/m^2) or less.

1705.13.5.1 Access floors. Periodic *special inspection* per section 1705.1.2 is required for the anchorage of access floors in *structures* assigned to *Seismic Design Category* D, E or F.

1705.13.6 Plumbing, mechanical and electrical components. *Periodic special inspection* of plumbing, mechanical and electrical components shall be required for the following:

1. Anchorage of electrical equipment for emergency and *standby power systems* in *structures* assigned to *Seismic Design Category* C, D, E or F shall be inspected per section 1705.1.2.
2. Anchorage of other electrical equipment in *structures* assigned to *Seismic Design Category* E or F shall be inspected per section 1705.1.2.
3. Installation and anchorage of piping systems designed to carry *hazardous materials* and their associated mechanical units in *structures* assigned to *Seismic Design Category* C, D, E or F shall be inspected per section 1705.1.2.
4. Installation and anchorage of ductwork designed to carry *hazardous materials* in *structures* assigned to *Seismic Design Category* C, D, E or F shall be inspected per section 1705.1.2.
5. Installation and anchorage of vibration isolation systems in *structures* assigned to *Seismic Design Category* C, D, E or F where the *approved construction documents* require a nominal clearance of $^1/_4$ inch (6.4 mm) or less between the equipment support frame and restraint shall be inspected per section 1705.1.2.
6. Installation of mechanical and electrical equipment, including duct work, piping systems and their structural supports, where *automatic sprinkler systems* are installed in *structures* assigned to *Seismic Design Category* C, D, E or F to verify one of the following:
   6.1. Minimum clearances have been provided as required by Section 13.2.4 ASCE/SEI 7.
   6.2. A nominal clearance of not less than 3 inches (76 mm) has been be provided between *automatic sprinkler system* drops and sprigs and: structural members not used collectively or independently to support the sprinklers; equipment attached to the *building structure*; and other systems' piping.

Where flexible sprinkler hose fittings are used, *special inspection* of minimum clearances is not required.

Reason: This proposal does not add any new special inspections to Chapter 17, nor does it override inspection tasks that are already defined in referenced standards. Special inspections of certain connections specified in Chapter 17 do not take the place of the building official's framing inspections. The building official has authority to determine the acceptable qualifications for the special inspector.

The proposed language for these connection, anchorage and fastening special inspection requirements strives to clarify the following:

Identify a required task,

Identify a procedure to complete that task (whether by description or by referenced standard),

Define a frequency for the task (continuous vs periodic), and

Identify a standard by which to verify compliance (construction documents, evaluation reports, ASTM standard, etc.).

This proposal reduces room for interpretation, helps with enforceability of the provisions, and results in a more consistent levels of quality assurance. The descriptions of the items are written generally to include a broad range of materials, but the requirements only apply when proposed section 1705.1.2 is specifically invoked within the detailed requirements of section 1705, as indicated in this proposal.

Table 1705.2.4 Item 1a – “End connections” calls for periodic special inspection of open web steel joist end connections per SJI 100 or 200. However, those standards do not contain any special inspection requirements for member end connections. Therefore, the proposed revision clarifies what items need to be considered by the special inspector to verify that the completed end connection is compliant, and references proposed section 1705.1.2 in lieu of SJI specifications since there are no tasks for inspection of end connections defined in SJI 100/200.

Table 1705.5.3 calls for special inspection of mass timber connections and anchorages. Required tasks related to inspection of threaded fastener items are clearly identified in the table. However, inspection tasks related to adhesive anchors, bolted connections, and concealed connections are not specified. There are no referenced standards that detail inspection tasks for these items so the proposed language clarifies what items need to be considered when inspecting connections per the noted line items of the table.

Sections 1705.12.1 and 1705.13.2 call for periodic special inspection of nailing, bolting, anchoring, and other fastening of certain lateral force resisting systems but the specific inspection tasks are not identified and the NDS referenced standard does not include special inspection provisions. The proposed language in this section adds a reference to 1705.1.2 as a means for verifying compliance.

Sections 1705.12.2 and 1705.13.3 call for periodic special inspection of nailing, bolting, anchoring, and other fastening of certain lateral force resisting systems. Tasks necessary to complete these inspections are specified in AISI S240. The applicable section number of the referenced standard is provided. QAI tasks for welding elements of the of the lateral force resisting system are not provided in Section D6.10, but IBC requires special inspection of welding operations. Therefore, Tables D6.7-2 and D6.7-2 are used to define the inspection tasks to comply with the IBC requirement.

Section 1705.12.3 requires special inspections of certain roof framing connections, wall connections to diaphragms and framing, roof covering, roof deck, roof framing connections, exterior wall covering, and exterior wall framing. Exceptions have been listed for referenced standards that already specify special inspection tasks. Proposed section 1705.1.2 covers conditions that are not already addressed preexisting code provisions.

Section 1705.13.5 requires special inspection of fastening of certain instances of exterior cladding, nonbearing walls, and veneer. The proposed section 1705.1.2 provides a list of items to be referenced when verifying compliance.

Section 1705.13.5.1 requires special inspection of the anchorage of access floors. Specific inspection tasks are not identified in this section. The proposed language in this section adds a reference to proposed section 1705.1.2 as a means of verifying compliance.

Section 1705.13.6 requires special inspection of the anchorage of electrical equipment for emergency and standby power systems, anchorage of piping systems designed to carry hazardous materials and their associated mechanical units, anchorage of ductwork designed to carry hazardous materials, and anchorage of vibration isolation systems. Specific inspection tasks are not identified in this section. The proposed language in this section adds a reference to proposed section 1705.1.2 as a means of verifying compliance.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Proposal does not add cost because it does not add work scope, it clarifies the tasks necessary to verify compliance when special inspections for connections are required.

S112-25

IBC: TABLE 1705.3

Proponents: Emily Dunham, representing NCSEA Code Advisory Committee Special Inspections/Quality Assurance Subcommittee (emily.dunham@greshamsmith.com); Emily Guglielmo, representing NCSEA (eguglielmo@martinmartin.com)

2024 International Building Code

Revise as follows:

TABLE 1705.3 REQUIRED SPECIAL INSPECTIONS AND TESTS OF CONCRETE CONSTRUCTION

	TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION	REFERENCED STANDARD[a]	IBC REFERENCE
1.	Inspect reinforcement, including prestressing tendons, and verify placement.	—	~~X~~	ACI 318: Ch. 26 ~~20, 25.2, 25.3, 26.6.1-26.6.3~~	1908.1
	a. Reinforcement in special moment frames, boundary elements of special structural walls and coupling beams.	X	-	ACI 318: Ch. 26	
	b. All other reinforcement.	-	X	ACI 318: Ch. 26	
2.	Reinforcing bar welding:				1705.3.1
	a. Verify weldability of reinforcing bars other than ASTM A706.	—	X	AWS D1.4 ACI 318: Ch. 26~~.13.1.4~~	
	b. Inspect welding of reinforcement for intermediate and special moment frames, boundary elements of special structural walls, ~~and~~ coupling beams and shear reinforcement.	X	—	AWS D1.4 ACI 318: Ch. 26~~.13.3~~	
	c. Inspect welded reinforcement splices.	X	—	—	
	d. Inspect welding of primary tension reinforcement in corbels.	X	—	—	
	e. Inspect single-pass fillet welds, maximum $^{5}/_{16}$″, not defined in 2.b.	—	X	AWS D1.4 ACI 318: Ch. 26~~.13.3~~	
	f. Inspect all other welds.	~~—~~X	~~X~~-	AWS D1.4 ACI 318: Ch. 26~~.13.3~~	
3.	Inspect anchors cast in concrete.	—	X	ACI 318: Ch. 26~~.13.3.3~~	—
4.	Inspect anchors post-installed in hardened concrete members.[b]				—
	a. Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads.	X	—	ACI 318: Ch. 26~~.13.3.2~~	
	b. Mechanical anchors and adhesive anchors not defined in 4.a.	—	X	ACI 318: Ch. 26~~.13.3~~	
5.	Verify use of required design mix.	X	~~X~~	ACI 318: Ch. ~~19,~~ 26 ~~.4.3, 26.4.4~~	1904.1, 1904.2
6.	Prior to and during concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	X	—	ASTM C31 ASTM C172 ACI 318: Ch. 26~~.5, 26.12~~	—
7.	Inspect concrete and shotcrete placement for proper application techniques.	X	—	ACI 318: Ch. 26~~.5~~	—
8.	Verify maintenance of specified curing temperature and techniques.	—	X	ACI 318: Ch. 26~~.5.3-26.5.5~~	—
9.	Inspect prestressed concrete for:				—
	a. Application of prestressing forces.	X	—	ACI 318: Ch. 26~~.10~~	
	b. Grouting of bonded prestressing tendons.	X	—		
10.	Inspect erection of precast concrete members.	—	X	ACI 318: Ch. 26~~.9~~	—
11.	For precast concrete diaphragm connections or reinforcement at joints classified as moderate or high deformability elements (MDE or HDE) in structures assigned to Seismic Design Category C, D, E or F, inspect such connections and reinforcement in the field for:			ACI 318: Ch. 26~~.13.1.3~~ ACI 550.5	—
	a. Installation of the embedded parts.	X	—		
	b. Completion of the continuity of reinforcement across joints.	X	—		
	c. Completion of connections in the field.	X	—		
12.	Inspect installation tolerances of precast concrete diaphragm connections for compliance with ACI 550.5.	—	X	ACI 318: Ch. 26~~.13.1.3~~	—
13.	Verify in-situ concrete strength, prior to stressing of tendons in posttensioned concrete and prior to removal of shores and forms from beams and structural slabs.	—	X	ACI 318: Ch. 26~~.11.2~~	—
14.	Inspect formwork for shape, location and dimensions of the concrete member being formed.	—	X	ACI 318: Ch. 26 ~~.11.1.2(b)~~	—

For SI: 1 inch = 25.4 mm.

a. Where applicable, see Section 1705.13.

b. Specific requirements for special inspection shall be included in the research report for the anchor issued by an approved source in accordance with 26.13 in ACI 318, or other qualification procedures. Where specific requirements are not provided, special inspection requirements shall be specified by the registered design professional and shall be approved by the building official prior to the commencement of the work.

Reason: Coordination between special inspection requirements in ACI 318 Ch. 26 and Table 1705.3 is consistently out of sync. By changing the reference standard pointer to just be Chapter 26: Construction Documents and Inspection (the only chapter directed at construction, all other chapters are directed to the designer), issues with 1705.3 not being aligned with ACI 318 is removed.

Items 1a and 1b: Amend required special inspections and tests of concrete construction table to include inspection of reinforcement in special moment frames, boundary elements of special structural walls and coupling beams as required by ACI 318-19 Section 26.13.1.3. This proposal corrects the exclusion of the required special inspections table for concrete construction of special structural systems. The proposal amends the table to include continuous inspections of reinforcement in special moment frames, boundary elements of special structural walls and coupling beams.

Item 2b: Amend to include intermediate moment frames and shear reinforcement for special structural walls to require continuous (rather than periodic) welding special inspection given the critical design role of such reinforcement.

Item 2e: Clarifying that 5/16” or less fillet welds associated with those critical elements in item 2b are to receive continuous rather than periodic welding special inspection.

Item 2f: Proposal to change back to previous continuous special inspection requirement since welds not addressed by other items should receive continuous rather than periodic special inspection, such as for common concrete tilt-up wall panel-to-panel chord bar connections. Item 2.e. addresses welds that should receive periodic special inspection. Further information and background were provided during the 2022 ICC public comment period for the 2024 IBC by Stephen Kerr and Roy Lobo, both representing the Structural Engineers Association of California (SEAOC) in response to the change from continuous to periodic in the IBC model code:

> The proposed modification is intended to preserve the "all other welds" as continuous. The proponent of S143 is correct that back in 2012 the change did modify the inspection requirements shifting the other welds to continuous. However, the change S148-12 was clear that the modifications in the change were not just organizational. The original reason statement from S148-12:
>
> > "... The purpose for this proposal is to simplify the required extent (continuous or periodic) of special inspection for the welding of reinforcing bars, which is currently based on the structural design (e.g., resisting flexural, axial or shear forces). The proposal changes the extent to continuous special inspection of all welding of reinforcing bars except for single-pass fillet welds that are a maximum of 5/16-inch where periodic special inspection is permitted. This will also be consistent with the historical approach taken by the building code for the extent of special inspections related to welding."
>
> The change to limit the periodic welding was clearly spelled out in the S148-12 change. This has been argued in subsequent code cycles with proposals S136-16 and S96-19. The code has still maintained that "all other welds" as continuously inspected. If item f "all other welds" are considered to be periodically inspected, then there is a conflict with item e for fillet welds a maximum of 5/16". Larger multi-pass fillet welds do not fall under items a - e, therefore would be considered an "all other weld" and would be periodically inspected. The larger multi-pass welds should continue to be continuously inspected.
>
> There are some additional welds that could reasonably be periodically inspected, rather than continuous. However these welds should be clearly spelled out, similar to the item e 5/16" fillet welds.

Item 5: Proposal aligns inspection requirements with reference standard ACI 318-19 Section 26.13.3.2(a) requirements.

Item 6: Proposal adding “and during” ensures concrete sampling complies with ASTM C172 requirements including sampling during placement. Sampling only prior to placement could lead to substantial delays between sampling and placement, which can lead to concrete curing or other detrimental effects not being captured by samples taken only prior to placement.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal brings alignment between ACI 318 and IBC.

Staff Analysis: CC # S112-25 and CC # S113-25 addresses requirements in a different or contradicting manner. The committee is urged to make their intensions clear with their actions on these proposals.

S113-25

IBC: TABLE 1705.3

Proponents: Stephen Szoke, representing American Concrete Institute (steve.szoke@concrete.org)

2024 International Building Code

Revise as follows:

TABLE 1705.3 REQUIRED SPECIAL INSPECTIONS AND TESTS OF CONCRETE CONSTRUCTION

Portions of table not shown remain unchanged.

	TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION	REFERENCED STANDARD[a]	IBC REFERENCE
1.	Inspect reinforcement, and verify placement				
~~1.~~	~~Inspect~~ a. Steel reinforcement, including prestressing tendons~~, and verify placement.~~	—	X	ACI 318: Ch. 20, 25.2, 25.3, 26.6.1-26.6.3	—
	b. GFRP reinforcement	--	X	ACI CODE 440.11: Ch 26	
2.	Reinforcing bar welding:				—
	a. Verify weldability of reinforcing bars other than ASTM A706.	—	X	AWS D1.4 ACI 318: 26.13.1.4	
	b. Inspect welding of reinforcement for special moment frames, boundary elements of special structural walls and coupling beams.	X	—	AWS D1.4 ACI 318: 26.13.3	
	c. Inspect welded reinforcement splices.	X	—	—	
	d. Inspect welding of primary tension reinforcement in corbels.	X	—	—	
	e. Inspect single-pass fillet welds, maximum $^5/_{16}$″.	—	X	AWS D1.4 ACI 318: 26.13.3	
	f. Inspect all other welds.	—	X	AWS D1.4 ACI 318: 26.13.3	
3.	Inspect anchors cast in concrete.	—	X	ACI 318: 26.13.3.3	—
4.	Inspect anchors post-installed in hardened concrete members.[b]				—
	a. Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads.	X	—	ACI 318: 26.13.3.2	
	b. Mechanical anchors and adhesive anchors not defined in 4.a.	—	X	ACI 318: 26.13.3	
5.	Verify use of required design mix.	—	X	ACI 318: Ch. 19, 26.4.3, 26.4.4	1904.1, 1904.2
6.	Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	X	—	ASTM C31 ASTM C172 ACI 318: 26.5, 26.12	—
7.	Inspect concrete and shotcrete placement for proper application techniques.	X	—	ACI 318: 26.5	—
8.	Verify maintenance of specified curing temperature and techniques.	—	X	ACI 318: 26.5.3-26.5.5	—
9.	Inspect prestressed concrete for:				—
	a. Application of prestressing forces.	X	—	ACI 318: 26.10	
	b. Grouting of bonded prestressing tendons.	X	—		
10.	Inspect erection of precast concrete members.	—	X	ACI 318: 26.9	—
11.	For precast concrete diaphragm connections or reinforcement at joints classified as moderate or high deformability elements (MDE or HDE) in structures assigned to Seismic Design Category C, D, E or F, inspect such connections and reinforcement in the field for:			ACI 318: 26.13.1.3	—
	a. Installation of the embedded parts.	X	—		
	b. Completion of the continuity of reinforcement across joints.	X	—	ACI 550.5	
	c. Completion of connections in the field.	X	—		
12.	Inspect installation tolerances of precast concrete diaphragm connections for compliance with ACI 550.5.	—	X	ACI 318: 26.13.1.3	—
13.	Verify in-situ concrete strength, prior to stressing of tendons in posttensioned concrete and prior to removal of shores and forms from beams and structural slabs.	—	X	ACI 318: 26.11.2	—
14.	Inspect formwork for shape, location and dimensions of the concrete member being formed.	—	X	ACI 318: 26.11.1.2(b)	—

For SI: 1 inch = 25.4 mm.

a. Where applicable, see Section 1705.13.

b. Specific requirements for special inspection shall be included in the research report for the anchor issued by an approved source in accordance with 26.13 in ACI 318, or other qualification procedures. Where specific requirements are not provided, special inspection requirements shall be specified by the registered design professional and shall be approved by the building official prior to the commencement of the work.

Reason: This code change proposal provides a pointer to the requirements of special inspection of structural concrete reinforced with GFRP bars. While the inspection requirements are maintained as mandatory requirements in ACI CODE 440.11, code officials in jurisdictions where GFRP bars are being accepted recommended adding this pointer to Table 1705.3. This language is informative and consistent with current inspection criteria for steel reinforcement, directing users to ACI 318.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This code change proposal has no impact on cost. ACI CODE 440.11 referenced in the IBC requires inspection. This proposal simply is a pointer to the inspection requirements ACI CODE 440.11

Staff Analysis: CC # S113-25 and CC # S112-25 addresses requirements in a different or contradicting manner. The committee is urged to make their intensions clear with their actions on these proposals.

S123-25

IBC: SECTION 202 (New), 1705.6.1 (New), TABLE 1705.6.1 (New), 1809.15 (New), 1809.15.1 (New), 1809.15.1.1 (New), 1809.15.2 (New), 1809.15.3 (New), 1809.15.4 (New)

Proponents: Lori Simpson, Langan, representing Geocoalition (lsimpson@langan.com); Daniel Stevenson, Berkel and Company Contractors, Inc., representing GeoCoalition (dstevenson@berkelapg.com)

2024 International Building Code

Add new definition as follows:

LOAD TRANSFER LAYER. Granular or cementitious materials placed between ground improvement elements and shallow foundations.

Add new text as follows:

1705.6.1 Ground improvement. Special Inspections and tests shall be performed during installation of *ground improvement* as specified in Table 1705.6.1. The approved geotechnical report and *construction documents* prepared by the *registered design professional* shall be used to determine compliance.

TABLE 1705.6.1 REQUIRED SPECIAL INSPECTIONS AND TESTS OF GROUND IMPROVEMENT

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Inspect implementation and verification procedures and maintain complete accurate records for each application of *ground improvement* systems.	X	-
2. Verify *ground improvement* equipment, materials, locations, diameters, and plumbness, as applicable.	X	-
3. Verify embedment into bearing strata, as applicable. Record relevant ground effects.	X	-
4. Verify working grade elevation	-	X
5. Verify material quantities used, as applicable.	X	-
6. Verify improvement using methods specified in geotechnical report.	-	X

1809.15 Ground improvement. *Ground improvement* shall be in accordance with this section.

1809.15.1 General. *Ground improvement* shall be designed, detailed, and constructed in accordance with sections 1809.15.1 through 1809.15.3.

1809.15.1.1 Geotechnical Investigation. *Ground improvement* shall be designed and installed on the basis of a geotechnical investigation and written report as set forth in Section 1803.

1809.15.2 Design. *Ground Improvement* for shallow foundation support shall be designed by a *registered design professional.* The *registered design professional* shall provide construction documents and calculations that include all of the following:

1. Structural loads, including vertical, lateral, and rotational, and maximum permissible total and differential settlements as provided by the *registered design professional in responsible charge* for the structure being supported.
2. Cut and fill heights, as shown on the site plan.
3. Geotechnical and structural capacity analyses.
4. Where required, thickness and characteristics of the load transfer layer.
5. Allowable bearing pressures.
6. Minimum safety factor used to determine the allowable bearing pressure. Where ground improvement includes individual elements, provide separate factors of safety for the individual elements and the overall system.
7. Predicted maximum total and differential settlements.

8. Recommended testing and acceptance criteria for the installation of the *ground improvement.*
9. Plans and specifications necessary for the completion of the work.

1809.15.3 Installation. *Ground improvement* shall be installed in accordance with construction documents provided by the *registered design professional.*

1809.15.4 Special inspection. Special inspections in accordance with 1705.6.1 shall be provided for *ground improvement.*

Reason: Ground Improvement systems are *methods which* can enhance the load-bearing capacity of the ground below shallow foundations and/or control total and differential settlements within the zone of influence of the foundations. Ground improvement systems are most often used as an alternative to deep foundations (i.e., pile foundations). There is no established standard for the design or installation of ground improvement.

Failures of ground improvement systems can have significant impact on the structural integrity of a building. The objective of this proposal is to provide consistent requirements for the design, construction, and inspection of ground improvement systems.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Ground improvement is commonly used; this code addition does not cause a cost impact, but provides consistent requirements for design, construction, and inspection of ground improvement systems.

S124-25

IBC: SECTION 202 (New), 1705.6.2 (New), TABLE 1705.6.2 (New), 1809.16 (New), 1809.16.1 (New), 1809.16.2 (New), 1809.16.2.1 (New), 1809.16.2.2 (New), 1809.16.2.3 (New), 1809.16.2.4 (New), 1809.16.2.4.1 (New), 1809.16.2.4.2 (New), 1809.16.2.4.2.1 (New), 1809.16.2.4.2.2 (New), 1809.16.2.4.2.3 (New), 1809.16.3 (New), 1809.16.4 (New)

Proponents: Lori Simpson, Langan, representing Geocoalition (lsimpson@langan.com); Daniel Stevenson, Berkel and Company Contractors, Inc., representing GeoCoalition (dstevenson@berkelapg.com)

2024 International Building Code

Add new definition as follows:

RIGID INCLUSIONS. Vertical elements within the ground consisting of timber, steel, *concrete*, grout, or other combination of cementitious materials mixed with aggregates, or other materials that are significantly stiffer than the ground in which they are installed and do not require lateral confinement of the surrounding soil for internal stability. Rigid inclusions are not connected directly to foundations.
RIGID INCLUSION SYSTEMS. *Rigid inclusions*, the strata and materials in which they are installed, and a *load transfer layer*.

Add new text as follows:

1705.6.2 Rigid inclusion systems. Special Inspections and tests shall be performed during installation of rigid inclusion systems as specified in Tables 1705.6.1 and 1705.6.2. The approved geotechnical investigation and *construction documents* prepared by the *registered design professional(s)* shall be used to determine compliance.

TABLE 1705.6.2 REQUIRED SPECIAL INSPECTIONS AND TESTS OF RIGID INCLUSION SYSTEMS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Inspect installation and load testing operations, and maintain complete and accurate records for each *rigid inclusion*	X	-
2. Verify *rigid inclusion* materials, placement locations, diamters, and plubness. Verify embedment into bearing strata and adequate end-bearing strata capacity. Record concrete or grout volumes. Verify top of *rigid inclusions* elevations.	X	-
3. Perform test and *special inspections* on *concrete* or grout in accordance with applicable requirements of Section 1705.3	In accordance with Section 1705.3	
4. During *rigid inclusion* load transfer/layer installation, verify use of proper materials, procedures, material densities, and lift thicknesses.	X	-

1809.16 Rigid inclusions. *Rigid inclusions* shall be in accordance with this section.

1809.16.1 General. Where *ground improvement systems* use *rigid inclusions*, *rigid inclusion systems* shall be designed, detailed and installed in accordance with sections 1809.16.2 through 1809.16.1.3.

1809.16.2 Design and detailing. *Rigid inclusion systems* shall be designed and detailed in accordance with sections 1809.16.2.1 through 1809.16.2.4.

1809.16.2.1 Design requirements. In addition to the requirements of Section 1809.15.1, the *registered design professional* shall provide construction documents and calculations that include all of the following:

1. The load distribution and strain compatibility between the *rigid inclusions* and surrounding strata.
2. The structural compatibility between the *rigid inclusions* and the shallow foundations including impacts of concentrated reaction loads imposed by the *rigid inclusions* on shallow foundations.
3. Minimum number and configuration of *rigid inclusions* to establish vertical, lateral, and rotational stability of foundations.

1809.16.2.2 Allowable stresses. The allowable stresses for materials used in *rigid inclusions* shall be in accordance with section

1810.3.2.6. Allowable stresses for materials not included in section 1810.3.2.6 shall be approved by the *building official.*

1809.16.2.3 Load Test. Where *rigid inclusions* are used to increase bearing capacity, or where predicted settlements without *rigid inclusions* would cause harmful distortion or instability in the structure, control test elements shall be tested in accordance with ASTM D1143 or ASTM D4945. One or more load tests shall be conducted in each area of similar subsurface conditions. The resulting allowable load shall be not more than one-half of the ultimate load bearing capacity as assessed by one of the published methods listed in section 1810.3.3.1.3.

1809.16.2.4 Seismic Design Categories C through F. For structures assigned to *seismic design category* C, D, E or F, materials used in *rigid inclusions* shall comply with section 1809.16.2.4.1, and reinforcement shall be provided in accordance with section 1809.16.2.4.2.

1809.16.2.4.1 Materials. For structures assigned to *seismic design category* C, D, E or F, materials used in rigid inclusions shall comply with one of the following:

1. Steel elements meeting the requirements of 1810.3.2.3.
2. Timber elements meeting the requirements of 1810.3.2.4.
3. Concrete elements meeting the requirements of 1808.8.1.
4. Other *approved* materials, which have adequate strength and ductility to resist imposed ground curvatures.

1809.16.2.4.2 Seismic reinforcement for concrete rigid inclusions. Where a *structure* is assigned to *Seismic Design Category* C, reinforcement shall be provided in accordance with Section 1809.16.2.4.2.1. Where a *structure* is assigned to *Seismic Design Category* D, E or F, reinforcement shall be provided in accordance with Sections 1809.16.2.4.2.2 and 1809.16.2.4.2.3.

1809.16.2.4.2.1 Seismic reinforcement in Seismic Design Category C. For *structures* assigned to *Seismic Design Category* C, concrete *rigid inclusions* shall be reinforced as specified in this section. Reinforcement shall be provided where required by analysis. At least one longitudinal bar, with a minimum longitudinal reinforcement ratio of 0.002, shall be provided throughout the minimum reinforced length of the element as defined in this section starting at the top of the element. The minimum reinforced length of the *rigid inclusion* shall be taken as the greatest of the following:

1. One-third of the element length.
2. A distance of 10 feet (3048 mm).
3. Three times the least element dimension.
4. Three times the least element dimension below the interfaces of strata that are hard or stiff and strata that are liquefiable or are composed of soft- to medium-stiff clay.

Exception: The requirements of this section shall not apply to concrete *rigid inclusions* cast in structural steel pipes or tubes.

1809.16.2.4.2.2 Seismic reinforcement in Seismic Design Categories D through F. For *structures* assigned to *Seismic Design Category* D, E or F, concrete *rigid inclusions* shall be reinforced as specified in this section. Reinforcement shall be provided where required by analysis. For *Site Class* A, B, BC, C, CD, D or DE sites, not less than one longitudinal bar, with a minimum longitudinal reinforcement ratio of 0.003, shall be provided throughout the minimum reinforced length of the *rigid inclusion*. For *Site Class* E and F sites, not less than four longitudinal bars, with a minimum longitudinal reinforcement ratio of 0.005, shall be provided throughout the minimum reinforced length of the *rigid inclusion*. The minimum reinforced length of the *rigid inclusion* is defined in this section as starting at the top of the element. The minimum reinforced length of the *rigid inclusion* shall be taken as the greatest of the following:

1. One-half of the element length.

2. A distance of 10 feet (3048 mm).

3. Three times the least element dimension.

4. Seven times the least element dimension below the interfaces of strata that are hard or stiff and strata that are liquefiable or are composed of soft- to medium-stiff clay.

Exceptions: The requirements of this section shall not apply to concrete cast in structural steel pipes or tubes.

1809.16.2.4.2.3 Transverse Confinement for Site Classes E and F. For *Site Class* E or F sites, transverse confinement reinforcement shall be provided in the rigid inclusion in accordance with Section 1810.3.9.4.2.2.

1809.16.3 Installation. The *rigid inclusion systems* shall be installed in accordance with construction documents provided by the *rigid inclusion systems* designer.

1809.16.4 Special inspection. *Special Inspections* in accordance with 1705.6.1 and 1705.6.2 shall be provided for *rigid inclusion systems*.

Reason: Ground Improvement systems are *methods which* can enhance the load-bearing capacity of the ground below shallow foundations and/or control total and differential settlements within the zone of influence of the foundations. Ground improvement systems are most often used as an alternative to deep foundations (i.e., pile foundations). Rigid inclusions are not presently addressed in the IBC. There is no established standard for the design or installation of rigid inclusion systems.

Failures of ground improvement systems can have significant impact on the structural integrity of a building. The objective of this proposal is to provide consistent requirements for the design, construction, and inspection of rigid inclusions systems.

Graphical comparison of different foundation systems:

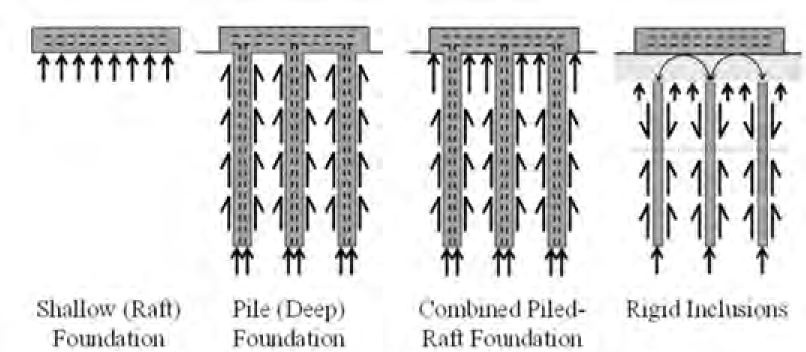


Figure 1. Generalized load path diagrams for typical foundation systems.

Cost Impact: Increase

Estimated Immediate Cost Impact:

Cost impact is the cost of reinforcement in each rigid inclusion, where it will be required and has not been previously used in design. The increase could be on the order of $3 to $16 per foot of length of rigid inclusions.

Estimated Immediate Cost Impact Justification (methodology and variables):

Where reinforcement will be required to be used in a rigid inclusion, there may be a cost increase, as not all designers are including it now. Where reinforcement is required, the cost increase will depend on:

- the amount of steel needed - from a single bar to a full cage
- the length the reinforcement is needed - a single bar will likely be for the full length, but a cage might only be needed in the upper 10 to 20 feet.

Estimated Life Cycle Cost Impact:

This proposal will not impact life cycle cost.

Estimated Life Cycle Cost Impact Justification (methodology and variables):

Once constructed, there is no cost change over the life cycle of the structure.

S163-25

IBC: 2304.11, 2304.11.1, TABLE 2304.11, 2304.11.1.1, 2304.11.1.2, 2304.11.1.3, AWC Chapter 35 (New)

Proponents: David Tyree, representing American Wood Council (dtyree@awc.org); Shane Nilles, representing American Wood Council (snilles@awc.org)

2024 International Building Code

Revise as follows:

2304.11 Heavy timber construction. Where a *structure*, portion thereof or individual structural elements are required by provisions of this code to be of heavy timber, the *building elements* therein shall comply with the applicable provisions of either Sections 2304.11.1 through 2304.11.4 or ANSI/AWC FDS requirements for heavy timber. ~~Minimum dimensions of heavy timber shall comply with the applicable requirements in Table 2304.11 based on roofs or floors supported and the configuration of each structural element, or in Sections 2304.11.2 through 2304.11.4. Lumber decking shall be in accordance with Section 2304.9.~~

2304.11.1 Details of heavy timber structural members. Heavy timber structural members shall be detailed and constructed in accordance with Sections 2304.11.1 through 2304.11.1.3. Minimum dimensions of heavy timber shall comply with the applicable requirements in Table 2304.11.1 based on roofs or floors supported and the configuration of each structural element, or in Sections 2304.11.2 through 2304.11.4. Lumber decking shall be in accordance with Section 2304.9.

TABLE ~~2304.11~~ 2304.11.1 MINIMUM DIMENSIONS OF HEAVY TIMBER STRUCTURAL MEMBERS

		MINIMUM NOMINAL SOLID SAWN SIZE		MINIMUM GLUED-LAMINATED NET SIZE		MINIMUM STRUCTURAL COMPOSITE LUMBER NET SIZE	
SUPPORTING	HEAVY TIMBER STRUCTURAL ELEMENTS	Width, inch	Depth, inch	Width, inch	Depth, inch	Width, inch	Depth, inch
Floor loads only or combined floor and roof loads	Columns; Framed sawn or glued-laminated timber arches that spring from the floor line; Framed timber trusses	8	8	$6^{3}/_{4}$	$8^{1}/_{4}$	7	$7^{1}/_{2}$
	Wood beams and girders	6	10	5	$10^{1}/_{2}$	$5^{1}/_{4}$	$9^{1}/_{2}$
Roof loads only	Columns (roof and ceiling loads); Lower half of: wood-frame or glued-laminated arches that spring from the floor line or from grade	6	8	5	$8^{1}/_{4}$	$5^{1}/_{4}$	$7^{1}/_{2}$
	Upper half of: wood-frame or glued-laminated arches that spring from the floor line or from grade	6	6	5	6	$5^{1}/_{4}$	$5^{1}/_{2}$
	Framed timber trusses and other roof framing;[a] Framed or glued-laminated arches that spring from the top of walls or wall abutments	4[b]	6	3[b]	$6^{7}/_{8}$	$3^{1}/_{2}$[b]	$5^{1}/_{2}$

For SI: 1 inch = 25.4 mm.

a. Spaced members shall be permitted to be composed of two or more pieces not less than 3 inches nominal in thickness where blocked solidly throughout their intervening spaces or where spaces are tightly closed by a continuous wood cover plate of not less than 2 inches nominal in thickness secured to the underside of the members. Splice plates shall be not less than 3 inches nominal in thickness.

b. Where protected by approved automatic sprinklers under the roof deck, framing members shall be not less than 3 inches nominal in width.

2304.11.1.1 Columns. Minimum dimensions of columns shall be in accordance with Table 2304.11.1. Columns shall be connected in an *approved* manner. Columns shall be continuous or aligned vertically from floor to floor in all stories of Type IV-HT construction. Girders and beams at column connections shall be closely fitted around columns and adjoining ends shall be cross tied to each other, or intertied by caps or ties, to transfer horizontal *loads* across joints. Wood bolsters shall not be placed on tops of columns unless the columns support roof *loads* only. Where traditional heavy timber detailing is used, connections shall be by means of reinforced concrete or metal caps with brackets, by properly designed steel or iron caps, with pintles and base plates, by timber splice plates affixed to the columns by metal connectors housed within the contact faces, or by other *approved* methods.

2304.11.1.2 Floor framing. Minimum dimensions of floor framing shall be in accordance with Table 2304.11.1. *Approved* wall plate boxes or hangers shall be provided where wood beams, girders or trusses rest on *masonry* or concrete walls. Where intermediate beams are used to support a floor, they shall rest on top of girders, or shall be supported by an *approved* metal hanger into which the ends of the beams shall be closely fitted. Where traditional heavy timber detailing is used, these connections shall be permitted to be supported by ledgers or blocks securely fastened to the sides of the girders.

2304.11.1.3 Roof framing. Minimum dimensions of roof framing shall be in accordance with Table 2304.11.1. Every roof girder and not less than every alternate roof beam shall be anchored to its supporting member to resist forces as required in Chapter 16.

Add new standard(s) as follows:

AWC

American Wood Council
222 Catoctin Circle SE, Suite 201
Leesburg, VA 20175

ANSI/AWC FDS-2024 Fire Design Specification for Wood Construction

Reason:
This proposal adds a reference to the ANSI/AWC *Fire Design Specification for Wood Construction* (FDS) heavy timber provisions to allow for an additional compliance path independent from the existing IBC heavy timber provisions. Section 2304.11 has been restructured to be charging language only, with the technical provisions relocated to 2304.11.1 to avoid conflict with the FDS. The FDS brings forth requirements consistent with the IBC, but with consistent product terminology and revised organization for heavy timber used in construction.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0

Estimated Immediate Cost Impact Justification (methodology and variables):

This proposal adds an additional option in the code for heavy timber requirements. Therefore, it does not result in an increase in the cost of construction, because the existing compliance option is still available. This proposal could potentially decrease construction costs if this option is used, but will have no effect on construction costs if it is not used. Therefore, the decrease in cost is conservatively estimated as $0.

Staff Analysis: A review of the standard proposed for inclusion in the code, ANSI/AWC FDS-2024 Fire Design Specification for Wood Construction, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before April 1, 2025.

S166-25

IBC: 2308.8.1.1, TABLE 2308.8.1.1(1), TABLE 2308.8.1.1(2) (New), TABLE 2308.8.1.1(2), TABLE 2308.8.1.1(4) (New)

Proponents: David Tyree, representing American Wood Council (dtyree@awc.org); Shane Nilles, representing American Wood Council (snilles@awc.org)

2024 International Building Code

Revise as follows:

2308.8.1.1 Allowable girder spans. The allowable spans of girders that are fabricated of dimension lumber shall not exceed the values set forth in Table 2308.8.1.1(1), 2308.8.1.1(2), 2308.8.1.1(3) or 2308.8.1.1(~~2~~4).

TABLE 2308.8.1.1(1) LATERALLY SUPPORTED HEADER AND GIRDER SPANS[a, b] FOR EXTERIOR BEARING WALLS (Maximum spans for Douglas fir-larch, hem-fir, Southern pine and spruce-pine-fir and required number of jack studs)
Portions of table not shown remain unchanged.

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.

b. Spans are based on minimum design properties for No. 2 grade lumber of Douglas fir-larch, hem-fir, Southern pine and spruce-pine fir.

c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

d. NJ = Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

e. Use 30 psf allowable stress design ground snow load for cases in which allowable stress design ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.

f. Spans are calculated assuming a single span header or girder under uniform load where the top of the header or girder is laterally braced by perpendicular framing. Where the top of the header or girder is not laterally braced (for example, cripple studs bearing on the header), refer to Table 2308.8.1.1(2). ~~tabulated spans for headers consisting of 2 × 8, 2 × 10, or 2 × 12 sizes shall be multiplied by 0.70 or the header or girder shall be designed.~~

Add new text as follows:

TABLE 2308.8.1.1(2)
LATERALLY UNSUPPORTED (DROPPED) HEADER AND GIRDER SPANS[a,b] FOR EXTERIOR BEARING WALLS (Maximum spans for Douglas Fir-Larch, Hem-Fir, Southern Pine and Spruce-Pine-Fir and required number of jack studs)

HEADERS AND GIRDERS SUPPORTING	SIZE	ALLOWABLE STRESS DESIGN GROUND SNOW LOAD, $p_{g(asd)}$, (psf)[e]																	
		30						50						70					
		Building width[c] (feet)																	
		12		24		36		12		24		36		12		24		36	
		Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]
	1-2 × 6	3-11	1	3-0	2	2-6	2	3-4	1	2-7	2	2-2	2	3-0	2	2-3	2	1-11	2
	1-2 × 8	4-10	2	3-9	2	3-2	2	4-2	2	3-3	2	2-8	2	3-9	2	2-10	2	2-5	3
	1-2 × 10	5-7	2	4-4	2	3-8	2	4-10	2	3-9	2	3-2	3	4-4	2	3-4	3	2-10	3
	1-2 × 12	6-2	2	4-11	2	4-3	3	5-5	2	4-4	3	3-8	3	4-11	2	3-10	3	3-3	3

Roof and ceiling	2-2 × 4	3-11	1	3-0	1	2-6	1	3-4	1	2-6	1	2-2	1	3-0	1	2-3	1	1-11	1
	2-2 × 6	5-8	1	4-4	1	3-8	1	4-11	1	3-9	1	3-2	2	4-5	1	3-4	2	2-10	2
	2-2 × 8	6-9	1	5-4	1	4-6	2	5-11	1	4-7	2	3-11	2	5-4	1	4-2	2	3-6	2
	2-2 × 10	7-6	1	6-0	2	5-2	2	6-7	2	5-3	2	4-6	2	6-0	2	4-9	2	4-1	2
	2-2 × 12	8-0	2	6-6	2	5-9	2	7-2	2	5-10	2	5-1	2	6-6	2	5-4	2	4-7	3
	3-2 × 8	8-0	1	6-5	1	5-6	1	7-1	1	5-7	1	4-10	2	6-5	1	5-1	2	4-4	2
	3-2 × 10	8-9	1	7-1	1	6-2	2	7-9	1	6-3	2	5-5	2	7-1	1	5-8	2	4-11	2
	3-2 × 12	9-4	1	7-7	2	6-8	2	8-4	2	6-9	2	5-11	2	7-7	2	6-2	2	5-5	2
	4-2 × 8	8-10	1	7-2	1	6-3	1	7-11	1	6-4	1	5-5	1	7-2	1	5-9	1	4-11	2
	4-2 × 10	9-8	1	7-11	1	6-11	1	8-8	1	7-0	1	6-1	2	7-11	1	6-5	2	5-6	2
	4-2 × 12	10-4	1	8-5	1	7-5	2	9-3	1	7-6	2	6-7	2	8-6	1	6-11	2	6-0	2
Roof, ceiling and one center-bearing floor	1-2 × 6	3-2	1	2-6	2	2-2	2	2-11	2	2-4	2	1-11	2	2-8	2	2-2	2	1-10	2
	1-2 × 8	4-0	2	3-2	2	2-8	2	3-8	2	2-11	2	2-5	3	3-5	2	2-8	2	2-3	3
	1-2 × 10	4-7	2	3-8	2	3-2	3	4-3	2	3-5	3	2-11	3	3-11	2	3-2	3	2-8	3
	1-2 × 12	5-3	2	4-3	3	3-8	3	4-10	2	3-11	3	3-4	3	4-6	3	3-8	3	3-1	4
	2-2 × 4	3-2	1	2-6	1	2-1	1	2-11	1	2-3	1	1-11	1	2-8	1	2-1	1	1-9	1
	2-2 × 6	4-8	1	3-8	1	3-2	2	4-4	1	3-4	2	2-10	2	3-11	1	3-2	2	2-8	2
	2-2 × 8	5-8	1	4-6	2	3-11	2	5-3	2	4-2	2	3-7	2	4-10	2	3-11	2	3-4	2
	2-2 × 10	6-4	2	5-2	2	4-6	2	5-11	2	4-10	2	4-2	2	5-6	2	4-6	2	3-10	2
	2-2 × 12	6-10	2	5-9	2	5-0	2	6-5	2	5-4	2	4-8	3	6-1	2	5-0	2	4-5	3
	3-2 × 8	6-9	1	5-6	1	4-9	2	6-4	1	5-1	2	4-5	2	5-11	1	4-9	2	4-1	2
	3-2 × 10	7-5	1	6-2	2	5-5	2	7-0	1	5-9	2	5-0	2	6-6	2	5-5	2	4-8	2
	3-2 × 12	8-0	2	6-8	2	5-11	2	7-6	2	6-3	2	5-6	2	7-0	2	5-11	2	5-2	2
	4-2 × 8	7-7	1	6-3	1	5-5	1	7-1	1	5-9	1	5-0	2	6-7	1	5-5	1	4-8	2
	4-2 × 10	8-4	1	6-11	2	6-1	2	7-9	1	6-5	2	5-7	2	7-4	1	6-1	2	5-3	2
	4-2 × 12	8-11	1	7-5	2	6-7	2	8-4	2	6-11	2	6-2	2	7-10	2	6-7	2	5-10	2
Roof, ceiling and one clear-span floor	1-2 × 6	2-11	2	2-3	2	1-10	2	2-8	2	2-1	2	1-9	2	2-7	2	1-11	2	1-8	2
	1-2 × 8	3-8	2	2-10	2	2-4	3	3-5	2	2-7	2	2-2	3	3-2	2	2-6	3	2-1	3
	1-2 × 10	4-3	2	3-4	3	2-9	3	4-0	2	3-1	3	2-7	3	3-9	2	2-11	3	2-5	3
	1-2 × 12	4-10	2	3-10	3	3-3	3	4-6	3	3-7	3	3-0	4	4-4	3	3-4	3	2-10	4
	2-2 × 4	2-11	1	2-3	1	1-10	1	2-8	1	2-1	1	1-9	1	2-6	1	1-11	1	1-7	1
	2-2 × 6	4-3	1	3-3	2	2-9	2	4-0	1	3-1	2	2-7	2	3-9	1	2-10	2	2-5	2
	2-2 × 8	5-2	2	4-1	2	3-6	2	4-10	2	3-10	2	3-3	2	4-7	2	3-7	2	3-0	2
	2-2 × 10	5-10	2	4-8	2	4-0	2	5-6	2	4-5	2	3-9	2	5-3	2	4-2	2	3-7	3
	2-2 × 12	6-4	2	5-3	2	4-7	3	6-1	2	4-11	2	4-3	3	5-9	2	4-8	3	4-1	3
	3-2 × 8	6-3	1	5-0	2	4-3	2	5-11	1	4-8	2	4-0	2	5-7	1	4-5	2	3-9	2
	3-2 × 10	6-11	2	5-7	2	4-10	2	6-7	2	5-3	2	4-7	2	6-3	2	5-0	2	4-4	2
	3-2 × 12	7-5	2	6-1	2	5-5	2	7-1	2	5-10	2	5-1	2	6-9	2	5-6	2	4-10	3
	4-2 × 8	7-0	1	5-8	1	4-10	2	6-8	1	5-4	2	4-6	2	6-4	1	5-0	2	4-3	2
	4-2 × 10	7-8	1	6-3	2	5-6	2	7-4	1	5-11	2	5-2	2	7-0	1	5-8	2	4-11	2
	4-2 × 12	8-3	2	6-9	2	6-0	2	7-10	2	6-5	2	5-8	2	7-6	2	6-2	2	5-5	2
Roof, ceiling and two center-bearing floors	1-2 × 6	2-8	2	2-1	2	1-10	2	2-6	2	2-0	2	1-8	2	2-5	2	1-11	2	1-7	2
	1-2 × 8	3-4	2	2-8	2	2-3	3	3-2	2	2-6	2	2-2	3	3-0	2	2-4	3	2-0	3
	1-2 × 10	3-11	2	3-2	3	2-8	3	3-8	2	2-11	3	2-6	3	3-6	2	2-9	3	2-5	3
	1-2 × 12	4-6	3	3-8	3	3-2	4	4-3	3	3-5	3	2-11	4	4-1	3	3-3	3	2-9	4
	2-2 × 4	2-8	1	2-1	1	1-9	1	2-6	1	2-0	1	1-8	1	2-4	1	1-10	1	1-7	1
	2-2 × 6	3-11	1	3-1	2	2-8	2	3-8	1	2-11	2	2-6	2	3-6	1	2-9	2	2-4	2
	2-2 × 8	4-10	2	3-11	2	3-4	2	4-7	2	3-8	2	3-2	2	4-4	2	3-5	2	2-11	2
	2-2 × 10	5-6	2	4-6	2	3-11	2	5-2	2	4-3	2	3-8	3	5-0	2	4-0	2	3-6	3

	2-2 × 12	6-0	2	5-0	2	4-5	3	5-9	2	4-9	3	4-2	3	5-6	2	4-7	3	4-0	3
	3-2 × 8	5-10	1	4-9	2	4-1	2	5-6	1	4-6	2	3-10	2	5-3	2	4-3	2	3-8	2
	3-2 × 10	6-6	2	5-4	2	4-9	2	6-2	2	5-1	2	4-5	2	5-11	2	4-10	2	4-3	2
	3-2 × 12	7-0	2	5-11	2	5-3	2	6-8	2	5-7	2	5-0	3	6-5	2	5-5	2	4-9	3
	4-2 × 8	6-7	1	5-5	1	4-8	2	6-3	1	5-1	2	4-5	2	6-0	1	4-10	2	4-2	2
	4-2 × 10	7-3	1	6-0	2	5-4	2	6-11	2	5-9	2	5-0	2	6-8	2	5-6	2	4-9	2
	4-2 × 12	7-9	2	6-6	2	5-10	2	7-5	2	6-3	2	5-6	2	7-2	2	6-0	2	5-4	2
Roof, ceiling, and two clear-span floors	1-2 × 6	2-3	2	1-8	2	1-5	2	2-3	2	1-8	2	1-5	3	2-2	2	1-8	2	1-5	3
	1-2 × 8	2-10	2	2-2	3	1-10	3	2-10	2	2-2	3	1-10	3	2-8	2	2-1	3	1-9	3
	1-2 × 10	3-4	2	2-6	3	2-2	3	3-4	3	2-6	3	2-2	4	3-2	3	2-6	3	2-1	4
	1-2 × 12	3-10	3	3-0	3	2-6	4	3-10	3	3-0	4	2-6	4	3-8	3	2-10	4	2-5	4
	2-2 × 4	2-3	1	1-8	1	1-4	1	2-3	1	1-8	1	1-4	1	2-2	1	1-7	1	1-4	2
	2-2 × 6	3-3	1	2-6	2	2-1	2	3-3	2	2-6	2	2-1	2	3-2	2	2-5	2	2-1	2
	2-2 × 8	4-1	2	3-2	2	2-8	2	4-1	2	3-2	2	2-8	2	3-11	2	3-1	2	2-7	3
	2-2 × 10	4-9	2	3-8	2	3-2	3	4-8	2	3-8	2	3-2	3	4-6	2	3-7	3	3-0	3
	2-2 × 12	5-4	2	4-3	3	3-8	3	5-3	2	4-3	3	3-8	3	5-1	2	4-1	3	3-6	3
	3-2 × 8	5-0	1	3-11	2	3-4	2	5-0	2	3-11	2	3-4	2	4-10	2	3-9	2	3-2	2
	3-2 × 10	5-9	2	4-7	2	3-10	2	5-7	2	4-6	2	3-10	2	5-5	2	4-4	2	3-9	3
	3-2 × 12	6-4	2	5-2	2	4-5	3	6-2	2	5-0	2	4-5	3	5-11	2	4-10	3	4-3	3
	4-2 × 8	5-9	1	4-6	2	3-10	2	5-8	1	4-6	2	3-10	2	5-5	1	4-4	2	3-8	2
	4-2 × 10	6-6	2	5-2	2	4-5	2	6-4	2	5-1	2	4-5	2	6-1	2	4-11	2	4-3	2
	4-2 × 12	7-1	2	5-9	2	5-0	2	6-10	2	5-7	2	4-11	2	6-7	2	5-5	2	4-9	3

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.

b. Spans are based on minimum design properties for No. 2 grade lumber of Douglas Fir-Larch, Hem-Fir, Southern Pine, and Spruce-Pine-Fir.

c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

d. NJ = Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

e. Use 30 psf allowable stress design ground snow load for cases in which allowable stress design ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.

f. Spans are assuming a single span header or girder under uniform load where the top of the header or girder is not laterally braced by perpendicular framing.

Revise as follows:

TABLE 2308.8.1.1(~~2~~3) LATERALLY SUPPORTED HEADER AND GIRDER SPANS[a, b] FOR INTERIOR BEARING WALLS (Maximum spans for Douglas fir-larch, hem-fir, Southern pine and spruce-pine-fir and required number of jack studs)

Portions of table not shown remain unchanged.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Spans are given in feet and inches.

b. Spans are based on minimum design properties for No. 2 grade lumber of Douglas fir-larch, hem-fir, Southern pine and spruce-pine fir.

c. *Building* width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

d. NJ = Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an *approved* framing anchor attached to the full-height wall stud and to the header.

e. Spans are calculated assuming a single span header or girder under uniform load where the top of the header or girder is laterally braced by perpendicular framing. Where the top of the header or girder is not laterally braced (for example, cripple studs bearing on the header), refer to Table 2308.8.1.1(4). ~~tabulated spans for headers consisting of 2 × 8, 2 × 10, or 2 × 12 sizes shall be multiplied by 0.70 or the header or girder shall be designed.~~

Add new text as follows:

TABLE 2308.8.1.1(4) LATERALLY UNSUPPORTED (DROPPED) HEADER AND GIRDER SPANS[a, b] FOR INTERIOR BEARING WALLS (Maximum spans for Douglas Fir-Larch, Hem-Fir, Southern Pine and Spruce-Pine-Fir and required number of jack studs)

HEADERS AND GIRDERS SUPPORTING	SIZE	BUILDING Width[c] (feet)					
		12		24		36	
		Span[e]	NJ[d]	Span[e]	NJ[d]	Span[e]	NJ[d]
One floor only	2-2 × 4	4-0	1	2-10	1	2-4	1
	2-2 × 6	5-11	1	4-3	1	3-5	1
	2-2 × 8	7-1	1	5-2	1	4-4	2
	2-2 × 10	7-11	1	5-11	2	5-0	2
	2-2 × 12	8-6	1	6-7	2	5-7	2
	3-2 × 8	8-5	1	6-4	1	5-3	1
	3-2 × 10	9-3	1	7-1	1	6-0	2
	3-2 × 12	9-11	1	7-8	2	6-7	2
	4-2 × 8	9-5	1	7-2	1	6-0	1
	4-2 × 10	10-3	1	7-11	1	6-9	1
	4-2 × 12	11-0	1	8-7	1	7-4	2
Two floors	2-2 × 4	2-7	1	1-11	1	1-7	1
	2-2 × 6	3-10	1	2-10	2	2-5	2
	2-2 × 8	4-9	1	3-7	2	3-0	2
	2-2 × 10	5-6	2	4-2	2	3-6	2
	2-2 × 12	6-1	2	4-9	2	4-1	3
	3-2 × 8	5-10	1	4-5	2	3-9	2
	3-2 × 10	6-7	1	5-1	2	4-4	2
	3-2 × 12	7-2	2	5-8	2	4-11	2
	4-2 × 8	6-7	1	5-1	1	4-3	2
	4-2 × 10	7-5	1	5-9	2	4-11	2
	4-2 × 12	8-0	1	6-4	2	5-6	2

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Spans are given in feet and inches.

b. Spans are based on minimum design properties for No. 2 grade lumber of Douglas Fir-Larch, Hem-Fir, Southern Pine, and Spruce-Pine-Fir.

c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

d. NJ = Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an *approved* framing anchor attached to the full-height wall stud and to the header.

e. Spans are assuming a single span header or girder under uniform load where the top of the header or girder is not laterally braced by perpendicular framing.

Reason: Laterally unsupported header and girder spans are currently addressed by a conservative adjustment in footnote f of the existing header/girder span tables. Spans for laterally unsupported headers and girders are added consistent with ANSI/AWC 2024 Wood Frame Construction Manual to show appropriate spans, avoiding the unnecessary conservatism. With this proposal, the laterally unsupported header and girder condition is now addressed by stand-alone tables and no longer needs to be addressed through an adjustment factor footnote. Existing tables have been renumbered and titles have been revised to reflect that they are applicable to laterally supported headers and girders.

Additionally, language has been added to the footnotes to clarify that all header and girder calculations are based on the assumption that they are single-span headers or girders. This clarification is necessary as multi-span headers are not addressed by the tables.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0

Estimated Immediate Cost Impact Justification (methodology and variables):

This proposal revises the code for laterally unsupported (dropped) header and girder spans. The new tables remove unnecessary conservatism, therefore this proposal could potentially decrease construction costs where the tables are used. The decrease in cost is conservatively estimated as $0.

S171-25

IBC: TABLE 2308.8.1.1(1)

Proponents: David Tyree, representing American Wood Council (dtyree@awc.org)

2024 International Building Code

Revise as follows:

TABLE 2308.8.1.1(1) HEADER AND GIRDER SPANS[a, b] FOR EXTERIOR BEARING WALLS (Maximum spans for Douglas fir-larch, hem-fir, Southern pine and spruce-pine-fir and required number of jack studs)

Portions of table not shown remain unchanged.

GIRDERS AND HEADERS SUPPORTING	SIZE	ALLOWABLE STRESS DESIGN GROUND SNOW LOAD, $p_{g(asd)}$, (psf)[e]																	
		30						50						70					
		Building width[c] (feet)																	
		12		24		36		12		24		36		12		24		36	
		Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]
Roof and ceiling	1-2 × 6	4-0	1	~~3-1~~ 3-0	2	~~2-7~~ 2-6	2	3-5	1	~~2-8~~ 2-7	2	~~2-3~~ 2-2	2	3-0	2	2-4	2	~~2-0~~ 1-11	2
	1-2 × 8	5-1	2	~~3-11~~ 3-10	2	3-3	2	4-4	2	~~3-4~~ 3-3	2	~~2-10~~ 2-9	2	3-10	2	~~3-0~~ 2-11	2	~~2-6~~ 2-5	3
	1-2 × 10	6-0	2	~~4-8~~ 4-7	2	~~3-11~~ 3-10	2	5-2	2	~~4-0~~ 3-11	2	~~3-4~~ 3-3	3	4-7	2	~~3-6~~ 3-5	3	~~3-0~~ 2-11	3
	1-2 × 12	7-1	2	~~5-5~~ 5-4	2	~~4-7~~ 4-6	3	6-1	2	~~4-8~~ 4-7	3	~~3-11~~ 3-10	3	~~5-5~~ 5-4	2	~~4-2~~ 4-1	3	~~3-6~~ 3-5	3
	2-2 × 4	4-0	1	~~3-1~~ 3-0	1	~~2-7~~ 2-6	1	3-5	1	2-7	1	2-2	1	3-0	1	~~2-4~~ 2-3	1	~~2-0~~ 1-11	1
	2-2 × 6	~~6-0~~ 5-11	1	~~4-7~~ 4-6	1	~~3-10~~ 3-9	1	5-1	1	~~3-11~~ 3-10	1	~~3-3~~ 3-2	2	4-6	1	~~3-6~~ 3-5	2	~~2-11~~ 2-10	2
	2-2 × 8	~~7-7~~ 7-6	1	~~5-9~~ 5-8	1	~~4-10~~ 4-9	2	6-5	1	~~5-0~~ 4-10	2	~~4-2~~ 4-1	2	~~5-9~~ 5-8	1	~~4-5~~ 4-4	2	~~3-9~~ 3-7	2
	2-2 × 10	~~9-0~~ 8-11	1	~~6-10~~ 6-9	2	~~5-9~~ 5-8	2	7-8	2	~~5-11~~ 5-9	2	~~4-11~~ 4-10	2	6-9	2	~~5-3~~ 5-1	2	~~4-5~~ 4-3	2
	2-2 × 12	~~10-7~~ 10-6	2	~~8-1~~ 7-11	2	~~6-10~~ 6-8	2	9-0	2	~~6-11~~ 6-9	2	~~5-10~~ 5-8	2	8-0	2	~~6-2~~ 6-0	2	~~5-2~~ 5-0	3
	3-2 × 8	9-5	1	~~7-3~~ 7-2	1	~~6-1~~ 6-0	1	8-1	1	~~6-3~~ 6-1	1	~~5-3~~ 5-1	2	7-2	1	~~5-6~~ 5-5	2	~~4-8~~ 4-6	2
	3-2 × 10	~~11-3~~ 11-2	1	~~8-7~~ 8-5	1	~~7-3~~ 7-1	2	9-7	1	~~7-4~~ 7-3	2	~~6-2~~ 6-1	2	8-6	1	~~6-7~~ 6-5	2	~~5-6~~ 5-4	2
	3-2 × 12	13-2	1	~~10-1~~ 10-0	2	~~8-6~~ 8-4	2	11-3	2	~~8-8~~ 8-6	2	~~7-4~~ 7-1	2	10-0	2	~~7-9~~ 7-7	2	~~6-6~~ 6-4	2
	4-2 × 8	10-11	1	~~8-4~~ 8-3	1	~~7-0~~ 6-11	1	9-4	1	~~7-2~~ 7-0	1	~~6-0~~ 5-11	1	8-3	1	~~6-4~~ 6-3	1	~~5-4~~ 5-3	2
	4-2 × 10	12-11	1	~~9-11~~ 9-9	1	~~8-4~~ 8-2	1	~~11-1~~ 11-0	1	~~8-6~~ 8-4	1	~~7-2~~ 7-0	2	~~9-10~~ 9-9	1	~~7-7~~ 7-5	2	~~6-4~~ 6-2	2
	4-2 × 12	15-3	1	~~11-8~~ 11-6	1	~~9-10~~ 9-7	2	13-0	1	~~10-0~~ 9-10	2	~~8-5~~ 8-3	2	~~11-7~~ 11-6	1	~~8-11~~ 8-9	2	~~7-6~~ 7-3	2
Roof, ceiling and one center-bearing floor	1-2 × 6	3-3	1	~~2-7~~ 2-6	2	2-2	2	3-0	2	2-4	2	2-0	2	2-9	2	2-2	2	1-10	2
	1-2 × 8	4-1	2	~~3-3~~ 3-2	2	2-9	2	3-9	2	~~3-0~~ 2-11	2	2-6	3	3-6	2	2-9	2	2-4	3
	1-2 × 10	~~4-11~~ 4-10	2	3-10	2	3-3	3	4-6	2	3-6	3	~~3-0~~ 2-11	3	4-1	2	3-3	3	2-9	3
	1-2 × 12	5-9	2	4-6	3	3-10	3	5-3	2	~~4-2~~ 4-1	3	3-6	3	4-10	3	3-10	3	3-3	4
	2-2 × 4	~~3-3~~ 3-2	1	2-6	1	~~2-2~~ 2-1	1	~~3-0~~ 2-11	1	~~2-4~~ 2-3	1	~~2-0~~ 1-11	1	2-8	1	~~2-2~~ 2-1	1	1-10	1
	2-2 × 6	4-10	1	3-9	1	~~3-3~~ 3-2	2	4-5	1	~~3-6~~ 3-5	2	~~3-0~~ 2-11	2	4-1	1	~~3-3~~ 3-2	2	~~2-9~~ 2-8	2
	2-2 × 8	6-1	1	~~4-10~~ 4-9	2	~~4-1~~ 4-0	2	5-7	2	~~4-5~~ 4-4	2	~~3-9~~ 3-8	2	5-2	2	~~4-1~~ 4-0	2	~~3-6~~ 3-5	2
	2-2 × 10	7-3	2	5-8	2	~~4-10~~ 4-9	2	6-8	2	~~5-3~~ 5-2	2	~~4-5~~ 4-4	2	6-1	2	~~4-10~~ 4-9	2	4-1	2
	2-2 × 12	8-6	2	6-8	2	5-8	2	7-10	2	~~6-2~~ 6-1	2	~~5-3~~ 5-2	3	7-2	2	5-8	2	~~4-10~~ 4-9	3
	3-2 × 8	7-8	1	~~6-0~~ 5-11	1	5-1	2	7-0	1	~~5-6~~ 5-5	2	~~4-8~~ 4-7	2	6-5	1	5-1	2	~~4-4~~ 4-3	2
	3-2 × 10	9-1	1	~~7-2~~ 7-1	2	~~6-1~~ 6-0	2	8-4	1	~~6-7~~ 6-6	2	~~5-7~~ 5-6	2	7-8	2	~~6-1~~ 6-0	2	~~5-2~~ 5-1	2
	3-2 × 12	10-8	2	~~8-5~~ 8-4	2	~~7-2~~ 7-1	2	9-10	2	~~7-8~~ 7-7	2	~~6-7~~ 6-5	2	9-0	2	7-1	2	~~6-1~~ 6-0	2
	4-2 × 8	8-10	1	6-11	1	~~5-11~~ 5-10	1	8-1	1	6-4	1	~~5-5~~ 5-4	2	7-5	1	~~5-11~~ 5-10	1	~~5-0~~ 4-11	2
	4-2 × 10	~~10-6~~ 10-5	1	~~8-3~~ 8-2	2	~~7-0~~ 6-11	2	~~9-8~~ 9-7	1	~~7-7~~ 7-6	2	~~6-5~~ 6-4	2	8-10	1	~~7-0~~ 6-11	2	~~6-0~~ 5-10	2
	4-2 × 12	12-4	1	~~9-8~~ 9-7	2	~~8-3~~ 8-2	2	11-4	2	~~8-11~~ 8-10	2	~~7-7~~ 7-5	2	10-4	2	~~8-3~~ 8-2	2	~~7-0~~ 6-11	2
Roof, ceiling and one clear span floor	1-2 × 6	2-11	2	2-3	2	1-11	2	2-9	2	2-1	2	1-9	2	2-7	2	2-0	2	1-8	2
	1-2 × 8	3-9	2	2-10	2	2-5	3	3-6	2	2-8	2	2-3	3	3-3	2	2-6	3	~~2-2~~ 2-1	3
	1-2 × 10	4-5	2	3-5	3	2-10	3	~~4-2~~ 4-1	2	3-2	3	2-8	3	~~3-11~~ 3-10	2	3-0	3	2-6	3
	1-2 × 12	5-2	2	4-0	3	3-4	3	4-10	3	3-9	3	~~3-2~~ 3-1	4	4-7	3	3-6	3	~~3-0~~ 2-11	4
	2-2 × 4	2-11	1	2-3	1	1-10	1	2-9	1	2-1	1	1-9	1	2-7	1	~~2-0~~ 1-11	1	~~1-8~~ 1-7	1
	2-2 × 6	4-4	1	3-4	2	2-10	2	4-1	1	~~3-2~~ 3-1	2	~~2-8~~ 2-7	2	3-10	1	~~3-0~~ 2-11	2	~~2-6~~ 2-5	2
	2-2 × 8	5-6	2	4-3	2	3-7	2	5-2	2	~~4-0~~ 3-11	2	3-4	2	4-10	2	~~3-9~~ 3-8	2	~~3-2~~ 3-1	2
	2-2 × 10	6-7	2	5-0	2	4-2	2	6-1	2	~~4-9~~ 4-8	2	~~4-0~~ 3-11	2	5-9	2	4-5	2	~~3-9~~ 3-8	3
	2-2 × 12	7-9	2	5-11	2	4-11	3	7-2	2	~~5-7~~ 5-6	2	4-8	3	6-9	2	~~5-3~~ 5-2	3	~~4-5~~ 4-4	3
	3-2 × 8	6-11	1	5-3	2	4-5	2	6-5	1	~~5-0~~ 4-11	2	4-2	2	6-1	1	4-8	2	~~4-0~~ 3-11	2
	3-2 × 10	~~8-3~~ 8-2	2	6-3	2	5-3	2	7-8	2	~~5-11~~ 5-10	2	~~5-0~~ 4-11	2	~~7-3~~ 7-2	2	~~5-7~~ 5-6	2	~~4-8~~ 4-7	2
	3-2 × 12	9-8	2	7-5	2	6-2	2	9-0	2	~~7-0~~ 6-11	2	5-10	2	8-6	2	~~6-7~~ 6-6	2	~~5-6~~ 5-5	3
	4-2 × 8	8-0	1	6-1	1	5-1	2	7-5	1	~~5-9~~ 5-8	2	~~4-10~~ 4-9	2	7-0	1	~~5-5~~ 5-4	2	~~4-7~~ 4-6	2
	4-2 × 10	9-6	1	7-3	2	6-1	2	8-10	1	~~6-10~~ 6-9	2	~~5-9~~ 5-8	2	8-4	1	~~6-5~~ 6-4	2	~~5-5~~ 5-4	2
	4-2 × 12	11-2	2	8-6	2	7-2	2	10-5	2	~~8-0~~ 7-11	2	~~6-9~~ 6-8	2	~~9-10~~ 9-9	2	~~7-7~~ 7-6	2	~~6-5~~ 6-3	2
	1-2 × 6	2-8	2	2-1	2	1-10	2	2-7	2	2-0	2	~~1-9~~ 1-8	2	2-5	2	1-11	2	~~1-8~~ 1-7	2
	1-2 × 8	3-5	2	2-8	2	2-4	3	3-3	2	~~2-7~~ 2-6	2	2-2	3	3-1	2	2-5	3	~~2-1~~ 2-0	3
	1-2 × 10	4-0	2	3-2	3	2-9	3	3-10	2	~~3-1~~ 3-0	3	2-7	3	3-8	2	~~2-11~~ 2-10	3	2-5	3
	1-2 × 12	4-9	3	3-9	3	3-2	4	4-6	3	3-7	3	~~3-1~~ 3-0	4	4-3	3	~~3-5~~ 3-4	3	~~2-11~~ 2-10	4
	2-2 × 4	2-8	1	2-1	1	1-9	1	2-6	1	2-0	1	1-8	1	2-5	1	~~1-11~~ 1-10	1	1-7	1

GIRDERS AND HEADERS SUPPORTING	SIZE	ALLOWABLE STRESS DESIGN GROUND SNOW LOAD, *p* (psf)																	
		30						50						70					
		Building width (feet)																	
		12		24		36		12		24		36		12		24		36	
		Span	NJ	Span	NJ	Span	NJ	Span	NJ	Span	NJ	Span	NJ	Span	NJ	Span	NJ	Span	NJ
~~Roof, ceiling and two center-bearing floors~~	2-2 × 6	4-0	1	3-2	2	2-8	2	3-9	1	3-0	2	~~2-7~~ 2-6	2	3-7	1	2-10	2	2-5	2
	2-2 × 8	5-0	2	4-0	2	3-5	2	~~4-10~~ 4-9	2	~~3-10~~ 3-9	2	~~3-3~~ 3-2	2	~~4-7~~ 4-6	2	3-7	2	~~3-1~~ 3-0	2
	2-2 × 10	6-0	2	4-9	2	4-0	2	5-8	2	4-6	2	3-10	3	5-5	2	4-3	2	~~3-8~~ 3-7	3
	2-2 × 12	7-0	2	5-7	2	4-9	3	6-8	2	~~5-4~~ 5-3	3	4-6	3	6-4	2	5-0	3	4-3	3
	3-2 × 8	6-4	1	5-0	2	4-3	2	6-0	1	4-9	2	~~4-1~~ 4-0	2	5-8	2	~~4-6~~ 4-5	2	~~3-10~~ 3-9	2
	3-2 × 10	7-6	2	5-11	2	5-1	2	7-1	2	~~5-8~~ 5-7	2	~~4-10~~ 4-9	2	6-9	2	~~5-4~~ 5-3	2	~~4-7~~ 4-6	2
	3-2 × 12	8-10	2	7-0	2	5-11	2	8-5	2	~~6-8~~ 6-7	2	~~5-8~~ 5-7	3	~~8-0~~ 7-11	2	~~6-4~~ 6-3	2	~~5-4~~ 5-3	3
	4-2 × 8	7-3	1	5-9	1	4-11	2	6-11	1	~~5-6~~ 5-5	2	4-8	2	6-7	1	5-2	2	~~4-5~~ 4-4	2
	4-2 × 10	8-8	1	6-10	2	5-10	2	8-3	2	6-6	2	~~5-7~~ 5-6	2	~~7-10~~ 7-9	2	~~6-2~~ 6-1	2	~~5-3~~ 5-2	2
	4-2 × 12	10-2	2	8-1	2	6-10	2	9-8	2	~~7-8~~ 7-7	2	~~6-7~~ 6-6	2	9-2	2	~~7-3~~ 7-2	2	~~6-2~~ 6-1	2
Roof, ceiling and two clear span floors	1-2 × 6	2-3	2	1-9	2	1-5	2	2-3	2	1-9	2	1-5	3	2-2	2	1-8	2	1-5	3
	1-2 × 8	2-10	2	2-2	3	1-10	3	2-10	2	2-2	3	1-10	3	2-9	2	2-1	3	~~1-10~~ 1-9	3
	1-2 × 10	3-4	2	2-7	3	2-2	3	3-4	3	2-7	3	2-2	4	3-3	3	2-6	3	~~2-2~~ 2-1	4
	1-2 × 12	4-0	3	3-0	3	2-7	4	4-0	3	3-0	4	2-7	4	3-10	3	~~3-0~~ 2-11	4	2-6	4
	2-2 × 4	2-3	1	1-8	1	1-4	1	2-3	1	1-8	1	1-4	1	2-2	1	~~1-8~~ 1-7	1	1-4	2
	2-2 × 6	3-4	1	2-6	2	2-2	2	3-4	2	2-6	2	2-2	2	3-3	2	2-6	2	2-1	2
	2-2 × 8	4-3	2	3-3	2	2-8	2	4-3	2	3-3	2	2-8	2	4-1	2	~~3-2~~ 3-1	2	2-8	3
	2-2 × 10	5-0	2	3-10	2	3-2	3	5-0	2	3-10	2	3-2	3	4-10	2	~~3-9~~ 3-8	3	~~3-2~~ 3-1	3
	2-2 × 12	5-11	2	4-6	3	3-9	3	5-11	2	4-6	3	3-9	3	5-8	2	~~4-5~~ 4-4	3	~~3-9~~ 3-8	3
	3-2 × 8	5-3	1	4-0	2	3-5	2	5-3	2	4-0	2	3-5	2	5-1	2	3-11	2	3-4	2
	3-2 × 10	6-3	2	4-9	2	4-0	2	6-3	2	4-9	2	4-0	2	6-1	2	4-8	2	~~4-0~~ 3-11	3
	3-2 × 12	7-5	2	5-8	2	4-9	3	7-5	2	5-8	2	4-9	3	7-2	2	5-6	3	~~4-8~~ 4-7	3
	4-2 × 8	6-1	1	4-8	2	3-11	2	6-1	1	4-8	2	3-11	2	5-11	1	~~4-7~~ 4-6	2	3-10	2
	4-2 × 10	7-3	2	5-6	2	4-8	2	7-3	2	5-6	2	4-8	2	7-0	2	~~5-5~~ 5-4	2	~~4-7~~ 4-6	2
	4-2 × 12	8-6	2	6-6	2	5-6	2	8-6	2	6-6	2	5-6	2	8-3	2	6-4	2	5-4	3

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.

b. Spans are based on minimum design properties for No. 2 grade lumber of Douglas fir-larch, hem-fir, Southern pine and spruce-pine fir.

c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

d. NJ = Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

e. Use 30 psf allowable stress design ground snow load for cases in which allowable stress designground snow load is less than 30 psf and the roof liveload is equal to or less than 20 psf.

f. Spans are calculated assuming a single span header or girder under uniform load where the top of the header or girder is laterally braced by perpendicular framing. Where the top of the header or girder is not laterally braced (for example, cripple studs bearing on the header), tabulated spans for headers consisting of 2 × 8, 2 × 10, or 2 × 12 sizes shall be multiplied by 0.70 or the header or girder shall be designed.

Reason: This proposal updates the header tables in multiple locations to be aligned with ASCE 7-22. The proposed spans align with those found in the ANSI/AWC *2024 Wood Frame Construction Manual (WFCM)*. Additionally, language has been added to footnote f to clarify that all header and girder calculations are based on the assumption that they are single-span headers or girders. This clarification is necessary as multi-span headers are not addressed by the tables.

Cost Impact: Increase

Estimated Immediate Cost Impact:

$0

Estimated Immediate Cost Impact Justification (methodology and variables):

This proposal updates the header tables in multiple locations to be aligned with ASCE 7-22. Updated spans are typically shorter by either 1 or 2 inches. This minor adjustment in span will likely not impact the lumber lengths needed for construction, as some trimming will still be necessary to accommodate the actual header span end use. As the cost impact cannot be a decrease, and any increase is minimal that may not be realized due to typical waste, the cost impact is estimated at an increase of $0.

S172-25

IBC: 2308.8.2.2, TABLE 2304.10.2

Proponents: David Tyree, representing American Wood Council (dtyree@awc.org); Shane Nilles, representing American Wood Council (snilles@awc.org); Jason Smart, representing American Wood Council (jsmart@awc.org)

2024 International Building Code

Revise as follows:

2308.8.2.2 Bearing. The ends of each joist shall have not less than 1 1/2 inches (38 mm) of bearing on wood or metal, or not less than 3 inches (76 mm) on *masonry*, except where supported on a 1-inch by 4-inch (25 mm by 102 mm) let-in ribbon strip, and the joist and ribbon strip shall be nailed to the adjoining stud in accordance with Table 2304.10.2.

TABLE 2304.10.2 FASTENING SCHEDULE

Portions of table not shown remain unchanged.

DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER[g]	SPACING AND LOCATION
Wall		
28. Ribbon strip supporting joists	3-8d box (2 1/2″ x 0.113″); or 2-8d common (2 1/2″ × 0.131″); or 2-10d box (3″ × 0.128″); or 2-1 3/4″ 16 gage staples, 1″ crown	Face nail at each stud
29. Joist to stud where supported by ribbon strip	4-8d box (2 1/2″ × 0.113″); or 3-8d common (2 1/2″ × 0.131″); or floor 3-10d box (3″ × 0.128″); or 3-3″ × 0.131″ nails; or 3-3″ 14 gage staples, 7/16″ crown	Face nail

Reason: Section 2308.8.2.2 permits a ribbon strip to provide bearing for joists but does not specify how the ribbon strip is required to be let-in to the stud and fastened. Additionally, the joists are required to be nailed to the adjacent stud, but no fasteners are specified. This code change provides provisions for proper installation of the ribbon strip and associated fastening with two new rows being added to Table 2304.10.2. The nailing for "Ribbon strip to supporting joists" is based on current item #19 and the nailing for "Joist to stud where supported by ribbon strip" is based on current item #21.

NOTE: The existing items in Table 2304.10.2 will be renumbered accordingly but are not shown for brevity.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This code change proposal provides clarification for installation of ribbon strips which is already a framing option in the code.

S176-25

IBC: TABLE 2506.2, TABLE 2507.2, ASTM Chapter 35 (New)

Proponents: Tim Earl, GBH International, representing the Gypsum Association (tearl@gbhint.com)

2024 International Building Code

Revise as follows:

TABLE 2506.2 GYPSUM PANEL PRODUCTS MATERIALS AND ACCESSORIES

MATERIAL	STANDARD
Accessories for gypsum board	ASTM C1047
Adhesives for fastening gypsum board to wood framing	ASTM C557
Cold-formed steel studs and track, structural	AISI S240 or ASTM C955
Cold-formed steel studs and track, nonstructural	AISI S220 or ASTM C645
Elastomeric joint sealants	ASTM C920
Expandable foam adhesives for fastening gypsum wallboard to wood framing	ASTM D6464
Factory-laminated gypsum panel product	ASTM C1766
Fiber-reinforced gypsum panels	ASTM C1278
Glass mat gypsum backing panel	ASTM C1178
Glass mat gypsum panels	ASTM C1658
Glass mat gypsum substrate used as sheathing	ASTM C1177
Joint reinforcing tape and compound	ASTM C474; C475
Nails for gypsum boards	ASTM C514, F547, F1667
Steel screws	ASTM C954; C1002
Standard specification for gypsum board	ASTM C1396
Testing gypsum and gypsum products	ASTM C22; C472; C473

TABLE 2507.2 LATH, PLASTERING MATERIALS AND ACCESSORIES

MATERIAL	STANDARD
Accessories for gypsum veneer base	ASTM C1047
Blended cement	ASTM C595
Cold-formed steel studs and track, structural	AISI S240 or ASTM C955
Cold-formed steel studs and track, nonstructural	AISI S220 or ASTM C645
Exterior plaster bonding compounds	ASTM C932
Hydraulic cement	ASTM C1157; C1600
Gypsum casting and molding plaster	ASTM C59
Gypsum Keene's cement	ASTM C61
Gypsum plaster	ASTM C28
Gypsum veneer plaster	ASTM C587
Interior bonding compounds, gypsum	ASTM C631
Lime plasters	ASTM C5; C206
Masonry cement	ASTM C91
Metal lath	ASTM C847
Plaster aggregatesSand Perlite Vermiculite	ASTM C35; C897 ASTM C35 ASTM C35
Plastic cement	ASTM C1328
Portland cement	ASTM C150
Steel screws	ASTM C1002; C954
Welded wire lath	ASTM C933
Woven wire plaster base	ASTM C1032

Add new standard(s) as follows:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428

ASTM C645-24: Standard Specification for Nonstructural Steel Framing Members

ASTM C955-24: Standard Specification for Cold-Formed Steel Structural Framing Members

Reason: This change adds the equivalent ASTM standards, which were removed from this section in the 2018 codes. Some users prefer to use ASTM standards.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This simply adds ASTM standards as alternatives to the AISI standards.

Staff Analysis: A review of the following standards proposed for inclusion in the code regarding some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before April 1, 2025:

ASTM C645-24 Standard Specification for Nonstructural Steel Framing Members

ASTM C955-24 Standard Specification for Cold-Formed Steel Structural Framing Members

S177-25

IBC: 2512.1.2, 2507.2, TABLE 2507.2, ASTM Chapter 35 (New)

Proponents: Jeff Bowlsby, representing Self

2024 International Building Code

Revise as follows:

2512.1.2 Weep screeds. A minimum 0.019-inch (0.48 mm) (No. 26 galvanized sheet gage), corrosion-resistant weep screed with a minimum vertical attachment flange of $3^1/_2$ inches (89 mm) shall be provided at or below the foundation plate line on exterior stud walls in accordance with ASTM C926 and ASTM C1861. The weep screed shall be placed not less than 4 inches (102 mm) above the earth or 2 inches (51 mm) above paved areas and be of a type that will allow trapped water to drain to the exterior of the *building*. The *water-resistive barrier* shall lap the attachment flange. The exterior lath shall cover and terminate on the attachment flange of the weep screed.

2507.2 Standards. Lathing and plastering materials shall conform to the standards listed in Table 2507.2 and Chapter 35 and, where required for fire protection, shall conform to the provisions of Chapter 7.

TABLE 2507.2 LATH, PLASTERING MATERIALS AND ACCESSORIES

MATERIAL	STANDARD
Accessories for gypsum veneer base	ASTM C1047
Blended cement	ASTM C595
Cold-formed steel studs and track, structural	AISI S240
Cold-formed steel studs and track, nonstructural	AISI S220
Exterior plaster bonding compounds	ASTM C932
Hydraulic cement	ASTM C1157; C1600
Gypsum casting and molding plaster	ASTM C59
Gypsum Keene's cement	ASTM C61
Gypsum plaster	ASTM C28
Gypsum veneer plaster	ASTM C587
Interior bonding compounds, gypsum	ASTM C631
Lathing Accessories, Furring Accessories and Fasteners	ASTM C1861
Lime plasters	ASTM C5; C206
Masonry cement	ASTM C91
Metal lath	ASTM C847
Plaster aggregatesSand Perlite Vermiculite	ASTM C35; C897 ASTM C35 ASTM C35
Plastic cement	ASTM C1328
Portland cement	ASTM C150
Steel screws	ASTM C1002; C954
Welded wire lath	ASTM C933
Woven wire plaster base	ASTM C1032

Add new standard(s) as follows:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428

ASTM C1861-23a — Standard Specification for Lathing and Furring Accessories, and Fasteners, for Interior and Exterior Portland Cement-Based Plaster

Reason: ASTM C1861 has been a reference standard in ASTM C1063, the metal lathing installation standard, since 2017.

ASTM C1861 is a product standard for lathing accessories, furring accessories and fasteners where their installation is specified in ASTM C1063.

Lathing accessory product manufacturers and project architectural specifications have been referencing ASTM C1861 for several years.

ASTM C1861 meets CP-28-05, Sections 4.4 and 4.6 requirements.

ASTM C1861 meets the requirements in the ICC References Standards Guide as a second tier reference standard and as such is currently enforceable by building code officials.

The ASTM C1861 task group members have expressed full support of an application to ICC for IBC for considering ASTM C1861 as a reference standard.

ASTM C1861 has been balloted for inclusion as a reference standard into ASTM E2128 Standard Guide for Evaluating Water Leakage of Buildings

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposed referenced standard is already being used in industry for many years.

Staff Analysis: A review of the standard proposed for inclusion in the code, ASTM C1861-23a Standard Specification for Lathing and Furring Accessories, and Fasteners, for Interior and Exterior Portland Cement-Based Plaster, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before April 1, 2025.

S178-25

IBC: TABLE 2507.2

Proponents: Shamim Rashid-Sumar, representing National Ready Mixed Concrete Association (ssumar@nrmca.org); James Farny, Portland Cement Association, representing US cement manufacturers (jfarny@cement.org); Dr. Julian Mills-Beale, representing National Ready Mixed Concrete Association (jmills-beale@nrmca.org)

2024 International Building Code

Revise as follows:

TABLE 2507.2 LATH, PLASTERING MATERIALS AND ACCESSORIES

MATERIAL	STANDARD
Accessories for gypsum veneer base	ASTM C1047
Blended cement	ASTM C595
Cold-formed steel studs and track, structural	AISI S240
Cold-formed steel studs and track, nonstructural	AISI S220
Exterior plaster bonding compounds	ASTM C932
Performance ~~Hydraulic~~ hydraulic cement	ASTM C1157~~; C1600~~
Rapid-hardening hydraulic cement	ASTM C1600
Gypsum casting and molding plaster	ASTM C59
Gypsum Keene's cement	ASTM C61
Gypsum plaster	ASTM C28
Gypsum veneer plaster	ASTM C587
Interior bonding compounds, gypsum	ASTM C631
Lime plasters	ASTM C5; C206
Masonry cement	ASTM C91
Metal lath	ASTM C847
Plaster aggregatesSand Perlite Vermiculite	ASTM C35; C897 ASTM C35 ASTM C35
Plastic cement	ASTM C1328
Portland cement	ASTM C150
Steel screws	ASTM C1002; C954
Welded wire lath	ASTM C933
Woven wire plaster base	ASTM C1032

Reason: This proposal is part of a series of proposals to the IBC and IRC to update cement terminology in the building codes.

The proposed revisions reflect current cement technology and market conditions, which can vary across regions. Nationally, the market is no longer dominated by portland cement. More than sixty percent of the current cement market consists of blended cements, including portland-limestone cement (PLC) and other blended cements that meet the requirements of ASTM C595/C595M, Specification for Blended Hydraulic Cements (Portland Cement Association, 2025). ASTM C595/C595M is referenced in the International Building Code/ International Residential Code.

This specific proposal provides clarification and differentiation between ASTM C1157 for performance hydraulic cement and ASTM C1600 for rapid-hardening hydraulic cement.

Bibliography: Portland Cement Association, 2025. Reducing Carbon at the Cement Plant. https://cementprogress.com/reducing-carbon-at-the-cement-plant/

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This editorial code change will not impact the cost of construction. See reason statement.

RB40-25

IRC: SECTION 202 (New), TABLE R301.2, R301.2.5 (New), R301.2.5.1 (New), ICC Chapter 44 (New),

Proponents: Milad Shabanian, representing Insurance Institute for Business & Home Safety (mshabanian@ibhs.org); Shamim Rashid-Sumar, representing National Ready Mixed Concrete Association (ssumar@nrmca.org); Christopher Brunette, representing Colorado Division of Fire Prevention & Control (chris.brunette@state.co.us)

2024 International Residential Code

Add new definition as follows:

WILDFIRE HAZARD AREAS (WHA). A geographic area designated by the local jurisdiction with fire hazard severity of medium, high, or extreme factors of wildfire exposure.

SECTION R301
DESIGN CRITERIA

Add new text as follows:

R301.2.5 Wildfire-resistant construction. The construction, alteration, inspection, maintenance and repair of buildings and structures located within wildfire hazard areas shall be in accordance with ICC 605 and this code.

R301.2.5.1 Wildfire hazard areas. The authority having jurisdiction shall designate *wildfire hazard areas* in accordance with the *International Wildland-Urban Interface Code*.

Add new standard(s) as follows:

ICC

International Code Council, Inc.
200 Massachusetts Avenue, NW, Suite 250
Washington, DC 20001

605-2025 Standard for Residential Construction in Regions with Wildfire Hazard

Revise as follows:

TABLE R301.2 CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA

GROUND SNOW LOAD[o]	WIND DESIGN				SEISMIC DESIGN CATEGORY[f]	SUBJECT TO DAMAGE FROM			ICE BARRIER UNDERLAYMENT REQUIRED[h]	FLOOD HAZARDS[g]	AIR FREEZING INDEX[i]	MEAN ANNUAL TEMP[j]	WILDFIRE HAZARD AREAS[p]
	Speed[d] (mph)	Topographic effects[k]	Special wind region[l]	Windborne debris zone[m]		Weathering[a]	Frost line depth[b]	Termite[c]					
—	—	—	—	—	—	—	—	---	—	—	—	—	---
MANUAL J DESIGN CRITERIA[n]													
Elevation			Altitude correction factor[e]	Coincident wet bulb	Indoor winter design relative humidity	Indoor winter design dry-bulb temperature			Outdoor winter design dry-bulb temperature		Heating temperature difference		
—			—	—	—	—			—		—		
Latitude			Daily range	Summer design gains	Indoor summer design relative humidity	Indoor summer design dry-bulb temperature			Outdoor summer design dry-bulb temperature		Cooling temperature difference		
—			—	—	—	—			—		—		

For SI: 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s.

a. Where weathering requires a higher strength concrete or grade of masonry than necessary to satisfy the structural requirements of this code, the frost line depth strength required for weathering shall govern. The weathering column shall be filled in with the weathering index, “negligible,” “moderate” or “severe” for concrete as determined from Figure R301.2(1). The grade of masonry units shall be determined from ASTM C34, ASTM C55, ASTM C62, ASTM C73, ASTM C90, ASTM C129, ASTM C145, ASTM C216 or ASTM C652.

b. Where the frost line depth requires deeper footings than indicated in Figure R403.1(1), the frost line depth strength required for weathering shall govern. The jurisdiction shall fill in the frost line depth column with the minimum depth of footing below finish grade.

c. The jurisdiction shall fill in this part of the table to indicate the need for protection depending on whether there has been a history of local subterranean termite damage.

d. The jurisdiction shall fill in this part of the table with the wind speed from the ultimate design wind speeds map [Figure R301.2(2)]. Wind exposure category shall be determined on a site-specific basis in accordance with Section R301.2.1.4.

e. The jurisdiction shall fill in this section of the table to establish the design criteria using Table 10A from ACCA Manual J or established criteria determined by the jurisdiction.

f. The jurisdiction shall fill in this part of the table with the seismic design category determined from Section R301.2.2.1.

g. The jurisdiction shall fill in this part of the table with: the date of the jurisdiction's entry into the National Flood Insurance Program (date of adoption of the first code or ordinance for management of flood hazard areas); and the title and date of the currently effective Flood Insurance Study or other flood hazard study and maps adopted by the authority having jurisdiction, as amended.

h. In accordance with Sections R905.1.2, R905.4.3.1, R905.5.3.1, R905.6.3.1, R905.7.3.1 and R905.8.3.1, where there has been a history of local damage from the effects of ice damming, the jurisdiction shall fill in this part of the table with "YES." Otherwise, the jurisdiction shall fill in this part of the table with "NO."

i. The jurisdiction shall fill in this part of the table with the 100-year return period air freezing index (BF-days) from Figure R403.3(2) or from the 100-year (99 percent) value on the National Climatic Data Center data table "Air Freezing Index-USA Method (Base 32°F)."

j. The jurisdiction shall fill in this part of the table with the mean annual temperature from the National Climatic Data Center data table "Air Freezing Index-USA Method (Base 32°F)."

k. In accordance with Section R301.2.1.5, where there is local historical data documenting structural damage to buildings due to topographic wind speed-up effects, the jurisdiction shall fill in this part of the table with "YES." Otherwise, the jurisdiction shall indicate "NO" in this part of the table.

l. In accordance with Figure R301.2(2), where there is local historical data documenting unusual wind conditions, the jurisdiction shall fill in this part of the table with "YES" and identify any specific requirements. Otherwise, the jurisdiction shall indicate "NO" in this part of the table.

m. In accordance with Section R301.2.1.2 the jurisdiction shall indicate the wind-borne debris wind zone(s). Otherwise, the jurisdiction shall indicate "NO" in this part of the table.

n. The jurisdiction shall fill in these sections of the table to establish the design criteria using Table 1a or 1b from ACCA Manual J or established criteria determined by the jurisdiction.

o. The jurisdiction shall fill in this section of the allowable stress design table using the Ground Snow Loads in Figure R301.2(3).

p. In accordance with Sections R301.2.5 and R301.2.5.1, the jurisdiction shall indicate the widlfire hazard area(s). Otherwise, the jurisdiction shall fill in this part of the table with "NO."

Reason: Wildfires present an increasingly significant risk to residential construction, yet the current version of the International Residential Code (IRC) does not adequately address this peril. The absence of specific guidance within the IRC for mitigating wildfire hazards creates a critical gap in the code. As wildfire exposure intensifies, particularly in regions identified as Wildland-Urban Interface (WUI) areas, the vulnerability of residential homes to wildfire events underscores the need for actionable standards.

Existing Gap in the IRC

The IRC serves as a comprehensive resource for the construction of one- and two-family dwellings and townhouses. However, it does not include specific provisions for wildfire resilience, such as construction techniques, material requirements, or design practices to reduce the risk of wildfire ignition. Without explicit references or requirements addressing wildfire hazards, homeowners and builders in wildfire-prone regions must rely on inconsistent local regulations or supplementary codes, such as the International Wildland-Urban Interface Code (IWUIC). This gap leaves a significant portion of residential construction exposed to preventable risks.

Increased Wildfire Exposure for Residential Buildings

The frequency, intensity, and geographic reach of wildfires are on the rise due to climate change, increased development in WUI areas, and other factors. According to recent data:

- Wildfire seasons are lasting longer, with more acres burned annually.
- Residential developments in WUI regions have expanded, placing more homes directly in harm's way.
- Wildfire-related losses have escalated, with billions of dollars in damages annually and devastating impacts on communities.

This heightened exposure demands proactive measures to improve the resilience of residential buildings against wildfire hazards. Incorporating wildfire-specific standards into the IRC is a crucial step toward addressing this growing threat.

Importance of ICC 605: Standard for Residential Construction in Regions with Wildfire Hazard

The new **ICC 605 Standard for Residential Construction in Regions with Wildfire Hazard**, developed by the International Standards for Mitigating Hazards in Residential and Related Construction (IS-MHRRC), provides comprehensive guidance for enhancing wildfire resilience. This standard offers:

- Prescriptive and performance-based design requirements to reduce ignition risks.
- Material specifications for fire-resistant construction components.
- Construction practices to limit ember penetration and radiant heat exposure.
- Practical strategies for reducing wildfire vulnerability while maintaining cost-effective solutions for builders and homeowners.

By referencing ICC 605 in the IRC, this proposal will:

1. Provide a clear and uniform approach to wildfire mitigation for residential construction.
2. Empower jurisdictions to adopt and enforce consistent wildfire-resilient practices.
3. Enhance the safety and durability of homes in wildfire-prone areas, thereby reducing losses and improving community resilience.

Conclusion

Adding ICC 605 as a referenced standard in the IRC is a necessary and timely update to address the growing threat of wildfires. It fills a critical gap in the code, aligns with modern building science, and supports the broader goal of safeguarding residential structures against all hazards. This proposal ensures that the IRC remains relevant and effective in protecting lives, property, and communities from the devastating impacts of wildfires.

For additional information on the standard, go to the ICC 605 webpage at IS-MHRRC - ICC.

Bibliography:

Cost Impact: Increase

Estimated Immediate Cost Impact:

$0

Adopting ICC 605 for residential construction in wildfire-prone areas will result in an increase in initial construction costs [1-4]. The magnitude of this increase is directly influenced by the extent of defensible space provided and the severity of the wildfire hazard in the area.

1. **Minimum Cost Increase (Extended Defensible Space)**

    When the defensible space is extended to **1.5 times the required minimum**, the increase in construction costs is minimal. This scenario primarily addresses risks associated with **ember exposure** by creating a buffer zone that reduces the likelihood of ignition from windborne embers.

2. **Moderate Cost Increase (Required Defensible Space)**

If the defensible space provided is **equal to the required minimum**, construction costs increase moderately. The additional cost is intended to mitigate risks from **both ember exposure and radiant heat**. With reduced clearance, more robust construction materials and design features are required to protect the structure from these hazards.

3. **Maximum Cost Increase (Less than Required Defensible Space)**

   In situations where defensible space is **less than the required minimum**, the increase in construction costs is highest. This is due to the need for enhanced fire-resistant materials and building practices to protect against **ember exposure, radiant heat, and direct flame contact.**

Estimated Immediate Cost Impact Justification (methodology and variables):

Reference:

[1] Headwaters economics, 2024, Retrofitting a Home for Wildfire Resistance, Costs and Considerations. https://headwaterseconomics.org/wp-content/uploads/2024/06/Wildfire_Retrofit_Report_R5.pdf

[2] Headwaters economics and Insurance institute for business & home safety, 2022, Construction Costs for a Wildfire-Resistant Home, California Edition. https://headwaterseconomics.org/wp-content/uploads/2022_HE_IBHS_WildfireConstruction.pdf

[3] Home innovation research labs, 2020, Cost Impact of Building a House in Compliance with IWUIC. https://www.nahb.org/-/media/NAHB/advocacy/docs/top-priorities/codes/code-adoption/cost-impact-building-house-in-compliance-with-iwuic.pdf?rev=ea1604e447b84da1b41432bb5d291d6a&hash=83D447A8997466E64DF34D8280BC7CD2.

4] Headwaters economics and Insurance institute for business & home safety, 2018, Building a Wildfire-Resistant Home: Codes and Costs. https://headwaterseconomics.org/wp-content/uploads/building-costs-codes-report.pdf

Estimated Life Cycle Cost Impact:

Despite the initial increase in construction costs, the overall **lifecycle cost** of structures built to ICC 605 standards is expected to be **lower**. This reduction results from the binary nature of fire damage—structures either survive with minimal loss or are destroyed entirely. By significantly improving the likelihood of survival during a wildfire incident, the enhanced construction requirements reduce potential repair and replacement costs over the building's lifespan. Furthermore, these measures can lead to indirect cost savings through reduced insurance premiums and minimized community recovery expenditures following a wildfire event.

Staff Analysis: A review of the following standards proposed for inclusion in the code regarding some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before April 1, 2025.
ICC 605-2025 Standard for Residential Construction in Regions with Wildfire Hazard

RB43-25

IRC: R301.2.1, TABLE R301.2.1(2), TABLE R301.2.1(3) (New)

Proponents: Dave Monsour, THOMAS ASSOCIATES, INC. (DASMA), representing DASMA (Door & Access Systems Manufacturers Assoc.) (dmonsour@thomasamc.com)

2024 International Residential Code

SECTION R301
DESIGN CRITERIA

Revise as follows:

R301.2.1 Wind design criteria. *Buildings* and portions thereof shall be constructed in accordance with the wind provisions of this code using the ultimate design wind speed in Table R301.2 as determined from Figure R301.2(2). The structural provisions of this code for wind loads are not permitted where wind design is required as specified in Section R301.2.1.1. Where different construction methods and structural materials are used for various portions of a *building*, the applicable requirements of this section for each portion shall apply. Where not otherwise specified, the wind loads listed in Table R301.2.1(1) adjusted for height and exposure using Table R301.2.1(2) shall be used to determine design load performance requirements for wall coverings, curtain walls, *roof coverings*, exterior windows, *skylights*, ~~garage doors~~ and exterior doors <ins>other than garage doors</ins>. <ins>Where loads for garage doors are not otherwise specified, the loads listed in Table R301.2.1(3) adjusted for height and exposure using Table R301.2.1(2) shall be used to determine design load performance requirements. The resulting positive and negative design wind pressures shall not be less than 10 psf.</ins>

TABLE R301.2.1(2) HEIGHT AND EXPOSURE ADJUSTMENT COEFFICIENTS ~~FOR Table R301.2.1(1)~~

MEAN ROOF HEIGHT	EXPOSURE		
	B	C	D
15	0.82	1.21	1.47
20	0.89	1.29	1.55
25	0.94	1.35	1.61
30	1.00	1.40	1.66
35	1.05	1.45	1.70
40	1.06	1.49	1.74
45	1.10	1.53	1.78
50	1.13	1.56	1.81
55	1.16	1.59	1.84
60	1.19	1.62	1.87

Add new text as follows:

<ins>TABLE</ins> <ins>R301.2.1(3)</ins> <ins>GARAGE DOOR WIND LOADS FOR A BUILDING WITH A MEAN ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B (ASD) (psf)</ins>[a,b,c]

DOOR SIZE		ULTIMATE DESIGN WIND SPEED, V*ult* (mph)																									
		90		95		100		105		110		115		120		130		140		150		160		170		180	
WIDTH (ft)	HEIGHT (ft)	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg
8	7	7.8	-8.8	8.6	-9.8	9.6	-10.9	10.6	-12.0	11.6	-13.2	12.7	-14.4	13.8	-15.7	16.2	-18.4	18.8	-21.3	21.5	-24.5	24.5	-27.8	27.7	-31.4	31.0	-35.2
9	7	7.7	-8.7	8.6	-9.7	9.5	-10.7	10.5	-11.8	11.5	-13.0	12.6	-14.2	13.7	-15.5	16.0	-18.1	18.6	-21.0	21.4	-24.1	24.3	-27.5	27.4	-31.0	30.8	-34.8
16	7	7.4	-8.2	8.2	-9.1	9.1	-10.1	10.0	-11.2	11.0	-12.3	12.0	-13.4	13.1	-14.6	15.4	-17.1	17.8	-19.9	20.5	-22.8	23.3	-25.9	26.3	-29.3	29.5	-32.8
18	7	7.3	-8.1	8.1	-9.1	9.0	-10.0	9.9	-11.1	10.9	-12.1	11.9	-13.3	13.0	-14.4	15.2	-16.9	17.7	-19.7	20.3	-22.6	23.1	-25.7	26.0	-29.0	29.2	-32.5
20	7	7.2	-8.0	8.1	-9.0	8.9	-9.9	9.9	-11.0	10.8	-12.0	11.8	-13.1	12.9	-14.3	15.1	-16.8	17.5	-19.5	20.1	-22.4	22.9	-25.4	25.8	-28.7	28.9	-32.2

For SI: 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = .0479 kPa

a. Interpolation shall be permitted for door widths or ultimate design wind speeds between those given above. For door heights over 7 feet, the values in this table shall be used. For door heights less than 7 feet and for doors less than 56 square feet in area, pressures shall be determined in accordance with Table R301.2.1(1).

b. Positive and negative values signify, respectively, pressures acting toward and away from the exterior surface of the door.

c. Negative pressures assume the door overlaps the building's end zone by 2 feet. For overlaps less than 2 feet, the values in this table shall be used. For overlaps exceeding 2 feet, pressures shall be determined in accordance with Table R301.2.1(1).

Reason: Garage doors are critical in maintaining building structural integrity during windstorms. If the garage door gives way, internal pressure can build up on the roof, leading to building collapse. This phenomenon has been demonstrated in many field and laboratory studies over the years by NIST, IBHS, FEMA, and others. Yet these same organizations, as well as DASMA, report a general lack of wind-rated doors being specified and enforced in many regions throughout the country. This proposal requests a new table for garage door design wind pressures. The table highlights and simplifies existing design wind pressure requirements for garage doors, and does not create any new requirements. We believe this new table will foster greater compliance with existing provisions of the code. A version of this table has been used for many years in Florida (Florida Building Code, Building and the Florida Building Code, Residential), and is included in the 2020 edition of ICC 600 Standard for Residential Construction in High-Wind Regions.

As an example of the complexity of the existing approach, Table R301.2.1(1) divides wall component and cladding pressures into two groups: Zone 4 and Zone 5 (wall end zone). Residential garage doors typically overlap the end zone. Accepted methods for resolving the overlap involve calculations not referenced in the code, which defeats the purpose of Table R301.2.1(1) in providing an easy reference for pre-calculated design wind pressures.

This proposal entails a change to the title of Table R301.2.1(2), since that table will no longer be used only for Table R301.2.1(1).

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is a clarification. The added table simplifies the process of determining design wind pressures for garage doors according to existing IRC requirements.

RB43-25

RB45-25

IRC: R301.2.1.6 (New), Figure R301.2.1.6 (New), TABLE R301.2.1.6 (New)

Proponents: Jay Crandell, P.E., ABTG / ARES Consulting, representing Self (jcrandell@aresconsulting.biz); Art DeGaetano, representing Northeast Regional Climate Center, Cornell University (atd2@cornell.edu)

2024 International Residential Code

SECTION R301
DESIGN CRITERIA

Add new text as follows:

R301.2.1.6 Wind-driven rain. Minimum design wind pressures used to evaluate the wind-driven rain resistance of building assemblies and components shall be permitted to be determined in accordance with Figure R301.2.1.6 and Table R301.2.1.6.

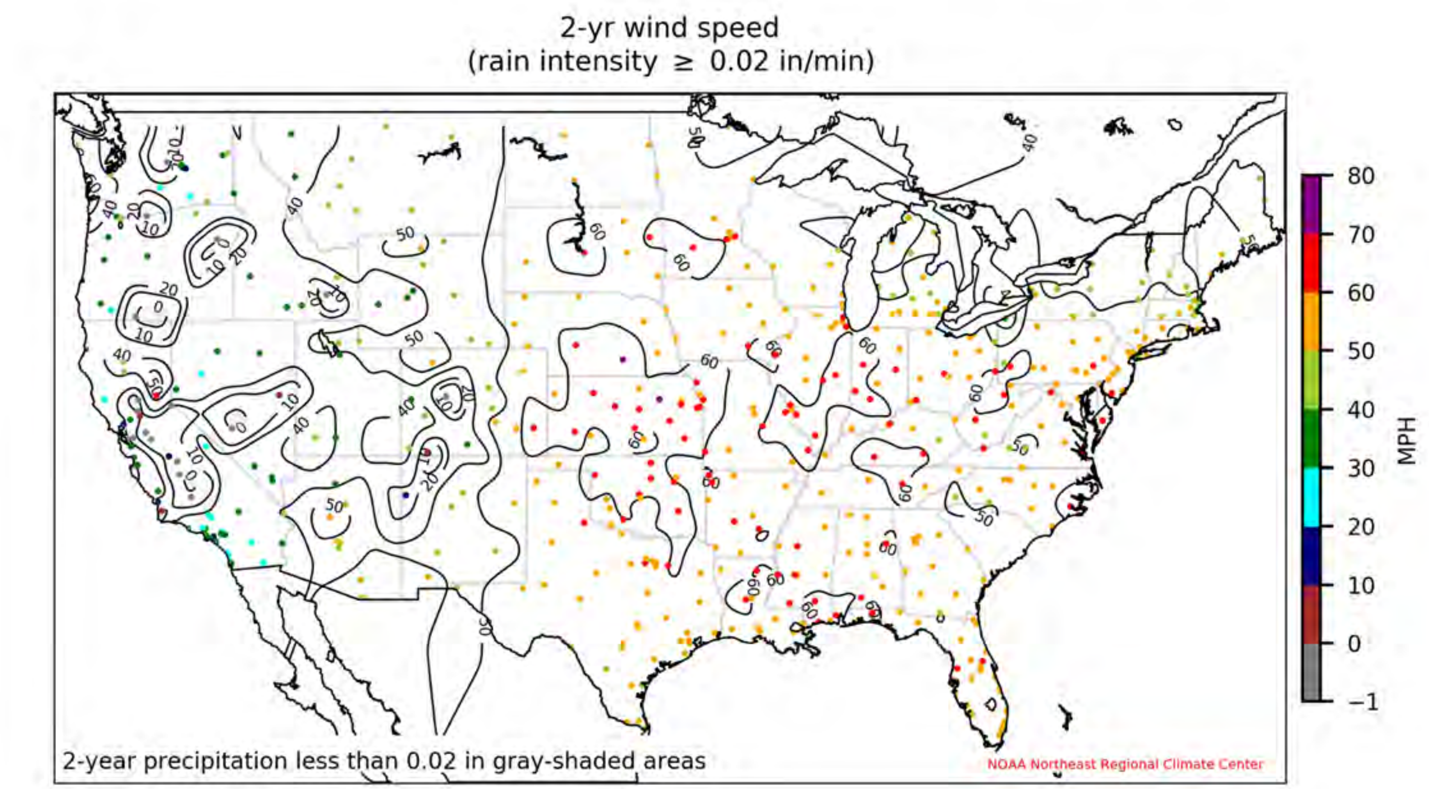


Figure R301.2.1.6 Wind-driven rain wind speed (mph, 3 sec gust)
[For SI: 1 mph = 0.447 m/s]

TABLE R301.2.1.6 MINIMUM WIND-DRIVEN RAIN DESIGN PRESSURE (PSF)[a,b]

Wind Exposure	Mean Roof Height (ft)	Wind-driven Rain Wind Speed (mph, 3 sec gust) from Figure R301.2.1.6					
		≤ 30	40	50	60	70	80

B	15	2.86	2.86	2.86	3.21	4.37	5.71
	20	2.86	2.86	2.86	3.50	4.76	6.21
	25	2.86	2.86	2.86	3.72	5.06	6.61
	30	2.86	2.86	2.86	3.95	5.37	7.02
	40	2.86	2.86	2.98	4.28	5.83	7.62
	50	2.86	2.86	3.17	4.57	6.22	8.12
	60	2.86	2.86	3.33	4.79	6.52	8.52
C	15	2.86	2.86	4.01	5.77	7.85	10.3
	20	2.86	2.86	4.24	6.11	8.31	10.9
	25	2.86	2.86	4.43	6.38	8.68	11.3
	30	2.86	2.96	4.62	6.65	9.05	11.8
	40	2.86	3.14	4.90	7.06	9.61	12.6
	50	2.86	3.29	5.14	7.40	10.1	13.2
	60	2.86	3.41	5.33	7.67	10.4	13.6
D	15	2.86	3.35	5.23	7.53	10.3	13.4
	20	2.86	3.51	5.48	7.90	10.8	14.0
	25	2.86	3.64	5.69	8.19	11.2	14.6
	30	2.86	3.77	5.89	8.48	11.6	15.0
	40	2.86	3.96	6.20	8.92	12.1	15.0
	50	2.86	4.13	6.45	9.29	12.6	15.0
	60	2.86	4.26	6.65	9.58	13.0	15.0

For SI: 1 psf = 47.9 Pa; 1 mph = 0.447 m/s; 1 ft = 0.305 m

a. Wind-driven rain wind speed is to be obtained from Figure R301.2.1.6 which provides 3-second gust wind speeds at standard conditions of wind exposure C (open, flat terrain) at a height of 33 ft (10m) above ground.

b. The tabulated pressures are positive components and cladding pressures calculated in accordance with ASCE 7 for a windward wall for the indicated exposure condition and building mean roof height. Wind directionality is not used to reduce the wind-driven rain pressure. The wind speed obtained from Figure R301.2.1.6 used for this pressure calculation is adjusted from a 3-sec gust basis to a 1-min average wind speed using the following wind speed averaging time conversion factors: 0.72 (Exposure B), 0.79 (Exposure C), and 0.82 (Exposure D). Wind-driven rain pressures for different exposure and mean roof height conditions shall be permitted to be calculated in a consistent manner in accordance with ASCE 7 and Figure R301.2.1.6. The calculated pressure shall not be less than 2.86 psf and need not exceed 15.0 psf.

Reason: The code lacks a risk-consistent basis for addressing wind-driven rain and resistance to water intrusion. This proposal provides a wind-driven rain hazard map (i.e., annual extreme 3-sec gust wind speeds coincidental with a minimum rainfall rate threshold) to properly characterize the hazard as it varies across wind-driven rain climatology of the U.S. Coordinating proposals have been submitted for the IBC and IRC.

First, the proposal “permits” and does not mandate use of these wind-driven rain wind speeds and associated minimum design pressures for evaluation water penetration resistance. This approach is necessary because various other code referenced product standards will need time to consider and re-align with this new hazard-based approach to wind-driven rain resistance. The proposed map and table requirements are somewhat more conservative than, but generally consistent with, current industry minimum and maximum pressure values used in practice. But now the selection of a design pressure for specification of water penetration resistance is properly related to variation in actual hazard across the US (and variation in fundamental wind load parameters such as exposure and building height).

The two key components of this proposal are further explained as follows:

Figure 1609.8 / R301.2.1.6 - The wind-driven rain wind speed map is based on the JAMC article referenced in the Bibliography as a joint effort of the University of Florida and Cornell University's Northeast Climate Data Center with support from other interested parties, including the Insurance Institute for Business and Home Safety (IBHS). Additional work to extend the research to develop a US map was funded by NOAA at Cornell University. The climatology of wind-driven rain is developed from recently available 1-min weather observations from National Weather Service Automated Surface Observing Systems (ASOS). One-minute data better represent the joint occurrence of the extremes that define wind-driven rain occurrence than hourly data, which previously was the shortest available temporal resolution. After adjusting the winds speeds to standardize for exposure and anemometer type, the wind data corresponding to specific rainfall thresholds were fit to a statistical distribution to obtain estimates of the recurrence of wind speeds associated with different rainfall intensities. The values serve as the basis for a wind-driven rain climatology for the United States that is analogous to climatologies that exist and inform building codes in Europe and Canada. The wind-driven rain map represents a 3-sec gust wind speed (miles per hour) for a 2-yr mean recurrence interval with a threshold coincidental rainfall rate of 0.02 in/min (0.5 mm/min). For additional information, refer to the JAMC article referenced in Bibliography.

Table 1609.8 / R301.2.1.6 - The main purpose of the mapped wind-driven rain hazard is to provide a wind-driven rain wind speed from which an appropriate, risk-consistent pressure differential can be determined as a means to specify or evaluate water-resistance of wall assemblies and exterior wall covering assemblies or components. The pressure differential may be determined in two ways. One way is to use pre-calculated values as shown in the table. The other way is to calculate the pressure using the ASCE 7 provisions for wind loads, but substituting the appropriate wind-driven rain wind speed from Figure 1609.8 / R301.2.1.6 for the basic wind speed used for structural design purposes in ASCE 7.

The latter method was how the table values were generated (as detailed for transparency and repeatability in the table footnotes). An example of calculating the wind-driven rain wind pressure using Figure 1609.8 / R301.2.1.6 and the wind load provisions of ASCE 7 is as follows:

Wind-driven rain wind speed: 60 mph, 3sec gust (Figure 1609.8 / R301.2.1.6)

Wind Exposure: B (suburban/wooded)

Building Height: 30 feet

Wall Pressure coefficients – GCp = 1.0 (positive); GCpi = -0.18 (negative internal pressure)

Kz = 0.7 (exposure B, 30' height)

Kd = 1.0 (directionality not considered)

Kzt = 1.0 (no topographic wind speed up effects considered)

Ke = 1.0 (no elevation effects considered w/r to lower density of air at higher elevations)

V1-min/V3-sec conversion factor: 0.72

$p = [0.00256\ K_z\ K_{zt}\ K_d\ K_e\ (0.72 \times V)^2] \times [GC_p - GC_{pi}]$

$= 0.00256(0.7)(1.0)(1.0)(1.0)(0.72 \times 60)^2 \times [1.0 + 0.18]$

= (3.34 psf) x [1.18] = **3.95 psf**

The range of calculated pressures are shown in the following supplemental table without inclusion of the minimum and maximum pressure values consistent with the extremes of current practice (and available products such as fenestration or water-resistive barrier systems and flashing methods). This table is provided for transparency and informational purposes.

Pressures (psf) for Water Resistance Evaluation (based on conversion to 1-min average wind speed)											
Wind Exposure	Mean Roof Height (ft)	WDR Wind Speed (MPH - 3 sec gust)									
		10	20	30	40	50	60	70	80	90	100
B	15	0.09	0.36	0.80	1.43	2.23	3.21	4.37	5.71	7.23	8.93
	20	0.10	0.39	0.87	1.55	2.43	3.50	4.76	6.21	7.86	9.71
	25	0.10	0.41	0.93	1.65	2.58	3.72	5.06	6.61	8.37	10.34
	30	0.11	0.44	0.99	1.75	2.74	3.95	5.37	7.02	8.88	10.96
	40	0.12	0.48	1.07	1.90	2.98	4.28	5.83	7.62	9.64	11.90
	50	0.13	0.51	1.14	2.03	3.17	4.57	6.22	8.12	10.27	12.68
	60	0.13	0.53	1.20	2.13	3.33	4.79	6.52	8.52	10.78	13.31
C	15	0.16	0.64	1.44	2.56	4.01	5.77	7.85	10.26	12.98	16.02
	20	0.17	0.68	1.53	2.71	4.24	6.11	8.31	10.86	13.74	16.97
	25	0.18	0.71	1.59	2.84	4.43	6.38	8.68	11.34	14.35	17.72
	30	0.18	0.74	1.66	2.96	4.62	6.65	9.05	11.82	14.97	18.48
	40	0.20	0.78	1.76	3.14	4.90	7.06	9.61	12.55	15.88	19.61
	50	0.21	0.82	1.85	3.29	5.14	7.40	10.07	13.15	16.65	20.55
	60	0.21	0.85	1.92	3.41	5.33	7.67	10.44	13.63	17.26	21.30
D	15	0.21	0.84	1.88	3.35	5.23	7.53	10.25	13.39	16.95	20.92
	20	0.22	0.88	1.97	3.51	5.48	7.90	10.75	14.04	17.77	21.94
	25	0.23	0.91	2.05	3.64	5.69	8.19	11.15	14.56	18.43	22.75
	30	0.24	0.94	2.12	3.77	5.89	8.48	11.55	15.08	19.09	23.56
	40	0.25	0.99	2.23	3.96	6.20	8.92	12.14	15.86	20.07	24.78
	50	0.26	1.03	2.32	4.13	6.45	9.29	12.64	16.51	20.89	25.80
	60	0.27	1.06	2.39	4.26	6.65	9.58	13.04	17.03	21.55	26.61

Second, it is important to note that the failure mode that this proposal addresses is the initiation of a leak (onset of water intrusion) at the most extreme (worst) 1-minute of coincidental wind and rain that would typically occur in a given year on average. Therefore, it provides protection for routine and lesser extreme events that have equal or lower wind-driven rain wind speed (even if the rainfall rate is substantially greater than the threshold used to develop the map). Events that exceed the wind-driven rain wind speed tend to have lower coincidental rainfall rates as based on the natural tendency or shape of the hazard curves in the climatological data (see JAMC article referenced in Bibliography).

Finally, as shown in the tabulated pressure values in the proposal, the lower limit of 2.86 psf (137 Pa) for test pressure is used to correspond with the minimum test pressure used in recognized standards addressing wind-driven rain resistance (e.g., ASTM E331) despite the table above showing that lower pressure could be justified in regions of low wind-driven rain hazard. The upper limit of 15.0 psf (718 Pa) also is based on current accepted practice for worst-case wind-driven rain climate conditions in the U.S. and ensures the availability of solutions (it also ensures equivalency with current accepted practices for regions or conditions considered to have high wind-driven rain hazard). This range of WDR pressures also is consistent with that used in Canada. These limits ensure that this new approach is “calibrated” to accepted practice and that solutions are available while also better aligning solutions with actual variation in U.S. wind-driven rain hazard. Even so, the 15 psfcap will provide substantial protection against significant water intrusion and contents damage in greater wind-driven rain hazard conditions or events (higher wind speed at greater return periods) up to the point where structural failures begin to occur and the general integrity of the building envelope is compromised. Such extreme structural safety-level events are beyond the scope of a serviceability concern underlying the current and proposed approach to water resistance. Regardless, the proposed approach deals with the matter of wind-driven rainwater resistance in a much more risk-consistent fashion based on the variation in hazard across the U.S. (wind-driven rain wind speed) and for different building conditions (e.g., wind exposure and building height).

Bibliography: Belcher, B.N., DeGaetano, A.T., Masters, F.J., Crandell, J., and Morrison, M.J. (2023). Development of an Extreme Wind-Driven Rain Climatology for the Southeastern United States Using 1-Min Rainfall and Peak Wind Speed Data. Journal of Applied Meteorology and Climatology, American Meteorological Society, DOI: https://doi.org/10.1175/JAMC-D-22-0156.1

Cost Impact: Increase

Estimated Immediate Cost Impact:

$0 - While the cost impact indicates “increased cost” (there was no suitable default answer in cdpACCESS), the proposal does not mandate any new requirements. It provides a new means or option to evaluate building wall assemblies and components for water resistance using an improved methodology based on actual wind-driven rain hazard. If voluntarily used, it could result in an increase or decrease cost for material or assembly qualification purposes relative to existing practices. But, the increase or decrease in cost to the end user may be very small. This proposal also does not require any existing materials or methods recognized in the code to alter current requirements, methods, or standards. So, it should be considered cost neutral.

Estimated Immediate Cost Impact Justification (methodology and variables):

$0 - see cost impact statement above.

RB45-25

RB51-25

IRC: R301.2.4, R306.1, R306.2, R306.3, R306.4 (New), R306.4.1 (New), R306.4.2 (New), BO102.7, BO103.1(New), BO104.6 (New), BO105.5 (New), BO106.4 (New), BO107.2 (New), BO108, BO108.1, TABLE BO108.1

Proponents: Rebecca Quinn, RCQuinn Consulting, representing Association of State Floodplain Managers (rebecca@rcquinnconsulting.com); Chad Berginnis, representing Association of State Floodplain Managers (cberginnis@floods.org)

2024 International Residential Code

SECTION R301
DESIGN CRITERIA

Revise as follows:

R301.2.4 Floodplain construction. *Buildings* and structures located ~~constructed~~ in whole or in part in flood hazard areas as established in Table R301.2 shall be constructed in accordance with the flood-resistant construction provisions of code.~~, and *substantial improvement* and *repair* of *substantial damage* of *buildings* and structures located in whole or in part in flood hazard areas, shall be designed and constructed in accordance with Section R306. *Buildings* and structures that are located in more than one flood hazard area, including A Zones, Coastal A Zones and V Zones, shall comply with the provisions associated with the most restrictive flood hazard area. *Buildings* and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.~~

R301.2.4.1 Alternative provisions. As an alternative to the requirements in Section R306, ASCE 24 is permitted subject to the limitations of this code and the limitations therein.

SECTION R306
FLOOD-RESISTANT CONSTRUCTION

Delete and substitute as follows:

~~**R306.1 General.** *Buildings* and structures constructed in whole or in part in flood hazard areas established in Table R301.2, and *substantial improvement* and *repair* of *substantial damage* of *buildings* and structures located in whole or in part in flood hazard areas, shall be designed and constructed in accordance with the provisions contained in this section. *Buildings* and structures that are located in more than one flood hazard area, including A Zones, Coastal A Zones and V Zones, shall comply with the provisions associated with the most restrictive flood hazard area. *Buildings* and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.~~

R306.1 General. Buildings located in whole or in part in flood hazard areas established by Table R301.2 shall comply with the following:

1. New construction shall be designed and constructed in accordance with Sections R306.1.1 through R306.1.10 and Section R306.2 or R306.3.
2. Buildings located in more than one flood hazard area shall comply with the provisions associated with the most restrictive flood hazard area.
3. Buildings located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.
4. Substantial improvement and repair of substantial damage of existing buildings shall be designed and constructed in accordance with Sections R306.1.1 through R306.1.10 and Section R306.2 or R306.3.
5. Repair, alteration, additions and foundations of existing buildings shall comply with Section R306.4.

Revise as follows:

R306.2 Flood hazard areas including A Zones. Areas that have been determined to be prone to flooding and that are not subject to high-velocity wave action shall be designated as flood hazard areas. Flood hazard areas that have been delineated as subject to wave heights between $1^{1}/_{2}$ feet (457 mm) and 3 feet (914 mm) or otherwise designated by the *jurisdiction* shall be designated as Coastal A Zones and are subject to the requirements of Section R306.3. *Buildings* and structures ~~constructed~~ located in whole or in part in flood hazard areas shall be designed and constructed in accordance with Sections R306.2.1 through R306.2.5 ~~R306.2.4~~.

R306.3 Coastal high-hazard areas including V Zones and Coastal A Zones, where designated. Areas that have been determined to be subject to wave heights in excess of 3 feet (914 mm) or subject to high-velocity wave action or wave-induced erosion shall be designated as coastal high-hazard areas. Flood hazard areas that have been designated as subject to wave heights between $1^{1}/_{2}$ feet (457 mm) and 3 feet (914 mm) or otherwise designated by the *jurisdiction* shall be designated as Coastal A Zones. *Buildings* and structures located ~~constructed~~ in whole or in part in coastal high-hazard areas and Coastal A Zones, where designated, shall be designed and constructed in accordance with Sections R306.3.1 through R306.3.10.

Add new text as follows:

R306.4 Existing buildings and structures. In flood hazard areas, repairs, alterations, additions and foundations of existing buildings and structures shall comply with Section R306.4.1, R306.4.2 or R306.4.3.

R306.4.1 Repairs. As applicable to the flood hazard area, comply with the following:

1. Existing buildings and structures shall be brought into compliance with requirements of Section R306.1 and R306.2 or R306.3 for new construction when the buildings have sustained substantial damage or when repairs constitute substantial improvement.
2. Replacement of exterior equipment and exterior appliances damaged by flood shall meet the requirements of Section R306.1.6.

R306.4.2 Alterations. As applicable to the flood hazard area, the following shall comply with Section R306.1 and Section R306.2 or R306.3 for new construction:

1. Alterations that constitute substantial improvement of an existing building and all aspects of the existing building.
2. New foundations, foundations raised or extended upward, and replacement foundations.

R306.4.3 Additions and foundations. For existing buildings and structures located in flood hazard areas:

1. Additions, and additions combined with other proposed work, that constitute substantial improvement of the existing building shall comply with the requirements of Section 306 for new construction, and all aspects of the existing building shall be brought into compliance with the requirements of Section R306 for new construction.

2. Additions, and additions combined with other proposed work that do not constitute substantial improvement of the existing building are not required to comply with the requirements of Section R306 for new construction provided that both of the following apply:
   - 2.1. The addition shall not create or extend a nonconformity of the existing building with the requirements of Section R306.
   - 2.2. The lowest floor of the addition shall be at or above the lower of the lowest floor of the existing building or the lowest floor elevation required in Section R306.

3. For new foundations, foundations raised or extended upward, and replacement foundations, the foundations shall be in compliance with the requirements of Section R306 for new construction. Existing buildings with slab-on-ground foundations shall not be elevated on new, raised, extended, or replaced foundations unless the existing slabs are assessed in accordance with ACI 562 and, if required in accordance with the assessment, strengthened in accordance with ACI 562 and ACI 318 to meet the load requirements of Chapter 4.

APPENDIX BO
EXISTING BUILDINGS AND STRUCTURES

SECTION BO102
COMPLIANCE

Delete and substitute as follows:

~~**BO102.7 Flood hazard areas.** Work performed in existing buildings located in a flood hazard area as established by Table R301.2 shall be subject to the provisions of Section R104.3.1.~~

BO102.7 Flood hazard areas. Work on existing buildings located in flood hazard areas shall comply with the flood hazard area provisions of Section R306 and this appendix, as applicable. The building official shall determine if the work proposed for existing buildings in flood hazard areas constitutes substantial improvement or repair of substantial damage.

SECTION BO103
DEFINITIONS

Add new definition as follows:

FLOOD HAZARD AREA. The greater of the following two areas

1. The area within a floodplain subject to a 1-percent or greater chance of flooding in any given year.
2. The area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.

SECTION BO104
REPAIRS

Add new text as follows:

BO104.1.1 Flood hazard areas. Repairs to existing buildings located in *flood hazard areas* shall comply with Section R306.4 and this appendix.

SECTION BO105
ALTERATIONS

BO105.1.1 Flood hazard areas. Alterations to existing buildings located in *flood hazard areas* shall comply with Section R306.4 and this appendix.

SECTION BO106
ADDITION

BO106.1.1 Flood hazard areas. Additions and foundations for existing buildings located in flood hazard areas shall comply with Section R306.4 and this appendix.

SECTION BO107
RELOCATED BUILDINGS

BO107.2 Flood hazard areas. When relocated within, or moved into, *flood hazard areas*, the foundations of residential buildings shall comply with the flood-resistant construction requirements of Section R306 for new construction.

BO108
HISTORIC BUILDINGS

BO108.1 Flood hazard areas. In *flood hazard areas*, where the work proposed constitutes *substantial improvement* or repair of *substantial damage*, the existing building shall be brought into compliance with the flood-resistant construction requirements of Section R306 for new construction.

Exception: If a historic building will continue to be a historic building after the proposed work is completed, then the proposed work is not considered *substantial improvement* or repair of *substantial damage*. For the purposes of this exception, a historic building is any of the following:

1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places.
2. Determined by the Secretary of the US Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district.
3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.

Revise as follows:

SECTION ~~BO108~~ BO109
REFERENCED STANDARDS

~~**BO108.1**~~ **BO109.1 General.** See Table ~~BO108.1~~ BO109.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, the standard title and the section or sections of this appendix that reference the standard.

TABLE ~~BO108.1~~ BO109.1 REFERENCED STANDARDS

STANDARD ACRONYM	STANDARD NAME	SECTION HEREIN REFERENCED
ACI 562-21	Assessment, Repair, and Rehabilitation of Existing Concrete Structures—Code Requirements	BO106.4
IEBC—24	*International Existing Building Code®*	BO102.8
IFC—24	*International Fire Code®*	BO107.1
IPMC—24	*International Property Maintenance Code®*	BO107.1

Reason: Communities that participate in the NFIP have always had to determine whether work on existing dwellings in floodplains constitutes substantial improvement and whether damage to existing dwellings in floodplains constitutes substantial damage. Sec. R306 already specifies that “substantial improvement and repair of substantial damage” shall comply with the section. The definition of “substantial improvement” includes alterations, repairs, and additions. Sec. R104.3.1 requires the code official to make substantial improvement and substantial damage determinations.

The IEBC has explicit provisions for repair, alteration, and additions of existing buildings in flood hazard areas. This proposal clarifies the IRC in Sec. R306 and Appendix BO, largely based on the IEBC. The IEBC provides clarity for building officials and applicants as to what requirements apply to repairs, alterations, and additions to existing buildings.

R301.2.4: rather than maintain word-for-word duplication with Sec. R306.1, the proposal replaces that language with a sentence to phrase the general requirement to be more in line with similar provisions in R301.2.1 (for wind) and the topic sentence in R301.2.2 (seismic).

R306.1: proposal reformats the text as a list, with some clarifications, prompted by the addition of a pointer to new Section R306.4 for repairs, alterations, additions and foundation work.

New R306.4 for existing buildings.

- R306.4.1 for repairs. The proposed language is based on IEBC 401.3 (repairs that constitute substantial improvement) and IEBC 405.2.6 (have sustained substantial damage). The provision for replacement of exterior equipment damaged by flood is companion to a separate proposal for the IEBC.
- R306.4.2 for alterations. The proposed language is based on IEBC 503.2 prescriptive compliance for alterations (except not retaining the inverse statement for alterations that do NOT constitute substantial improvement).
- R306.3 for additions and foundations. The provisions for additions to dwellings and foundation work on buildings in flood hazard areas. The basis for the proposed added text is IEBC 502.2, prescriptive compliance for additions, with the addition of evaluation of slabs-on-ground when existing dwellings will be raised on foundations (same is proposed to be added to IEBC). Raised, extended, and new foundations are included with additions because the “addition” is defined as “An extension or increase in floor areas, number of stories, or height of a building or structure” (emphasis added). FEMA and others have reported on evidence of problems and failures of elevation projects when slabs are not evaluated
and strengthened before raising. A separate proposal adds the evaluation of slabs to the IEBC.

The proposal also amends IRC Appendix BO, Existing Buildings and Structure, to more fully incorporate flood requirements and better coordinate with the IRC.

- BO102.7: Describe the requirements, rather than refer only to R104.3.1.
- BO103, Definitions: Add the definition for “flood hazard area.” A separate proposal would add the same to Sec. R202. If that proposal passes, this definition in Appendix BO is not needed.
- BO104.1.1: for clarity, refer to the proposed added Sec. 306 for repairs.
- BO105.1.1: for clarity, refer to the proposed added Sec. 306 for alterations.
- BO106.1.1: for clarity, refer to proposed added Sec. 306 for additions and foundations.
- BO107.2: add for relocated buildings, equivalent to IEBC 1402.6.
- BO108.1: add for historic buildings, equivalent to IEBC 1201.4. The I-Code definition for “historic building” allows designation under local law and local designation of historic districts. The NFIP does not recognize designation by local historic preservation programs unless the communities are designated by the US Department of Interior as Certified Local Governments. Certified local programs, like certified state programs, must abide by federal requirements when they designate historic buildings and historic districts. The exception means all historic structures in flood hazard areas must comply when work is substantial improvement or the structures incur substantial damage – except those that qualify under the NFIP definition. That preserves consistency with the NFIP regulations.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal provides more detail in the IRC on how to achieve compliance with existing requirements for substantial improvement and repair of substantial damage in flood hazard areas. Providing additional detail on meeting requirements already in the code will not impact the cost of construction.

Staff Analysis: The proposed referenced standard, ACI 562-21, Assessment, Repair, and Rehabilitation of Existing Concrete Structures —Code Requirements, is currently referenced in the IEBC.

RB52-25

IRC: TABLE R301.5

Proponents: Allen Burris, Clark County Nevada, representing Southern Nevada Chapter (allen.burris@clarkcountynv.gov); Jeffrey Grove, representing Southern Nevada ICC Chapter (jeff.grove@coffman.com)

2024 International Residential Code

SECTION R301
DESIGN CRITERIA

Revise as follows:

TABLE R301.5 MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS (in pounds per square foot)

USE	UNIFORM LOAD (psf)	CONCENTRATED LOAD (lb)
Uninhabitable attics without storage[b]	10	—
Uninhabitable attics with limited storage[b, g]	20	—
Habitable attics and attics served with fixed stairs	~~30~~40	—
Balconies (exterior) and decks[e]	40	—
Fire escapes	40	—
Guards	—	200[h, i]
Guard in-fill components[f]	—	50[h]
Handrail[d]	—	200[h]
Passenger vehicle garages	50	2,000[a]
Areas other than sleeping areas	40	—
Sleeping areas	~~30~~40	—
Stairs	40[c]	300[c]

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 square inch = 645 mm^2, 1 pound = 4.45 N.

a. Elevated garage floors shall be capable of supporting the uniformly distributed live load or a 2,000-pound concentrated load applied on an area of $4^1/_2$ inches by $4^1/_2$ inches, whichever produces the greater stresses.

b. Uninhabitable attics without storage are those where the clear height between joists and rafters is not more than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. This live load need not be assumed to act concurrently with any other live load requirements.

c. Individual stair treads shall be capable of supporting the uniformly distributed live load or a 300-pound concentrated load applied on an area of 2 inches by 2 inches, whichever produces the greater stresses.

d. A single concentrated load applied in any direction at any point along the top. For a guard not required to serve as a handrail, the load need not be applied to the top element of the guard in a direction parallel to such element.

e. See Section R507.1 for decks attached to exterior walls.

f. Guard in-fill components (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 pounds on an area equal to 1 square foot. This load need not be assumed to act concurrently with any other live load requirement.

g. Uninhabitable attics with limited storage are those where the clear height between joists and rafters is 42 inches or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses.

The live load need only be applied to those portions of the joists or truss bottom chords where all of the following conditions are met:

1. The attic area is accessed from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is not less than 30 inches.
2. The slopes of the joists or truss bottom chords are not greater than 2 units vertical in 12 units horizontal.
3. Required insulation depth is less than the joist or truss bottom chord member depth.

The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed concurrent live load of not less than 10 pounds per square foot.

h. Glazing used in handrail assemblies and guards shall be designed with a load adjustment factor of 4. The load adjustment factor shall be applied to each of the concentrated loads applied to the top of the rail, and to the load on the in-fill components. These loads shall be determined independent of one another, and loads are assumed not to occur with any other live load.

i. Where the top of a guard system is not required to serve as a handrail, the single concentrated load shall be applied at any point along the top, in the vertical downward direction and in the horizontal direction away from the walking surface. Where the top of a guard is also serving as the handrail, a single concentrated load shall be applied in any direction at any point along the top. Concentrated loads shall not be applied concurrently.

Reason: In the post COVID environment, many people are working from home and setting up home offices or exercise equipment in their extra bedrooms. The homeowners are unaware there is a different strength in the floor system in the sleeping areas than in the rest of the house. When these rooms are designed with a lighter structural load with the assumption that these will be used for sleeping and bedroom furniture there is a risk that the change in use will overload the structure. While changing the load requirements will not cover all scenarios such as putting heavy safes on the second floor, it will allow the homeowner to use the house as the want without concern to which rooms or areas of the floor are weaker than others.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There could be a cost savings buy making joist sizes more consistent and getting reduced pricing based on quantity. There could also be a slight cost increase due to larger member sizes. The end result is a wash.

RB52-25

RB53-25

IRC: TABLE R301.5

Proponents: Thomas Zuzik Jr, Railingcodes.com, representing Feeney Inc. - Oakland, CA (https://feeneyinc.com) (coderep@railingcodes.com)

2024 International Residential Code

SECTION R301
DESIGN CRITERIA

Revise as follows:

TABLE R301.5 MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS (in pounds per square foot)

USE	UNIFORM LOAD (psf)	CONCENTRATED LOAD (lb)
Uninhabitable attics without storage[b]	10	—
Uninhabitable attics with limited storage[b, g]	20	—
Habitable attics and attics served with fixed stairs	30	—
Balconies (exterior) and decks[e]	40	—
Fire escapes	40	—
Guards	—	200[h, i]
Guard in-fill components[f, i]	—	50[h], 12[i]
Handrail[d]	—	200[h]
Passenger vehicle garages	50	2,000[a]
Areas other than sleeping areas	40	—
Sleeping areas	30	—
Stairs	40[c]	300[c]

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 square inch = 645 mm^2, 1 pound = 4.45 N.

a. Elevated garage floors shall be capable of supporting the uniformly distributed live load or a 2,000-pound concentrated load applied on an area of 4$^1/_2$ inches by 4$^1/_2$ inches, whichever produces the greater stresses.

b. Uninhabitable attics without storage are those where the clear height between joists and rafters is not more than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. This live load need not be assumed to act concurrently with any other live load requirements.

c. Individual stair treads shall be capable of supporting the uniformly distributed live load or a 300-pound concentrated load applied on an area of 2 inches by 2 inches, whichever produces the greater stresses.

d. A single concentrated load applied in any direction at any point along the top. For a guard not required to serve as a handrail, the load need not be applied to the top element of the guard in a direction parallel to such element.

e. See Section R507.1 for decks attached to exterior walls.

f. Guard in-fill components (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 pounds on an area equal to 1 square foot. This load need not be assumed to act concurrently with any other live load requirement.

g. Uninhabitable attics with limited storage are those where the clear height between joists and rafters is 42 inches or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses.

The live load need only be applied to those portions of the joists or truss bottom chords where all of the following conditions are met:

1. The attic area is accessed from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is not less than 30 inches.
2. The slopes of the joists or truss bottom chords are not greater than 2 units vertical in 12 units horizontal.
3. Required insulation depth is less than the joist or truss bottom chord member depth.

The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed concurrent live load of not less than 10 pounds per square foot.

h. Glazing used in handrail assemblies and guards shall be designed with a load adjustment factor of 4. The load adjustment factor shall be applied to each of the concentrated loads applied to the top of the rail, and to the load on the in-fill components. These loads shall be determined independent of one another, and loads are assumed not to occur with any other live load.

i. Where the top of a guard system is not required to serve as a handrail, the single concentrated load shall be applied at any point along the top, in the vertical downward direction and in the horizontal direction away from the walking surface. Where the top of a guard is also serving as the handrail, a single concentrated load shall be applied in any direction at any point along the top. Concentrated loads shall not be applied concurrently.

j. Guard in-fill components, except the handrail, shall be designed to withstand a horizontally applied concentrated load of 12 pounds (.0534kN) from a sphere passing through the guard where openings greater than 1.25-inches (31.75 mm) exist in a guard's infill. The sphere shall have a diameter equal to the applicable infill opening limitation in Section R321.1.3.

Attached Files

- **ICC Test Rail Pic B.png**
  https://www.cdpaccess.com/proposal/12052/35618/files/download/9300/
- **ICC Test Rail Pic A.png**
  https://www.cdpaccess.com/proposal/12052/35618/files/download/9299/
- **ICC Test Rail Pic C.png**
  https://www.cdpaccess.com/proposal/12052/35618/files/download/9292/
- **ICC Test Rail Pic S.png**
  https://www.cdpaccess.com/proposal/12052/35618/files/download/9291/

Reason: For over 30-years building officials, engineers, designers, contractors, manufacturers and fabricators have been debating whether or not the sphere measurements delineated for guard opening limitations, currently in the 2024 IRC Section R321.1.3 and prior editions, is simply a opening size measurement or is it an opening size measurement combined with a measured force load, citing "openings that allow passage". With a lack of language delineating no force load be applied, then the opposite is to define a specific infill penetration spread load in the model codes to cover this conflict with inspectors who routinely use many different non-codified techniques to determine if a guard meets a requirement that is not in the ICC-IRC model code.
This proposal is based on testing research done by the proponent to correlate a pound-force load on a sphere in relation to ASTM E935-00 "Test Method D - Application of horizontal static load to determine resistance to cone penetration by infill area of picket and panel railing systems", first published by ASTM in the designation: E 935 - 91 "Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings[1]", and then include this corelated cone load to a sphere load as a specific design load for infill spread for the model 2027 IRC. For those of you who are not familiar with this "Test Method" it was developed by the same group who also developed the method for testing the 1sqft area load test, published in one form or another, and first published in the model IRC

since the 2001 supplement (Proposal RB14-01 added by this same proponent), to the current 2024 model IRC in table "R301.5 Guard in-fill component [h]".

The information for this reason statement in the monograph is limited to the very basic's. For those parties interested in more detailed information on this proposal beyond the summary, we are publishing on going information though out the 2025 group "B" process at (https://railingcodes.com/infill/) to provide more up to date information and details, as this proposal progresses through the 2027 code cycle process.

ESTABLISHED ASTM TESTING METHOD HISTORY

The initial publication of ASTM E935 in 1983 included 2 test methods, "Test Method A - Horizontal Static Load Application" and "Test Method B - Vertical Static Load Application". Two additional test methods were then added to E935 in the 1991 publication of ASTM E935-91, which also includes the title changes to Test Methods A and B. In the 1991 publication, Test Method A was renamed "Application of Horizontal Static Load to Top Rail" and Test Method B was renamed "Application of Vertical Static Load to Top Rail", and the first of the 2 new test methods added in 1991 was "Test Method C - Application of Horizontal Static Load to Infill Areas of Picket and Panel Railing Systems", and the second was “Test Method D – Application of Horizontal Static Load to Determine Resistance to Cone Penetration by Infill Area of Baluster and Panel Railing Systems.”, Test Method D was specifically developed to be able to test the spread between infill elements in guard systems. ASTM E935-91 cites ASTM E985 "Specifications for Permanent Metal Railing Systems and Rails for Buildings" for the specific loads to be used for each test method in E935.

ASTM E935-00 was Reapproved in 2006 and

- is the latest edition which included the test method for guard infill deflection as; “Test Method D – Application of Horizontal Static Load to Determine Resistance to Cone Penetration by Infill Area of Baluster and Panel Railing Systems”.
- E935-00 also cites, as did the 1991 test method, to use
  - E985-00 for the load that will be applied for Test Method D, and
  - in section 7.1.8 "The minimum horizontal test load to be applied by a penetration cone to the infill area of a baluster or panel railing system (see Test Method D of Test Methods E935) shall be 220 N (50 lbf)."

Specifics of importance in ASTM E935-00, in Test Method D

- Test Method D specifies when testing to use a cone that is 1.25% the size of the opening limitation.
  - This translates to using a 5-inch Cone for testing an opening limitation of 4-inches in guard infill.
- The test method specifies that the cone's point be truncated to 1-inch in diameter.
  - For this reason we have limited the load requirement in this proposal to openings that allow a sphere 1.25-inches in diameter to pass through.
  - Openings smaller than the 1.25-inch sphere are exempt from this requirement

The current edition of ASTM E935-21 does not include "Test Method D". E935 was re-written to be more inline with only the sections of the "code" which were being used and removed sections that were never adopted and published as E935-13. The revisions in E935-13 of the Test Method Document outlined the test methods in Section 10 Procedure. Though some may argue that a lack of adoption means that "Test Method D" is not valid, we believe and present the fact that 3 of the 4 test methods first developed over 40 and 30 years ago are still used and that it took 30 years to add the 4th test method to clarify minimum compliance for infill spreading when the building code industry see's the need for the code to clarify the detail.

Identifying openings in Guard Infill most vulnerable to Spreading through Penetration

To simplify this code submittal which will apply to guard infill, the proposal will be focusing on wire cables as they are the most vulnerable and scrutinized type of guard infill for opening spreading/deflection concerns. Furthermore, we are narrowing the monograph reason statement even further to focus on the most vulnerable common wire cable used in the built environment, imported 1/8-inch diameter 1x19 type 316 stainless steel, arguably the most flexible type of infill commonly used in guard systems. Even though this proposal adds the requirement to all types of guard infill, and we are researching and testing different types of guard materials and construction, the ongoing results will be being published on the proponents website for public review. We stipulate for this proposal that the minimum required by code language should be based on the results of the most vulnerable and with wire cable guard infill being the most scrutinized by code officials and is likely the most affected by the addition of this proposed new model code requirement, we focused on finding this infill types pass/fail point for Test Method D of ASTM E935-00.

SAFE INFILL – SAFE CABLE DESIGN LOADS

The tensioning, stiffness and resistance that the guard infill preforms to is directly related to the material, and with wire cable this is directly related to safe cable design loads. Per industry manufacture Loos & Co. Inc., 1/8-inch diameter, 1x19 type 316 stainless steel imported wire cable, lists the minimum break point at 1,780lbf on their website. The cable's minimum break point is applied to the industry-based safety factors for designated Safe Workload and the Maximum Cable Pretension load for Cable Rail Installations. This results in a safe workload limit of 356lbf, based on 20% of the cable's minimum break load and a Maximum Cable Pretension limit of 445lbf which is 25% of the cable's minimum break load.

TRANSLATING THE ASTM E935-00 Test Method D PENETRATION CONE TEST METHOD TO SPHERE CODE

The proponent of this proposal erected a guard section 28 feet long, with cable infill and installed load cells to measure the lbf for each cable's tension that the cone and sphere were pulled between. The wire infill cables were tensioned uniformly until the infill met enough tension so the 50lbf on the cone's load cell sensor was met, (minus the drag load), without exceeding the cables work load maximum limit and pretension load. Once the guard's infill section met the Part D Test Method of E935-00, the proponent changed out the 5-inch cone designated in ASTM E935-00 with a 4-inch sphere. The 4-inch sphere was then pulled logging the tension through to failure while recording the results. Those results produced data which was then used to establish the proposed pound-force load to be applied to the sphere for the requirements listed in the code proposal.

There will be questions for how code officials might be able to verify that the infill will meet the designated new load. To start with, how are code officials inspecting the current loads for guards in IRC R301.5 table? There are more than a few ways this can be done, of which one is manufactures specifications for guard systems. As for guards with cable infill, some cable fitting manufactures already publish charts in their installation instructions for tensioning based on cable construction, size, length, clear span, and centerline vertical spacing. There are a few ways that verifying these parameters are met if the field with simple hand tools. However, this information is different based on more than a few parameters as our research through testing is showing.

The amount of work product, information and documentation for this proposal has been document for public viewing with information, pictures and videos of the results and testing done to correlate the proposed code change on the proponents website at https://railingcodes.com/infill/

Of Note the proponent will begin holding monthly or bi-monthly working sessions, though zoom in the middle of February 2025, to discuss the proposal and the on going research as this proposal progresses through the 2027 code cycle. Those interested in joining in the group meetings can fill out a form on the proponents website.

Bibliography: ASTM Editions:

- ASTM E935-83 Initial edition Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for buildings[1]A
- ASTM E935-91 Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for buildings[1]
- ASTM E935-00ε1 Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for buildings[1]
- ASTM E935-13 Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for buildings[1]
- ASTM E985-91 Standard Specification for Performance of Permanent Metal Railing Systems and Rails for Buildings[1]
- ASTM E985-00 Standard Specification for Performance of Permanent Metal Railing Systems and Rails for Buildings[1]

ICC Evaluation Service:

- ICC ES-AC273 Acceptance Criteria for Handrails and Guards.
  - Originally approved 2004.
  - Last Approved 2017
  - Editorially revised May 2021

ICC 2001 Supplement Monograph

- RB14-01 T.R301.4 (IBC 1607.7.1.2)

Websites:

- Loos & Co. Inc - Stainless Steel Strand, Bare 1x19, Import
  - https://loosco.com/product/cable/stainless-steel-strand-bare-1x19-import/
- Railingcodes.com - Proponent Research & Testing Information
  - https://railingcodes.com/infill/

- Feeney Inc. - Guard system for Testing Provided by
  - https://feeneyinc.com/product/metal/

Cost Impact: Increase

Estimated Immediate Cost Impact:

The estimated cost impact is between $0.00 & $320.00

Estimated Immediate Cost Impact Justification (methodology and variables):

The proponent of this proposal does not believe that there will be a cost increase, let alone any significant increase in cost because we believe that an estimated 98%, if not higher, of the guards being installed today are being built to comply and already meet or exceed the minimum requirements set forth in this code change proposal. However, per ICC requirements if we see any possible increase we need to provide justification of that cost increase in details.

So for those guards that possibly don't meet the minimums proposed, they can do so at minimum cost with minor changes to the design and installation of the guard system.

As stipulated in the proposal's main reason statement the most affected type of guard infill is, imported 1x19 1/8-inch diameter stainless steel cable, and the following examples are based on an installation of the cable infill guard system on an exterior deck 24 feet wide by 15 feet projection of 2 sides, and the other 24 foot side being a building.

The following summaries are supported by the breakdowns that follow after the 2 summary examples.

- WOOD POST GUARD INSTALLATION:
  - The 24ft guard section is divided by 4ft, this equals 6 sections, which then translates to 7 support posts.
    - Next if we divide the same 24ft section by 3ft we now have 8 sections, which translates to 9 support posts.
      - This is an additional 2 posts at an estimated $80.00 each
  - Then if we look at the 2 sides being 15ft and divide that by 4ft, this equals 4 sections, which translates to 5 support posts
    - Next is we divide the same 15ft section by 3ft we now have 5 sections, which translates to 6 support posts per side.
      - This is an additional 2 posts at an estimated $80.00 each
  - This example summary produces (4) posts at $80.00 each for a estimated total of $320.00

- WIDE SPAN POST GUARD INSTALLATION:
  - The 24ft section is divided by 5ft, this equals 5 sections, which then translates to 6 support posts.
    - Next we add a midspan vertical tension baluster into each of the 5 sections
      - This is an additional 5 balusters estimated at $47.49 each
      - This minuses 1 post at an estimated $80.00 each
  - Then if we look at the 2 sides being 15ft and divide that by 5ft, this equals 3 sections, which translates to 4 support posts
    - Next we add a midspan vertical tension baluster into each of the 3 sections on each side
      - This is an additional 6 balusters estimated at $47.49 each
      - This minuses 2 posts at an estimated $80.00 each
  - This example summary produces
    - (3) less posts at $80.00 each and equals a credit of $240.00
    - and adds (11) balusters at $47.49 each and equals a total of $522.39
      - This equals $522.39 - $240.00 for an additional estimated cost of $282.39
      - The $282.39 is less than the $320.00 estimated cost increase

Cost Reference Supporting Documentation:

- Wood post costs
  - Wood Post Added to Wood Deck Estimated Cost
    Wood post prices pulled from lowes.com at the time of code proposals submittal.
    - Severe Weather 4-in x 4-in x 6-ft 2 Southern yellow pine
      - Ground contact pressure treated lumber
      - Lowe's Item #312530 | Model #Y240406-GC $9.18 each
    - Simpson Strong-Tie 2-in x 4-in 14-gauge ZMAX Tension tie
      - Lowe's Item #2132165 | Model #DTT2Z $10.88 each
    - Deck Plus 1/2-in x 7-in Coated Coarse Thread Hex Bolt
      - Lowe's Item #756045 | Model #260735 $4.05 each x (2) = $8.10
    - Deck Plus 1/2-in Coated Standard Washer
      - Lowe's Item #756041 | Model #260724 $0.49 each x (4) = $1.96

        - Deck Plus 1/2-in x 13 Coated Steel Hex Nut
            - Lowe's Item #756033 | Model #260704 $4.05 each x (2) = $0.59
        - Per post estimated added cost:
            - Material Estimated at $31.30 plus local sales tax
            - $25.00 Installation Labor cost
                - Combined Estimate of $56.30 Each Post
                - Misc. Contingency labor/materials $23.70
                    - Proposal Budget per post $80.00
- Option for keeping wide metal or wood post spans:
    - Adding Vertical Mid-Span Baluster based on Feeney Inc. Retail Pricing
        - Feeney 42-in-level baluster $40.00 each
        - Mounting Hardware estimated at $2.49 each
        - Labor cost added per baluster for installation $5.00
            - Estimated $47.49 added for each baluster.

Labor costs will vary depending on the area of the country the work is being done.

Estimated Life Cycle Cost Impact:

We estimate no increase in life cycle cost

Estimated Life Cycle Cost Impact Justification (methodology and variables):

Guards are a fixed building material that requires no change in the cost of the life cycle with this type of requirement.

RB53-25

RB54-25

IRC: TABLE R301.5

Proponents: Glenn Mathewson, BuildingCodeCollege.com, representing Self (glenn@glennmathewson.com)

2024 International Residential Code

SECTION R301
DESIGN CRITERIA

Revise as follows:

TABLE R301.5 MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS (in pounds per square foot)

USE	UNIFORM LOAD (psf)	CONCENTRATED LOAD (lb)
Uninhabitable attics without storage[b]	10	—
Uninhabitable attics with limited storage[b, g]	20	—
Habitable attics and attics served with fixed stairs	30	—
Balconies (exterior) and decks[e]	40	—
Fire escapes	40	—
Guards	—	200[h, i]
Guard in-fill components[f]	—	50[h]
Handrail[d]	—	200[h]
Passenger vehicle garages	50	2,000[a]
Areas other than sleeping areas	40	—
Sleeping areas	30	—
Stairs	40[c]	300[c]

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 square inch = 645 mm^2, 1 pound = 4.45 N.

a. Elevated garage floors shall be capable of supporting the uniformly distributed live load or a 2,000-pound concentrated load applied on an area of $4^{1}/_{2}$ inches by $4^{1}/_{2}$ inches, whichever produces the greater stresses.

b. Uninhabitable attics without storage are those where the clear height between joists and rafters is not more than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. This live load need not be assumed to act concurrently with any other live load requirements.

c. Individual stair treads shall be capable of supporting the uniformly distributed live load or a 300-pound concentrated load applied on an area of 2 inches by 2 inches, whichever produces the greater stresses.

d. A single concentrated load applied in any direction at any point along the top. For a guard not required to serve as a handrail, the load need not be applied to the top element of the guard in a direction parallel to such element.

e. See Section R507.1 for decks attached to exterior walls.

f. Guard in-fill components (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 pounds on an area not to exceed 12 inches by 12 inches, including openings and spaces between infill components ~~equal to 1 square foot.~~ This load need not be assumed to act concurrently with any other live load requirement.

g. Uninhabitable attics with limited storage are those where the clear height between joists and rafters is 42 inches or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses.

   The live load need only be applied to those portions of the joists or truss bottom chords where all of the following conditions are met:

   1. The attic area is accessed from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is not less than 30 inches.
   2. The slopes of the joists or truss bottom chords are not greater than 2 units vertical in 12 units horizontal.
   3. Required insulation depth is less than the joist or truss bottom chord member depth.

   The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed concurrent live load of not less than 10 pounds per square foot.

h. Glazing used in handrail assemblies and guards shall be designed with a load adjustment factor of 4. The load adjustment factor shall be applied to each of the concentrated loads applied to the top of the rail, and to the load on the in-fill components. These loads shall be determined independent of one another, and loads are assumed not to occur with any other live load.

i. Where the top of a guard system is not required to serve as a handrail, the single concentrated load shall be applied at any point along the top, in the vertical downward direction and in the horizontal direction away from the walking surface. Where the top of a guard is also serving as the handrail, a single concentrated load shall be applied in any direction at any point along the top. Concentrated loads shall not be applied concurrently.

Reason: Between the 2005 and 2010 edition of ASCE 7, loading for infill of guards changed from "one square foot" to "12 inches by 12 inches". This was a critical change to better describe the intent of the application of this load. Since the 2012 edition, the IBC has referenced ASCE 7 for guard infill design loads. The goal of this proposal is to align the IRC with the IBC and ASCE 7 for how infill loads are to be applied for evaluation.

This is important, because "one square foot" could be any shape. It would allow the load to be placed on a single baluster in the shape of 24 inches tall and 6 inches wide, and makes the IRC more restrictive in guard design than is permitted under the IBC . I do not believe that is the intent, as revealed in the ASCE 7.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This change "could" lower the cost of construction if builders are currently required to make a single baluster strong enough to resist the entire load. This cost savings is not worth justifying. The motivation to this change is to make the words match the most likely application being interpreted.

RB54-25

RB55-25

IRC: TABLE R301.7, ASTM Chapter 44 (New)

Proponents: Quyen Thai, representing City of Tacoma (qthai@cityoftacoma.org)

2024 International Residential Code

SECTION R301
DESIGN CRITERIA

Revise as follows:

TABLE R301.7 ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS[b, c]

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Rafters having slopes greater than 3:12 with finished ceiling not attached to rafters	*L*/180
Interior walls and partitions	*H*/180
Floors	*L*/360
Ceilings with brittle finishes (including plaster and stucco)	*L*/360
Ceilings with flexible finishes (including gypsum board)	*L*/240
All other structural members[f] ~~excluding guards and handrails~~	*L*/240
Exterior walls—wind loads[a] with plaster or stucco finish	*H*/360
Exterior walls—wind loads[a] with other brittle finishes	*H*/240
Exterior walls—wind loads[a] with flexible finishes	*H*/120[d]
Lintels supporting masonry veneer walls[e]	*L*/600

Note: *L* = span length, *H* = span height.

a. For the purpose of the determining deflection limits herein, the wind load shall be permitted to be taken as 0.7 times the component and cladding (ASD) loads obtained from Table R301.2.1(1).

b. For cantilever members, *L* shall be taken as twice the length of the cantilever.

c. For aluminum structural members or panels used in roofs or walls of sunroom *additions* or patio covers, not supporting edge of glass or sandwich panels, the total load deflection shall not exceed *L*/60. For continuous aluminum structural members supporting edge of glass, the total load deflection shall not exceed *L*/175 for each glass lite or *L*/60 for the entire length of the member, whichever is more stringent. For sandwich panels used in roofs or walls of sunroom *additions* or patio covers, the total load deflection shall not exceed *L*/120.

d. Deflection for exterior walls with interior gypsum board finish shall be limited to an allowable deflection of *H*/180.

e. Refer to Section R703.8.2. The *dead load* of supported materials shall be included when calculating the deflection of these members.

f. Guards, regardless of material, shall comply wiht the deflection criteria in ASTM E985.

Add new standard(s) as follows:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428

E985-00e1 Standard Specification for Permanent Metal Railing Systems and Rails for Buildings

Reason: This proposal introduces a deflection limit for guards that is compatible with current testing standards.

In the proposal last cycle that eliminated the deflection requirement for guards and handrails (RB44-22), the proponent indicated that requiring a guard to meet the L/240 was not feasible, as many current guards would not meet that requirement. However, under the current, code, there is no limit. We believe that it is critical that guards be restrained from deflecting more than a certain expected limit.

ICC Acceptance Criteria AC 273 for wood and metal guards points to ASTM E935. ASTM E935 limits the deflection to the lesser of:

H/24 + L/96, or

H/12

Where:

H = guard height (inches)

L = tributary length of guard top rail (inches)

For a 3-foot high guard with posts at 4 feet on center, a post would be allowed to deflect 2 inches:

H/24 + L/96 = 36/24 + 48/96 = 2 inches

H/12 = 36/12 = 3 inches

If the L/240 limit were applied (noting that Footnote b says to use twice the length of the cantilever), the allowable deflection would be 36/240 = 0.15 inches.

In most cases, sizing the members to comply with the structural requirements (shear and bending moment) will govern, and deflection will not be an issue. However, even though 2 inches is still a relatively large deflection for such a short post, we believe that the ASTM standard will provide a reasonable limit.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

By nature, this is more or less editorial since the requirement was removed but expectations are still there to ensure guard rails are strong enough to withstand loads. Majority of existing guard rail systems should already meet/comply with this proposal and would not be impacted compared to if the prior versions of the deflection load was required at L/240, then majority of guard rails would need to be reevaluated and modified to strengthen the guards and would therefore be an increase in cost. But, since this code proposal is more in line with what is existing, there should be no increase nor decrease in cost.

Staff Analysis: A review of the following standards proposed for inclusion in the code regarding some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before April 1, 2025.
ASTM E985-00e1 Standard Specification for Permanent Metal Railing Systems and Rails for Buildings

RB55-25

RB56-25

IRC: R302.1, TABLE R302.1(1), TABLE R302.1(2)

Proponents: Bryant Arms, representing NYS DOS (bryant.arms@dos.ny.gov); Jeanne Rice, representing NYSDOS (jeanne.rice@dos.ny.gov); China Clarke, representing New York State Dept of State (china.clarke@dos.ny.gov); Chad Sievers, NYS, representing NYS Dept of State (chad.sievers@dos.ny.gov); Stephen Van Hoose, representing NYS DOS (stephen.vanhoose@dos.ny.gov); Bryan Toepfer, representing NY DOS (bryan.toepfer@dos.ny.gov); Daniel Carroll, New York State Department of State, representing Division of Building Standards and Codes (daniel.carroll@dos.ny.gov); Gregory Benton, NYS, representing Department of State, Division of Building Standards and Codes (gregory.benton@dos.ny.gov); Christopher Jensen, representing NYS DOS - Division of Building Standards and Codes (christopher.jensen@dos.ny.gov)

2024 International Residential Code

SECTION R302 FIRE-RESISTANT CONSTRUCTION

Revise as follows:

R302.1 Exterior ~~walls~~ <u>fire separation distance</u>. Construction, projections, openings and penetrations of exterior walls~~of, *dwellings, townhouses*~~<u>, and</u> <u>horizontal combustible assemblies</u> ~~and accessory buildings~~ shall comply with Table R302.1(1) based on *fire separation distance*; or *dwellings* and *townhouses* equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2) based on *fire separation distance.*

For the purposes of determining *fire separation distance*, *dwellings* and *townhouses* on the same *lot* shall be assumed to have an imaginary line between them. Where a new *dwelling* or *townhouse* is to be erected on the same lot as an existing *dwelling* or *townhouse*, the location of the assumed imaginary line with relation to the existing *dwelling* or *townhouse* shall be such that the existing *dwelling* or *townhouse* meets requirements of this section.

Where a *lot line* exists between adjacent *townhouse units*, *fire separation distance* of exterior walls shall be measured to the *lot line*. Where a lot line does not exist between adjacent *townhouse units*, an imaginary line shall be assumed between the adjacent *townhouse units* and *fire separation distance* of exterior walls shall be measured to the imaginary line. *Fire separation distance* and requirements of Section R302.1 shall not apply to walls separating *townhouse units* that are required by Section R302.2.

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls of *individual dwelling units* and their *accessory* buildings located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from *permits* are not required to provide wall protection based on location on the *lot*. Projections beyond the exterior wall shall not extend over the *lot line*.
4. ~~4~~. Detached garages accessory to a *dwelling unit* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

TABLE R302.1(1) EXTERIOR <u>HORIZONTAL ASSEMBLIES AND</u> WALLS

EXTERIOR ~~WALL~~ ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the International Building Code with exposure from both sides	0 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Projections <u>and horizontal assemblies</u>	Not allowed	NA	< 2 feet
	Fire-resistance rated	1 hour on the underside, or heavy timber, or fire-retardant-treated wood[a, b]	≥ 2 feet to < 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
	Not allowed	NA	< 3 feet

EXTERIOR ~~WALL~~ ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
~~Openings in~~ walls			
	25% maximum of wall area	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< 3 feet
		None required	3 feet

For SI: 1 foot = 304.8 mm.

NA = Not Applicable.

a. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave overhang if fireblocking is provided from the wall top plate to the underside of the roof sheathing.

b. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the rake overhang where vent openings that communicate with the attic are not installed in the overhang or gable wall.

TABLE R302.1(2) EXTERIOR HORIZONTAL ASSEMBLIES AND WALLS—DWELLINGS AND TOWNHOUSES WITH AN AUTOMATIC SPRINKLER SYSTEM

EXTERIOR ~~WALL~~ ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the International Building Code with exposure from the outside	0 feet
	Not fire-resistance rated	0 hours	3 feet[a]
Projections and horizontal assemblies	Not allowed	NA	< 2 feet
	Fire-resistance rated	1 hour on the underside, or heavy timber, or fire-retardant-treated wood[b, c]	2 feet[a]
	Not fire-resistance rated	0 hours	3 feet
Openings in walls	Not allowed	NA	< 3 feet
	Unlimited	0 hours	3 feet[a]
Penetrations	All	Comply with Section R302.4	< 3 feet
		None required	3 feet[a]

For SI: 1 foot = 304.8 mm.

NA = Not Applicable.

a. For residential subdivisions where all dwellings and townhouses are equipped throughout with an automatic sprinkler system installed in accordance with Section P2904, the fire separation distance for exterior walls not fire-resistance rated and for fire-resistance-rated projections and horizontal assemblies shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.

b. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave overhang if fireblocking is provided from the wall top plate to the underside of the roof sheathing.

c. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the rake overhang where vent openings that communicate with the attic are not installed in the overhang or gable wall.

Reason: According to Exception #2 in Section R302.1 of the 2024 IRC, neither fire separation nor fire-resistance is required between accessory buildings or between them and their dwelling units. That section also allows combustible carports, decks, pavilions, gazebos, and other buildings that lack certain exterior walls to have no fire-resistance and zero fire separation distance to other structures on the same lot and to the lot's boundaries.

Consequently:

Regardless of their size, those accessory structures can be placed anywhere on the dwelling's lot without any of the fire separation considerations that are required for exterior walls. They can have zero-clearance to other buildings. They can even join fire-separated buildings without jeopardizing compliance to the IRC.

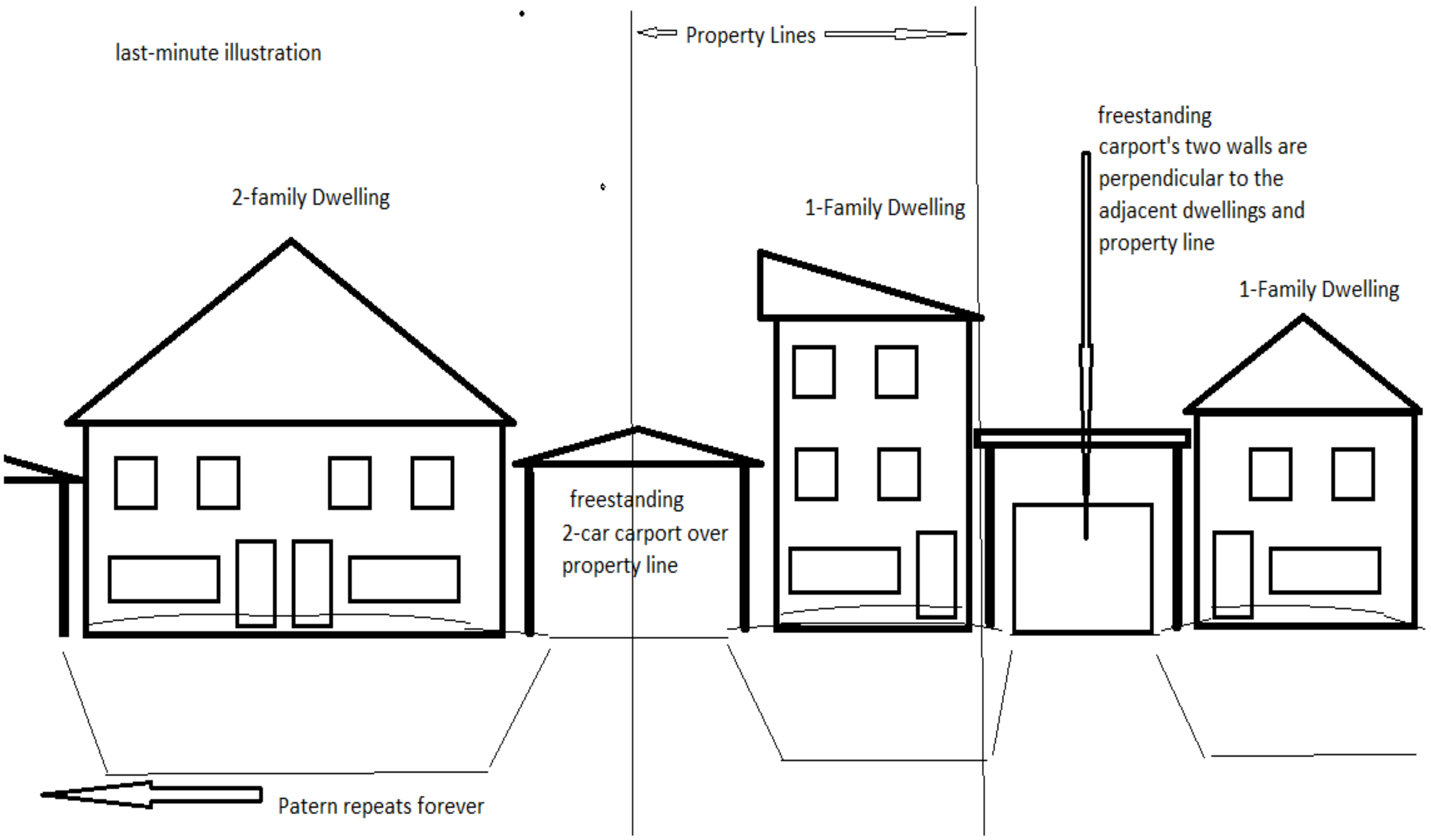
For example, a freestanding open combustible accessory structure, which is its own separate "building", can effectively connect a detached garage to a dwelling without causing the garage to lose its detached status. That's a consequence of no fire separation and no fire-resistance being required between accessory structures and between them and their dwellings. Note that the provisions in Sections R302.5, R302.6, and R311.2.1 of the 2024 IRC only apply to dwelling units and garages that are in the same "building".

Furthermore, carports can include up to two exterior walls according to Section R317.2 of the IRC. If those walls are perpendicular to the walls of adjacent buildings and the carports are freestanding, then Section R302.1 currently allows those carport walls to abut the adjacent buildings without any fire-resistance. Carports that are placed that way between two buildings can effectively become garages that doesn't lose their status as carports.

The hazard being presented is substantial. To understand why, consider a freestanding hallway. It can currently be placed between a detached garage and a dwelling without fire separation or any fire-resistance between it and either of them if its open on two ends and the walls on its other sides are perpendicular to the exterior walls of both the garage and the dwelling. That 'detached' hallway can direct a fire from the garage's door to the dwelling's door through its open ends. An open-ended attic over the freestanding hallway could do worse by providing a direct path for fire from the detached garage's ventilated attic to the dwelling's ventilated attic despite them technically being separate buildings.

That hazard is compounded by the number of buildings that can be joined together in this manner. The 2024 IRC allows accessory non-fire-resistant open structures to abut the walls of other buildings or even cross property lines without any fire separation or fire-resistance. They can do that even when they have exterior walls, although those walls must be perpendicular to the adjacent building or property line. Fire is able to burn its way unimpeded from accessory building to dwelling to accessory building to the next dwelling, and from property to property to include an unlimited number of dwellings that are daisy-chained together in this manner.

This proposal solves that problem by applying the fire separation that is being required for an exterior wall's projections to apply also to the ceilings, roofs, and decks of accessory structures. It prevents the lack the exterior walls that face adjacent structures or property lines from enabling a potentially substantial fire hazard. Basically, this proposal causes combustible horizontal assemblies such as carports, gazebos, pavilions, and decks to be equivalent to an exterior wall's projections for the purposes of determining fire separation distances around accessory structures.



Cost Impact: Increase

Estimated Immediate Cost Impact:

The proposed change requires horizontal assemblies, such as walls in partially enclosed carports, to have at most 1-hour fire resistance depending on separation distance. For light-frame wood construction, a 1-hour fire rating on the exterior side of the wall is often by installing a layer of fire-resistant gypsum paneling over combustible sheathing.

Estimated Immediate Cost Impact Justification (methodology and variables):

The cost of 1-hour fire resistant gypsum paneling (5/8" Type X) is approximately \$0.35 to \$0.45 per square foot (1). The cost of ½" gypsum paneling is approximately \$0.30 to \$0.37" per square foot (2). Assuming a 1-car carport with a size of 20'x10'x8' (length x width x height), with two framed and sheathed walls, the materials cost increase for a 1-hour fire resistance rating on both walls would be determined as follows (using average costs):

Square footage of walls: 2x (20' x 8') = 320 sqft. (assuming long walls are the ones sheathed)

Cost increase for interior FRT drywall: (\$0.40 – \$0.34) x 320 sqft = \$19

Cost for exterior FRT drywall: \$0.40 x 320 sqft = \$144

Total materials cost: \$144 + \$48 = \$147

Assuming 50% additional cost for taping/sealant/etc, the new total materials cost is \$221.

Labor costs for installing drywall vary between \$1.30 to \$2.02 per square foot for typical installations but can be as high as \$3.90 to \$5.15

per square foot for complex jobs (such as fire rated assemblies) (3). For the same carport as above, the labor cost increase would be determined as follows (using average costs):

Cost increase for interior FRT drywall: ($4.53 - $1.66) x 320 sqft. = $918

Cost for exterior FRT drywall: $4.53 x 320 sqft. = $1,450

Total labor cost increase = $2,368

Total cost increase: $2,589Sources:

https://realestimateservice.com/blog/cost-of-fire-rated-wall/

https://drywallpriceguide.com/drywall-prices-by-type/

https://drywallpriceguide.com/drywall-installation-prices-and-costs/

RB56-25

RB60-25

IRC: TABLE R302.1(1), TABLE R302.1(2)

Proponents: Alexander Haldeman, representing James Hardie Building Products (alex.haldeman@jameshardie.com)

2024 International Residential Code

SECTION R302
FIRE-RESISTANT CONSTRUCTION

Revise as follows:

TABLE R302.1(1) EXTERIOR WALLS

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the International Building Code with exposure from both sides	0 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Projections	Not allowed	NA	< 2 feet
	Fire-resistance rated	1 hour on the underside, or heavy timber, or fire-retardant-treated wood[a, b], or noncombustible fiber-cement[a,b]	≥ 2 feet to < 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Openings in walls	Not allowed	NA	< 3 feet
	25% maximum of wall area	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< 3 feet
		None required	3 feet

For SI: 1 foot = 304.8 mm.
NA = Not Applicable.

a. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave overhang if fireblocking is provided from the wall top plate to the underside of the roof sheathing.

b. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the rake overhang where vent openings that communicate with the attic are not installed in the overhang or gable wall.

TABLE R302.1(2) EXTERIOR WALLS—DWELLINGS AND TOWNHOUSES WITH AN AUTOMATIC SPRINKLER SYSTEM

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the International Building Code with exposure from the outside	0 feet
	Not fire-resistance rated	0 hours	3 feet[a]
Projections	Not allowed	NA	< 2 feet
	Fire-resistance rated	1 hour on the underside, or heavy timber, or fire-retardant-treated wood[b, c], or noncombustible fiber-cement[b, c]	2 feet[a]
	Not fire-resistance rated	0 hours	3 feet
Openings in walls	Not allowed	NA	< 3 feet
	Unlimited	0 hours	3 feet[a]
Penetrations	All	Comply with Section R302.4	< 3 feet
		None required	3 feet[a]

For SI: 1 foot = 304.8 mm.

NA = Not Applicable.

a. For residential subdivisions where all dwellings and townhouses are equipped throughout with an automatic sprinkler system installed in accordance with Section P2904, the fire separation distance for exterior walls not fire-resistance rated and for fire-resistance-rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.

b. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave overhang if fireblocking is provided from the wall top plate to the underside of the roof sheathing.

c. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the rake overhang where vent openings that communicate with the attic are not installed in the overhang or gable wall.

Reason: Just as with *fire-retardant-treated wood,* a material which by IRC definition exhibits reduced surface burning characteristics and resists propagation of fire; (1) where fireblocking is provided <u>and</u> (2) vent openings that communicate with the attic are not installed in the overhang or gable wall; materials which resist propagation of fire satisfy the intent of these tables. Fiber-cement products are required to have a flame-spread index of <u>zero</u>, per ASTM standards referenced within this code. Further outlining that fiber-cement shall also be noncombustible, ensures equal-to-or-greater performance to existing solutions while offering more choices and material availability to users.

an example of this ASTM mandatory supplementary requirement can be seen below, taken from ASTM C1186:

> S6. *Surface Burning Characteristics*—Fiber cement sheets of ¼ in. (6 mm) shall have a reported flame spread index of 0 and a smoke developed index of not more than 5, when tested in accordance with Test Method E84. Sheets of thickness greater than ¼ in. (6 mm) shall meet this specification or shall be formed at ¼ in. (6 mm) thickness with the same formulation for test purposes.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Pricing of various solutions will vary by region and materials availability. this proposal does not mandate use of additional materials, just offers additional options for builders.

RB60-25

RB61-25

IRC: TABLE R302.1(1), TABLE R302.1(2)

Proponents: Scot Harris, Preston Wood & Associates, LLC. Jack Preston Wood AIBD/NCBDC, representing self (scot@jackprestonwood.com)

2024 International Residential Code

SECTION R302 FIRE-RESISTANT CONSTRUCTION

Revise as follows:

TABLE R302.1(1) EXTERIOR WALLS

Portions of table not shown remain unchanged.

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the *International Building Code* with exposure from both sides	0 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Unprotected openings ~~Openings~~ in walls	Not allowed	NA	< 3 feet
	25% maximum of wall area	0 hours	3 feet
	Unlimited	0 hours	5 feet
Protected openings in walls[c]	10% maximum of wall area	3/4 hour- tested in accordance with ASTM E119 or UL 263[c]	< 3 feet
	Unlimited	0 hours	3 feet

For SI: 1 foot = 304.8 mm.

NA = Not Applicable.

a. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave overhang if fireblocking is provided from the wall top plate to the underside of the roof sheathing.

b. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the rake overhang where vent openings that communicate with the attic are not installed in the overhang or gable wall.

c. Protected openings shall be installed in accordance with NFPA 80. Products shall be labeled with a fire-rated glazing marking of OH-45 or W60. There shall be a minimum fire separation distance of 3 feet (914.4 mm) between the protected opening and any structure on the abutting property. Where it is unknown that a structure on the abutting property will be built closer than 3 feet (914.4 mm), wall openings are prohibited.

TABLE R302.1(2) EXTERIOR WALLS—DWELLINGS AND TOWNHOUSES WITH AN AUTOMATIC SPRINKLER SYSTEM

Portions of table not shown remain unchanged.

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Unprotected openings ~~Openings~~ in walls	Not allowed	NA	< 3 feet
	Unlimited	0 hours	3 feet[a]
Protected openings in walls	Unlimited	3/4 hour- tested in accordance with ASTM E119 or UL 263[d]	< 3 feet
	Unlimited	0 hours	3 feet[a]

For SI: 1 foot = 304.8 mm.

NA = Not Applicable.

a. For residential subdivisions where all dwellings and townhouses are equipped throughout with an automatic sprinkler system installed in accordance with Section P2904, the fire separation distance for exterior walls not fire-resistance rated and for fire-resistance-rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.

b. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave overhang if fireblocking is provided from the wall top plate to the underside of the roof sheathing.

c. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the rake overhang where vent openings that communicate with the attic are not installed in the overhang or gable wall.

d. Protected openings shall be installed in accordance with NFPA 80. Products shall be labeled with a fire-rated glazing marking of OH-45 or W60. There shall be a minimum fire separation distance of 3 feet (914.4 mm) between the protected opening and any structure on the abutting property. Where it is unknown that a structure on the abutting property will be built closer than 3 feet (914.4 mm), wall openings are prohibited.

Add new standard(s) as follows:

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

80-22 Standard for Fire Doors and Other Opening Protectives

Reason: This proposal takes advantage of building materials that were not available at the time Table R302.1(1) and Table R302.1(2) was written. This will also align with the wording found in Table 705.9 of the IBC.

Request:

If this proposal is not approved, consider revising the table rows to include the phrases “Unprotected” and “Protected” as line items to the wall opening section of the table for future consideration.

"Garden Homes"

Garden homes are allowed to have a non-fire-resistive wall at the (side) property line provided there is a 10-foot setback on the abutting property. This wall shall not have any openings and penetrations. The wording shown in footnote "d" is adapted from footnote "a" of Table R302.1(2).

Background:

We have in the past used fire-rated glass block in exterior walls that are closer than 3 feet to a property line. The abutting property will typically have the building face 3 feet or greater from this property line due to the required egress path from the back yard to the front (non-townhouse projects). Where building faces have a separation distance of less than 3 feet, we advise our clients that glass block is not permitted on the subject exterior wall. The popularity of employing glass block has decreased over the years due to inherent leaking and our clients know this, but few are still requesting the glass block for natural lighting. However, the turnover jurisdiction officials will no longer allow this and other types of “protected” opening for walls that are facing to and less than 3 feet (914.4 mm) to a property line.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

No discernible difference in cost. This is more of an aesthetic item by providing comfort to the occupants of the dwelling by use of natural lighting that would otherwise be nonexistent.

Staff Analysis: NFPA 80 is currently referenced in the IBC, IFC, IMC and IPMC.

RB63-25

IRC: R302.2, R302.2.1 (New), R302.2.2 (New), R302.2.1, R302.2.2, R302.2.5 (New), R302.2.3

Proponents: Jeff Grove, Chair, representing BCAC (bcac@iccsafe.org)

2024 International Residential Code

SECTION R302 FIRE-RESISTANT CONSTRUCTION

Revise as follows:

R302.2 Townhouses. Townhouses shall be constructed in accordance with this section. Walls separating *townhouse units* shall be constructed in accordance with Section R302.2.1, ~~or~~ R302.2.2, R302.2.3, or R302.2.4, and shall comply with Sections R302.2.5 ~~R302.2.3~~ through R302.2.6 ~~R302.2.5~~.

Add new text as follows:

R302.2.1 Prescriptive assemblies. The assemblies in Table R302.2.1 shall be deemed to have the fire-resistance ratings prescribed therein and shall be permitted to be used to meet the fire-resistance-rating required in Section R302.2.3 or R302.2.4.

R302.2.1 RATED FIRE-RESISTANCE PERIODS FOR ASSEMBLIES [a,b,c,d]

LOCATION	RATING	CONSTRUCTION
Interior Wall	1-hour	• 2" × 4" wood studs 24" on center with 5/8" Type X gypsum wallboard applied vertically or horizontally nailed with 6d cooler or wallboard nails at 7" on center with end joints on nailing members. Stagger joints each side. • 0.018" (No. 25 carbon sheet steel gage) channel-shaped studs 24" on center with one full-length layer of 5/8" Type X gypsum wallboard applied vertically attached with 1"-long No. 6 dry wall screws to each stud. Screws are 8" on center around the perimeter and 12" on center on the intermediate stud. Where applied horizontally, the Type X gypsum wallboard shall be attached to 3-5/8" studs and the horizontal joints shall be staggered with those on the opposite side. Screws for the horizontal application shall be 8" on center at vertical edges and 12" on center at intermediate studs. • 2" × 4" wood studs 16" on center with 3/8" perforated or plain gypsum lath and 1/2" gypsum plaster each side. Lath nailed with 1-1/8" by No. 13 gage by 19/64" head plasterboard blued nails, 4" on center. Plaster mixed 1:2 by weight, gypsum to sand aggregate.
	2-hour	• 2" × 4" wood studs at 24" centers with double top plates, single bottom plate; interior and exterior side covered with two layers of 5/8" Type X gypsum wallboard, 4′ wide, applied horizontally with vertical joints over studs. Base layer fastened with 2 1/4" Type S drywall screws, spaced 24" on center and face layer fastened with Type S drywall screws, spaced 8" on center, wallboard joints covered with paper tape and joint compound, fastener heads covered with joint compound. Cavity to be filled with 5 1/2" mineral wool insulation.
Floor/Ceiling or Roof/Ceilng	1-hour	• Wood joists, wood I-joists, floor trusses and flat or pitched roof trusses spaced a maximum 24" o.c. with 1/2" wood structural panels with exterior glue applied at right angles to top of joist or top chord of trusses with 8 d nails. The wood structural panel thickness shall be not less than nominal 1/2" nor less than required by Chapter 23. Base layer 5/8" Type X gypsum wallboard applied at right angles to joist or truss 24" o.c. with 1-1/4" Type S or Type W drywall screws 24" o.c. Face layer 5/8" Type X gypsum wallboard or veneer base applied at right angles to joist or truss through base layer with 1-7/8" Type S or Type W drywall screws 12" o.c. at joints and intermediate joist or truss. Face layer Type G drywall screws placed 2" back on either side of face layer end joints, 12" o.c • Steel joists, floor trusses and flat or pitched roof trusses spaced a maximum 24" o.c. with 1/2" wood structural panels with exterior glue applied at right angles to top of joist or top chord of trusses with No. 8 screws. The wood structural panel thickness shall be not less than nominal 1/2" nor less than required by Chapter 23. Base layer 5/ 8" Type X gypsum board applied at right angles to steel framing 24" on center with 1" Type S dry wall screws spaced 24" on center. Face layer 5/8" Type X gypsum board applied at right angles to steel framing attached through base layer with 1-5/8" Type S dry wall screws 12" on center at end joints and intermediate joints and 1-1/2" Type G dry wall screws 12 inches on center placed 2" back on either side of face layer end joints. Joints of the face layer are offset 24" from the joints of the base layer.

a. Framing members with a larger dimension are permitted to be substituted.

b. Framing members are permitted to be closer spacing.

c. Wood structural panels shall be permitted to be installed between the fire protection and the wood studs on either the interior or exterior side of the wood frame assemblies in this table, provided that the length of the fasteners used to attach the fire protection is increased by an amount not less than the thickness of the wood structural panel.

d. Screws meeting ASTM C1002 or ASTM C954 are permitted in place of nails at the same spacings when the length and head diameters meet or exceed the stated nailing requirements. All fasteners noted are minimums unless otherwise stated.

R302.2.2 Other assemblies.. Fire-resistance rated assemblies using Section 703.2.2 of the *International Building Code* to achieve the *fire-resistance-rating* required in Section R302.2.3 or R302.2.4 shall be permitted.

Revise as follows:

R302.2.3 ~~R302.2.1~~ Double walls. Each *townhouse unit* shall be separated from other *townhouse units* by two 1-hour fire-resistance-rated wall assemblies tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the *International Building Code.*

R302.2.4 ~~R302.2.2~~ Common walls. Common walls separating *townhouse units* shall be assigned a fire-resistance rating in accordance with Item 1 or 2 and shall be rated for fire exposure from both sides. ~~Common walls shall extend to and be tight against the exterior sheathing of the exterior walls, or the inside face of exterior walls without stud cavities, and the underside of the roof sheathing.~~ The common wall shared by two *townhouse units* shall be constructed without openings, plumbing or mechanical equipment, ducts or vents, other than water-filled fire sprinkler piping in the cavity of the common wall. Electrical installations shall be in accordance with Chapters 34 through 43. Penetrations of the membrane of common walls for electrical outlet boxes shall be in accordance with Section R302.4.

1. Where an automatic sprinkler system in accordance with Section P2904 is provided, the common wall shall be not less than a 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the *International Building Code*.
2. Where an automatic sprinkler system in accordance with Section P2904 is not provided, the common wall shall be not less than a 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the *International Building Code*.

~~**Exception:** Common walls are permitted to extend to and be tight against the inside of the exterior walls if the cavity between the end of the common wall and the exterior sheathing is filled with a minimum of two 2-inch nominal thickness wood studs.~~

Add new text as follows:

R302.2.5 Additions to walls.. The provisions of Sections R302.2.1 through R302.2.5 regulating openings, plumbing or mechanical equipment, ducts, or vents shall not apply to cavities in walls that are attached to, but not part of, the fire-resistance rated wall or assembly.

Revise as follows:

R302.2.6 ~~R302.2.3~~ Continuity. The fire-resistance-rated wall or assembly separating *townhouse units* shall comply with all of the following:

1. Be continuous from the foundation to the underside of the roof sheathing, roof deck, or slab.
2. Extend to and be tight against the exterior sheathing of the exterior walls, or the inside face of exterior walls without stud cavities.
3. The fire-resistance rating shall extend the full length of the wall or assembly, including wall extensions through and separating attached enclosed *accessory structures.*

~~be continuous from the foundation to the underside of the roof sheathing, roof deck or slab. The fire-resistance rating shall extend the full length of the wall or assembly, including wall extensions through and separating attached enclosed *accessory structures*.~~

Exception: Common walls are permitted to extend to and be tight against the inside of the exterior walls where the cavity between the end of the common wall and the exterior sheathing is filled with not less than two 2-inch nominal thickness wood studs.

Reason: This is a comprehensive cleanup of the section on townhouse separation to clear up areas of confusion.

It does three things:

1. It rearranges sections so that it flows in a more logical manner.
2. It adds a table with prescriptive options to provide the easiest method of compliance. These are existing options taken from the IBC.

3. It clarifies that unrated walls attached to common walls (in a common wall assembly referred to by the industry as Area Separation Firewalls) are not subject to restrictions regarding plumbing and mechanical equipment and penetrations.

This makes clear that there are 4 options for townhouse separation:

1. A prescriptive assembly from the table
2. An assembly that uses the analytical method from the IBC.
3. A tested double wall assembly (no change from existing text)
4. A tested common wall assembly (no change from existing text)

This proposal is submitted by the ICC Building Code Action Committee (BCAC).
BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and 2024 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC webpage.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

In general, this will have no effect on construction costs. However, in some cases it could lower costs since it adds a compliance option (analytical methods) which could lower construction costs if selected, when compared to tested assemblies.

RB63-25

RB69-25

IRC: R302.3.6, TABLE R302.3.6, R302.3.6.1, R302.3.6.2, R302.3.6.3

Proponents: Joseph Summers, Mashantucket Pequot Tribal Nation, representing Self

2024 International Residential Code

SECTION R302
FIRE-RESISTANT CONSTRUCTION

R302.3.6 ~~Shared accessory rooms~~ Common areas and spaces. ~~Shared accessory rooms~~ Common areas and spaces shall be separated from each individual *dwelling unit* in accordance with Table R302.3.6. Openings between the shared accessory room and *dwelling unit* shall comply with Section R302.3.6.1. Attachment of *gypsum board* shall comply with Table R702.3.5.

TABLE R302.3.6 DWELLING-~~SHARED ACCESSORY ROOM~~ COMMON AREAS AND SPACES SEPARATION

SEPARATION	MATERIAL
From the dwelling units and attics	Not less than $^1/_2$-inch gypsum board or equivalent applied to the accessory room side wall
From habitable rooms above or below the shared accessory room	Not less than $^5/_8$-inch Type X gypsum board or equivalent
Structures supporting floor/ceiling assemblies used for separation required by this section	Not less than $^1/_2$-inch gypsum board or equivalent

For SI: 1 inch = 25.4 mm.

R302.3.6.1 Opening protection. Openings from a ~~shared accessory room or area~~ common area or space directly into a room used for sleeping purposes shall not be permitted. Other openings between the ~~shared accessory room or area~~ common area or space and dwelling units shall be equipped with solid wood doors not less than $1^3/_8$ inches (35 mm) in thickness, solid or honeycomb core steel doors not less than $1^3/_8$ inches (35 mm) in thickness, or a fire door assembly with a 20-minute fire-protection rating, equipped with a self-closing or automatic-closing device.

R302.3.6.2 Duct penetration. Ducts penetrating the walls or ceilings separating the dwelling from the ~~shared accessory room~~ common area and spaces shall be constructed of sheet steel not less than No. 26 gage (0.48 mm) or other approved material and shall not have openings into the ~~shared accessory room~~ common area and space.

R302.3.6.3 Other penetrations. Penetrations through the walls, ceiling and floor-level separation required in Section R302.3.6 shall be protected as required by Section R302.11, Item 4.

Reason: The IRC does not define "shared accessory rooms" the terminology used mostly, especially with the two-family dwelling section, is common. The intent is to provide some consistency within the document and not add new terms.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is only changing terms within the section of the IRC.

RB70-25

IRC: SECTION R302, R302.3.6, TABLE R302.3.6, R302.3.6.1, R302.3.6.2, R302.3.6.3

Proponents: Joseph Summers, Mashantucket Pequot Tribal Nation, representing Self

2024 International Residential Code

SECTION R302
FIRE-RESISTANT CONSTRUCTION

Revise as follows:

R302.3.6 Shared accessory rooms. Shared accessory rooms shall be separated from each individual *dwelling unit* in accordance with ~~Table R302.3.6~~ Section R302.3. Openings between the shared accessory room and *dwelling unit* shall comply with Section ~~R302.3.6.1~~ R302.5.1. ~~Attachment of *gypsum board* shall comply with Table R702.3.5.~~

Delete without substitution:

~~TABLE R302.3.6 DWELLING-SHARED ACCESSORY ROOM SEPARATION~~

~~SEPARATION~~	~~MATERIAL~~
~~From the dwelling units and attics~~	~~Not less than $^1/_2$-inch gypsum board or equivalent applied to the accessory room side wall~~
~~From habitable rooms above or below the shared accessory room~~	~~Not less than $^5/_8$-inch Type X gypsum board or equivalent~~
~~Structures supporting floor/ceiling assemblies used for separation required by this section~~	~~Not less than $^1/_2$-inch gypsum board or equivalent~~

~~For SI: 1 inch = 25.4 mm.~~

~~R302.3.6.1 Opening protection.~~ ~~Openings from a shared accessory room or area directly into a room used for sleeping purposes shall not be permitted. Other openings between the shared accessory room or area and dwelling units shall be equipped with solid wood doors not less than $1^3/_8$ inches (35 mm) in thickness, solid or honeycomb core steel doors not less than $1^3/_8$ inches (35 mm) in thickness, or a fire door assembly with a 20-minute fire-protection rating, equipped with a self-closing or automatic-closing device.~~

Revise as follows:

~~R302.3.6.2~~ R302.3.6.1 Duct penetration. Ducts penetrating the walls or ceilings separating the dwelling from the shared accessory room shall ~~be constructed of sheet steel not less than No. 26 gage (0.48 mm) or other approved material and shall not have openings into the shared accessory room~~ comply with Section R302.5.2.

~~R302.3.6.3~~ R302.3.6.2 Other penetrations. Penetrations through the walls, ceiling and floor-level separation required in Section R302.3.6 shall be protected as required by Section R302.11, Item 4.

Reason: The intent of this proposal is to be clarification on what I believe the intent is and to provide references to other sections of the IRC that already address these features. The proposal is intended to be editorial in nature and to reduce redundent language within the code that has the potential to create conflicts and issues down the road.

without these changes it is possible to have a shared room between two dwelling units with only gypsum board on the shared room side increasing the possibility of fire spreading. Especially if the shared room is laundry room or similar space.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

It is my interpretation that the original intent was to provide fire separation between these rooms and this change should not increase the cost of construction.

RB70-25

RB73-25

IRC: SECTION R302.5, R302.5.1, R302.5.2, R302.5.3, R302.6, TABLE R302.6; SECTION R317.1, R317.2,

Proponents: Glenn Mathewson, BuildingCodeCollege.com, representing Self (glenn@glennmathewson.com)

2024 International Residential Code

SECTION R317 GARAGES AND CARPORTS

Revise as follows:

R317.1 Floor surface. Garage and carport floor surfaces shall be of *approved noncombustible material*. The area of floor used for parking of automobiles or other vehicles shall be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway.

Exception: Asphalt surfaces shall be permitted at ground level in carports open on two or more sides.

Delete without substitution:

~~**R317.2 Carports.** Carports shall be open on not less than two sides. Carport floor surfaces shall be of *approved noncombustible material*. Carports not open on two or more sides shall be considered to be a garage and shall comply with the provisions of this section for garages.~~

~~The area of floor used for parking of automobiles or other vehicles shall be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway.~~

~~**Exception:** Asphalt surfaces shall be permitted at ground level in carports.~~

SECTION R302 FIRE-RESISTANT CONSTRUCTION

~~**R302.5 Dwelling unit garage opening and penetration protection.** Openings and penetrations through the walls or ceilings separating the *dwelling unit* from the garage shall be in accordance with Sections R302.5.1 through R302.5.3.~~

Revise as follows:

~~**R302.6**~~ **R302.5 Dwelling unit garage fire separation.** Garages shall comply with comply with the provisions of this section. Carports not open on two or more sides shall comply with the provisions of this section for garages. The garage shall be separated as required by Table ~~R302.6.~~ R302.5.~~Openings in garage walls shall comply with Section R302.5.~~ Attachment of *gypsum board* shall comply with Table R702.3.5. The wall separation provisions of Table ~~R302.6~~ R302.5 shall not apply to garage walls that are perpendicular to the adjacent *dwelling unit* wall.

R302.5.1 Opening protection. Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and *dwelling unit* shall be equipped with solid wood doors not less than $1^3/_8$ inches (35 mm) in thickness, solid or honeycomb-core steel doors not less than $1^3/_8$ inches (35 mm) thick, or 20-minute fire-rated doors. Doors shall be self-latching and equipped with a self-closing or automatic-closing device.

R302.5.2 ~~**Duct**~~ **penetration protection.** Penetrations through the wall or ceiling membranes separating the garage from the dwelling unit shall be protected in accordance with Section R302.11, Item 4. Ducts in the garage that penetrate ~~and ducts penetrating~~ the wall or ceiling membranes ~~walls or ceilings~~ separating the dwelling unit from the garage shall be constructed of a minimum No. 26 gage (0.48

mm) sheet steel or other *approved* material and shall not have openings into the garage.

Delete without substitution:

~~**R302.5.3 Other penetrations.** Penetrations through the separation required in Section R302.6 shall be protected as required by Section R302.11, Item 4.~~

Revise as follows:

TABLE ~~R302.6~~ R302.5 DWELLING UNIT GARAGE SEPARATION

SEPARATION	MATERIAL
From the dwelling unit and attics	Not less than 1/2-inch gypsum board or equivalent applied to the garage side
From portions of the dwelling unit above the garage	Not less than 5/8-inch Type X gypsum board or equivalent
Structure supporting floor/ceiling assemblies used for separation required by this section	Not less than 1/2-inch gypsum board or equivalent
Garages located less than 3 feet from a dwelling unit on the same lot	Not less than 1/2-inch gypsum board or equivalent applied to the interior side of exterior walls that are within this area

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

Reason: Prior to changes made in the 2009 IRC, this section on garages and carports included the details for garage-dwelling unit fire separation. The statement in the "carport" section about carports "not open on two or more sides must comply with the section as garages" included compliance with the fire separation provisions. However, in the 2009 IRC when fire separation was moved to R302, the only remaining use for that statement is for the exception allowing asphalt surfaces in carports. With that understanding, Section R317.2 in the 2024 IRC could be eliminated and replaced by simply including "carports" in Section R317.1 and moving the asphalt exception.

The statement about carports not open on two or more sides needing to comply as a garage is added to the beginning of Section R302.6 as was the original intent through the 2006 IRC, as described above. This section is relocated to come before the requirements for openings. Openings and penetrations, Section R302.5 is deleted and replaced to two subsections under the section regarding the separation (R302.6)

"Other penetrations" sounds like it applies to penetrations "other" than duct penetrations in the previous subsection. However, even a duct penetration of 26 ga steel would need the annual space filled around it so as to not allow passage of smoke and hot gasses, as is required by the "other penetrations" subsection and its reference to fireblocking method, #4. It is cleaner to have one sub section for openings and another for penetrations.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

I believe the common interpretation in the building code industry is that a carport closed on more than two sides is regulated as a garage for dwelling-garage separation purposes. This change in the 2009 IRC appears to simply be an oversight, as the Significant Changes to the 2009 IRC book describes the relocation of the separation requirements to Section R302 as having "no technical change". Unless there is a different interpretation being used for what is a "garage" and requires the separation, there is no increase in the cost of construction.

RB73-25

RB74-25

IRC: TABLE R302.6

Proponents: Tim Earl, GBH International, representing the Gypsum Association (tearl@gbhint.com)

2024 International Residential Code

SECTION R302
FIRE-RESISTANT CONSTRUCTION

Revise as follows:

TABLE R302.6 DWELLING UNIT GARAGE SEPARATION

SEPARATION	MATERIAL
From the dwelling unit and attics	Not less than $^1/_2$-inch gypsum board or equivalent applied to the garage side
From portions of the dwelling unit above the garage	Not less than $^5/_8$-inch Type X gypsum board or other material with a 40-minute *fire-resistance rating* ~~equivalent~~
Structure supporting floor/ceiling assemblies used for separation required by this section	Not less than $^1/_2$-inch gypsum board or equivalent
Garages located less than 3 feet from a dwelling unit on the same lot	Not less than $^1/_2$-inch gypsum board or equivalent applied to the interior side of exterior walls that are within this area

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

Reason: Type X gypsum board is a special type of gypsum panel product with core additives to increase fire resistance (in accordance with applicable ASTM standards). Proving equivalency to Type X is not straightforward, and there is no known alternative to it. When we conducted an informal poll of code users, many of the answers to the question “What do you consider equivalent to Type X gypsum board” were alarming.

Although nothing is exactly “equivalent” to Type X gypsum board, the primary property of interest is fire-resistance. The IBC assigns a fire-resistance rating of 40 minutes for type X board in vertical assemblies as part of the calculated method. Allowing any material with the same calculated fire-resistance rating in this application is a reasonable substitution. Beyond that, alternate materials should be approved as specified in Section 104.11, which was comprehensively revised last cycle.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

None. Anyone wishing to use an alternate material can still do so in accordance with Section 104.11.

RB83-25

IRC: R304.1, TABLE R304.1 (New), R304.1.1, R304.1.2

Proponents: Shane Nilles, representing American Wood Council (snilles@awc.org); David Tyree, representing American Wood Council (dtyree@awc.org)

2024 International Residential Code

SECTION R304
PROTECTION OF WOOD AND WOOD-BASED PRODUCTS AGAINST DECAY

Delete and substitute as follows:

~~**R304.1 Location required.** Protection of wood and wood-based products from decay shall be provided in the following locations by the use of *naturally durable wood* or wood that is preservative-treated in accordance with AWPA U1.~~

1. ~~In *crawl spaces* or unexcavated areas located within the periphery of the building foundation, wood joists or the bottom of a wood structural floor where closer than 18 inches (457 mm) to exposed ground, wood girders where closer than 12 inches (305 mm) to exposed ground, and wood columns where closer than 8 inches (204 mm) to exposed ground.~~
2. ~~Wood framing members, including columns, that rest directly on concrete or masonry exterior foundation walls and are less than 8 inches (203 mm) from the exposed ground.~~
3. ~~Sills and sleepers on a concrete or masonry slab that is in direct contact with the ground unless separated from such slab by an impervious moisture barrier.~~
4. ~~The ends of wood girders entering exterior masonry or concrete walls having clearances of less than $^1/_2$ inch (12.7 mm) on tops, sides and ends.~~
5. ~~Wood siding, sheathing and wall framing on the exterior of a *building* having a clearance of less than 6 inches (152 mm) from the ground or less than 2 inches (51 mm) measured vertically from concrete steps, porch slabs, patio slabs and similar horizontal surfaces exposed to the weather.~~
6. ~~Wood structural members supporting moisture-permeable floors or roofs that are exposed to the weather, such as concrete or masonry slabs, unless separated from such floors or roofs by an impervious moisture barrier.~~
7. ~~Wood furring strips or other wood framing members attached directly to the interior of exterior masonry walls or concrete walls below *grade* except where an *approved* vapor retarder is applied between the wall and the furring strips or framing members.~~
8. ~~Portions of wood structural members that form the structural supports of *buildings*, decks, balconies, porches or similar permanent building appurtenances where those members are exposed to the weather without adequate protection from a roof, eave, overhang or other covering that prevents moisture or water accumulation on the surface or at joints between members.~~

    ~~**Exception:** Sawn lumber used in structures located in a geographical region where experience has demonstrated that climatic conditions preclude the need to use naturally durable or preservative-treated wood where the structure is exposed to the weather.~~

9. ~~Wood columns in contact with *basement* floor slabs unless supported by concrete piers or metal pedestals projecting not less than 1 inch (25 mm) above the concrete floor and separated from the concrete pier by an impervious moisture barrier.~~

R304.1 Preservative treatment. Wood and wood-based products used in locations identified in Table R304.1 shall be preservative treated in accordance with AWPA U1 for the Use Category indicated in Table R304.1.

Exceptions:

1. Naturally durable wood shall be permitted to be substituted for preservative-treated wood in locations requiring Use Category UC2, UC3A or UC3B protection, as indicated in Table R304.1.
2. Wood used entirely below groundwater level or continuously submerged in fresh water shall not be required to be preservative treated.

Add new text as follows:

TABLE R304.1 PROTECTION FROM DECAY

Location	AWPA U1 Minimum Use Category
1. Wood in contact with the ground that supports permanent structures intended for human occupancy.	UC4A, UC4B, or UC4C[a]
2. Wood embedded in concrete in direct contact with the ground that supports permanent structures intended for human occupancy.	UC4A, UC4B, or UC4C[a]
3. Wood embedded in concrete exposed to the weather that supports permanent structures intended for human occupancy.	UC4A, UC4B, or UC4C[a]
4. Portions of wood structural members that form the structural supports of buildings, decks, balconies, porches or similar permanent building appurtenances where those members are exposed to the weather without adequate protection from a roof, eave, overhang or other covering that prevents moisture or water accumulation on the surface or at joints between members. **Exception:** Preservative treatment is not required for sawn lumber used in structures located in a geographical region where experience has demonstrated that climatic conditions preclude the need.	UC3B[b]
5. Wood structural members supporting moisture-permeable floors or roofs that are exposed to the weather, such as concrete or masonry slabs. **Exception:** Preservative treatment is not required for such wood structural members separated from the floor or roof by an impervious moisture barrier.	UC3B[b]
6. Wood sheathing and framing in the exterior wall of a building having a clearance of less than 6 inches (152 mm) from the ground.	UC3B[b]
7. Wood sheathing and framing in the exterior wall of a building less than 2 inches (51 mm) measured vertically from concrete steps, porch slabs, patio slabs and similar horizontal surfaces exposed to the weather.	UC3B[b]
8. Wood siding on the exterior of a building having a clearance of less than 6 inches (152 mm) from the ground.	UC3A
9. Wood siding on the exterior of a building less than 2 inches (51 mm) measured vertically from concrete steps, porch slabs, patio slabs and similar horizontal surfaces exposed to the weather.	UC3A
10. Wood columns, not exposed to the weather, where closer than 8 inches (203 mm) to exposed ground.	UC2
11. Wood columns, not exposed to the weather, in contact with basement floor slabs unless supported by concrete piers or metal pedestals projecting not less than 1 inch (25 mm) above the concrete floor and separated from the concrete pier by an impervious moisture barrier.	UC2
12. Wood framing members, not exposed to the weather, that rest directly on concrete or masonry exterior foundation walls and are less than 8 inches (203 mm) from the exposed ground.	UC2
13. Wood furring strips or other wood framing members, not exposed to the weather, attached directly to the interior of exterior masonry walls or concrete walls below grade. **Exception:** Preservative treatment is not required for such wood furring strips or wood framing members separated from walls by an impervious moisture barrier.	UC2
14. Wood joists or the bottom of a wood structural floor, not exposed to the weather, where closer than 18 inches (457 mm) to exposed ground.	UC2
15. Wood girders, not exposed to the weather, where closer than 12 inches (305 mm) to exposed ground.	UC2
16. Ends of wood girders, not exposed to the weather, entering exterior masonry or concrete walls having clearances of less than 1/2 inch (12.7 mm) on tops, sides and ends.	UC2
17. Wood sills and sleepers, not exposed to the weather, on a concrete or masonry slab that is in direct contact with the ground. **Exception:** Preservative treatment is not required for such wood sills and sleepers that are separated from the concrete or masonry slab by an impervious moisture barrier.	UC2

a. Use Category depends on exposure severity as defined in AWPA U1.

b. In accordance with AWPA U1, sawn lumber joists and beams shall be treated to requirements for Use Category 4A when they are difficult to maintain, repair, or replace and are critical to the performance and safety of the entire system/construction.

Revise as follows:

~~**R304.1.1**~~R304.2 **Field treatment.** Field-cut ends, notches and drilled holes of preservative-treated wood shall be treated in the field in accordance with AWPA M4.

Delete without substitution:

~~**R304.1.2 Ground contact.** All wood in contact with the ground, embedded in concrete in direct contact with the ground or embedded in concrete exposed to the weather that supports permanent structures intended for human occupancy shall be *approved* pressure-~~

~~preservative-treated wood suitable for ground contact use, except that untreated wood used entirely below groundwater level or continuously submerged in fresh water shall not be required to be pressure-preservative treated.~~

Reason: Section R304.1 currently provides only a general reference to the AWPA U1 standard with no further guidance regarding Use Category requirements for each location. In addition, requirements are presented in multiple formats and locations in this section. This code change restructures the locations where preservative-treated wood is required into one table and clarifies the required minimum Use Categories from the AWPA U1 standard. In the creation of the table, some location requirements were divided for clarity and/or to be more specific for the wood element being protected. Consistent with the current code, if a wood member fits into multiple categories, the most restrictive Use Category will apply.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There are no technical changes proposed in this code change. The current code already requires compliance with AWPA U1.

RB83-25

RB89-25

IRC: SECTION R306 (New), R306.1 (New), R306.1.1 (New), R306.1.1.1 (New), R306.1.1.2 (New), R306.1.1.3 (New), R306.1.2 (New), R306.1.2.1 (New), R306.1.2.2 (New), R306.1.2.3 (New), TABLE R306.1 (New),R502.1.8 (New), R502.3.1 (New), R505.2.5.1 (New), R507.2.3, TABLE R507.2.3, R602.1.12 (New), R603.2.5.1 (New), R604.3.1 (New), R608.9.1, R608.9.4 (New), R610.3.4 (New), R703.3.3.1 (New), R704.2 (New), R802.1.8 (New), R803.2.3.1 (New), R804.2.5.1 (New), R905.2.5.1 (New), R905.3.7.1 (New), R905.4.5.1 (New), R905.5.5.1 (New), R905.6.6.1 (New), R905.10.4.1 (New), R905.12.3.1 (New), R905.15.5.1 (New), R905.16.6.1 (New), ASTM Chapter 44 (New)

Proponents: T. Eric Stafford, representing Insurance Institute for Business and Home Safety (testafford@charter.net); Milad Shabanian, representing Insurance Institute for Business & Home Safety (mshabanian@ibhs.org)

2024 International Residential Code

Add new text as follows:

SECTION R306
CORROSION RESISTANCE - SALTWATER ENVIRONMENTS

R306.1 Fasteners and connectors exposed to saltwater environments. In *hurricane-prone regions*, fasteners and connectors in areas within 3,000 ft (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.1.1 and R306.1.2.

R306.1.1 Screws, bolts and nails. Screws, bolts and nails shall be corrosion resistant by composition, stainless steel or nonferrous metal, or by coating or galvanization as specified in this section and Table R306.1.

R306.1.1.1 Stainless steel. Where required by Table R306.1, fasteners shall be manufactured from ASTM A240 Type 304, Type 305 or Type 316 stainless steel.

R306.1.1.2 Galvanized. Where required by Table R306.1, fasteners shall be in accordance with the following:

1. For fasteners with diameters greater than 3/8 inch (9.5 mm), the minimum corrosion resistance shall comply with or be equivalent to ASTM A153, Class C.
2. For fasteners with diameters 3/8 inch (9.5 mm) and less, the minimum corrosion resistance shall comply with or be equivalent to one of the following methods:
    - 2,1. ASTM A153, Class D.
    - 2.2. ASTM A641, Class 3S.
    - 2.3. Corrosion resistance exhibiting not more than 5 percent red rust after 1,000 hours of exposure in accordance with ASTM B117.
    - 2.4. Corrosion resistance exhibiting not more the 5 percent red rust after 280 hours of exposure for nails, 1000 hours of exposure for roof tile fasteners or 360 hours of exposure for other carbon steel fasteners in accordance with ASTM G85, Annex 5.

R306.1.1.3 Compatibility. Fasteners used with connectors or other metal plates shall have a corrosion-resistant coating or composition that is compatible with the corrosion-resistant coating or composition of the connectors to prevent corrosion from galvanic action between dissimilar materials.

R306.1.2 Connectors and metal plates. Connectors and metal plates shall be corrosion resistant by composition, stainless steel or nonferrous metal, or by coating or galvanization as specified in this section and Table R306.1.

R306.1.2.1 Stainless steel. Where required by Table R306.1, connectors and metal plates shall be manufactured from ASTM A240 Type

316 stainless steel.

R306.1.2.2 Enhanced galvanizing. Where required by Table R306.1, connectors and metal plates shall be hot-dipped galvanized prior to fabrication to meet ASTM A653, Coating Designation G185, hot-dipped galvanized after fabrication to meet ASTM A123, or provided with a protective coating as specified by TPI 1.

R306.1.2.3 Standard galvanizing. Where required by Table R306.1, connectors and metal plates shall be hot-dipped galvanized prior to fabrication to meet ASTM A653, Coating Designation G90, hot-dipped galvanized after fabrication to meet ASTM A123, or provided with a protective coating as specified by TPI 1.

TABLE R306.1 CORROSION RESISTANCE OF FASTENERS AND CONNECTORS

Exposure Description[a]	Building Location			
	Less than or equal to 300 ft from saltwater coastline		Greater than 300 ft and up to 3000 ft from a saltwater coastline	
	Screws, bolts, lag screws, including nuts and washters, nails and glulam rivets	Connectors and metal plates	Screws, bolts, lag screws, including nuts and washters, nails and glulam rivets	Connectors and metal plates
Exterior-Partially Sheltered and Exterior-Open Exposed	Stainless Steel in accordance with Section R306.1.1.1	Stainless Steel in accordance with Section R306.1.2.1	Galvanized in accordance with Section R306.1.1.2	Galvanized in accordance with Section R306.1.2.2
Interior - Vented Enclosed	Galvanized in accordance with Section R306.1.1.2	Enhanced Galvanized in accordance with Section R306.1.2.2	Galvanized in accordance with Section R306.1.1.2	Enhanced Galvanized in accordance with Section R306.1.2.2
Interior - Unvented Enclosed	Galvanized in accordance with Section R306.1.1.2	Standard Galvanized in accordance with Section R306.1.2.3	Galvanized in accordance with Section R306.1.1.2	Standard Galvanized in accordance with Section R306.1.2.3

a. Exposure Descriptions:
Exterior-Partially Sheltered locations are areas where fasteners and connectors are exposed to salt air, but not exposed to fresh rainwater to remove accumulated salt.
Exterior-Open Exposed locations are areas where fasteners and connectors are exposed to salt air, but also exposed to rainwater to allow rinsing of the accumulated salt, and also more likely to dry after rain.
Interior-Vented Enclosed locations are those where fasteners and connectors inside a part of the building that also has vents to the outside environment that would allow salt air to enter.
Interior-Unvented Enclosed locations are those that are inside the building, but not in the conditioned space.

CHAPTER 5
FLOORS

R502.1.8 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

R502.3.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

R505.2.5.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

Revise as follows:

R507.2.3 Fasteners and connectors. Metal fasteners and connectors used for all decks shall be in accordance with Section R304.3 and Table R507.2.3. Holes for through bolts shall be drilled to a diameter of $^1/_{32}$ inch to $^1/_{16}$ inch larger than the bolt diameter. Connectors shall be installed in accordance with the manufacturer's *approved* instructions.In *hurricane-prone regions*, fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

.

TABLE R507.2.3 FASTENER AND CONNECTOR SPECIFICATIONS FOR DECKS[a, b]

ITEM	MATERIAL	MINIMUM FINISH/COATING	ALTERNATE FINISH/COATING [c]
Nails and glulam rivets	In accordance with ASTM F1667	Hot-dipped galvanized per ASTM A153, Class D or ASTM A641 Class 3S for $^3/_8$-inch diameter and less	Stainless steel, silicon bronze or copper
Bolts Lag screws (including nuts and washers)	In accordance with ASTM A307 (bolts), ASTM A563 (nuts), ASTM F844 (washers)	Hot-dipped galvanized per ASTM A153, Class C (Class D for $^3/_8$-inch diameter and less) or mechanically galvanized per ASTM B695, Class 55 or 410 stainless steel	Stainless steel, silicon bronze or copper
Metal connectors	Per manufacturer's specification	ASTM A653 type G185 zinc-coated galvanized steel or post hot-dipped galvanized per ASTM A123 providing a minimum average coating weight of 2.0 oz./ft^2 (total both sides)	Stainless steel

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Equivalent materials, coatings and finishes shall be permitted.

b. In *hurricane-prone regions*, fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306. Outside *hurricane-prone regions*, fasteners and connectors within 300 feet of a saltwater coastline shall be stainless steel.
~~Fasteners and connectors exposed to salt water or located within 300 feet of a salt water shoreline shall be stainless steel.~~

c. Stainless-steel-driven fasteners shall be in accordance with ASTM F1667.

CHAPTER 6
WALL CONSTRUCTION

Add new text as follows:

R602.1.12 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

R603.2.5.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

R604.3.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

Revise as follows:

R608.9.1 Connections between concrete walls and light-frame floor, ceiling and roof systems. Connections between concrete walls and light-frame floor, ceiling and roof systems using the prescriptive details of Figures R608.9(1) through R608.9(12) shall comply with this section and Sections R608.9.2, ~~and~~ R608.9.3 and R608.9.4.

Add new text as follows:

R608.9.4 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

Exception: One-half inch (12.7 mm) diamter or greater steel bolts.

R610.3.4 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

CHAPTER 7
WALL COVERING

R703.3.3.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

R704.2 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

CHAPTER 8
ROOF-CEILING CONSTRUCTION

R802.1.8 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

R803.2.3.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

R804.2.5.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

CHAPTER 9
ROOF ASSEMBLIES

R905.2.5.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

R905.3.7.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

R905.4.5.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

R905.5.5.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

R905.6.6.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

R905.10.4.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

R905.12.3.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

R905.15.5.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914 m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

R905.16.6.1 Fasteners and connectors exposed to saltwater environments. Fasteners and connectors in areas within 3,000 feet (914

m) of a saltwater coastline, or other areas subject to salt corrosion, shall comply with Section R306.

Add new standard(s) as follows:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428

B117-19	Standard Practice for Operating Salt Spray (Fog) Apparatus
G85-19	Standard Practice for Modified Salt Spray (Fog) Testing

Reason: Post-disaster assessments of wood-framed buildings following natural hazard events such as high winds, floods, and earthquakes have revealed that structural failures frequently occur at connections rather than in framing members. In coastal areas, where higher moisture and humidity levels exist and buildings are exposed to salt spray, corroded metal connectors and fasteners have been observed to contribute to the loss of an adequate load path. The loss of an adequate load path often results in damage to or failure of the structure.

This proposal is based on the corrosion resistance requirements in ICC 600-2020 and is also consistent with the requirements for an IBHS FORTIFIED designation. The FORTIFIED Home™ program was developed to reduce avoidable suffering and financial loss caused by hurricanes, high winds, and hail. The program requirements provide a systems-based, multi tiered approach for improving the resistance of homes and their contents to damage caused by wind, wind-driven rain, and hail. There are three designation levels—FORTIFIED Roof™, FORTIFIED Silver™, and FORTIFIED Gold™—that build on each other and address different systems of the home.

While ICC 600-2020 is referenced in Section R301.2.1.1, it is not required by the code and therefore not mandatory for buildings goverend by the IRC.

Research has shown that fasteners and connectors near the coastline exhibit corrosion where they are readily exposed to salt air and humidity, particularly if they are in a partially sheltered location where the salt is not washed off by rain. While the proposed IRC table is adapted from ICC 600-2020 Section 505.3, the ICC 600 requirements and this proposal are based on the recommendations in the FEMA NFIP Technical Bulletin (TB) 8, Corrosion Protection for Metal Connectors and Fasteners in Coastal Areas in Accordance with the National Flood Insurance Program (June 2019). TB 8 can be viewed and downloaded at https://www.fema.gov/sites/default/files/2020-07/tb8-corrosion_protection_metal_connectors_coastal_areas.pdf.

Metal connectors and fasteners are important elements in transferring loads from natural hazards (e.g., flood, wind, seismic) through a building. Corrosion rates for metal are dramatically higher in coastal environments than in less harsh, non-coastal environments as illustrated below by severely corroded deck connectors (FEMA P-55, Coastal Construction Manual, Figure 14-3). Therefore, it is important to increase the corrosion protection for metal connectors and fasteners in coastal environments. Studies have shown that stainless steel and thick hot-dip galvanized (G185 or higher) metal connectors and fasteners improve corrosion protection.

Cost Impact: Increase

Estimated Immediate Cost Impact:

The overall cost of replacing uncoated connectors and fasteners with corrosion-resistant connectors and fasteners will vary depending on type and number of connectors and fasteners needed for any specific situation. Generally, the cost of fasteners and connectors, whether uncoated, galvanized, or stainless, are small percentage of the overall cost of a particular job.

At one building supplies retailer, the cost for a box of 4000 3-inch uncoated common nails was $100.00. The cost for a box of 4000 3-inch galavanized common nails was $150.00. For a typical 2000 square foot roof, the approximate number fasteners required to attach a wood structural panel roof deck would be 2,813. The cost per uncoated nail is $0.025. The cost per galvanized nail is $0.0375. The use of galvanized nails over uncoated nails in this example works out to a cost increase of about $35.00.

At a separate retailer, the cost for a box of 304 stainless steel 2 1/2-inch ring shank nails was $16.97 ($0.056 per nail). The cost for a box 99 galvanized 2 1/2-inch ring shank nails was $7.98 ($0.08 per nails). For this example, the stainless steel nails are less than a similar galvanized nail. These fasteners are from the same manufacturer.

At another building supplies retailer, the cost for a box of 62 stainless steel 10x2 1/2" deck screws was $21.98 ($0.35 per screw). The cost for a box of 110 galvanized 10x2 1/2" deck screws was $9.98 ($0.09 per screw). For a 300 square foot deck, the approximate number fasteners required to attached the deck boards would be 1,227 screws. The use of stainless steel screws over galvanized screws in this example works out to a cost increase of about $319.00. This example is provided to demonstrate the potential immediate cost impact resulting from increasing corrosion protection from galvanized to stainless steel fasteners but it should be noted that exterior decks within 300' of saltwater shorelines are already required to use stainless steel fasteners and connectors in accordance with 2024 IRC Section R507.2.3.

Although this code change proposal will increase costs, the additional costs are modest and will significantly reduce the likelihood of failure under anticipated wind loads, and thus will decrease future costs associated with repairs and rebuilding after high wind events.

Estimated Immediate Cost Impact Justification (methodology and variables):

Information in the estimated cost impact was obtained by discussion with a metal connector and fastener manufacture in addition to cost surveys at a couple of building supplies retailers.

Staff Analysis: A review of the following standards proposed for inclusion in the code regarding some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before April 1, 2025.

UL B117-19 Standard Practice for Operating Salt Spray (Fog) Apparatus
UL G85-19 Standard Practice for Modified Salt Spray (Fog) Testing

RB95-25

IRC: R306.2.3 (New), R306.2.3, R306.2.3.2 (New), R404.1.1, R404.1.2.2 (New)

Proponents: Rebecca Quinn, RCQuinn Consulting, representing Association of State Floodplain Managers (rebecca@rcquinnconsulting.com); Chad Berginnis, representing Association of State Floodplain Managers (cberginnis@floods.org)

2024 International Residential Code

SECTION R306
FLOOD-RESISTANT CONSTRUCTION

Add new text as follows:

R306.2.3 Foundation design and construction. In flood hazard areas, foundation walls for *buildings* and structures shall meet the requirements of Section R306.2.3.1 or R306.2.3.2.

Revise as follows:

~~**R306.2.3**~~ **R306.2.3.1** ~~**Foundation design and construction**~~ **Non-coastal flood source.** ~~Foundation walls for *buildings* and structures erected in flood hazard areas shall meet the requirements of Chapter 4.~~In flood hazard areas where the source of flooding is determined as non-coastal originating from riverine waterways, lakes, and areas where floodwaters collect, foundation walls for *buildings* and structures shall meet the requirements of Chapter 4.

Exception: Unless designed in accordance with Section ~~R404~~ R404.1.2:

1. The unsupported wall height of 6-inch (152 mm) plain masonry walls shall be not more than 3 feet (914 mm).
2. The unsupported wall height of 8-inch (203 mm) plain masonry walls shall be not more than 4 feet (1219 mm).
3. The unsupported wall height of 8-inch (203 mm) reinforced masonry walls shall be not more than 8 feet (2438 mm).

For the purpose of this exception, the unsupported wall height is the ~~distance from the finished grade of the under floor space to the~~ difference in height between ~~to~~ the top of the foundation wall and the top of the concrete footing that supports the foundation wall.

Add new text as follows:

R306.2.3.2 Coastal flood source. In flood hazard areas where the source of flooding is determined as coastal originating from oceans, gulfs, bays, and large lakes, not including coastal high hazard areas and Coastal A Zones, foundation walls for buildings and structures shall meet the requirements of Section R404.1.2.2.

Exception: Foundation walls designed in accordance with Section R404.1.2.

SECTION R404
FOUNDATION AND RETAINING WALLS

Revise as follows:

R404.1.1 Design required. Concrete or masonry foundation walls shall be designed in accordance with accepted engineering practice where one or more ~~either~~ of the following conditions exists:

1. Walls are subject to hydrostatic pressure from ground water.

2. Walls supporting more than 48 inches (1219 mm) of unbalanced backfill that do not have permanent lateral support at the top or bottom.
3. Walls in flood hazard areas that do not conform to Section R306.2.3 or Section R404.1.2.2.

Add new text as follows:

R404.1.2.2 Flood hazard areas. In flood hazard areas where the source of flooding is determined as coastal originating from oceans, gulfs, bays, and large lakes, not including coastal high hazard areas and Coastal A Zones, concrete masonry and clay masonry foundation walls for buildings and structures shall be constructed as set forth in Table R404.1.2.2 and shall comply with the applicable provisions of Section R606.

R404.1.2.2 8-INCH MASONRY FOUNDATION WALLS WITH REINFORCING WHERE d >= 5 INCHES[a, b]

MAXIMUM UNSUPPORTED WALL HEIGHT[c]	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES)[d]
2 feet 0 inches	#4 at 72
2 feet 8 inches	#4 at 40 or #5 at 56
3 feet 4 inches	#4 at 24 or #5 at 48
4 feet 0 inches	#4 at 24 or #5 at 40
4 feet 8 inches	#4 at 16 or #5 at 32
5 feet 4 inches	#4 at 16 or #5 at 32
6 feet 0 inches	#4 at 16 or #5 at 32
6 feet 8 inches	#4 at 16 or #5 at 24
7 feet 4 inches	#4 at 16 or #5 at 24
8 feet 0 inches	#4 at 16 or #5 at 24
8 feet 8 inches	#4 at 16 or #5 at 24
9 feet 4 inches	#4 at 16 or #5 at 24
10 feet 0 inches	#4 at 8 or #5 at 16

a. Applicable in flood hazard areas where the source of flooding is determined as coastal originating from oceans, gulfs, bays, and large lakes, not including coastal high hazard areas and Coastal A Zones.
b. Vertical reinforcement shall be Grade 60 minimum. The distance, d, from the face of the outer side of the wall to the center of vertical reinforcement shall be not less than 5 inches.
c. Unsupported wall height is the difference in height between the top of foundation wall and the top of the concrete footing that supports the foundation wall.
d. Where unbalanced fill conditions exist, the vertical reinforcement shall be the greater of that required by this table or Table R404.1.2.1(2).

Reason: This code change proposal seeks to update the foundation wall requirements for flood hazard areas to meet the standards currently referenced in the 2024 IRC and to address foundation wall failures documented in Federal Emergency Management Agency (FEMA) Mitigation Assessment Team (MAT) Reports. Flood hazard area requirements for enclosed areas, including crawl spaces, located below the required minimum elevations are provided in Section R306.2.2.

Prescriptive solutions for masonry foundation walls in flood hazard areas that are not designated as coastal high hazard areas (Zones V) or Coastal A Zones (CAZs), are provided in Section 306.2.3. This proposal does not change elevation requirements for buildings in flood hazard areas. Instead, it modifies the current prescriptive masonry foundation wall solutions to resist minimum flood and wind loads on sites subject to coastal flooding.

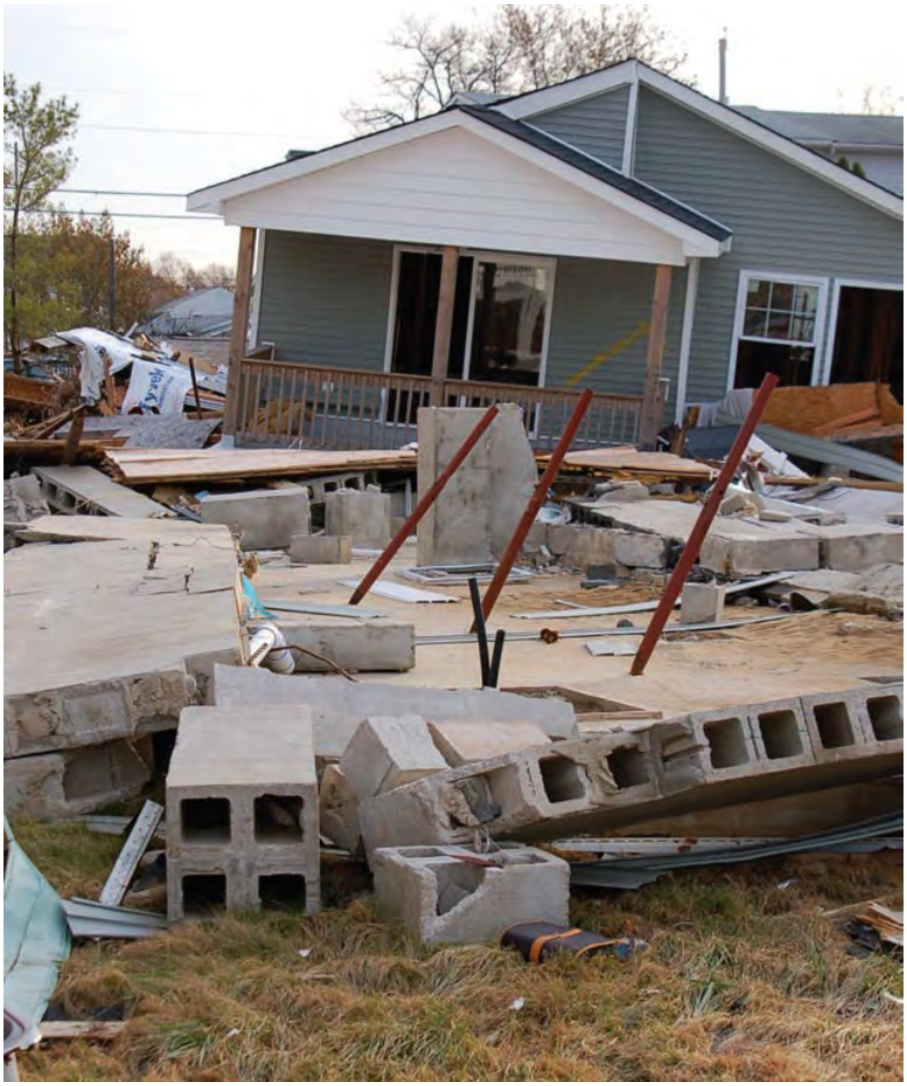
IRC Section R306.2.3 permits construction of masonry foundation walls in flood hazard areas per Section R404 with height restrictions on plain masonry and 8” reinforced masonry walls. The wall height limitations in Section R306.2.3 are based on analyses performed in 1998 for a range of flood depths and flood velocities. FEMA examined those limitations in 2012 after observing foundation wall damage from Hurricane Sandy. The requirements were re-examined following the 2022 Group B Committee Action Hearings with input provided by industry groups, including National Concrete Masonry Association (NCMA) and American Concrete Institute (ACI), to reconsider earlier assumptions and to account for changes resulting from updates to referenced standards.

Foundation walls in flood hazard areas may be susceptible to hydrostatic forces (addressed by the requirement for flood openings in R306.2.2) and hydrodynamic forces imposed by moving water and moderate breaking wave loads on vertical walls with wave heights not greater than 1 ½ feet (see R306.2, if areas subject to wave heights between 1 ½ and 3 feet are delineated, they are designated “Coastal A Zones” and must comply with Section R306.3). FEMA evaluated the structural capacity of 8" masonry walls of variable heights to a range of velocities (for riverine-sourced flooding) and a range of wave heights (for coastal-sourced flooding) to determine whether the current IRC solutions could resist the minimum loads. Key assumptions in the current analyses include:

1. 1- story wood-framed residential structure supported on masonry foundation walls with flood openings installed per IRC Section R306.2.2.
2. Top of foundation wall braced by elevated floor system.
3. Material properties used to determine wall resistances are in accordance with standards referenced in the 2024 IRC.
4. For analysis of wall resistance to hydrodynamic loads, the maximum flood velocity evaluated is 9 fps with flood depth set equal to wall height.
5. For analysis of wall resistance to breaking wave loads, the maximum breaking wave height is 1.5 feet and the minimum design wind load (16 psf per ASCE 7-22 Section 30.2.2) is applied above the stillwater depth. (Note that for areas without designated Coastal A Zones, the breaking wave heights can be as high as 3 feet)
6. All loads were determined using Allowable Stress Design (ASD) Load Combination 7b in non-coastal A-Zones (not Zones V or CAZ) per ASCE 7-22 Section 2.4.2.

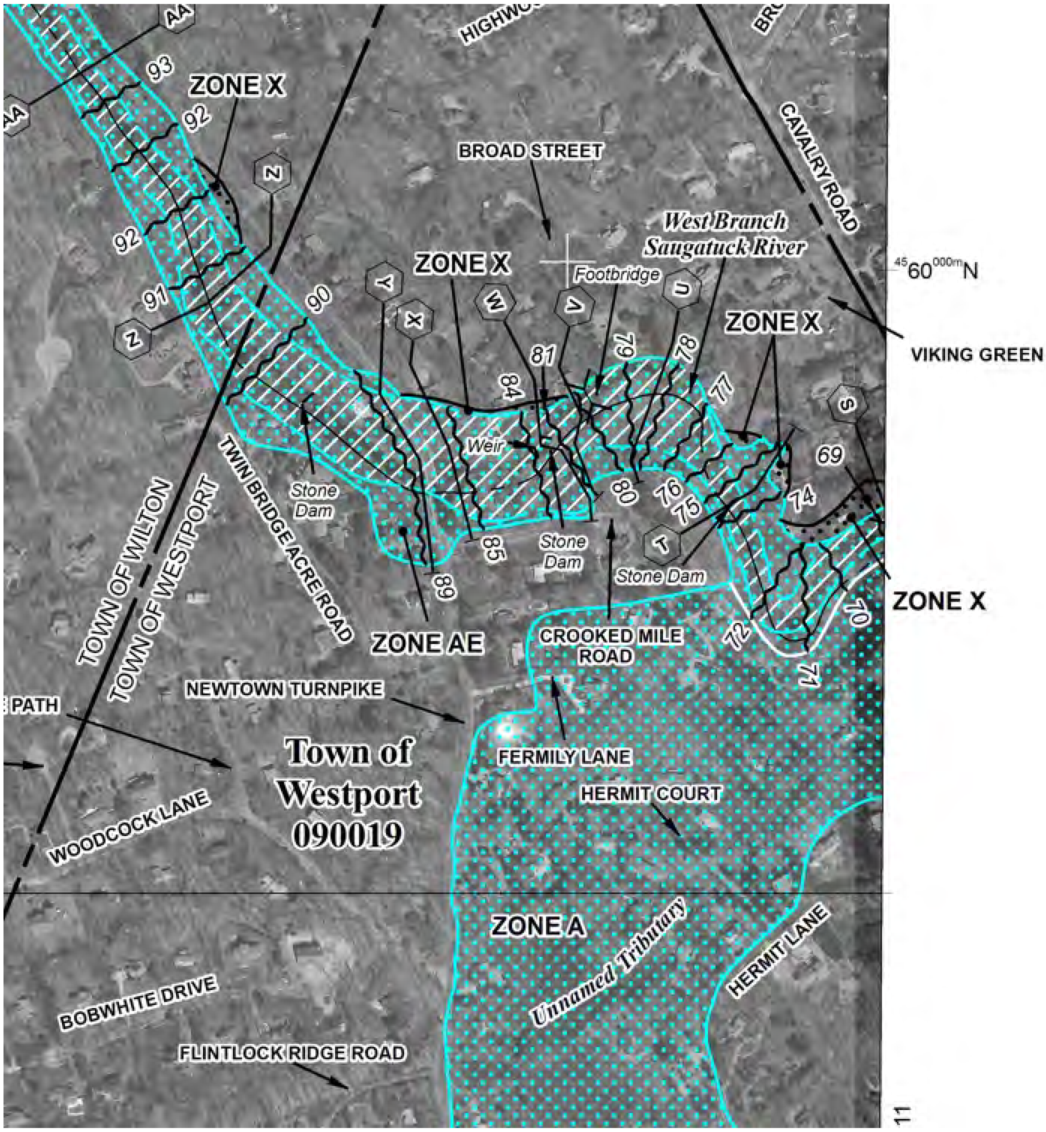
The analyses concluded that current solutions provided in Section R306.2.3 are sufficient for hydrostatic and hydrodynamic loading when flood openings are installed in accordance with Section 306.2.2 such that floodwaters of equal elevation are present on both sides of the foundation walls for sites without coastal sources of flooding causing wave loads. However, for sites with coastal sources of flooding, the analyses indicate that even small breaking wave loads induced failure across the current prescriptive solutions and increased reinforcement as provided in proposed Table R404.1.2.2 is necessary to resist the minimum required loads.

The Hurricane Sandy in New Jersey and New York MAT Report (FEMA P-962) included observations of shallow masonry foundation wall failures, including the example shown below. As noted in the report, the destroyed Union Beach, New Jersey residence was located in flood hazard area Zone A, elevated on a masonry wall foundation, and appeared to be no more than a few years old. All of the remaining masonry wall sections shown scattered across the site appear to be unreinforced. Although the report cannot conclude the sequence of failure, the example illustrates the vulnerability of unreinforced masonry walls in areas subject to coastal sources of flooding.



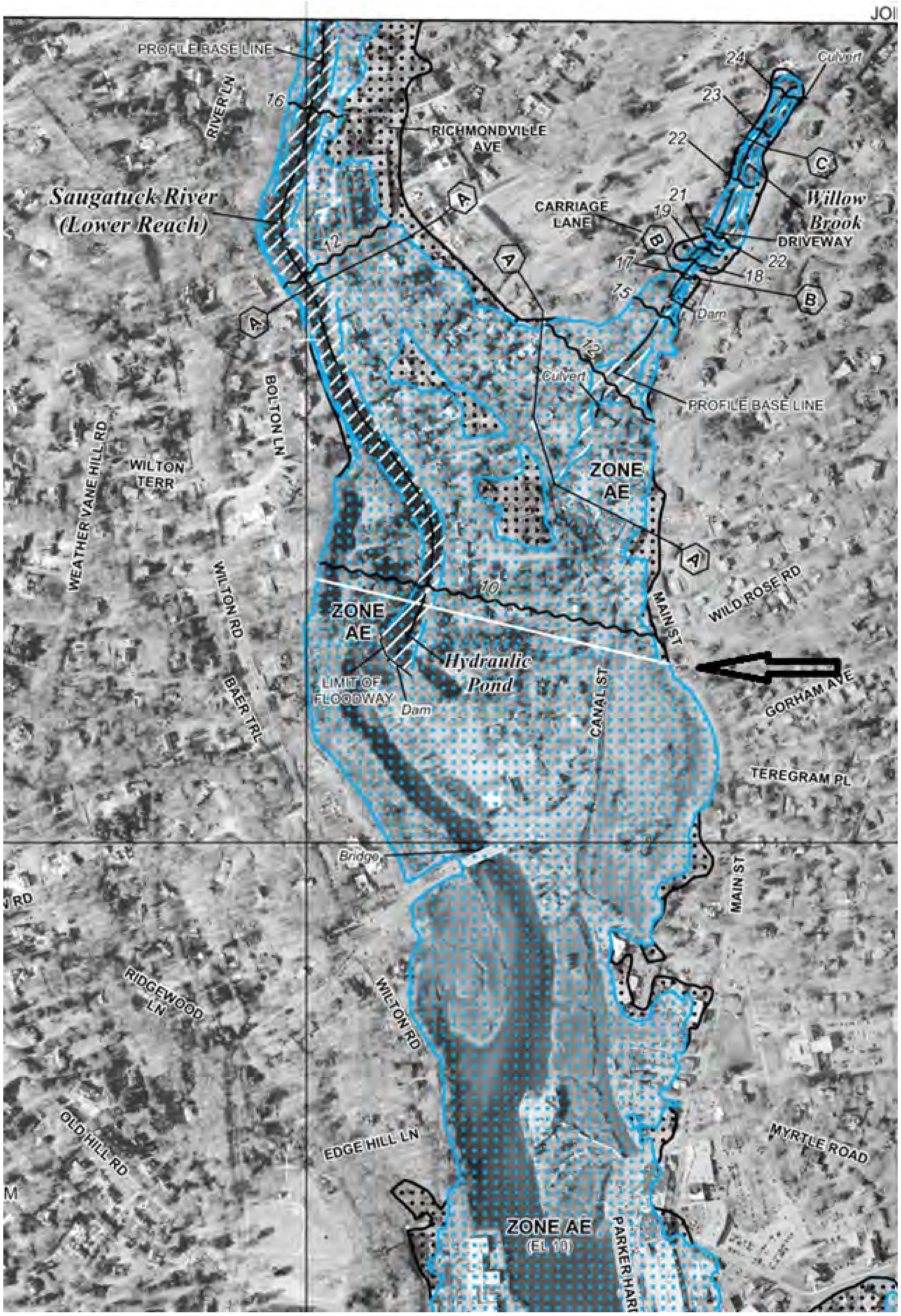
As a result of failed foundation wall observations, the Sandy MAT Report recommended (see Recommendation 22, Propose changes to the I-Codes) that FEMA should propose changes to the I-codes including, “Remove prescriptive provisions allowing unreinforced masonry foundation walls for new construction in Zone A.”

This proposal requires users to distinguish between coastal and non-coastal sources of flooding for flood hazard areas other than coastal high hazard areas and Coastal A Zones. Sources of flooding may be obvious based on geographic location, such as in states with no coastal or Great Lakes shorelines. However, where there are questions about the sources of flooding, the FEMA Flood Insurance Studies readily provide information as to whether riverine or coastal flood analyses was used to develop the Flood Insurance Rate Map. Flood Insurance Rate Maps look different for coastal and non-coastal sources of flooding (see map examples below). In areas where sources of flooding may be both coastal and non-coastal, such as near the mouth of a river where it meets the coast, maps show a “limit of study” where there is a distinct line between riverine and coastal analysis types (see map example). An area adjacent to a creek or riverine waterway may still be modeled as coastal source flooding where the coastal source flooding dominates (see Figure 2, Charles Creek is located within a coastal source flooding Zone AE).



1 – Non-coastal source of flooding is depicted as a series of elevations along the waterway for Zone AE with BFE, otherwise labeled as Zone A (no associated elevation). Base flood elevation is interpolated between elevation lines.

2-Coastal source of flooding is depicted as areas with a single base flood elevation for each area shown in parentheses under the Zone AE or Zone VE labels.



3- “Limit of study” is shown on this FIRM as a thick white line to distinguish between coastal and non-coastal analyses on the map (black arrow added for emphasis)

Cost Impact: Increase

Estimated Immediate Cost Impact:

Where required, additional materials and labor costs for most masonry foundation walls should average between approximately $1.00 (2 feet high) and $0.84 (6 feet high) per square foot of foundation wall surface area when compared to unreinforced 8" masonry (for 2' high walls) or lesser reinforced 8" masonry (as required for 6' high walls per Section R323.2.3).

Total costs for individual residences will vary linearly according to the foundation enclosure’s perimeter wall length and nonlinearly according to wall height since reinforcement requirements increase with wall height. The following total cost examples are based on the 60’x30’ wood-framed residence (180’ long perimeter wall) used to model flood load resistance for this proposal. For 2’ high masonry foundation walls requiring #4 bar at 72” on center, the cost increase over unreinforced masonry would average approximately $1.00 per square foot ($13.47 vs. $12.47). The total wall surface area is 360 square feet for a total cost increase of approximately $360. For a 6' high wall requiring #5 bar at 32" on center, the cost increase over the current requirements for 8" masonry with #4 bar at 48" on center (per Section R306.2.3 and Table R404.1.2.1(2)) would average approximately $0.84 per square foot ($14.80 vs. $13.96) for a total cost increase of approximately $907.

This code change proposal will increase the cost of construction for a limited set of perimeter wall foundations in flood hazard areas with coastal sourced flooding, not including Zones V or CAZ. But the additional costs are modest and will significantly reduce the likelihood of failure under anticipated flood loads, and thus will decrease future costs associated with repairs and rebuilding after flood and flood/high wind events.

Estimated Immediate Cost Impact Justification (methodology and variables):

Estimates are based on 8"x8"x16" hollow concrete masonry units having no core fill and a compressive strength of 2000 psi as provided by 2024 RSMeans Construction Costs Index.

RB95-25

RB135-25

IRC: R321.1.3.1 (New), TABLE R321.1.3.1(1) (New), TABLE R321.1.3.1(2) (New)

Proponents: Ashley Goodin, Technical Services, representing Stairbuilders and Manufacturers Association (ashley.goodin@stairways.org)

2024 International Residential Code

SECTION R321
GUARDS AND WINDOW FALL PROTECTION

R321.1.3 Opening limitations. Required *guards* shall not have openings from the walking surface to the required *guard* height that allow passage of a sphere 4 inches (102 mm) in diameter.

Exceptions:

1. The triangular openings at the open side of *stair*, formed by the *riser*, tread and bottom rail of a *guard*, shall not allow passage of a sphere 6 inches (153 mm) in diameter.
2. *Guards* on the open side of *stairs* shall not have openings that allow passage of a sphere $4^{3}/_{8}$ inches (111 mm) in diameter.

Add new text as follows:

R321.1.3.1 Cable infill opening limitations. Where flexible cables of any material are components of the guard infill located between the walking surface and the required guard height, the guard infill shall comply with all of the following:

1. Each cable shall be installed with hardware designed specifically for use in guard infill systems in accordance with the manufacturers' instructions for the frame materials to be used.
2. When measured with a strain indicator, it must be in accordance with the tension values in Table R321.1.3.1(1) for the cable diameter, cable length, span, and tension used. Alternately, the distance between any two cables or a cable and another surface shall not exceed the applicable opening limitation and the values listed in Table R321.1.2.1(2) when a 4.4 pound (2.0 Kg) mass is suspended at mid span of weight is hung from any individual cable.
3. Cable infill materials used in exterior applications shall be manufactured for use in exterior applications.

Table R321.1.1.3.1(1) shall be in effect for the stated wire diameters, construction (lay), and clear span between supports. Overall cable length between terminations shall be distance between supports or greater. Measurements shall be taken with a hand-held strain gauge at the time of cable installation.

TABLE R321.1.3.1(1) CABLE TENSION BY CLEAR SPAN DISTANCE [a,b,c,d,e,f,g]

Wire Diameter (inch)	Construction (Lay)	Wire separation spacing (inch)	Clear Span Between Supports (inch)							
			24	32	36	40	48	60	72	80
			Minimum Required Tension (lbf)							
3/32	7x7	2-3/8	12.4	42.7	59.1	93.3	107.5	185.0	242.8	256.1
		3-1/8	85.9	141.6	165.1	185.2	230.4	289.6	NP	NP
3/32	1x19	2-3/8	7.9	49.0	69.7	90.4	131.5	182.1	252.9	297.9
		3-1/8	94.4	141.6	165.2	188.8	236.0	314.7	393.4	NP
1/8	7x7	2-3/8	3.4	40.0	60.7	70.6	113.8	148.4	216.9	262.6
		3-1/8	56.2	92.8	112.4	166.6	183.9	243.5	308.0	351.8
1/8	1x19	2-3/8	5.6	41.1	58.7	76.4	116.9	177.6	230.4	265.3
		3-1/8	73.1	124.8	150.6	176.5	230.4	299.0	387.8	445.1
3/16	1x19	2-3/8	1.1	1.1	2.2	3.4	4.5	33.0	133.3	200.1
		3-1/8	6.7	43.2	67.4	93.3	133.3	248.4	292.9	322.6
3/16	7x19	2-3/8	34.8	65.2	80.5	95.5	134.7	193.3	242.8	288.9
		3-1/8	88.6	147.0	176.5	205.7	257.0	333.8	418.1	473.2

For SI: 1 inch=25.6 mm.

a. Lay = number of strands by the individual wires in each strand. For example a lay of 7x19 consists of 7 strands with 19 individual wires in each strand.

b. Where a change of direction is made in a run of wire, the tensioning device is to be placed at the end of the longest span.

c. This table shall be permitted to be used for a set of non-continuous (single) vertical wires forming a barrier using the appropriate clear distance between posts as the vertical clear distance between the rails.

d. Where a 3.0 mm diameter wire is used, the tension figures for 1/8" diameter are applied.

e. Spans labeled "NP" are not allowed because the required tension would exceed the safe load of the wire.

f. Tension shall be measured with a strain indicator.

g. For wire diameters, lays, separation spacing, and spans not listed, results shall be permitted to be interpolated as necessary to meet or exceed stated values.

TABLE R321.1.3.1(2) MAXIMUM PERMISSIBLE DEFLECTION FOR CABLE INFILL BY SPAN [a,b,c,d,e]

Wire Diameter (inch)	Wire Separation Spacing (inch)	Clear Span Between Vertical Members (inch)					
		24	36	48	60	72	80
		Maximum permissible deflection of each wire when a 4.4 lb. mass is suspended at mid-span.(inch)					
3/32	2-3/8	11/16	7/16	3/8	5/16	5/16	5/16
	3-1/8	9/32	3/16	3/16	3/16	NP	NP
1/8	2-3/8	3/4	1/2	5/16	9/32	9/32	9/32
	3-1/8	5/16	1/4	1/4	3/16	3/16	3/16
3/16	2-3/8	3/4	1/2	5/16	5/16	9/32	9/32
	3-1/8	5/16	1/4	3/16	3/16	3/16	3/16

For SI: 1 inch=25.4 mm

a. Where a change of direction is made in a run of wire, the 4.4 lb mass shall be placed at the middle of the longest span.

b. Where a 3.0 mm diameter wire is used, the deflection figures for 1/8" diameter wire are applied.

c. This table shall be permitted to be used for a set of non-continuous (single) vertical wires forming a barrier using the appropriate clear distance between posts as the vertical clear distance between the rails. The deflection (offset) is measured by hooking a standard spring scale to the mid-span of each wire and pulling it horizontally until a force of 4.4 lbf is applied.

d. Spans labeled "NP" are not allowed because the required tension would exceed the safe load of the wire.

e. For wire diameters, separation spacing, and spans not listed, results shall be permitted be interpolated as necessary to meet or exceed stated values.

Attached Files

- **Part 3.9.2 Barriers and handrails _ NCC.pdf**
  https://www.cdpaccess.com/proposal/11819/35610/files/download/9379/
- **Part 2.5 Safe movement and access _ NCC.pdf**
  https://www.cdpaccess.com/proposal/11819/35610/files/download/9375/

Reason: This issue was previously considered during the 2024 cycle for IBC structural. To date, this body has not been presented with evidence of accident or number of injuries related to cable infill nor are such the subject of reports to the public. There is no doubt however that cable infill systems are highly desired by the public who by evidence of the numbers are not wary of cable systems as a life safety issue. Minimalist design, the appeal of the industrial and maritime aesthetics, not to mention visibility and sight lines are driving the demand.

Cable systems are in vogue, however, the conundrum we are here to resolve is solely a lack of guidance for users of the code and a nightmare for regulators that are left to interpret the intent of the code. This is not a life safety issue but purely an enforcement issue.

How do we measure the opening limitation when the opening is flexible? Surely applying the failure load as some have reasoned is overkill. The cable is not in failure mode. In the case of failure there would be no infill and the idea of an opening limitation would be a moot point. The measurement of the distance in question, the diameter of a sphere, is not a structural requirement, nor is this dimension a parameter of the structural properties of the guard system in question. There simply is no correlation of the failure load nor any reasoned portion thereof to the measurement of the opening limitation.

We know what works and it is clearly defined in the installation instructions of the major manufacturers of cable infill systems. When installed properly, Cable systems meet the guard requirements. This proposal provides clear, concise solutions to address conformance to code requirements for manufactureres, installers, and authorities having jurisdiction for enforcement.

This proposal seeks to incorporate elements from the Australian National Construction Code, Volume Two, Amendment 1 – 2019. This model building code allows for two different yet effective assessments for determining the ability of a flexible cable infill system to retain its ability to prevent the maximum allowable opening of 4” to be exceeded. By incorporating either a prescriptive cable installation tension or a measured deflection using a mass suspended at the mid-point of a given span, both the installer and code official have a common, objective assessment methodology for ensuring that a given installation conforms to the opening limitation requirement(s) as applicable.

The 4.4 lb suspended mass utilized in the proposed table can be derived from the 50 lbs. per square foot guard infill load.

12" x 12" = 144 square inches

50 lbs. / 144 square inches = .347 lbs. per square inch

Area of a 4" diameter sphere = 12.57 square inches x .347 lbs/square inch = 4.36 lbs.

Further, if the load were uniformly applied to a 4" x 4" area = 16 square inches x .347 lbs/square inch = 5.55 lbs.

Therefore, the proposed suspended mass of 4.4lbs. is within reason for the existing guard infill load required by the code.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

As written, this proposal is a clarification for assessment of conformance, therefore no cost impact is anticipated for code-compliant installations. Potentially, there may be a decrease in cost due to current lack of a consistent assessment tool leading to increased cost for overbuilding and/or removal of potentially compliant guard infill systems.

RB135-25

RB149-25

IRC: TABLE R401.4.1(2), ASTM Chapter 44 (New)

Proponents: Chad Sievers, NYS, representing NYS Dept of State (chad.sievers@dos.ny.gov); Jeanne Rice, representing NYSDOS (jeanne.rice@dos.ny.gov); Stephen Van Hoose, representing NYS DOS (stephen.vanhoose@dos.ny.gov); Larissa DeLango, representing NYSDOS (larissa.delango@dos.ny.gov); Daniel Carroll, New York State Department of State, representing Division of Building Standards and Codes (daniel.carroll@dos.ny.gov); Christopher Jensen, representing NYS DOS - Division of Building Standards and Codes (christopher.jensen@dos.ny.gov); China Clarke, representing New York State Dept of State (china.clarke@dos.ny.gov); Bryant Arms, representing NYS DOS (bryant.arms@dos.ny.gov); Bryan Toepfer, representing NY DOS (bryan.toepfer@dos.ny.gov)

2024 International Residential Code

Revise as follows:

TABLE R401.4.1(2) PROPERTIES OF SOILS CLASSIFIED ACCORDING TO THE UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL GROUP	UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOL[d]	SOIL DESCRIPTION	USDA TEXTURAL SOIL CLASSIFICATION	DRAINAGE CHARACTERISTICS[a]	FROST HEAVE POTENTIAL	VOLUME CHANGE POTENTIAL EXPANSION[b]
Group I	GW	Well-graded gravels, gravel sand mixtures, little or no fines	N/A	Good	Low	Low
	GP	Poorly graded gravels or gravel sand mixtures, little or no fines	N/A	Good	Low	Low
	SW	Well-graded sands, gravelly sands, little or no fines	N/A	Good	Low	Low
	SP	Poorly graded sands or gravelly sands, little or no fines	Sand	Good	Low	Low
	GM	Silty gravels, gravel-sand-silt mixtures	N/A	Good	Medium	Low
	SM	Silty sand, sand-silt mixtures	Loamy sand, sandy loam	Good	Medium	Low
Group II	GC	Clayey gravels, gravel-sand-clay mixtures	N/A	Medium	Medium	Low
	SC	Clayey sands, sand-clay mixture	Sandy clay loam, sandy clay	Medium	Medium	Low
	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	Silt, silt loam	Medium	High	Low
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	Loam, clay loam, silty clay loam	Medium	Medium	Medium to Low
Group III	CH	Inorganic clays of high plasticity, fat clays	Clay, silty clay	Poor [c]	Medium	High
	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	N/A	Poor [c]	High	High
Group IV	OL	Organic silts and organic silty clays of low plasticity	N/A	Poor [c]	Medium	Medium
	OH	Organic clays of medium to high plasticity, organic silts	N/A	Unsatisfactory [c]	Medium	High
	Pt	Peat and other highly organic soils	N/A	Unsatisfactory [c]	Medium	High

For SI: 1 inch = 25.4 mm.

N/A = Not Applicable.

a. The percolation rate for good drainage is over 4 inches per hour, medium drainage is 2 inches to 4 inches per hour, and poor is less than 2 inches per hour.

b. Soils with a low potential expansion typically have a plasticity index (PI) of 0 to 15, soils with a medium potential expansion have a PI of 10 to 35 and soils with a high potential expansion have a PI greater than 20.

c. Unsuitable as backfill material.

d. Soil classifications are in accordance with ASTM D2487 and ASTM D2488.

Add new standard(s) as follows:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428

D2487-17e1	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
D2488-17e1	Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)

Reason: The addition of this footnote clearly identifies what method and procedures are used to determine the soil classifications.

Although the table heading currently generically identifies the Unified Soil Classification System it does not identify the reference standard number and version nor does it give the appropriate credit to the standard development group.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This change is just formally incorporating the reference standards into the code which is already identified in the table. Therefore there is no cost impact.

Staff Analysis: A review of the following standards proposed for inclusion in the code regarding some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before April 1, 2025:
ASTMD2487-17e1 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTMD2488-17e1 Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)

RB149-25

RB150-25

IRC: R403.1.2, TABLE R403.1.2

Proponents: Kelly Cobeen, Wiss Janney Elstner Associates, representing Self (kcobeen@wje.com); Julie Furr, Smith Seckman Reid, Inc, representing Julie Furr, PE (jcfurr@ssr-inc.com)

2024 International Residential Code

Revise as follows:

R403.1.2 Continuous footing in Seismic Design Categories D_0, D_1 and D_2. Exterior walls and ~~required~~ interior *braced wall panels* of *buildings* located in *Seismic Design Categories* D_0, D_1 and D_2 shall be supported by continuous ~~solid or fully grouted masonry or concrete~~ footings in accordance with Table R403.1.2. <u>These footings shall be concrete or masonry that is solid or fully grouted in accordance with Section R403.1.3. Where concrete or masonry continuous footings intersect with perpendicular footings, the horizontal reinforcing shall lap between the elements to resist tension in accordance with Section R608.5.4.3.</u> ~~Other footing~~ <u>Footings made from other</u> materials or systems shall be designed in accordance with accepted engineering practice.

TABLE R403.1.2 CONTINUOUS FOOTING REQUIREMENTS IN SEISMIC DESIGN CATEGORIES D_0, D_1 AND D_2<u>a</u>

BUILDING PLAN DIMENSIONS	1-STORY						2-STORY						3-STORY	
	50 feet or less			> 50 feet			50 feet or less			> 50 feet			Any	
SDC	D_0	D_1	D_2	D_0	D_1	D_2	D_0	D_1	D_2	D_0	D_1	D_2	D_0	D_1
~~Continuous f~~ <u>F</u>ootings supporting exterior walls	R													
~~Continuous f~~ Footings supporting ~~required~~ interior braced wall panels	NR			R[a]			NR		R[a]	R[a]			R	

For SI: 1 foot = 304.8 mm.

R = Continuous ~~solid or fully grouted masonry or concrete~~footings ~~in accordance with Section R403.1.3.4~~ required.

NR = Continuous footings not required.

<u>a.</u> ~~B~~ <u>One- and two-story b</u>uildings shall be permitted to have interior braced wall panels supported on continuous ~~foundations~~ <u>footings</u> at intervals not exceeding 50 feet, provided that the following conditions are all met:

1. The height of cripple walls does not exceed 4 feet.
2. First-floor braced wall panels are supported on doubled floor joists, continuous blocking or floor beams.
3. The distance between bracing lines does not exceed twice the building width measured parallel to the braced wall line.

Reason: Table R403.1.2 was developed by APA in the last cycle as RB169 and was intended to be a code simplification by tabulating complex and possibly confusing requirements for continuous footings at interior braced wall panels that were written in the text of the IRC. While we've provided input during the prior code hearings, we believe additional changes are needed to help clarify and potentially correct the current provisions. The proposed changes provide the following clarifications and corrections:

Editorial changes to Section 403.1.2 and Table 403.1.2 are proposed that will improve readability for users by rewording existing language that may be confusing, merging cells with duplicative information, and deleting redundant words.

The referenced code section in footnote "R" has been relocated to the main text to prevent it from being overlooked by users. The original code reference to Section R403.1.3.4 is only applicable to footings supporting interior walls and we have changed the reference to R403.1.3, which includes provisions for footings supporting exterior and interior walls.

The changes provided clarify that the exception to Table R403.1.2 only applies to one- and two-story buildings and does not apply to three-story buildings.

We are also proposing a needed technical change to the provisions with the addition of reinforcement detailing requirements at footing intersections. During development of FEMA P-232, *Homebuilder's Guide to Earthquake-Resistant Design and Construction,* it was identified that current code provisions overlook detailing of reinforcing at intersecting footings. FEMA P-232 recommended developing horizontal footing reinforcing at intersecting footings based on reinforcing detailing requirements in Section R608.5.4 and those recommendations are included in this proposal.

Cost Impact: Increase

Estimated Immediate Cost Impact:

This change proposal primarily provides editorial clarification of existing provisions for required footing locations, resulting in no cost change. It does also include, however, a specific requirement for lapping of reinforcing at intersecting continuous foundations. While it is hoped that this is already occurring in residential construction, we have estimated a cost of approximately $81 for addition of lapping bars at intersecting footings based on a representative single-family dwelling. This is approximately 0.02% of the median new home price of $425,000 reported by NAHB in March 2023. While the specific dollar amount might be argued, we believe that the cost can definitively be categorized as negligible, and can be compared to the benefit of improved footing performance.

Estimated Immediate Cost Impact Justification (methodology and variables):

The estimated cost is based on two No. 4 bars in each continuous footing based on Figure R403.1.3, Detail 1. Based on the house plan shown in Figure R602.10.1.1, intersections between footings occur at nine locations. At each of these locations it was assumed that each of the two lapped bars at the intersections would have a length of four feet. From this the total added weight of rebar is 54 lb. Based on an RS Means cost per ton of $2725 for footing reinforcing (with materials, labor, overhead and profit included) this gives a cost of $74. With 10% added for Division 1/insurance/bonds, this gives at total cost of $81 for the example dwelling. No location adjustment has been made.

RB150-25

RB153-25

IRC: R403.3, TABLE R403.3(1)

Proponents: Richard Justin Koscher, representing Polyisocyanurate Insulation Manufacturers Association (jkoscher@pima.org); Marcin Pazera, representing Polyisocyanurate Insulation Manufacturers Association (mpazera@pima.org)

2024 International Residential Code

Revise as follows:

R403.3 Frost-protected shallow foundations. For *buildings* where the monthly mean temperature of the *building* is maintained at not less than 64°F (18°C), footings are not required to extend below the frost line where protected from frost by insulation in accordance with Figure R403.3(1) and Table R403.3(1). Foundations protected from frost in accordance with Figure R403.3(1) and Table R403.3(1) shall not be used for unheated spaces such as porches, utility rooms, garages and carports, and shall not be attached to *basements* or *crawl spaces* that are not maintained at a minimum monthly mean temperature of 64°F (18°C).

Foam plastic insulation materials and *foam plastic insulation* components ~~Materials~~ used below *grade* for the purpose of insulating footings against frost shall be *labeled* ~~as complying with ASTM C578~~ in accordance with Section R303.2.

TABLE R403.3(1) MINIMUM FOOTING DEPTH AND INSULATION REQUIREMENTS FOR FROST-PROTECTED FOOTINGS IN HEATED BUILDINGS[a]

AIR-FREEZING INDEX (°F days)[b]	MINIMUM FOOTING DEPTH, *D* (inches)	VERTICAL INSULATION *R*-VALUE[c, ~~d~~]	HORIZONTAL INSULATION *R*-VALUE[c, ~~e~~]		HORIZONTAL INSULATION DIMENSIONS PER FIGURE R403.3(1) (inches)		
			Along walls	At corners	A	B	C
1,500 or less	12	4.5	Not required	Not required	Not required	Not required	Not required
2,000	14	5.6	Not required	Not required	Not required	Not required	Not required
2,500	16	6.7	1.7	4.9	12	24	40
3,000	16	7.8	6.5	8.6	12	24	40
3,500	16	9.0	8.0	11.2	24	30	60
4,000	16	10.1	10.5	13.1	24	36	60

For SI: 1 inch = 25.4 mm, °C = [(°F) – 32]/1.8.

a. Insulation requirements are for protection against frost damage in heated buildings. Greater values could be required to meet energy conservation standards.

b. See Figure R403.3(2) or Table R403.3(2) for Air-Freezing Index values.

c. Manufacturers of insulation materials used below *grade*~~Insulation materials~~ shall provide ~~the stated~~ minimum *R*-values that reflect a risk reduction factor to account for ~~under~~ long-term exposure to moist, below-ground conditions in freezing climates. Insulation materials used below *grade* shall provide the necessary compressive strengths to resist the pressures in below-ground or below-slab conditions. ~~The following *R*-values shall be used to determine insulation thicknesses required for this application: Type II expanded polystyrene (EPS) 3.2 R per inch for vertical insulation and 2.6 R per inch for horizontal insulation; Type IX expanded polystyrene (EPS) 3.4 R per inch for vertical insulation and 2.8 R per inch for horizontal insulation; Types IV, V, VI, VII, and X extruded polystyrene (XPS) 4.5 R per inch for vertical insulation and 4.0 R per inch for horizontal insulation.~~

~~d. Vertical insulation shall be expanded polystyrene insulation or extruded polystyrene insulation.~~

~~e. Horizontal insulation shall be expanded polystyrene insulation or extruded polystyrene insulation.~~

Reason: Section R403.3 unreasonably limits the use of insulation used for insulating footings and foundations against frost to only two product types: extruded polystrene (XPS) and expanded polystrene (EPS). Other insulation products like polyisocyanurate and spray foam can deliver the performance required for protecting foundations from frost damage. These products share key physical properties to XPS insulation such as being closed-cell (i.e., resistant to moisture intrusion) and like polystyrene insulation products can be manufactured in sufficient compressive strengths to resist soil pressures. The current material restrictions in Section R403.3 are not technically justified. Furthermore, these material restrictions in the absence of performance-based requirements is contrary to the ICC's material-neutral, performance-based principles for code development.

This code change proposal removes the language that suggests or explicitly requires the use of only XPS and EPS insulation. It should be noted that the current code language does not contain any performance-based requirements for insulation used below grade for frost protection. This proposal adds useful guidance and requirements on what information should be provided to the code user related to insulation used below grade for frost protection. All foam plastic insulation materials are tested for R-value, water or moisture absorption, and compressive strength. These materials can be manufactured with the performance specifications required for below grade applications. This proposal improves the existing language by requiring manufactures to provide code users with the necessary information to determine or demonstrate that a particular product is suitable for below grade applications.

In summary, this proposal removes problematic material restrictions and improves the current code language with application-specific reporting and performance requirements.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This code change proposal is expected to decrease the cost of construction or have no impact on the cost of construction.

This code change proposal eliminates existing restrictions on the use of alternative materials that are fit for purpose for protecting foundations from frost damage. Typically, when the code permits the use of additional or alternative material types, this optionality can decrease the cost of construction through improved competition.

RB153-25

RB160-25

IRC: TABLE R404.1.2.1(1), TABLE R404.1.2.1(2), TABLE R404.1.2.1(3), TABLE R404.1.2.1(4), R404.1.4, R404.1.4.1

Proponents: Nicholas Lang, representing Concrete Masonry & Hardscapes Association (nlang@masonryandhardscapes.org)

2024 International Residential Code

Revise as follows:

TABLE R404.1.2.1(1) PLAIN MASONRY FOUNDATION WALLS[f]

MAXIMUM UNSUPPORTED WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT[c] (feet)	PLAIN MASONRY[a] MINIMUM NOMINAL WALL THICKNESS (inches)		
		Soil classes and lateral soil load [b] (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, MH, ML-CL and inorganic CL soils 60
5	4	6 solid[d] or 8	6 solid[d] or 8	6 solid[d] or 8
	5	6 solid[d] or 8	8	10
6	4	6 solid[d] or 8	6 solid[d] or 8	6 solid[d] or 8
	5	6 solid[d] or 8	8	10
	6	8	10	12
7	4	6 solid[d] or 8	8	8
	5	6 solid[d] or 8	10	10
	6	10	12	10 grout ~~solid~~[d]
	7	12	10 grout ~~solid~~[d]	12 grout ~~solid~~[d]
8	4	6 solid[d] or 8	6 solid[d] or 8	8
	5	6 solid[d] or 8	10	12
	6	10	12	12 grout ~~solid~~[d]
	7	12	12 grout ~~solid~~[d]	Note e
	8	10 grout[d]	12 grout[d]	Note e
9	4	6 grout[d] or 8 solid[d] or 12	6 grout[d] or 8 solid[d]	8 grout[d] or 10 grout ~~solid~~[d]
	5	6 grout[d] or 10 grout ~~solid~~[d]	8 grout[d] or 12 grout ~~solid~~[d]	8 grout[d]
	6	8 grout[d] or 12 grout ~~solid~~[d]	10 grout[d]	10 grout[d]
	7	10 grout[d]	10 grout[d]	12 grout
	8	10 grout[d]	12 grout	Note e
	9	12 grout	Note e	Note e

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Mortar shall be Type M or S and masonry shall be laid in running bond. Ungrouted hollow masonry units are permitted except where otherwise indicated.

b. Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R401.4.1(2).

c. Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab-on-grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.

d. Solid indicates solid masonry unit; grout indicates grouted hollow units.

e. Wall construction shall be in accordance with Table R404.1.2.1(2), R404.1.2.1(3) or R404.1.2.1(4), or a design shall be provided.

f. The use of this table shall be prohibited for soil classifications not shown.

TABLE R404.1.2.1(2) 8-INCH MASONRY FOUNDATION WALLS WITH REINFORCING WHERE d ≥ 5 INCHES[a, c, f]

MAXIMUM UNSUPPORTED WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL[e]	MINIMUM VERTICAL REINFORCEMENT AND SPACING (inches)[b, c]		
		Soil classes and lateral soil load[d] (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, ML-CL and inorganic CL soils 60
	~~4 feet (or less)~~	~~#4 at 48~~	~~#4 at 48~~	~~#4 at 48~~
	5 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	6 feet 8 inches	#4 at 48	#5 at 48	#6 at 48

6 feet 8 inches MAXIMUM UNSUPPORTED WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL	MINIMUM VERTICAL REINFORCEMENT AND SPACING (inches)		
		Soil classes and lateral soil load (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, ML-CL and inorganic CL soils 60
7 feet 4 inches	~~4 feet (or less)~~	~~#4 at 48~~	~~#4 at 48~~	~~#4 at 48~~
	5 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	6 feet	#4 at 48	#5 at 48	#5 at 48
	7 feet 4 inches	#5 at 48	#6 at 48	#6 at 40
8 feet	~~4 feet (or less)~~	~~#4 at 48~~	~~#4 at 48~~	~~#4 at 48~~
	5 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	6 feet	#4 at 48	#5 at 48	#5 at 48
	7 feet	#5 at 48	#6 at 48	#6 at 40
	8 feet	#5 at 48	#6 at 48	#6 at 32
8 feet 8 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#5 at 48
	6 feet	#4 at 48	#5 at 48	#6 at 48
	7 feet	#5 at 48	#6 at 48	#6 at 40
	8 feet 8 inches	#6 at 48	#6 at 32	#6 at 24
9 feet 4 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#5 at 48
	6 feet	#4 at 48	#5 at 48	#6 at 48
	7 feet	#5 at 48	#6 at 48	#6 at 40
	8 feet	#6 at 48	#6 at 40	#6 at 24
	9 feet 4 inches	#6 at 40	#6 at 24	#6 at 16
10 feet	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#5 at 48
	6 feet	#4 at 48	#5 at 48	#6 at 48
	7 feet	#5 at 48	#6 at 48	#6 at 32
	8 feet	#6 at 48	#6 at 32	#6 at 24
	9 feet	#6 at 40	#6 at 24	#6 at 16
	10 feet	#6 at 32	#6 at 16	#6 at 16

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/mm.

a. Mortar shall be Type M or S and masonry shall be laid in running bond.

b. Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per lineal foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches in Seismic Design Categories A, B and C, and 48 inches in Seismic Design Categories D_0, D_1 and D_2.

c. Vertical reinforcement shall be Grade 60 minimum. The distance, *d*, from the face of the soil side of the wall to the center of vertical reinforcement shall be not less than 5 inches.

d. Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for moist conditions without hydrostatic pressure. Refer to Table R401.4.1(2).

e. Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab-on-grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.

f. The use of this table shall be prohibited for soil classifications not shown.

TABLE R404.1.2.1(3) 10-INCH MASONRY FOUNDATION WALLS WITH REINFORCING WHERE d ≥ 6.75 INCHES[a, c, f]

MAXIMUM UNSUPPORTED WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL[e]	MINIMUM VERTICAL REINFORCEMENT AND SPACING (inches)[b, c]		
		Soil classes and later soil load[d] (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, ML-CL and inorganic CL soils 60
6 feet 8 inches	~~4 feet (or less)~~	~~#4 at 56~~	~~#4 at 56~~	~~#4 at 56~~
	5 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	6 feet 8 inches	#4 at 56	#5 at 56	#5 at 56
7 feet 4 inches	~~4 feet (or less)~~	~~#4 at 56~~	~~#4 at 56~~	~~#4 at 56~~
	5 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#4 at 56	#5 at 56
	7 feet 4 inches	#4 at 56	#5 at 56	#6 at 56
	~~4 feet (or less)~~	~~#4 at 56~~	~~#4 at 56~~	~~#4 at 56~~
	5 feet (or less)	#4 at 56	#4 at 56	#4 at 56

MAXIMUM UNSUPPORTED WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL	MINIMUM VERTICAL REINFORCEMENT AND SPACING (inches)		
		Soil classes and later soil load (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, ML-CL and inorganic CL soils 60
8 feet	6 feet	#4 at 56	#4 at 56	#5 at 56
	7 feet	#4 at 56	#5 at 56	#6 at 56
	8 feet	#5 at 56	#6 at 56	#6 at 48
8 feet 8 inches	~~4 feet (or less)~~	~~#4 at 56~~	~~#4 at 56~~	~~#4 at 56~~
	5 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#4 at 56	#5 at 56
	7 feet	#4 at 56	#5 at 56	#6 at 56
	8 feet 8 inches	#5 at 56	#6 at 48	#6 at 32
9 feet 4 inches	~~4 feet (or less)~~	~~#4 at 56~~	~~#4 at 56~~	~~#4 at 56~~
	5 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#5 at 56	#5 at 56
	7 feet	#4 at 56	#5 at 56	#6 at 56
	8 feet	#5 at 56	#6 at 56	#6 at 40
	9 feet 4 inches	#6 at 56	#6 at 40	#6 at 24
10 feet	~~4 feet (or less)~~	~~#4 at 56~~	~~#4 at 56~~	~~#4 at 56~~
	5 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#5 at 56	#5 at 56
	7 feet	#5 at 56	#6 at 56	#6 at 48
	8 feet	#5 at 56	#6 at 48	#6 at 40
	9 feet	#6 at 56	#6 at 40	#6 at 24
	10 feet	#6 at 48	#6 at 32	#6 at 24

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/mm.

a. Mortar shall be Type M or S and masonry shall be laid in running bond.

b. Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per lineal foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches in Seismic Design Categories A, B and C, and 48 inches in Seismic Design Categories D_0, D_1 and D_2.

c. Vertical reinforcement shall be Grade 60 minimum. The distance, *d*, from the face of the soil side of the wall to the center of vertical reinforcement shall be not less than 6.75 inches.

d. Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for moist conditions without hydrostatic pressure. Refer to Table R401.4.1(2).

e. Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab-on-grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.

f. The use of this table shall be prohibited for soil classifications not shown.

TABLE R404.1.2.1(4) 12-INCH MASONRY FOUNDATION WALLS WITH REINFORCING WHERE d ≥ 8.75 INCHES[a, c, f]

MAXIMUM UNSUPPORTED WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL[e]	MINIMUM VERTICAL REINFORCEMENT AND SPACING (inches)[b, c]		
		Soil classes and lateral soil load[d] (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, ML-CL and inorganic CL soils 60
6 feet 8 inches	~~4 feet (or less)~~	~~#4 at 72~~	~~#4 at 72~~	~~#4 at 72~~
	5 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	6 feet 8 inches	#4 at 72	#4 at 72	#5 at 72
7 feet 4 inches	~~4 feet (or less)~~	~~#4 at 72~~	~~#4 at 72~~	~~#4 at 72~~
	5 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#4 at 72	#5 at 72
	7 feet 4 inches	#4 at 72	#5 at 72	#6 at 72
8 feet	~~4 feet (or less)~~	~~#4 at 72~~	~~#4 at 72~~	~~#4 at 72~~
	5 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#4 at 72	#5 at 72
	7 feet	#4 at 72	#5 at 72	#6 at 72
	8 feet	#5 at 72	#6 at 72	#6 at 64
	~~4 feet (or less)~~	~~#4 at 72~~	~~#4 at 72~~	~~#4 at 72~~
	5 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#4 at 72	#5 at 72

8 feet 8 inches MAXIMUM UNSUPPORTED WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL	MINIMUM VERTICAL REINFORCEMENT AND SPACING (inches)		
		Soil classes and lateral soil load (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, ML-CL and inorganic CL soils 60
	7 feet	#4 at 72	#5 at 72	#6 at 72
	8 feet 8 inches	#5 at 72	#7 at 72	#6 at 48
9 feet 4 inches	~~4 feet (or less)~~	~~#4 at 72~~	~~#4 at 72~~	~~#4 at 72~~
	5 feet <u>(or less)</u>	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#5 at 72	#5 at 72
	7 feet	#4 at 72	#5 at 72	#6 at 72
	8 feet	#5 at 72	#6 at 72	#6 at 56
	9 feet 4 inches	#6 at 72	#6 at 48	#6 at 40
10 feet	~~4 feet (or less)~~	~~#4 at 72~~	~~#4 at 72~~	~~#4 at 72~~
	5 feet <u>(or less)</u>	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#5 at 72	#5 at 72
	7 feet	#4 at 72	#6 at 72	#6 at 72
	8 feet	#5 at 72	#6 at 72	#6 at 48
	9 feet	#6 at 72	#6 at 56	#6 at 40
	10 feet	#6 at 64	#6 at 40	#6 at 32

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/mm.

a. Mortar shall be Type M or S and masonry shall be laid in running bond.

b. Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per lineal foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches in Seismic Design Categories A, B and C, and 48 inches in Seismic Design Categories D_0, D_1 and D_2.

c. Vertical reinforcement shall be Grade 60 minimum. The distance, *d*, from the face of the soil side of the wall to the center of vertical reinforcement shall be not less than 8.75 inches.

d. Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for moist conditions without hydrostatic pressure. Refer to Table R401.4.1(2).

e. Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground levels. Where an interior concrete slab-on-grade is provided and in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height is permitted to be measured from the exterior finish ground level to the top of the interior concrete slab is permitted.

f. The use of this table shall be prohibited for soil classifications not shown.

R404.1.4 Seismic Design Category D_0, D_1 or D_2.

R404.1.4.1 Masonry foundation walls. In *buildings* assigned to *Seismic Design Category* D_0, D_1 or D_2, as established in Table R301.2, masonry foundation walls shall comply with <u>TMS 402 or the provisions of</u> this section. In addition to the requirements of Table R404.1.2.1(1), plain masonry foundation walls shall comply with the following:

1. Wall height shall not exceed 8 feet (2438 mm).
2. Unbalanced backfill height shall not exceed 4 feet (1219 mm).
3. Minimum nominal thickness for plain masonry foundation walls shall be 8 inches (203 mm).
4. Masonry stem walls shall have a minimum vertical reinforcement of one No. 4 (No. 13) bar located not greater than 4 feet (1219 mm) on center in grouted cells. Vertical reinforcement shall be tied to the horizontal reinforcement in the footings.

Foundation walls, supporting more than 4 feet (1219 mm) of unbalanced backfill or exceeding 8 feet (2438 mm) in height shall be constructed in accordance with Table R404.1.2.1(2), R404.1.2.1(3) or R404.1.2.1(4). Masonry foundation walls shall have two No. 4 (No. 13) horizontal bars located in the upper 12 inches (305 mm) of the wall.

Reason: This proposal makes several changes to clarify and improve the requirements for masonry foundation walls.

1. Table R404.1.2.1 (1) - Solid 10 inch and 12 inch masonry units are not commonly available any longer. The proposal includes

modifying this table to replace solid 10 inch and 12 inch units in favor of grouted units of the same size. In unreinforced masonry, the strength of solid grouted masonry exceeds that of masonry constructed using solid units. As such, this change provides more useful, cost-effective solutions while concurrently increasing the strength of the assembly.

2. Tables R404.1.2.1(2), R404.1.2.1(3), and R404.1.2.1(4) - In may situations, the reinforcing schedule for walls with unbalanced backfill of 4 feet (or less) and 5 feet is the same. This change proposes to remove redundant requirements at those unbalanced backfill heights.

3. R404.1.4.1 - this section provides a prescriptive solution for masonry foundation walls in Seismic Design Category D_0, D_1, or D_2. No changes to the prescriptive solution are proposed, but an option to allow an engineered design per TMS 402 (Building Code Requirements for Masonry Structures) is proposed to be added. This is useful to provide an additional option in seismic areas that could create more economical designs, and can also be used in situations where the prescriptive solution is not feasible (such as when the wall height exceeds 8 feet).

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The changes are clarifications to reduce redundancy of foundation tables, remove outdated unit options, and provide an alternative path for engineering design of masonry foundation walls in seismic areas.

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IRC: R404.1.3, R404.1.3.1, R404.1.3.2, R404.1.3.3.7.2 (New), R404.1.3.3.7.2, R404.1.3.3.7.4, R404.1.3.3.7.5, TABLE 404.1.3.3 (New), R404.1.3.3.7.6, TABLE R404.1.3.2(1), TABLE R404.1.3.2(10) (New), ACI Chapter 44 (New), ASTM Chapter 44 (New)

Proponents: Stephen Szoke, representing American Concrete Institute (steve.szoke@concrete.org); Jerzy Zemajtis, NEx, An ACI Center of Excellence for Nonmetallic Building Materials, representing Jerzy Zemajtis, NEx (jerzy.zemajtis@nonmetallic.org); John Busel, representing American Composites Manufacturers Association (jbusel@acmanet.org); Dr. Julian Mills-Beale, representing National Ready Mixed Concrete Association (jmills-beale@nrmca.org); Doug Gremel, representing Owens Corning (douglas.gremel@owenscorning.com)

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R404.1.3 Concrete foundation walls. Concrete foundation walls that support light-frame walls shall be designed and constructed in accordance with the provisions of this section, ACI 318, ACI 332, ACI CODE 440.11 or PCA 100. Concrete foundation walls that support above-grade concrete walls that are within the applicability limits of Section R608.2 shall be designed and constructed in accordance with the provisions of this section, ACI 318, ACI 332, ACI CODE 440.11 or PCA 100. Concrete foundation walls that support above-grade concrete walls that are not within the applicability limits of Section R608.2 shall be designed and constructed in accordance with the provisions of ACI 318, ACI 332, ACI CODE 440.11 or PCA 100. Where ACI 318, ACI 332, ACI CODE 440.11, PCA 100 or the provisions of this section are used to design concrete foundation walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design, unless otherwise required by the state law of the *jurisdiction* having authority.

R404.1.3.1 Concrete cross section. Concrete walls constructed in accordance with this code shall comply with the shapes and minimum concrete cross-sectional dimensions required by Table R608.3. Other types of forming systems resulting in concrete walls not in compliance with this section and Table R608.3 shall be designed in accordance with ACI 318 or ACI CODE 440.11.

R404.1.3.2 Reinforcement for foundation walls. Concrete foundation walls shall be laterally supported at the top and bottom. Horizontal reinforcement shall be provided in accordance with Table R404.1.3.2(1). Vertical reinforcement shall be provided in accordance with Table R404.1.3.2(2), R404.1.3.2(3), R404.1.3.2(4), R404.1.3.2(5), R404.1.3.2(6), R404.1.3.2(7) or R404.1.3.2(8) for walls reinforced with steel reinforcement or Table R404.1.3.2(10) for walls reinforced with GFRP reinforcement. Vertical steel reinforcement for flat basement walls retaining 4 feet (1219 mm) or more of unbalanced backfill is permitted to be determined in accordance with Table R404.1.3.2(9). For *basement* walls supporting above-grade concrete walls, vertical steel reinforcement shall be the greater of that required by Tables R404.1.3.2(2) through R404.1.3.2(8) or by Section R608.6 for the above-grade wall. In *buildings* assigned to *Seismic Design Category* D_0, D_1 or D_2, concrete foundation walls shall also comply with Section R404.1.4.2.

Add new text as follows:

R404.1.3.3.7.2 Glass fiber reinforced polymer (GFRP) reinforcement. GFRP reinforcement shall comply with ASTM D7957. Concrete foundation walls reinforced with GFRP reinforcement shall only be permitted in buildings assigned to Seismic Design Category A.

R404.1.3.3.7.2 Location of reinforcement in wall. The center of vertical reinforcement in *basement* walls determined from Tables R404.1.3.2(2) through R404.1.3.2(7)for walls reinforced with steel reinforcement and Table 404.1.3.2(10) for walls with GFRP reinforcement shall be located at the centerline of the wall. Vertical reinforcement in *basement* walls determined from Table R404.1.3.2(8) shall be located to provide a maximum cover of 1$^{1}/_{4}$ inches (32 mm) measured from the inside face of the wall. Regardless of the table used to determine vertical wall reinforcement placement, the center of the ~~steel~~ reinforcing bars shall not vary from the specified location by more than the greater of 10 percent of the wall thickness and $^{3}/_{8}$ inch (10 mm). Horizontal and vertical reinforcement shall be located in foundation walls to provide the minimum cover required by Section R404.1.3.3.7.4.

R404.1.3.3.7.4 Support and cover. Reinforcement shall be secured in the proper location in the forms with tie wire or other bar support system to prevent displacement during the concrete placement operation. Steel reinforcement in concrete cast against the earth shall have a minimum cover of 3 inches (75 mm). Minimum cover for steel reinforcement in concrete cast in removable forms that will be exposed to the earth or weather shall be 1$^{1}/_{2}$ inches (38 mm) for No. 5 bars and smaller, and 2 inches (50 mm) for No. 6 bars and larger. For concrete cast in removable forms that will not be exposed to the earth or weather, and for concrete cast in stay-in-place forms, minimum cover for steel reinforcement shall be $^{3}/_{4}$ inch (19 mm). For concrete reinforced with GFRP reinforcement the minimum cover for any exposure shall be 3/4 inch (19 mm).The minus tolerance for cover shall not exceed the smaller of one-third the required cover or $^{3}/_{8}$ inch (10 mm).

R404.1.3.3.7.5 Lap splices. Vertical and horizontal wall reinforcement shall be the longest lengths practical. Where splices are necessary in reinforcement, the length of lap splice shall be in accordance with Table R608.5.4(1) for steel reinforcement or Table 404.1.3.3 for GFRP reinforcement and Figure R608.5.4(1). The maximum gap between noncontact parallel bars at a lap splice shall not exceed the smaller of one-fifth the required lap length and 6 inches (152 mm) [see Figure R608.5.4(1)].

TABLE 404.1.3.3 MINIMUM SPLICE LENGTH FOR HORIZONTAL GFRP REINFORCEMENT[a]

No. 4 bars	No. 5 bars	No. 6 bars
26 in.	32 in.	38 in.

a. Lap splices are not permitted for vertical GFRP reinforcement unless approved by a registered design professional.

R404.1.3.3.7.6 Alternate grade of steel reinforcement and spacing. Where tables in Section R404.1.3.2 specify vertical ~~wall~~ steel reinforcement based on minimum bar size and maximum spacing, which are based on Grade 60 (414 MPa) steel reinforcement, different size bars or bars made from a different grade of steel are permitted provided that an equivalent area of steel per linear foot of wall is provided. Use of Table R404.1.3.2(9) is permitted to determine the maximum bar spacing for different bar sizes than specified in the tables or bars made from a different grade of steel. Bars shall not be spaced less than one-half the wall thickness, or more than 48 inches (1219 mm) on center.

TABLE R404.1.3.2(1) MINIMUM HORIZONTAL REINFORCEMENT FOR CONCRETE ~~BASEMENT~~ FOUNDATION WALLS~~[a, b]~~

REINFORCEMENT TYPE	MAXIMUM UNSUPPORTED WALL HEIGHT (feet)	LOCATION OF HORIZONTAL REINFORCEMENT Steel
Steel[a, b]	≤ 8	Minimum of 3 No. 4 bars placed such that there is ~~O~~one ~~No. 4~~ bar within 12 inches of the top of the wall story and one ~~No. 4 bar~~ near mid-height of the wall story.
	> 8	Minimum of four No. 4 bars placed such that there is ~~O~~one ~~No. 4 bar~~ within 12 inches of the top of the wall story and one ~~No. 4 bar~~ near third points in the wall story.
GFRP	≤ 8	Minimum of four No. 4 bars placed such that there is one bar wihtin 24 inches of the top and bottom of the wall story and one bar near the third points in the wall story.
	> 8 and ≤ 10	Minimum of five No. 4 bars placed such that there is one bar within 12 inches of the top and bottom of the wall story and one bar near the quarter points of the wall story.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 kPa.

a. Horizontal reinforcement requirements are for reinforcing bars with a minimum yield strength of 40,000 psi and concrete with a minimum concrete compressive strength of 2,500 psi.

b. See Section R404.1.3.2 for minimum reinforcement required for foundation walls supporting above-grade concrete walls.

TABLE R404.1.3.2(10) MINIMUM VERTICAL GFRP REINFORCEMENT FOR FLAT CONCRETE WALLS [a,b]

Maximum Unsupported Wall Height (ft)	Maximum Unbalanced Fill (ft)	Minimum Vertical Reinforcement - Bar Size No, and Spacing (in.)								
		Maximum Design Lateral Soil Load psf/ft of depth								
		GW, GP, SW, SP 30			GM, GC, SM, SM-SC and ML 45			SC, ML-CL and Inorganic CL 60		
		Nominal Wall Thickness, in.			Nominal Wall Thickness, in			Nominal Wall Thickness, in		
		6	8	10	6	8	10	6	8	10
	4	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	5@32	NR	NR	6@31	NR	NR

8	6	5@32	NR	NR	6@26	NR	NR	6@13	6@32	NR
	7	6@29	NR	NR	6@12	6@27	NR	DR	6@19	NR
	8	6@17	6@32	6@32	DR	6@20	6@32	DR	6@10	6@19
9	4	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	5@32	NR	NR	6@29	NR	NR
	6	5@27	NR	NR	6@23	NR	NR	6@10	6@26	NR
	7	6@25	NR	NR	6@8	6@24	NR	DR	6@62	6@28
	8	6@12	6@27	NR	DR	6@16	NR	DR	6@7	6@17
	9	6@6	6@21	6@32	DR	6@8	6@28	DR	DR	6@11
10	4	NR	NR	NR	NR	NR	6@18	NR	NR	NR
	5	NR	NR	NR	5@26	NR	NR	6@27	NR	NR
	6	6@32	NR	NR	6@20	NR	NR	6@8	6@24	NR
	7	6@22	NR	NR	6@6	6@22	NR	DR	6@13	6@21
	8	6@9	6@25	NR	DR	6@13	6@21	DR	DR	6@15
	9	DR	6@18	6@30	DR	6@6	6@16	DR	DR	6@8
	10	DR	6@11	6@20	DR	DR	6@10	DR	DR	DR

NR = Reinforcement not required.

DR = Design required.

a. Interpolation between values in these tables is not permitted. However, smaller bar sizes are permitted provided the bar cross sectional area divided by the bar spacing is greater than the bar cross sectional area divided by the bar spacing shown in the table. Bar cross sectional areas are provided in ASTM D7957-22.

b. Minimum vertical reinforcement spacing is 6 in.

Add new standard(s) as follows:

ACI

American Concrete Institute
38800 Country Club Drive
Farmington Hills, MI 48331

CODE 440.11 — Building Code Requirements for Structural Concrete Reinforced with Glass Fiber-Reinforced Polymer (GFRP) Bars—Code and Commentary

D7957/D7957M-22 — Standard Specification for Solid Round Glass Fiber Reinforced Polymer Bars for Concrete Reinforcement

Reason: This proposal adds prescriptive provisions for the construction of concrete foundation walls reinforced with glass fiber reinforced polymer (GFRP) reinforcement. The design is based on ACI CODE 440.11 Building Code Requirements for Structural Concrete Reinforced with Glass Fiber-Reinforced Polymer (GFRP) Bars and limited to GFRP complying with ASTMD7957/D7957M-22—Standard Specification for Solid Round Glass Fiber Reinforced Polymer Bars for Concrete Reinforcement. Both standards are proposed as referenced standards in this code change proposal. GFRP reinforcement can significantly improve safety and durability in corrosive environments which can be present for foundation wall systems.

This proposal does not alter current means of compliance for foundation walls, but adds minimum criteria where foundation walls are to be constructed using GFRP reinforcement.

This proposal introduces concrete foundation walls reinforced with GFRP into the IRC for building assigned to Seismic Design Category A. The 2024 International Building Code permits the use of structural concrete reinforced with GFRP reinforcement in accordance with ACI CODE 440.11 for SDC A. The criteria in ACI CODE 440.11 and the assumptions used to develop the steel reinforced foundation walls currently in the IRC were used to develop these pre-engineered criteria for the IRC.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal provides minimum criteria for alternative means of design and construction of concrete foundation walls. It does alter current code compliance requirements.

Staff Analysis: A review of the following standards proposed for inclusion in the code regarding some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before April 1, 2025:

ACICODE 440.11 Building Code Requirements for Structural Concrete Reinforced with Glass Fiber-Reinforced Polymer (GFRP) Bars—Code and Commentary

ASTMD7957/D7957M-22 Standard Specification for Solid Round Glass Fiber Reinforced Polymer Bars for Concrete Reinforcement

RB161-25

RB169-25

IRC: TABLE R502.3.1(1), TABLE R502.3.1(2)

Proponents: Shane Nilles, representing American Wood Council (snilles@awc.org); David Tyree, representing American Wood Council (dtyree@awc.org)

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Revise as follows:

TABLE R502.3.1(1) FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES (Residential sleeping areas, live load = 30 psf, L/Δ = 360)[a]

Portions of table not shown remain unchanged.

JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf				DEAD LOAD = 20 psf			
			2 × 6	2 × 8	2 × 10	2 × 12	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum floor joist spans							
			(ft-in)	(ft-in)	(ft-in)	(ft-in)	(ft-in)	(ft-in)	(ft-in)	(ft-in)
12	Southern pine	SS	12-3	16-2	20-8	25-1	12-3	16-2	20-8	25-1
	Southern pine	#1	11-10	15-7	19-10	24-2	11-10	15-7	18-7	22-0
	Southern pine	#2	11-3	14-11	18-1	21-4	10-9	13-8	16-2	19-1
	Southern pine	#3	9-2	11-6	~~14-0~~13-11	16-6	8-2	10-3	12-6	14-9
16	Southern pine	SS	11-2	14-8	18-9	22-10	11-2	14-8	18-9	22-10
	Southern pine	#1	10-9	14-2	18-0	21-4	10-9	13-9	16-1	19-1
	Southern pine	#2	10-3	13-3	15-8	18-6	9-4	11-10	14-0	16-6
	Southern pine	#3	7-11	10-0	~~11-1~~12-1	14-4	7-1	8-11	10-10	12-10
19.2	Hem-fir	SS	10-1	13-4	17-0	20-8	10-1	13-4	17-0	20-7
	Hem-fir	#1	9-10	13-0	16-7	19-3	9-7	12-2	14-10	17-2
	Hem-fir	#2	9-5	12-5	15-6	~~17-1~~17-11	8-11	11-4	13-10	16-1
	Hem-fir	#3	7-8	9-9	11-10	13-9	6-10	8-8	10-7	12-4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

Note: Check sources for availability of lumber in lengths greater than 20 feet.

a. Dead load limits for townhouses in Seismic Design Category C and all structures in Seismic Design Categories D_0, D_1 and D_2 shall be determined in accordance with Section R301.2.2.2.

TABLE R502.3.1(2) FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES (Residential living areas, live load = 40 psf, L/Δ = 360)[b]

Portions of table not shown remain unchanged.

JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf				DEAD LOAD = 20 psf			
			2 × 6	2 × 8	2 × 10	2 × 12	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum floor joist spans							
			(ft-in)	(ft-in)	(ft-in)	(ft-in)	(ft-in)	(ft-in)	(ft-in)	(ft-in)
24	Southern pine	SS	8-10	11-8	14-11	18-1	8-10	11-8	14-11	18-0
	Southern pine	#1	8-6	11-3	13-1	15-7	8-1	10-3	12-0	14-3
	Southern pine	#2	7-7	9-8	11-5	13-6	~~7-0~~6-11	8-10	10-5	12-4
	Southern pine	#3	5-9	7-3	8-10	10-5	5-3	6-8	8-1	9-6

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

Note: Check sources for availability of lumber in lengths greater than 20 feet.

a. End bearing length shall be increased to 2 inches.

b. Dead load limits for townhouses in Seismic Design Category C and all structures in Seismic Design Categories D_0, D_1, and D_2 shall be determined in accordance with Section R301.2.2.2.

Reason: This proposal updates the span tables to be aligned with ASCE 7-22 and corrects errors in spans that could not be corrected by ICC staff using ICC's editorial process. The proposed spans align with those found in the ANSI/AWC 2024 *Wood Frame Construction*

Manual (WFCM).

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal corrects errors and updates for floor joist spans to align with the WFCM.

RB169-25

RB170-25

IRC: R502.6, TABLE R602.3(1), FIGURE R602.3(1)

Proponents: Shane Nilles, representing American Wood Council (snilles@awc.org); David Tyree, representing American Wood Council (dtyree@awc.org); Jason Smart, representing American Wood Council (jsmart@awc.org)

2024 International Residential Code

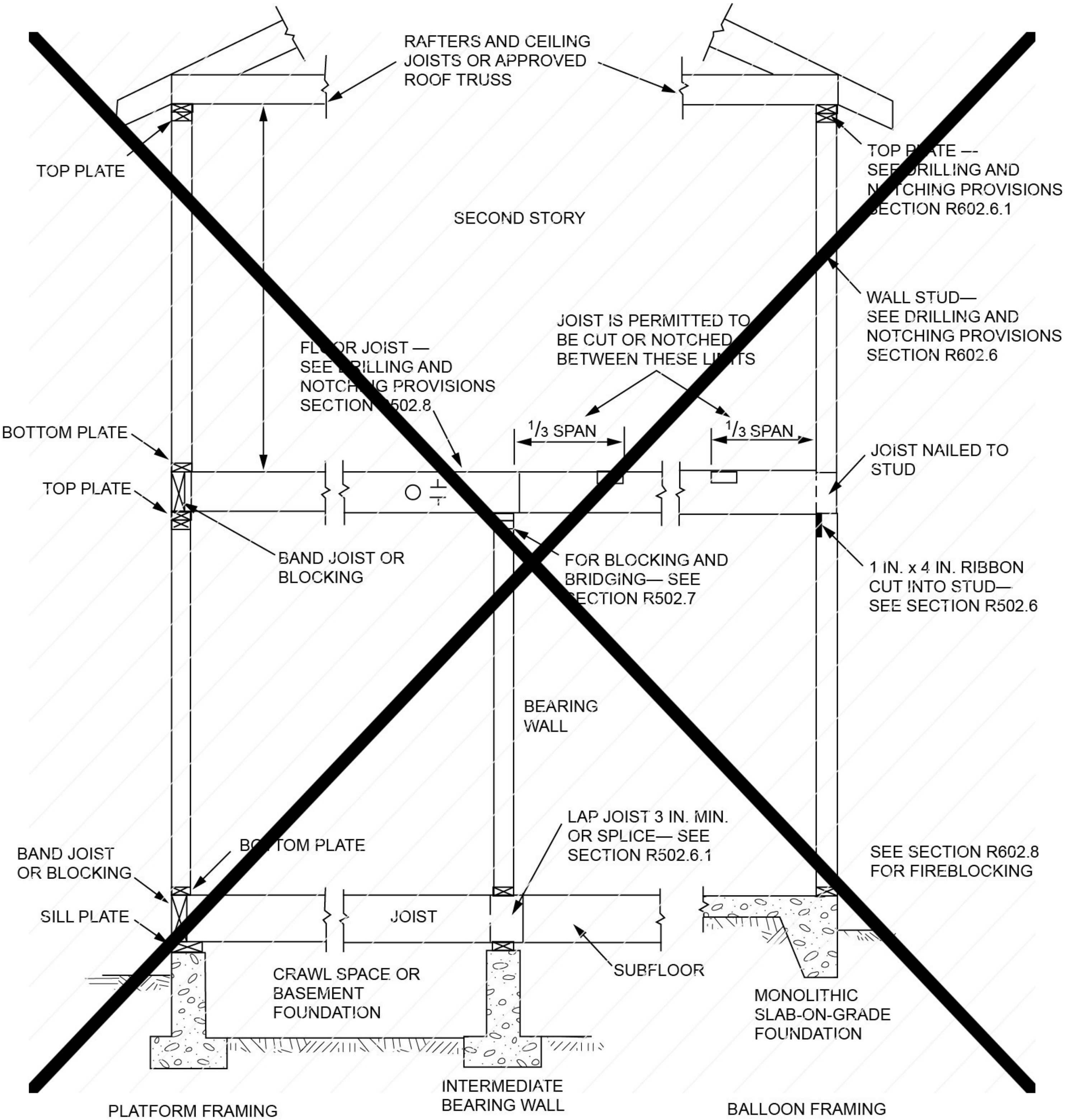
Revise as follows:

R502.6 Bearing. The ends of each joist, beam or girder shall have not less than 1$^1/_2$ inches (38 mm) of bearing on wood or metal, have not less than 3 inches of bearing (76 mm) on masonry or concrete or be supported by *approved* joist hangers. Alternatively, the ends of joists shall be supported on a 1-inch by 4-inch (25 mm by 102 mm) let-in ribbon strip and the joist and ribbon strip shall be nailed to the adjacent stud in accordance with Table R602.3(1). The bearing on masonry or concrete shall be direct, or a sill plate of 2-inch-minimum (51 mm) nominal thickness shall be provided under the joist, beam or girder. The sill plate shall provide a minimum nominal bearing area of 48 square inches (30 865 mm^2).

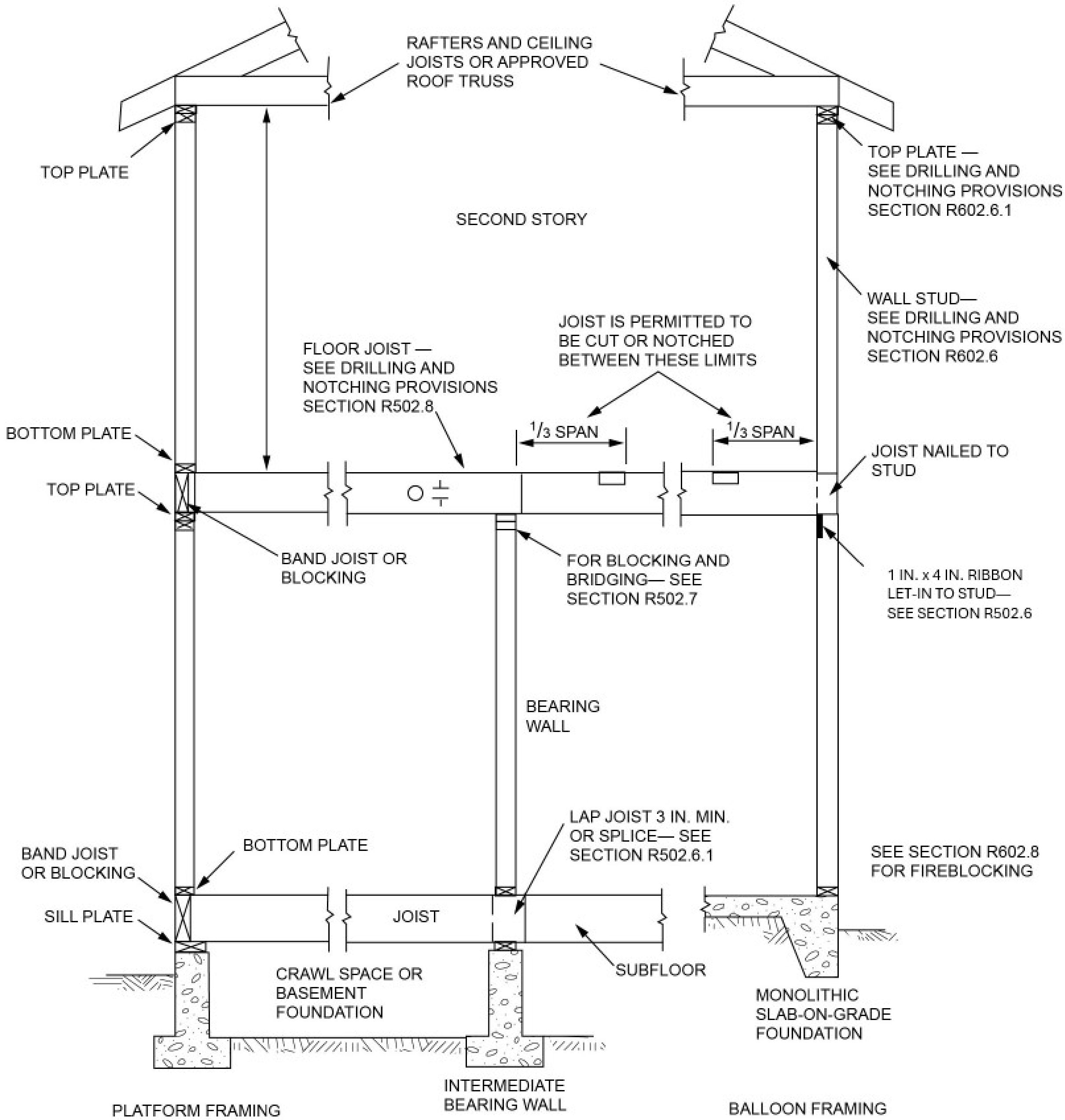
TABLE R602.3(1) FASTENING SCHEDULE

Portions of table not shown remain unchanged.

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER[a, b, c]	SPACING AND LOCATION
		Floor	
30	Ribbon strip to stud	3-8d box (2$^1/_2$″ × 0.113″); or 2-8d common (2$^1/_2$″ × 0.131″); or 2-10d box (3″ × 0.128″); or 2 staples, 1″ crown, 16 ga., 1$^3/_4$″ long	Face nail at each stud
31	Joist to stud where supported by ribbon strip	4-8d box (2$^1/_2$″ × 0.113″); or 3-8d common (2$^1/_2$″ × 0.131″); or 3-10d box (3″ × 0.128″); or 3-3″ × 0.131″ nails	Face nail



RAFTERS AND CEILING JOISTS OR APPROVED ROOF TRUSS
TOP PLATE
SECOND STORY
WALL STUD—
SEE DRILLING AND
NOTCHING PROVISIONS
SECTION R602.6
BOTTOM PLATE
TOP PLATE
1/3 SPAN
1/3 SPAN
JOIST NAILED TO STUD
BAND JOIST OR BLOCKING
FOR BLOCKING AND BRIDGING— SEE
1 IN. x 4 IN. RIBBON
CUT INTO STUD—
SEE SECTION R502.6
BEARING WALL
LAP JOIST 3 IN. MIN.
OR SPLICE— SEE
SECTION R502.6.1
BAND JOIST OR BLOCKING
SEE SECTION R602.8 FOR FIREBLOCKING
SILL PLATE
JOIST
SUBFLOOR
CRAWL SPACE OR BASEMENT FOUNDATION
MONOLITHIC SLAB-ON-GRADE FOUNDATION
INTERMEDIATE BEARING WALL
PLATFORM FRAMING
BALLOON FRAMING



For SI: 1 inch = 25.4 mm.

FIGURE R602.3(1) TYPICAL WALL, FLOOR AND ROOF FRAMING

Reason: Section R502.6 permits a ribbon strip to provide bearing for joists but does not specify how the ribbon strip is required to be let-in to the stud and fastened.

Additionally, the joists are required to be nailed to the adjacent stud, but no fasteners are specified. This code change provides provisions for proper installation of the ribbon strip and associated fastening with two new rows being added to Table R602.3(1). The nailing for "Ribbon strip to supporting joists" is based on current item #20 and the nailing for "Joist to stud where supported by ribbon strip" is based on current item #22. Additionally, the ribbon strip callout in Figure R602.3(1) has been revised from "cut-in" to "let-in" to be consistent with the common terminology used in the code.

NOTE: The existing items in Table R602.3(1) will be renumbered accordingly but are not shown for brevity.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This code change proposal provides clarification for installation of ribbon strips which is already a framing option in the code.

RB173-25

IRC: R503.1, TABLE R503.1, TABLE R507.9.1.3(1), TABLE R703.3(1), R703.3.3, R803.1, TABLE R803.1, TABLE R905.1.1(1), R905.2.1, R905.3.1, R905.4.1, R905.4.4.1, R905.5.1, R905.6.1, R905.7.1, R905.7.1.1, R905.8.1, R905.8.1.1, R905.10.1, R905.15.1, R905.16.1

Proponents: Shane Nilles, representing American Wood Council (snilles@awc.org); David Tyree, representing American Wood Council (dtyree@awc.org)

2024 International Residential Code

Revise as follows:

R503.1 Sawn Lumber sheathing. Maximum allowable spans for sawn lumber ~~used as~~ floor sheathing shall conform to Tables R503.1~~, R503.2.1.1(1) and R503.2.1.1(2)~~.

TABLE R503.1 MINIMUM THICKNESS OF SAWN LUMBER FLOOR SHEATHING

Portions of table not shown remain unchanged.

For SI: 1 inch = 25.4 mm, 1 pound per square inch = 6.895 kPa.

N/A = Not Applicable.

a. For this support spacing, sawn lumber sheathing shall have a minimum F_b of 675 and minimum E of 1,100,000 (see ANSI AWC NDS).

b. For this support spacing, sawn lumber sheathing shall have a minimum F_b of 765 and minimum E of 1,400,000 (see ANSI AWC NDS).

c. For this support spacing, sawn lumber sheathing shall have a minimum F_b of 855 and minimum E of 1,700,000 (see ANSI AWC NDS).

TABLE R507.9.1.3(1) DECK LEDGER CONNECTION TO BAND JOIST

Portions of table not shown remain unchanged.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Interpolation permitted. Extrapolation is not permitted.

b. Ledgers shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joist.

c. Dead Load = 10 psf. Snow load shall not be assumed to act concurrently with live load.

d. The tip of the lag screw shall fully extend beyond the inside face of the band joist. Lag screws shall be full-body diameter screws.

e. Sheathing shall be wood structural panel or ~~solid~~ sawn lumber.

f. Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard, sawn lumber or foam sheathing. Up to $^1/_2$-inch thickness of stacked washers shall be permitted to substitute for up to $^1/_2$ inch of allowable sheathing thickness where combined with wood structural panel or sawn lumber sheathing.

TABLE R703.3(1) SIDING MINIMUM ATTACHMENT AND MINIMUM THICKNESS

Portions of table not shown remain unchanged.

SIDING MATERIAL	NOMINAL THICKNESS (inches)	JOINT TREATMENT	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS					
			~~Wood~~ Sawn lumber or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud[l]	Direct to studs	Number or spacing of fasteners

R703.3.3 Fasteners. *Exterior wall coverings* shall be securely fastened with aluminum, galvanized, stainless steel or rust-preventative coated nails or staples in accordance with Table R703.3(1) or with other *approved* corrosion-resistant fasteners in accordance with the wall covering manufacturer's installation instructions. Nails and staples shall comply with ASTM F1667. Nails shall be T-head, modified round head, or round head with smooth or deformed shanks. Staples shall have a minimum crown width of $^{7}/_{16}$ inch (11.1 mm) outside diameter and be manufactured of minimum 16-gage wire. Where fiberboard, gypsum, or foam plastic sheathing backing is used, nails or staples shall be driven into the studs. Where ~~wood~~ sawn lumber sheathing or *wood structural panel* sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with either the siding manufacturer's installation instructions or Table R703.3.3.

R803.1 Sawn Lumber sheathing. Allowable spans for sawn lumber ~~used as~~ roof sheathing shall conform to Table R803.1. Spaced sawn lumber sheathing for wood shingle and shake roofing shall conform to the requirements of Sections R905.7 and R905.8. Spaced sawn lumber sheathing is not allowed in *Seismic Design Category* D_2.

TABLE R803.1 MINIMUM THICKNESS OF SAWN LUMBER ROOF SHEATHING

Portions of table not shown remain unchanged.

TABLE R905.1.1(1) UNDERLAYMENT TYPES

Portions of table not shown remain unchanged.

ROOF COVERING	SECTION	AREAS WHERE WIND DESIGN IS NOT REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1	AREAS WHERE WIND DESIGN IS REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1
Wood shakes on ~~solid~~ wood structural panels or closely fitted sawn lumber sheathing	R905.8	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV	ASTM D226 Type II ASTM D4869 Type III or IV
Metal panels on ~~solid~~ wood structural panels or closely fitted sawn lumber sheathing	R905.10	ASTM D226 Type I or II ASTM D4869 Type I, II III or IV	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257

R905.2.1 Sheathing requirements. Asphalt shingles shall be fastened to *wood structural panels* or ~~solid~~ closely fitted sawn lumber sheathing.

R905.3.1 Sheathing requirements. Concrete and clay tile shall be installed over wood structural panels or ~~solid~~ closely fitted sawn lumber sheathing.

Exception: Spaced sawn lumber sheathing in accordance with Section R803.1 shall be permitted in *Seismic Design Categories* A, B and C.

R905.4.1 Sheathing requirements. *Metal roof shingles* shall be fastened to *wood structural panels*~~, solid lumber sheathing~~ or closely fitted sawn lumber sheathing, except where the *roof covering* is specifically designed to be applied to spaced sawn lumber sheathing.

R905.4.4.1 Wind resistance of metal roof shingles. *Metal roof shingles* fastened to *wood structural panels*~~, solid lumber sheathing~~ or closely fitted sawn lumber sheathing shall be tested in accordance with ASTM D3161, FM 4474, UL 580 or UL 1897. *Metal roof shingles* tested in accordance with ASTM D3161 shall meet the classification requirements of Table R905.4.4.1 for the appropriate maximum *basic wind speed* and the metal shingle packaging shall bear a *label* to indicate compliance with ASTM D3161 and the required classification in Table R905.2.4.1.

R905.5.1 Sheathing requirements. Mineral-surfaced roll roofing shall be fastened to *wood structural panels* or ~~solid~~ closely fitted sawn lumber sheathing .

R905.6.1 Sheathing requirements. Slate shingles shall be fastened to *wood structural panels* or ~~solid~~ closely fitted sawn lumber sheathing.

R905.7.1 Sheathing requirements. Wood shingles shall be fastened to *wood structural panels*, ~~solid~~ closely fitted sawn lumber sheathing or spaced sawn lumber sheathing. Where spaced sawn lumber sheathing is used, sheathing boards shall be not less than 1-inch by 4-inch (25 mm by 102 mm) nominal dimensions and shall be spaced on centers equal to the weather exposure from Table R905.7.6(1) to coincide with the placement of fasteners. Where 1-inch by 4-inch (25 mm by 102 mm) spaced sawn lumber sheathing is installed at 10 inches (254 mm) or greater, additional 1-inch by 4-inch (25 mm by 102 mm) boards shall be installed between the sheathing boards. Where wood shingles are installed over spaced sawn lumber sheathing and the underside of the shingles are exposed to the *attic* space, the *attic* shall be ventilated in accordance with Sections R806.1, R806.2, R806.3 and R806.4. The shingles shall not be backed with materials that will occupy the required air gap space and prevent the free movement of air on the interior side of the spaced sawn lumber sheathing.

R905.7.1.1 ~~Solid sheathing required~~ Sheathing under ice barrier. ~~In areas where the average daily temperature in January is 25°F (-4°C) or less,~~ *wood structural panels* or ~~solid~~ closely fitted sawn lumber sheathing is required on ~~that~~ portions of the roof deck ~~requiring~~ where the application of an ice barrier is required by Section R905.1.2 .

R905.8.1 Sheathing requirements. Wood shakes shall be fastened to *wood structural panels*, ~~solid~~ closely fitted sawn lumber sheathing or spaced sawn lumber sheathing. Where spaced sawn lumber sheathing is used, sheathing boards shall be not less than 1-inch by 4-inch (25 mm by 102 mm) nominal dimensions and shall be spaced on centers equal to the weather exposure from Table R905.8.7 to coincide with the placement of fasteners. Where 1-inch by 4-inch (25 mm by 102 mm) spaced sawn lumber sheathing is installed at 10 inches (254 mm) on center, additional 1-inch by 4-inch (25 mm by 102 mm) boards shall be installed between the sheathing boards. Where wood shakes are installed over spaced sawn lumber sheathing and the underside of the shakes are exposed to the *attic* space, the *attic* shall be ventilated in accordance with Sections R806.1, R806.2, R806.3 and R806.4. The shakes shall not be backed with materials that will occupy the required air gap space and prevent the free movement of air on the interior side of the spaced sawn lumber sheathing.

R905.8.1.1 ~~Solid sheathing required~~ Sheathing under ice barrier. ~~In areas where the average daily temperature in January is 25°F (-4°C) or less,~~ *wood structural panels* or ~~solid~~ closely fitted sawn lumber sheathing is required on ~~that~~ portions of the roof deck ~~requiring~~ where the application of an ice barrier is required by Section R905.1.2.

R905.10.1 Sheathing requirements. *Metal roof panel* roof coverings shall be fastened to *wood structural panels*, ~~solid~~ closely fitted sawn lumber sheathing or spaced sawn lumber sheathing, except where the *roof covering* is specifically designed to be applied to spaced supports without sheathing.

R905.15.1 Sheathing requirements. *BIPV shingles* shall be fastened to *wood structural panels*~~, solid lumber sheathing~~ or closely fitted sawn lumber sheathing, except where the *roof covering* is specifically designed to be applied over spaced sawn lumber sheathing.

R905.16.1 Sheathing requirements. *BIPV roof panels* shall be fastened to *wood structural panels*~~, solid lumber sheathing~~ or ~~closely fitted~~ closely fitted sawn lumber sheathing , except where the *roof covering* is specifically designed to be applied over spaced sawn lumber sheathing.

Reason: Code users have questioned if "lumber sheathing" is the same thing as "wood structural panels". This code change is intended to make a clearer distinction between the two by changing "lumber sheathing" to "sawn lumber sheathing" throughout. Sawn lumber is the appropriate terminology that refers to structural wood members that are not a composite and are rather sawn from a log.

Additionally, the phrase "solid sheathing" is misleading where sawn lumber is used as it leaves the code user to question if any gaps are permitted. The code also recognizes "closely fitted" as a phrase to indicate that sawn lumber used as sheathing is permitted to be installed with necessary gaps due to construction tolerances, provided they are closely fitted. Therefore the language has been cleaned up to only refer to "closely fitted" in the context of sawn lumber sheathing.

Lastly, a change has been made to the provisions for decking requirements of wood shakes and shingles to appropriately indicate Section R905.1.2 for the requirement to install an ice barrier, rather than have duplicated language in that section and the sheathing requirement sections.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There are no technical changes proposed in this code change.

RB173-25

RB179-25

IRC: TABLE R507.3.1

Proponents: Jeff Grove, Chair, representing BCAC (bcac@iccsafe.org)

2024 International Residential Code

Revise as follows:

TABLE R507.3.1 MINIMUM FOOTING SIZE FOR DECKS

LIVE OR GROUND SNOW LOAD[b] (psf)	TRIBUTARY AREA[e] (ft^2)	LOAD-BEARING VALUE OF SOILS[a, c, d] (psf)								
		1,500			2,000			≥ 3,000		
		Side of a square footing (inches)	Diameter of a round footing (inches)	Plain concrete thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Plain concrete thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Plain concrete thickness (inches)
40	5	7	8	6	7	8	6	7	8	6
	20	10	12	6	9	9	6	7	8	6
	40	14	16	6	12	14	6	10	12	6
	60	17	19	6	15	17	6	12	14	6
	80	20	22	7	17	19	6	14	16	6
	100	22	25	8	19	21	6	15	17	6
	120	24	27	9	21	23	7	17	19	6
	140	26	29	10	22	25	8	18	21	6
	160	28	31	11	24	27	9	20	22	7
50	5	7	8	6	7	8	6	7	8	6
	20	11	13	6	10	11	6	8	9	6
	40	15	17	6	13	15	6	11	13	6
	60	19	21	6	16	18	6	13	15	6
	80	21	24	8	19	21	6	15	17	6
	100	24	27	9	21	23	7	17	19	6
	120	26	30	10	23	26	8	19	21	6
	140	28	32	11	25	28	9	20	23	7
	160	30	34	12	26	30	10	21	24	8
60	5	7	8	6	7	8	6	7	8	6
	20	12	14	6	11	12	6	9	10	6
	40	16	19	6	14	16	8	12	14	6
	60	20	23	7	17	20	6	14	16	6
	80	23	26	9	20	23	7	16	19	6
	100	26	29	10	22	25	8	18	21	6
	120	28	32	11	25	28	9	20	23	7
	140	31	35	12	27	30	10	22	24	8
	160	33	37	13	28	32	11	23	26	9
70	5	7	8	6	7	8	6	7	8	6
	20	12	14	6	11	13	6	9	10	6
	40	18	20	6	15	17	6	12	14	6
	60	21	24	8	19	21	6	15	17	6
	80	25	28	9	21	24	8	18	20	6
	100	28	31	11	24	27	9	20	22	7
	120	30	34	12	26	30	10	21	24	8
	140	33	37	13	28	32	11	23	26	9
	160	35	40	15	30	34	12	25	28	9

For SI: 1 inch = 25.4 mm, 1 square foot = 0.0929 m^2, 1 pound per square foot = 0.0479 kPa.

a. Interpolation permitted, extrapolation not permitted.

b. Based on highest load case: Dead + Live or Dead + Snow.

Dead load = 10 psf. Snow load is not assumed to be concurrent with live load.

c. Footing dimensions shall allow complete bearing of the post.

d. If the support is a brick or CMU pier, the footing shall have a minimum 2-inch projection on all sides.

e. Area, in square feet, of deck surface supported by post and footings.

Reason: The added text is provided to clarify how to use the table for the code users and be consistent with other tables in the code. This code change clarifies the use of column "LIVE OR GROUND SNOW LOADb (psf)" in the table. The table values are based on the highest load case: Dead + Live or Dead + Snow. Dead load = 10 psf. Snow load is not assumed to be concurrent with live load.

This proposal is submitted by the ICC Building Code Action Committee (BCAC).

BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and 2024 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC webpage.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposal clarifies how to use the table values.

RB179-25

RB180-25

IRC: TABLE R507.6

Proponents: Glenn Mathewson, BuildingCodeCollege.com, representing Self (glenn@glennmathewson.com)

2024 International Residential Code

Revise as follows:

TABLE R507.6 MAXIMUM DECK JOIST SPANS

LOAD[a] (psf)	JOIST SPECIES[b]	JOIST SIZE	ALLOWABLE JOIST SPAN[b, c] (feet-inches)			MAXIMUM CANTILEVER[d, f] (feet-inches)							
			Joist spacing (inches)			Joist back span[g] (feet)							
			12	16	24	4	6	8	10	12	14	16	18
40 live load	Southern pine	2 × 6	9-11	9-0	7-7	1-0	1-6	1-5	NP	NP	NP	NP	NP
		2 × 8	13-1	11-10	9-8	1-0	1-6	2-0	2-6	2-3	NP	NP	NP
		2 × 10	16-2	14-0	11-5	1-0	1-6	2-0	2-6	3-0	3-4	3-4	NP
		2 × 12	18-0	16-6	13-6	1-0	1-6	2-0	2-6	3-0	3-6	4-0	4-1
	Douglas fir-larch[e] Hem-fir[e] Spruce-pine-fir[e]	2 × 6	9-6	8-4	6-10	1-0	1-6	1-4	NP	NP	NP	NP	NP
		2 × 8	12-6	11-1	9-1	1-0	1-6	2-0	2-3	2-0	NP	NP	NP
		2 × 10	15-8	13-7	11-1	1-0	1-6	2-0	2-6	3-0	3-3	NP	NP
		2 × 12	18-0	15-9	12-10	1-0	1-6	2-0	2-6	3-0	3-6	3-11	3-11
	Redwood[f] Western cedars[f] Ponderosa pine[f] Red pine[f]	2 × 6	8-10	8-0	6-10	1-0	1-4	1-1	NP	NP	NP	NP	NP
		2 × 8	11-8	10-7	8-8	1-0	1-6	2-0	1-11	NP	NP	NP	NP
		2 × 10	14-11	13-0	10-7	1-0	1-6	2-0	2-6	3-0	2-9	NP	NP
		2 × 12	17-5	15-1	12-4	1-0	1-6	2-0	2-6	3-0	3-6	3-8	NP
50 ground snow load	Southern pine	2 × 6	9-2	8-4	7-4	1-0	1-6	1-5	NP	NP	NP	NP	NP
		2 × 8	12-1	11-0	9-5	1-0	1-6	2-0	2-5	2-3	NP	NP	NP
		2 × 10	15-5	13-9	11-3	1-0	1-6	2-0	2-6	3-0	3-1	NP	NP
		2 × 12	18-0	16-2	13-2	1-0	1-6	2-0	2-6	3-0	3-6	3-10	3-10
	Douglas fir-larch[e] Hem-fir[e] Spruce-pine-fir[e]	2 × 6	8-10	8-0	6-8	1-0	1-6	1-4	NP	NP	NP	NP	NP
		2 × 8	11-7	10-7	8-11	1-0	1-6	2-0	2-3	NP	NP	NP	NP
		2 × 10	14-10	13-3	10-10	1-0	1-6	2-0	2-6	3-0	3-0	NP	NP
		2 × 12	17-9	15-5	12-7	1-0	1-6	2-0	2-6	3-0	3-6	3-8	NP
	Redwood[f] Western cedars[f] Ponderosa pine[f] Red pine[f]	2 × 6	8-3	7-6	6-6	1-0	1-4	1-1	NP	NP	NP	NP	NP
		2 × 8	10-10	9-10	8-6	1-0	1-6	2-0	1-11	NP	NP	NP	NP
		2 × 10	13-10	12-7	10-5	1-0	1-6	2-0	2-6	2-9	NP	NP	NP
		2 × 12	16-10	14-9	12-1	1-0	1-6	2-0	2-6	3-0	3-5	3-5	NP
60 ground snow load	Southern pine	2 × 6	8-8	7-10	6-10	1-0	1-6	1-5	NP	NP	NP	NP	NP
		2 × 8	11-5	10-4	8-9	1-0	1-6	2-0	2-4	NP	NP	NP	NP
		2 × 10	14-7	12-9	10-5	1-0	1-6	2-0	2-6	2-11	2-11	NP	NP
		2 × 12	17-3	15-0	12-3	1-0	1-6	2-0	2-6	3-0	3-6	3-7	NP
	Douglas fir-larch[e] Hem-fir[e] Spruce-pine-fir[e]	2 × 6	8-4	7-6	6-2	1-0	1-6	1-4	NP	NP	NP	NP	NP
		2 × 8	10-11	9-11	8-3	1-0	1-6	2-0	2-2	NP	NP	NP	NP
		2 × 10	13-11	12-4	10-0	1-0	1-6	2-0	2-6	2-10	NP	NP	NP
		2 × 12	16-6	14-3	11-8	1-0	1-6	2-0	2-6	3-0	3-5	3-5	NP
	Redwood[f] Western cedars[f] Ponderosa pine[f] Red pine[f]	2 × 6	7-9	7-0	6-2	1-0	1-4	NP	NP	NP	NP	NP	NP
		2 × 8	10-2	9-3	7-11	1-0	1-6	2-0	1-11	NP	NP	NP	NP
		2 × 10	13-0	11-9	9-7	1-0	1-6	2-0	2-6	2-7	NP	NP	NP
		2 × 12	15-9	13-8	11-2	1-0	1-6	2-0	2-6	3-0	3-2	NP	NP
70 ground snow load	Southern pine	2 × 6	8-3	7-6	6-5	1-0	1-6	1-5	NP	NP	NP	NP	NP
		2 × 8	10-10	9-10	8-2	1-0	1-6	2-0	2-2	NP	NP	NP	NP
		2 × 10	13-9	11-11	9-9	1-0	1-6	2-0	2-6	2-9	NP	NP	NP
		2 × 12	16-2	14-0	11-5	1-0	1-6	2-0	2-6	3-0	3-5	3-5	NP
	Douglas fir-larch[e] Hem-fir[e] Spruce-pine-fir[e]	2 × 6	7-11	7-1	5-9	1-0	1-6	NP	NP	NP	NP	NP	NP
		2 × 8	10-5	9-5	7-8	1-0	1-6	2-0	2-1	NP	NP	NP	NP
		2 × 10	13-3	11-6	9-5	1-0	1-6	2-0	2-6	2-8	NP	NP	NP
		2 × 12	15-5	13-4	10-11	1-0	1-6	2-0	2-6	3-0	3-3	NP	NP
	Redwood[f] Western cedars[f] Ponderosa pine[f] Red pine[f]	2 × 6	7-4	6-8	5-10	1-0	1-4	NP	NP	NP	NP	NP	NP
		2 × 8	9-8	8-10	7-4	1-0	1-6	1-11	NP	NP	NP	NP	NP
		2 × 10	12-4	11-0	9-0	1-0	1-6	2-0	2-6	2-6	NP	NP	NP
		2 × 12	14-9	12-9	10-5	1-0	1-6	2-0	2-6	3-0	3-0	NP	NP

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

NP = Not Permitted.

a. Dead load = 10 psf. Snow load not assumed to be concurrent with live load.

b. No. 2 grade, wet service factor included.

c. L/Δ = 360 at main span.

d. L/Δ = 180 at cantilever with a 220-pound point load applied to end.

e. Includes incising factor.

f. Incising factor not included.

g. Interpolation permitted ~~allowed~~. Extrapolation not permitted ~~is not allowed~~.

Reason: "allowed" and "not allowed" are not standard code language. In addition, all the other design tables in Section 507 are written "Interpolation permitted, extrapolation not permitted", as proposed herein. As a professional standard, consistent language is preferred.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is only for consistency of terminology and language. There is no impact to the cost of construction.

RB180-25

RB182-25

IRC: R507.8, R507.9, R507.9.1, R507.9.1.1, R507.9.1.2, R507.9.1.3, R507.9.1.4, R507.9.1.5, R507.9.1.6, R507.9.1.7, R507.9.1.8, R507.9.2, TABLE R507.9.1.3(1), FIGURE R507.9.1.3(1), TABLE R507.9.1.3(2), FIGURE R507.9.1.3(2), FIGURE R507.9.2(1), FIGURE R507.9.2(2)

Proponents: Glenn Mathewson, BuildingCodeCollege.com, representing Self (glenn@glennmathewson.com)

2024 International Residential Code

R507.8 Vertical and lateral supports. Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. For decks with cantilevered framing members, connection to exterior walls or other framing members shall be designed and constructed to resist uplift resulting from the full *live load* specified in Table R301.5 acting on the cantilevered portion of the deck. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting.

Delete without substitution:

~~**R507.9 Vertical and lateral supports at band joist.** Vertical and lateral supports for decks shall comply with this section.~~

~~**R507.9.1 Vertical supports.** Vertical loads shall be transferred to band joists with ledgers in accordance with this section.~~

Revise as follows:

~~**R507.9.1.1**~~ **R507.8.1 Ledger details.** Deck ledgers shall be a minimum 2-inch by 8-inch (51 mm by 203 mm) nominal, No. 2 grade or better pressure-preservative-treated Southern pine, incised pressure-preservative-treated hem-fir, or decay-resistant, *naturally durable wood* . Deck ledgers shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer.

~~**R507.9.1.2**~~ **R507.8.2 Band joist details.** Band joists supporting a ledger shall be a minimum 2-inch-nominal (51 mm), solid-sawn, spruce-pine-fir or better lumber or a minimum 1-inch (25 mm) nominal engineered wood rim boards in accordance with Section R502.1.7. Band joists shall bear fully on the primary structure capable of supporting all required loads.

~~**R507.9.1.3**~~ **R507.8.3 Ledger to band joist details.** Where ledgers are fastened in accordance with Table R507.8.3(1) ~~R507.9.1.3(1)~~ , fasteners shall comply with Section R507.2.3 and shall be installed in accordance with Table R507.8.3(2) ~~R507.9.1.3(2)~~ and Figures R507.8.3(1) ~~R507.9.1.3(1)~~ and R507.8.3(2) ~~R507.9.1.3(2)~~. Holes for $^1/_2$-inch (12.7 mm) lag screws shall be predrilled with two drill bits so that a hole $^1/_2$ inch (12.7mm) in diameter is drilled through the ledger and sheathing, if present, and a hole $^5/_{16}$ inch (7.9 mm) to $^3/_8$ inch (9.5mm) in diameter is drilled through the band joist.

~~**R507.9.1.4**~~ **R507.8.4 Alternate ledger details.** Alternate framing configurations supporting a ledger constructed to meet the load requirements of Section R301.5 shall be permitted.

~~**R507.9.1.5**~~ **R507.8.5 Ledger flashing.** Where ledgers are attached to wood-frame construction, flashing shall be installed above the ledger to prevent the entry of water into the wall cavity or behind the ledger. Flashing shall extend vertically not less than 2 inches (51 mm) above the ledger. Flashing shall extend horizontally not less than 4 inches (102 mm) beyond the ledger face or shall extend to the ledger face and not less than $^1/_4$ inch down the ledger face.

Exceptions:

1. Where a window or door opening is located less than 2 inches (51 mm) above the ledger, flashing shall extend to the bottom of the wall opening.
2. Flashing is not required where the ledger is spaced horizontally from the *exterior wall covering* not less than $^1/_4$ inch (6.4 mm) to allow for drainage and ventilation behind the ledger.

~~R507.9.1.6~~ **<u>R507.8.6</u> Water-resistive barrier.** The water-resistive barrier required by Section R703.2 shall be lapped over a vertical leg of the ledger flashing or counterflashing extending up the wall by not less than 2 inches (51 mm) or the height of the vertical flashing leg, whichever is less. The *water-resistive barrier* shall continue from the top of the ledger flashing down the wall and behind the ledger flashing and ledger.

Exceptions:

1. Flashing shall be permitted to be placed against the face of the *water-resistive barrier* where a self-adhering membrane counterflashing is installed not less than 2 inches (51 mm) over the vertical leg of the flashing and not less than 2 inches (51 mm) onto the *water-resistive barrier*.
2. Flashing shall be permitted to be placed in front of the *water-resistive barrier* and behind the *exterior wall covering* where ledgers are spaced horizontally from the exterior wall not less than $^1/_4$ inch (6.4 mm) to allow for drainage and ventilation behind the ledger.

~~R507.9.1.7~~ **<u>R507.8.7</u> Existing walls.** Where ledgers are attached to existing walls without water-resistive barriers, a *water-resistive barrier* shall be installed behind the ledger and ledger flashing. The *water-resistive barrier* shall extend to the top of the ledger flashing vertical leg and not less than $^1/_2$ inch (12.7 mm) beyond the sides and bottom of the ledger. A self-adhering membrane counterflashing shall be installed not less than 2 inches (51 mm) over the vertical leg of the ledger flashing and not less than 2 inches (51 mm) onto the existing sheathing.

Exceptions:

1. Where a window or door opening is located less than 2 inches (51 mm) above the ledger, flashing shall extend to the bottom of the wall opening.
2. Flashing is not required where the ledger is spaced horizontally from the *exterior wall covering* not less than $^1/_4$ inch (6.4 mm) to allow for drainage and ventilation behind the ledger.

~~R507.9.1.8~~ **<u>R507.8.8</u> Exterior wall coverings.** *Exterior wall coverings* shall be terminated above the finished deck surface in accordance with the covering manufacturer's requirements and Chapter 7, as applicable to the type of covering.

Exception: *Exterior wall covering*s shall be permitted behind ledgers in accordance with Section <u>R507.8.5</u> ~~R507.9.1.5~~ where capable of resisting compression forces from the ledger attachment.

~~R507.9.2~~ **<u>R507.9</u> Lateral ~~connection~~ <u>bracing</u>.** Lateral loads shall be transferred to the ground or to a structure capable of transmitting them to the ground. Where ~~the~~ lateral <u>bracing is provided with a</u> load connection ~~is provided~~ in accordance with Figure R507.9~~.2~~(1), hold-down tension devices shall be installed in not less than two locations per deck, within 24 inches (610 mm) of each end of the deck. Each device shall have an allowable stress design capacity of not less than 1,500 pounds (6672 N). Where the lateral load connections are provided in accordance with Figure R507.9~~.2~~(2), the hold-down tension devices shall be installed in not less than four locations per deck, and each device shall have an allowable stress design capacity of not less than 750 pounds (3336 N).

TABLE ~~R507.9.1.3(1)~~ <u>R507.8.3(1)</u> DECK LEDGER CONNECTION TO BAND JOIST

Portions of table not shown remain unchanged.

LOAD[c] (psf)	JOIST SPAN[a] (feet)	ON-CENTER SPACING OF FASTENERS[b] (inches)		
		$^1/_2$-inch diameter lag screw with $^1/_2$-inch maximum sheathing[d, e]	$^1/_2$-inch diameter bolt with $^1/_2$-inch maximum sheathing[e]	$^1/_2$-inch diameter bolt with 1-inch maximum sheathing[f]
40 live load	6	30	36	36
	8	23	36	36
	10	18	34	29
	12	15	29	24
	14	13	24	21
	16	11	21	18
	18	10	19	16
50 ground snow load	6	29	36	36
	8	22	36	35
	10	17	33	28
	12	14	27	23

	14	12	23	20
	16	11	20	17
	18	9	18	15
60 ground snow load	6	25	36	36
	8	18	35	30
	10	15	28	24
	12	12	23	20
	14	10	20	17
	16	9	17	15
	18	8	15	13
70 ground snow load	6	22	36	35
	8	16	31	26
	10	13	25	21
	12	11	20	17
	14	9	17	15
	16	8	15	13
	18	7	13	11

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Interpolation permitted. Extrapolation is not permitted.

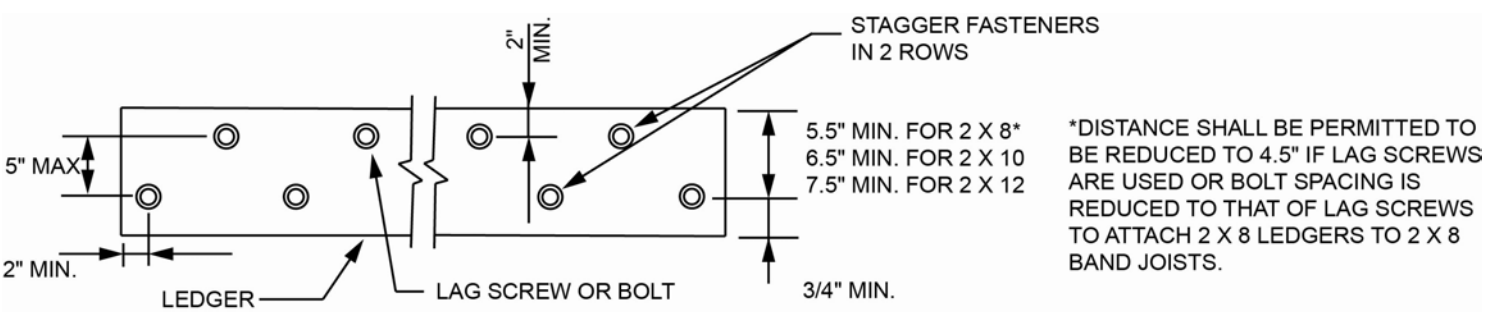
b. Ledgers shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joist.

c. Dead Load = 10 psf. Snow load shall not be assumed to act concurrently with live load.

d. The tip of the lag screw shall fully extend beyond the inside face of the band joist. Lag screws shall be full-body diameter screws.

e. Sheathing shall be wood structural panel or solid sawn lumber.

f. Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard, lumber or foam sheathing. Up to $^1/_2$-inch thickness of stacked washers shall be permitted to substitute for up to $^1/_2$ inch of allowable sheathing thickness where combined with wood structural panel or lumber sheathing.



For SI: 1 inch = 25.4 mm.

FIGURE ~~R507.9.1.3(1)~~ R507.8.3(1) PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGERS

TABLE ~~R507.9.1.3(2)~~ R507.8.3(2) PLACEMENT OF LAG SCREWS AND BOLTS IN DECK LEDGERS AND BAND JOISTS

MINIMUM END AND EDGE DISTANCES AND SPACING BETWEEN ROWS				
	TOP EDGE	BOTTOM EDGE	ENDS	ROW SPACING
Ledger[a]	2 inches[d]	$^3/_4$ inch	2 inches[b]	1$^5/_8$ inches[b]
Band Joist[c]	$^3/_4$ inch	2 inches	2 inches	1$^5/_8$ inches[b]

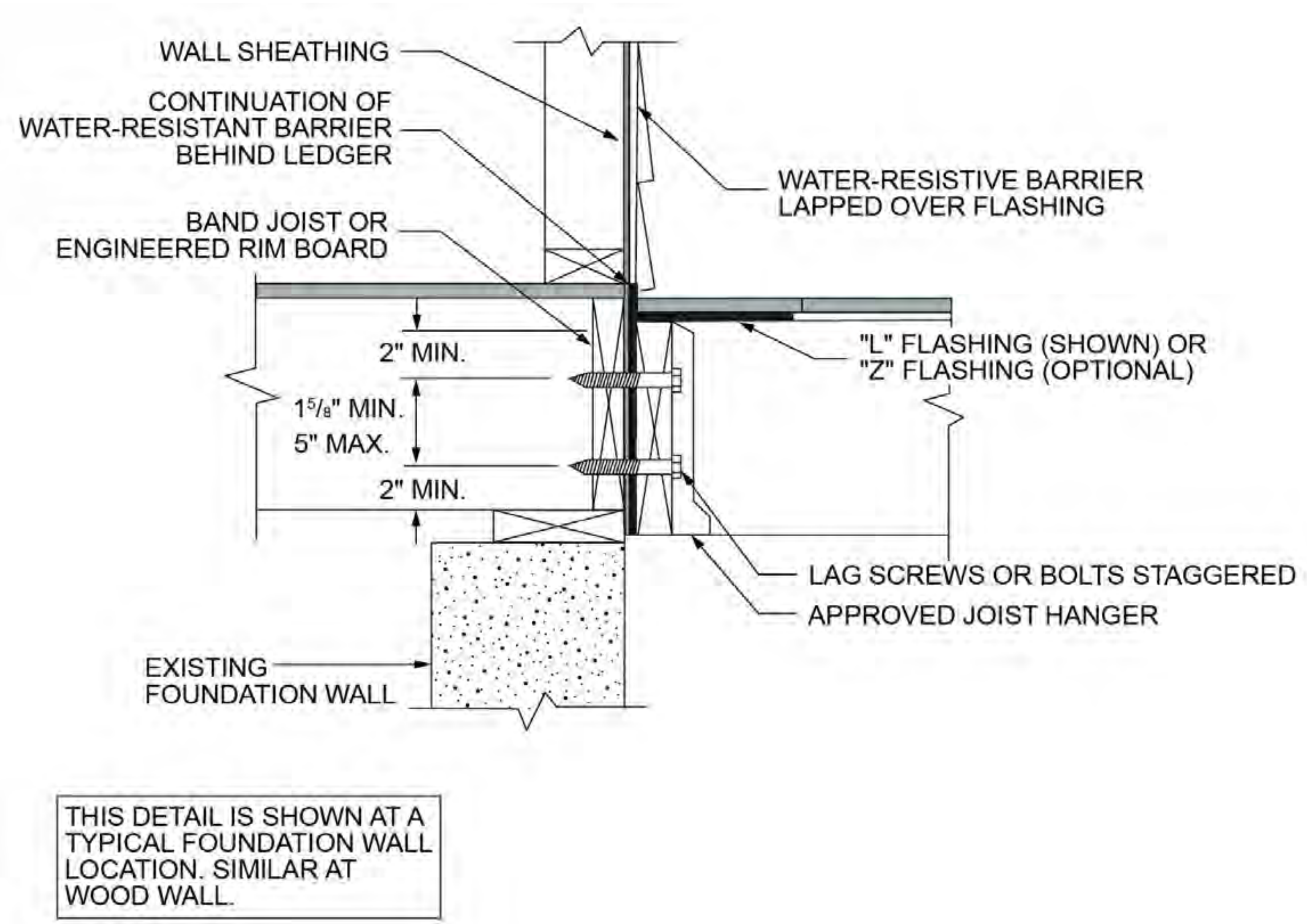
For SI: 1 inch = 25.4 mm.

a. Lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger in accordance with Figure R507.9.1.3(1).

b. Maximum 5 inches.

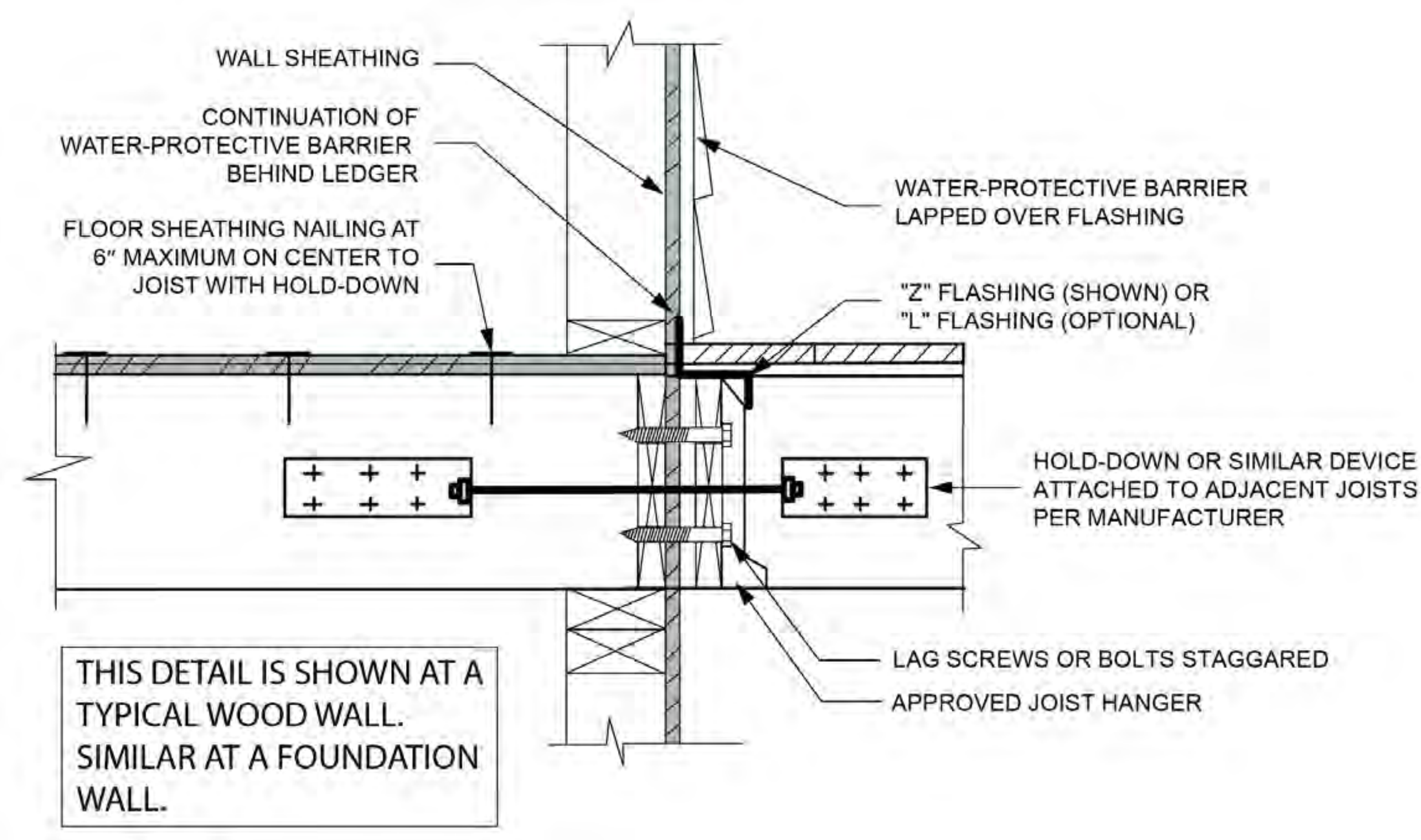
c. For engineered rim joists, the manufacturer's recommendations shall govern.

d. The minimum distance from bottom row of lag screws or bolts to the top edge of the ledger shall be in accordance with Figure R507.9.1.3(1).



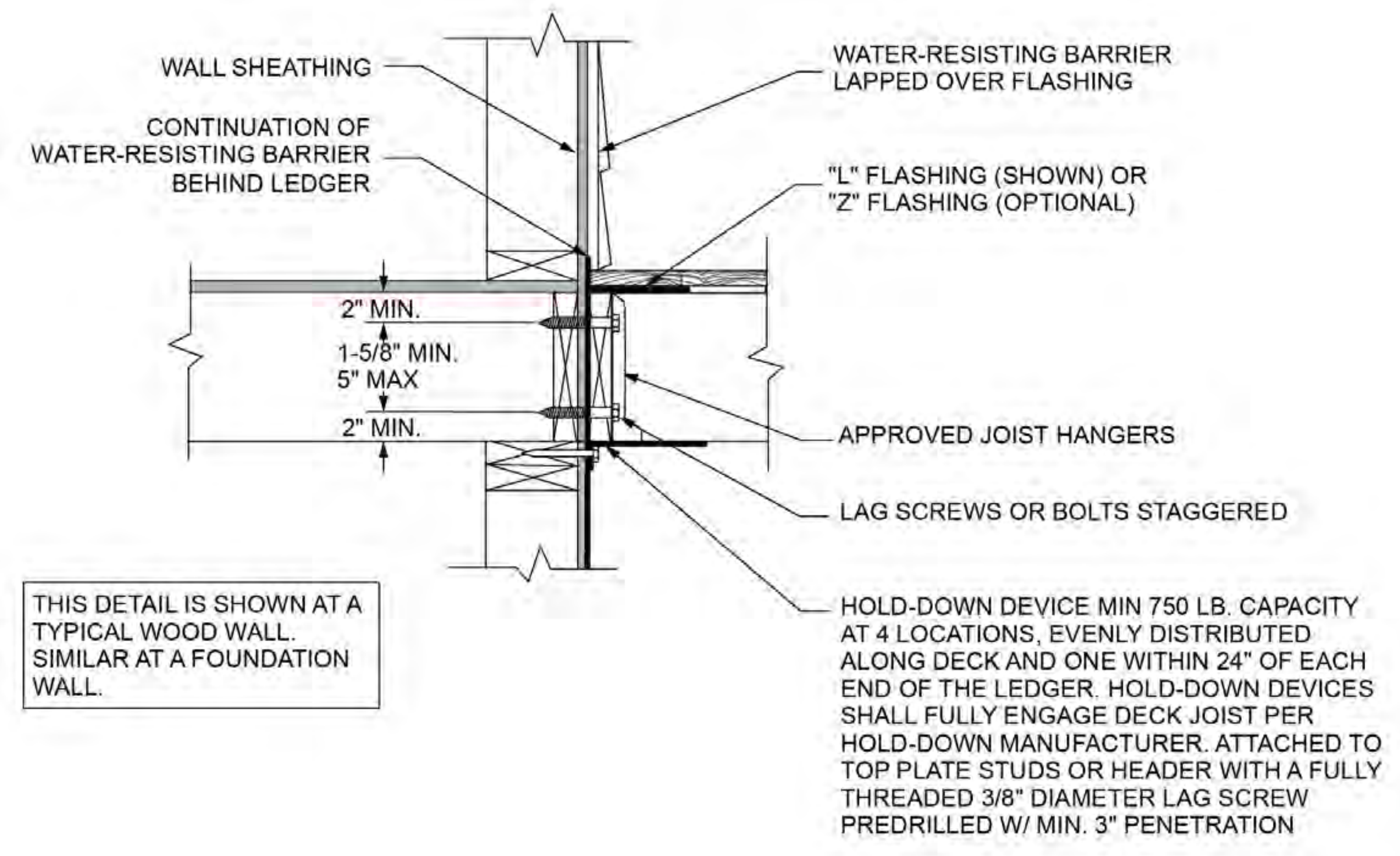
For SI: 1 inch = 25.4 mm.

FIGURE ~~R507.9.1.3(2)~~ R507.8.3(2) PLACEMENT OF LAG SCREWS AND BOLTS IN BAND JOISTS



For SI: 1 inch = 25.4 mm.

FIGURE ~~R507.9.2(1)~~ R507.9(1) DECK ATTACHMENT FOR LATERAL LOADS



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

FIGURE ~~R507.9.2(2)~~ R507.9(2) DECK ATTACHMENT FOR LATERAL LOADS

Reason: Since the 2015 IRC, new deck design provisions have been added or improved in each edition thanks to the collaborative efforts of many private professionals, organizations, and building officials, informally called "The Deck Code Coalition". Though so much great work was done in providing prescriptive deck design codes, a major component of a sound deck structure has not been addressed, lateral live loads. In the 2024 IRC, I wrote a proposal attempting to address this by shining light on the fact that a deck without bracing will sway and the IRC only provides hold down connections at the ledger to address lateral loads. This would be like having design codes for a wall that includes hold downs at the foundation but no wall sheathing or bracing. What kind of house would that build? My efforts in 2024 were met with much opposition and were disapproved. I do not believe anyone has worked on research for prescriptive methods for deck lateral bracing since then.

The purpose of this proposal is to continue to draw attention to the need to complete the design provisions for decks by addressing lateral bracing. This proposal eliminates unnecessary subsections resulting in long strings of section numbers. It also places the lateral load section in its own subsection under R507 instead of being under the ledger provisions. There are many ways to brace a deck that are not just connections at the ledger. Connections at the ledger only brace a deck when build in an inside corner. By renaming that section "lateral bracing" it is my hope the reader of the IRC will recognize that some sort of bracing is necessary, whether provided with details in the IRC or not.

This proposal will better set up the IRC for the attention it needs and for a proposal in 2030.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal only restructures the organization of existing code language. There is some change in language but only to clarify what is already necessary.

RB183-25

IRC: TABLE R507.9.1.3(1)

Proponents: Glenn Mathewson, BuildingCodeCollege.com, representing Self (glenn@glennmathewson.com)

2024 International Residential Code

Revise as follows:

TABLE R507.9.1.3(1) DECK LEDGER CONNECTION TO BAND JOIST

LOAD[c] (psf)	JOIST SPAN[a] (feet)	ON-CENTER SPACING OF FASTENERS[b] (inches)		
		1/2-inch diameter lag screw with 1/2-inch maximum sheathing[d, e]	1/2-inch diameter bolt with 1/2-inch maximum sheathing[e]	1/2-inch diameter bolt with 1-inch maximum sheathing[f]
40 live load	6	30	36	36
	8	23	36	36
	10	18	34	29
	12	15	29	24
	14	13	24	21
	16	11	21	18
	18	10	19	16
50 ground snow load	6	29	36	36
	8	22	36	35
	10	17	33	28
	12	14	27	23
	14	12	23	20
	16	11	20	17
	18	9	18	15
60 ground snow load	6	25	36	36
	8	18	35	30
	10	15	28	24
	12	12	23	20
	14	10	20	17
	16	9	17	15
	18	8	15	13
70 ground snow load	6	22	36	35
	8	16	31	26
	10	13	25	21
	12	11	20	17
	14	9	17	15
	16	8	15	13
	18	7	13	11

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Interpolation permitted. Extrapolation is not permitted.

b. Ledgers shall be flashed in accordance with Section ~~R703.4~~ R507.9.1.5 ~~to prevent water from contacting the house band joist~~.

c. Dead Load = 10 psf. Snow load shall not be assumed to act concurrently with live load.

d. The tip of the lag screw shall fully extend beyond the inside face of the band joist. Lag screws shall be full-body diameter screws.

e. Sheathing shall be wood structural panel or solid sawn lumber.

f. Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard, lumber or foam sheathing. Up to 1/2-inch thickness of stacked washers shall be permitted to substitute for up to 1/2 inch of allowable sheathing thickness where combined with wood structural panel or lumber sheathing.

Reason: Section R703.4 "Flashing" was changed in the 2024 IRC to reference deck ledger flashing to the new Section R507.9.1.5. This proposal simply bypasses that double reference. I suggest deleting the statement about ledger flashing performance (not let water contact the band joist), as this footnote is just meant as a reminder that there are additional ledger flashing codes. The ledger flashing codes referenced in this footnote provide sufficient detail for ledger flashing performance.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal only clarifies the current intent of the IRC.

RB183-25

RB187-25

IRC: TABLE R602.3(1)

Proponents: Tim Earl, GBH International, representing the Gypsum Association (tearl@gbhint.com)

2024 International Residential Code

Revise as follows:

TABLE R602.3(1) FASTENING SCHEDULE

Portions of table not shown remain unchanged.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s; 1 ksi = 6.895 MPa.

a. Nails are smooth-common, box or deformed shanks except where otherwise stated. Nails used for framing and sheathing connections are carbon steel and shall have minimum average bending yield strengths as shown: 80 ksi for shank diameter of 0.192 inch (20d common nail), 90 ksi for shank diameters larger than 0.142 inch but not larger than 0.177 inch, and 100 ksi for shank diameters of 0.142 inch or less. Connections using nails and staples of other materials, such as stainless steel, shall be designed by accepted engineering practice or approved under Section R104.2.2.

b. RSRS-01 is a Roof Sheathing Ring Shank nail meeting the specifications in ASTM F1667.

c. Nails shall be spaced at not more than 6 inches on center at all supports where spans are 48 inches or greater.

d. Four-foot by 8-foot or 4-foot by 9-foot panels shall be applied vertically.

e. Spacing of fasteners not included in this table shall be based on Table R602.3(2).

f. For wood structural panel roof sheathing attached to gable end roof framing and to intermediate supports within 48 inches of roof edges and ridges, nails shall be spaced at 4 inches on center where the ultimate design wind speed is greater than 130 mph in Exposure B or greater than 110 mph in Exposure C. Fastener spacing applies where roof framing specific gravity is 0.42 or larger. Where roof framing specific gravity is greater than or equal to 0.35 but less than 0.42 in accordance with AWC NDS, fastening of roof sheathing shall be with RSRS-03 ($2^1/_2$″ × 0.131″ × 0.281″ head) nails.

g. Paper-faced gypsum ~~Gypsum~~ sheathing shall conform to ASTM C1396 . Glass-mat gypsum sheathing shall conform to ASTM C1177. ~~and~~ gypsum sheathing shall be installed in accordance with ASTM C1280 or GA 253. Fiberboard sheathing shall conform to ASTM C208.

h. Spacing of fasteners on floor sheathing panel edges applies to panel edges supported by framing members and required blocking and at floor perimeters only. Spacing of fasteners on roof sheathing panel edges applies to panel edges supported by framing members and required blocking. Blocking of roof or floor sheathing panel edges perpendicular to the framing members need not be provided except as required by other provisions of this code. Floor perimeter shall be supported by framing members or solid blocking.

i. Where a rafter is fastened to an adjacent parallel ceiling joist in accordance with this schedule, provide two toe nails on one side of the rafter and toe nails from the ceiling joist to top plate in accordance with this schedule. The toe nail on the opposite side of the rafter shall not be required.

Reason: This proposal adds the appropriate ASTM standard for glass-mat gypsum sheathing to the footnote. It is already referenced elsewhere in the IRC.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This adds an additional ASTM specification which was missing from the list.

RB188-25

IRC: TABLE R602.3(1), TABLE R602.3(2), TABLE R602.3(3), R608.9.2, R608.9.3, R608.10, TABLE R703.15.1, TABLE R703.15.2, TABLE R703.16.2, TABLE R704.3.4, R802.11

Proponents: Shane Nilles, representing American Wood Council (snilles@awc.org); David Tyree, representing American Wood Council (dtyree@awc.org)

2024 International Residential Code

Revise as follows:

TABLE R602.3(1) FASTENING SCHEDULE

Portions of table not shown remain unchanged.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s; 1 ksi = 6.895 MPa.

a. Nails are smooth-common, box or deformed shanks except where otherwise stated. Nails used for framing and sheathing connections are carbon steel and shall have minimum average bending yield strengths as shown: 80 ksi for shank diameter of 0.192 inch (20d common nail), 90 ksi for shank diameters larger than 0.142 inch but not larger than 0.177 inch, and 100 ksi for shank diameters of 0.142 inch or less. Connections using nails and staples of other materials, such as stainless steel, shall be designed by accepted engineering practice or approved under Section R104.2.2.

b. RSRS-01 is a Roof Sheathing Ring Shank nail meeting the specifications in ASTM F1667.

c. Nails shall be spaced at not more than 6 inches on center at all supports where spans are 48 inches or greater.

d. Four-foot by 8-foot or 4-foot by 9-foot panels shall be applied vertically.

e. Spacing of fasteners not included in this table shall be based on Table R602.3(2).

f. For wood structural panel roof sheathing attached to gable end roof framing and to intermediate supports within 48 inches of roof edges and ridges, nails shall be spaced at 4 inches on center where the ultimate design wind speed is greater than 130 mph in Exposure B or greater than 110 mph in Exposure C. Fastener spacing applies where roof framing is Southern Pine, Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir, or other species with specific gravity ~~is~~ greater than or equal to 0.42 ~~or larger~~ in accordance with AWC NDS. Where roof framing specific gravity is greater than or equal to 0.35 but less than 0.42 ~~in accordance with AWC NDS~~, fastening of roof sheathing shall be with RSRS-03 ($2^1/_2$″ × 0.131″ × 0.281″ head) nails.

g. Gypsum sheathing shall conform to ASTM C1396 and shall be installed in accordance with ASTM C1280 or GA 253. Fiberboard sheathing shall conform to ASTM C208.

h. Spacing of fasteners on floor sheathing panel edges applies to panel edges supported by framing members and required blocking and at floor perimeters only. Spacing of fasteners on roof sheathing panel edges applies to panel edges supported by framing members and required blocking. Blocking of roof or floor sheathing panel edges perpendicular to the framing members need not be provided except as required by other provisions of this code. Floor perimeter shall be supported by framing members or solid blocking.

i. Where a rafter is fastened to an adjacent parallel ceiling joist in accordance with this schedule, provide two toe nails on one side of the rafter and toe nails from the ceiling joist to top plate in accordance with this schedule. The toe nail on the opposite side of the rafter shall not be required.

TABLE R602.3(2) ALTERNATE ATTACHMENTS TO TABLE R602.3(1)

Portions of table not shown remain unchanged.

For SI: 1 inch = 25.4 mm.

g. Alternate fastening is only permitted for roof sheathing where the ultimate design wind speed is less than or equal to 110 mph, and where fasteners are installed 3 inches on center at all supports, and where fastening is to wood framing of Southern Pine, Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir, or other a species with specific gravity greater than or equal to 0.42 in accordance with AWC NDS.

TABLE R602.3(3) REQUIREMENTS FOR WOOD STRUCTURAL PANEL WALL SHEATHING USED TO RESIST WIND PRESSURES[a, b, c]

Portions of table not shown remain unchanged.

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

d. Fastener spacing applies where wall framing is Southern Pine, Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir, or other species with specific gravity is greater than or equal to 0.42 or larger in accordance with AWC NDS. Where wall framing specific gravity is greater than or equal to 0.35 but less than 0.42 in accordance with AWC NDS, maximum nail spacing in the field of the panel shall be 8 inches.

R608.9.2 Connections between concrete walls and light-frame floor systems. Connections between concrete walls and light-frame floor systems shall be in accordance with one of the following:

1. For floor systems of wood-framed construction, the provisions of Section R608.9.1 and the prescriptive details of Figures R608.9(1) through R608.9(4), where permitted by the tables accompanying those figures. Portions of connections of wood-framed floor systems not noted in the figures shall be in accordance with Section R502, or AWC WFCM, if applicable. Wood framing members shall be of a Southern Pine, Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir, or other species having a specific gravity equal to or greater than 0.42 in accordance with AWC NDS.
2. For floor systems of cold-formed steel construction, the provisions of Section R608.9.1 and the prescriptive details of Figures R608.9(5) through R608.9(8), where permitted by the tables accompanying those figures. Portions of connections of cold-formed steel-framed floor systems not noted in the figures shall be in accordance with Section R505, or AISI S230, if applicable.
3. Proprietary connectors selected to resist loads and load combinations in accordance with Appendix A (ASD) or Appendix B (LRFD) of PCA 100.
4. An engineered design using loads and load combinations in accordance with Appendix A (ASD) or Appendix B (LRFD) of PCA 100.
5. An engineered design using loads and material design provisions in accordance with this code, or in accordance with ASCE 7, ACI 318, and AWC NDS for wood-framed construction or AISI S100 for cold-formed steel frame construction.

R608.9.3 Connections between concrete walls and light-frame ceiling and roof systems. Connections between concrete walls and light-frame ceiling and roof systems shall be in accordance with one of the following:

1. For ceiling and roof systems of wood-framed construction, the provisions of Section R608.9.1 and the prescriptive details of Figures R608.9(9) and R608.9(10), where permitted by the tables accompanying those figures. Portions of connections of wood-framed ceiling and roof systems not noted in the figures shall be in accordance with Section R802, or AWC WFCM, if applicable. Wood framing members shall be of a Southern Pine, Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir, or other species having a specific gravity equal to or greater than 0.42 in accordance with AWC NDS.
2. For ceiling and roof systems of cold-formed steel construction, the provisions of Section R608.9.1 and the prescriptive details of Figures R608.9(11) and R608.9(12), where permitted by the tables accompanying those figures. Portions of connections of cold-formed steel-framed ceiling and roof systems not noted in the figures shall be in accordance with Section R804, or AISI S230, if applicable.
3. Proprietary connectors selected to resist loads and load combinations in accordance with Appendix A (ASD) or Appendix B (LRFD) of PCA 100.

4. An engineered design using loads and load combinations in accordance with Appendix A (ASD) or Appendix B (LRFD) of PCA 100.
5. An engineered design using loads and material design provisions in accordance with this code, or in accordance with ASCE 7, ACI 318, and AWC NDS for wood-framed construction or AISI S100 for cold-formed steel-framed construction.

R608.10 Floor, roof and ceiling diaphragms. Floors and roofs in *buildings* with exterior walls of concrete shall be designed and constructed as *diaphragms*. Where gable-end walls occur, ceilings shall be designed and constructed as *diaphragms*. The design and construction of floors, roofs and ceilings of wood framing or cold-formed-steel framing serving as *diaphragms* shall comply with the applicable requirements of this code, or AWC WFCM or AISI S230, if applicable. Wood framing members shall be ~~of a~~ Southern Pine, Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir, or other species having a specific gravity equal to or greater than 0.42 in accordance with AWC NDS.

TABLE R703.15.1 CLADDING MINIMUM FASTENING REQUIREMENTS FOR DIRECT ATTACHMENT OVER FOAM PLASTIC SHEATHING TO SUPPORT CLADDING WEIGHT[a]

Portions of table not shown remain unchanged.

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

DR = Design Required.

o.c. = On Center.

a. Wood framing shall be Southern Pine, Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir, ~~Spruce-pine-fir~~ or ~~any wood~~ other species with a specific gravity of 0.42 or greater in accordance with AWC NDS.

b. The thickness of wood structural panels complying with the specific gravity requirement of Note a shall be permitted to be included in satisfying the minimum penetration into framing. For cladding connections to wood structural panels, refer to Table R703.3.3. For brick veneer tie connections to wood structural panels, refer to Table R703.8.4(2).

c. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths.

d. Fastener vertical spacing is an average spacing associated with the following nail count per foot: 6-inch spacing is associated with two nails per foot, 8-inch spacing is associated with 1.5 nails per foot, and 12-inch spacing is associated with one nail per foot.

e. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with ASTM C578 or ASTM C1289.

f. Cladding weight is the maximum weight of cladding materials in pounds per square foot of wall area. The 3 psf category typically applies to panel and lap siding materials; the 11 psf category typically applies to conventional three-coat stucco of $^{7}/_{8}$-inch thickness; and 15 psf to 25 psf categories typically apply to adhered masonry veneers.

TABLE R703.15.2 FURRING MINIMUM FASTENING REQUIREMENTS FOR APPLICATION OVER FOAM PLASTIC SHEATHING TO SUPPORT CLADDING WEIGHT[a, b]

Portions of table not shown remain unchanged.

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

DR = Design Required.

o.c. = On Center.

a. Wood framing and furring shall be Southern Pine, Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir ~~Spruce-pine-fir~~ or other ~~any wood~~ species with a specific gravity of 0.42 or greater in accordance with AWC NDS.

b. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths.

c. The thickness of wood structural panels complying with the specific gravity requirements of Note a shall be permitted to be included in satisfying the minimum required penetration into framing.

d. Where the required cladding fastener penetration into wood material exceeds 3/4 inch and is not more than 1 1/2 inches, a minimum 2× wood furring or an approved design shall be used.

e. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with ASTM C578 or ASTM C1289.

f. Furring shall be spaced not more than 24 inches on center, in a vertical or horizontal orientation. In a vertical orientation, furring shall be located over wall studs and attached with the required fastener spacing. In a horizontal orientation, the indicated 8-inch and 12-inch fastener spacing in furring shall be achieved by use of two fasteners into studs at 16 inches and 24 inches on center, respectively.

g. Cladding weight is the maximum weight of cladding materials in pounds per square foot of wall area. The 3 psf category typically applies to panel and lap siding materials; the 11 psf category typically applies to conventional three-coat stucco of 7/8-inch thickness; and 15 psf to 25 psf categories typically apply to adhered masonry veneers.

TABLE R703.16.2 FURRING MINIMUM FASTENING REQUIREMENTS FOR APPLICATION OVER FOAM PLASTIC SHEATHING TO SUPPORT CLADDING WEIGHT[a]

Portions of table not shown remain unchanged.

For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

DR = Design Required.

o.c. = On Center.

a. Wood furring shall be Southern Pine, Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir, ~~Spruce-pine-fir~~ or other ~~any softwood~~ species with a specific gravity of 0.42 or greater in accordance with AWC NDS. Steel furring shall be minimum 33-ksi steel. Steel studs shall be minimum 33-ksi steel for 33-mil and 43-mil thickness, and 50-ksi steel for 54-mil steel or thicker.

b. Screws shall comply with the requirements of ASTM C1513.

c. Where the required cladding fastener penetration into wood material exceeds 3/4 inch and is not more than 1 1/2 inches, a minimum 2-inch nominal wood furring or an approved design shall be used.

d. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with ASTM C578 or ASTM C1289.

e. Furring shall be spaced not more than 24 inches (610 mm) on center, in a vertical or horizontal orientation. In a vertical orientation, furring shall be located over wall studs and attached with the required fastener spacing. In a horizontal orientation, the indicated 8-inch and 12-inch fastener spacing in furring shall be achieved by use of two fasteners into studs at 16 inches and 24 inches on center, respectively.

TABLE R704.3.4 PRESCRIPTIVE ALTERNATIVE FOR WOOD STRUCTURAL PANEL EXTERIOR SOFFIT [b, c, d, e]

Portions of table not shown remain unchanged.

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

e. Fastener spacing applies where wood exterior soffit framing member ~~specific gravity~~ is Southern Pine, Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir, or other species with specific gravity greater than or equal to 0.42 ~~or larger~~ in accordance with AWC NDS. Where the specific gravity of exterior soffit framing members is greater than or equal to 0.35 but less than 0.42 ~~in accordance with AWC NDS~~, the fastener spacing shall be multiplied by 0.67 or the same fastener spacing as prescribed for galvanized steel nails shall be permitted to be used where RSRS-01 (2-inch by 0.099-inch by 0.266-inch head) nails replace 6d box nails and RSRS-03 (2 1/2-inch × 0.131-inch × 0.281-inch head) nails replace 8d common nails or 10d box nails. RSRS is a Roof Sheathing Ring Shank nail meeting the specifications in ASTM F1667. Framing members shall be minimum 2 × 3 nominal with the larger dimension in the cross section aligning with the length of fasteners to provide sufficient embedment depths.

R802.11 Roof tie uplift resistance. *Roof assemblies* shall have uplift resistance in accordance with Sections R802.11.1 and R802.11.2.

Exceptions: Rafters or trusses shall be permitted to be attached to their supporting wall assemblies in accordance with Table R602.3(1) where either of the following occur:

1. Where ~~the specific gravity of the wood species used for~~ wall framing is Southern Pine, Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir, or other species with specific gravity greater than or equal to 0.42 in accordance with AWC NDS and the uplift force per rafter or truss does not exceed 200 pounds (90.8 kg) as determined by Table R802.11.
2. Where the *basic wind speed* does not exceed 115 miles per hour (51.4 m/s), the wind exposure category is B, the roof pitch is 5 units vertical in 12 units horizontal (42-percent slope) or greater, the roof span is 32 feet (9754 mm) or less, and rafters and trusses are spaced not more than 24 inches (610 mm) on center.

Reason: There are several sections of the IRC which direct the user to the ANSI/AWC *National Design Specification (NDS) for Wood Construction* to determine the specific gravity of the wood. This code change proposes to add names of common wood species that have a specific gravity of 0.42 or greater to reduce the need to lookup wood specific gravity in the NDS. The common wood species names listed (i.e., Southern Pine, Douglas Fir-Larch, Hem-Fir, Spruce-Pine-Fir) all have specific gravity of 0.42 or greater and are used elsewhere in the code such as in span tables for joist, rafters, and headers. This revision will make the code easier to use without changing the technical requirements.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There is no technical change proposed in this code change. The footnote clarifications improve the ease-of-use of the code.

RB188-25

RB190-25

IRC: TABLE R602.7(1)

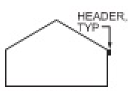
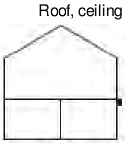
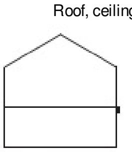
Proponents: Shane Nilles, representing American Wood Council (snilles@awc.org); David Tyree, representing American Wood Council (dtyree@awc.org)

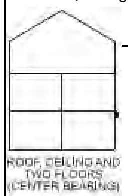
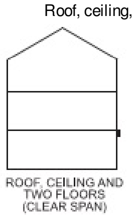
2024 International Residential Code

Revise as follows:

TABLE R602.7(1) GIRDER SPANS[a] AND HEADER SPANS[a] FOR EXTERIOR BEARING WALLS (Maximum spans for Douglas fir-larch, hem-fir, Southern pine and spruce-pine-fir[b] and required number of jack studs)

Portions of table not shown remain unchanged.

GIRDERS AND HEADERS SUPPORTING	SIZE	ALLOWABLE STRESS DESIGN GROUND SNOW LOAD, $P_{g(asd)}$ (psf)[e]																	
		30						50						70					
		Building width[c] (feet)																	
		12		24		36		12		24		36		12		24		36	
		Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]
Roof and ceiling  ROOF AND CEILING	1-2 × 6	4-0	1	~~3-1~~ 3-0	2	~~2-7~~ 2-6	2	3-5	1	~~2-8~~ 2-7	2	~~2-3~~ 2-2	2	3-0	2	2-4	2	~~2-0~~ 1-11	2
	1-2 × 8	5-1	2	~~3-11~~ 3-10	2	3-3	2	4-4	2	~~3-4~~ 3-3	2	~~2-10~~ 2-9	2	3-10	2	~~3-0~~ 2-11	2	~~2-6~~ 2-5	3
	1-2 × 10	6-0	2	~~4-8~~ 4-7	2	~~3-11~~ 3-10	2	5-2	2	~~4-0~~ 3-11	2	~~3-4~~ 3-3	3	4-7	2	~~3-6~~ 3-5	3	~~3-0~~ 2-11	3
	1-2 × 12	7-1	2	~~5-5~~ 5-4	2	~~4-7~~ 4-6	3	6-1	2	~~4-8~~ 4-7	3	~~3-11~~ 3-10	3	~~5-5~~ 5-4	2	~~4-2~~ 4-1	3	~~3-6~~ 3-5	3
	2-2 × 4	4-0	1	~~3-1~~ 3-0	1	~~2-7~~ 2-6	1	3-5	1	2-7	1	2-2	1	3-0	1	~~2-4~~ 2-3	1	~~2-0~~ 1-11	1
	2-2 × 6	~~6-0~~ 5-11	1	~~4-7~~ 4-6	1	~~3-10~~ 3-9	1	5-1	1	~~3-11~~ 3-10	1	~~3-3~~ 3-2	2	4-6	1	~~3-6~~ 3-5	2	~~2-11~~ 2-10	2
	2-2 × 8	~~7-7~~ 7-6	1	~~5-9~~ 5-8	1	~~4-10~~ 4-9	2	6-5	1	~~5-0~~ 4-10	2	~~4-2~~ 4-1	2	~~5-9~~ 5-8	1	~~4-5~~ 4-4	2	~~3-9~~ 3-7	2
	2-2 × 10	~~9-0~~ 8-11	1	~~6-10~~ 6-9	2	~~5-9~~ 5-8	2	7-8	2	~~5-11~~ 5-9	2	~~4-11~~ 4-10	2	6-9	2	~~5-3~~ 5-1	2	~~4-5~~ 4-3	2
	2-2 × 12	~~10-7~~ 10-6	2	~~8-1~~ 7-11	2	~~6-10~~ 6-8	2	9-0	2	~~6-11~~ 6-9	2	~~5-10~~ 5-8	2	8-0	2	~~6-2~~ 6-0	2	~~5-2~~ 5-0	3
	3-2 × 8	9-5	1	~~7-3~~ 7-2	1	~~6-1~~ 6-0	1	8-1	1	~~6-3~~ 6-1	1	~~5-3~~ 5-1	2	7-2	1	~~5-6~~ 5-5	2	~~4-8~~ 4-6	2
	3-2 × 10	~~11-3~~ 11-2	1	~~8-7~~ 8-5	1	~~7-3~~ 7-1	2	9-7	1	~~7-4~~ 7-3	2	~~6-2~~ 6-1	2	8-6	1	~~6-7~~ 6-5	2	~~5-6~~ 5-4	2
	3-2 × 12	13-2	1	~~10-1~~ 10-0	2	~~8-6~~ 8-4	2	11-3	2	~~8-8~~ 8-6	2	~~7-4~~ 7-1	2	10-0	2	~~7-9~~ 7-7	2	~~6-6~~ 6-4	2
	4-2 × 8	10-11	1	~~8-4~~ 8-3	1	~~7-0~~ 6-11	1	9-4	1	~~7-2~~ 7-0	1	~~6-0~~ 5-11	1	8-3	1	~~6-4~~ 6-3	1	~~5-4~~ 5-3	2
	4-2 × 10	12-11	1	~~9-11~~ 9-9	1	~~8-4~~ 8-2	1	~~11-1~~ 11-0	1	~~8-6~~ 8-4	1	~~7-2~~ 7-0	2	~~9-10~~ 9-9	1	~~7-7~~ 7-5	2	~~6-4~~ 6-2	2
	4-2 × 12	15-3	1	~~11-8~~ 11-6	1	~~9-10~~ 9-7	2	13-0	1	~~10-0~~ 9-10	2	~~8-5~~ 8-3	2	~~11-7~~ 11-6	1	~~8-11~~ 8-9	2	~~7-6~~ 7-3	2
Roof, ceiling and one center-bearing floor  ROOF, CEILING AND ONE FLOOR (CENTER BEARING)	1-2 × 6	3-3	1	~~2-7~~ 2-6	2	2-2	2	3-0	2	2-4	2	2-0	2	2-9	2	2-2	2	1-10	2
	1-2 × 8	4-1	2	~~3-3~~ 3-2	2	2-9	2	3-9	2	~~3-0~~ 2-11	2	2-6	3	3-6	2	2-9	2	2-4	3
	1-2 × 10	~~4-11~~ 4-10	2	3-10	2	3-3	3	4-6	2	3-6	3	~~3-0~~ 2-11	3	4-1	2	3-3	3	2-9	3
	1-2 × 12	5-9	2	4-6	3	3-10	3	5-3	2	~~4-2~~ 4-1	3	3-6	3	4-10	3	3-10	3	3-3	4
	2-2 × 4	~~3-3~~ 3-2	1	2-6	1	~~2-2~~ 2-1	1	~~3-0~~ 2-11	1	~~2-4~~ 2-3	1	~~2-0~~ 1-11	1	2-8	1	~~2-2~~ 2-1	1	1-10	1
	2-2 × 6	4-10	1	3-9	1	~~3-3~~ 3-2	2	4-5	1	~~3-6~~ 3-5	2	~~3-0~~ 2-11	2	4-1	1	~~3-3~~ 3-2	2	~~2-9~~ 2-8	2
	2-2 × 8	6-1	1	~~4-10~~ 4-9	2	~~4-1~~ 4-0	2	5-7	2	~~4-5~~ 4-4	2	~~3-9~~ 3-8	2	5-2	2	~~4-1~~ 4-0	2	~~3-6~~ 3-5	2
	2-2 × 10	7-3	2	5-8	2	~~4-10~~ 4-9	2	6-8	2	~~5-3~~ 5-2	2	~~4-5~~ 4-4	2	6-1	2	~~4-10~~ 4-9	2	4-1	2
	2-2 × 12	8-6	2	6-8	2	5-8	2	7-10	2	~~6-2~~ 6-1	2	~~5-3~~ 5-2	3	7-2	2	5-8	2	~~4-10~~ 4-9	3
	3-2 × 8	7-8	1	~~6-0~~ 5-11	1	5-1	2	7-0	1	~~5-6~~ 5-5	2	~~4-8~~ 4-7	2	6-5	1	5-1	2	~~4-4~~ 4-3	2
	3-2 × 10	9-1	1	~~7-2~~ 7-1	2	~~6-1~~ 6-0	2	8-4	1	~~6-7~~ 6-6	2	~~5-7~~ 5-6	2	7-8	2	~~6-1~~ 6-0	2	~~5-2~~ 5-1	2
	3-2 × 12	10-8	2	~~8-5~~ 8-4	2	~~7-2~~ 7-1	2	9-10	2	~~7-8~~ 7-7	2	~~6-7~~ 6-5	2	9-0	2	7-1	2	~~6-1~~ 6-0	2
	4-2 × 8	8-10	1	6-11	1	~~5-11~~ 5-10	1	8-1	1	6-4	1	~~5-5~~ 5-4	2	7-5	1	~~5-11~~ 5-10	1	~~5-0~~ 4-11	2
	4-2 × 10	~~10-6~~ 10-5	1	~~8-3~~ 8-2	2	~~7-0~~ 6-11	2	~~9-8~~ 9-7	1	~~7-7~~ 7-6	2	~~6-5~~ 6-4	2	8-10	1	~~7-0~~ 6-11	2	~~6-0~~ 5-10	2
	4-2 × 12	12-4	1	~~9-8~~ 9-7	2	~~8-3~~ 8-2	2	11-4	2	~~8-11~~ 8-10	2	~~7-7~~ 7-5	2	10-4	2	~~8-3~~ 8-2	2	~~7-0~~ 6-11	2
Roof, ceiling and one clear-span floor  ROOF, CEILING AND ONE FLOOR (CLEAR SPAN)	1-2 × 6	2-11	2	2-3	2	1-11	2	2-9	2	2-1	2	1-9	2	2-7	2	2-0	2	1-8	2
	1-2 × 8	3-9	2	2-10	2	2-5	3	3-6	2	2-8	2	2-3	3	3-3	2	2-6	3	~~2-2~~ 2-1	3
	1-2 × 10	4-5	2	3-5	3	2-10	3	~~4-2~~ 4-1	2	3-2	3	2-8	3	~~3-11~~ 3-10	2	3-0	3	2-6	3
	1-2 × 12	5-2	2	4-0	3	3-4	3	4-10	3	3-9	3	~~3-2~~ 3-1	4	4-7	3	3-6	3	~~3-0~~ 2-11	4
	2-2 × 4	2-11	1	2-3	1	1-10	1	2-9	1	2-1	1	1-9	1	2-7	1	~~2-0~~ 1-11	1	~~1-8~~ 1-7	1
	2-2 × 6	4-4	1	3-4	2	2-10	2	4-1	1	~~3-2~~ 3-1	2	~~2-8~~ 2-7	2	3-10	1	~~3-0~~ 2-11	2	~~2-6~~ 2-5	2
	2-2 × 8	5-6	2	4-3	2	3-7	2	5-2	2	~~4-0~~ 3-11	2	3-4	2	4-10	2	~~3-9~~ 3-8	2	~~3-2~~ 3-1	2
	2-2 × 10	6-7	2	5-0	2	4-2	2	6-1	2	~~4-9~~ 4-8	2	~~4-0~~ 3-11	2	5-9	2	4-5	2	~~3-9~~ 3-8	3
	2-2 × 12	7-9	2	5-11	2	4-11	3	7-2	2	~~5-7~~ 5-6	2	4-8	3	6-9	2	~~5-3~~ 5-2	3	~~4-5~~ 4-4	3
	3-2 × 8	6-11	1	5-3	2	4-5	2	6-5	1	~~5-0~~ 4-11	2	4-2	2	6-1	1	4-8	2	~~4-0~~ 3-11	2
	3-2 × 10	~~8-3~~ 8-2	2	6-3	2	5-3	2	7-8	2	~~5-11~~ 5-10	2	~~5-0~~ 4-11	2	~~7-3~~ 7-2	2	~~5-7~~ 5-6	2	~~4-8~~ 4-7	2
	3-2 × 12	9-8	2	7-5	2	6-2	2	9-0	2	~~7-0~~ 6-11	2	5-10	2	8-6	2	~~6-7~~ 6-6	2	~~5-6~~ 5-5	3
	4-2 × 8	8-0	1	6-1	1	5-1	2	7-5	1	~~5-9~~ 5-8	2	~~4-10~~ 4-9	2	7-0	1	~~5-5~~ 5-4	2	~~4-7~~ 4-6	2
	4-2 × 10	9-6	1	7-3	2	6-1	2	8-10	1	~~6-10~~ 6-9	2	~~5-9~~ 5-8	2	8-4	1	~~6-5~~ 6-4	2	~~5-5~~ 5-4	2
	4-2 × 12	11-2	2	8-6	2	7-2	2	10-5	2	~~8-0~~ 7-11	2	~~6-9~~ 6-8	2	~~9-10~~ 9-9	2	~~7-7~~ 7-6	2	~~6-5~~ 6-3	2
	1-2 × 6	2-8	2	2-1	2	1-10	2	2-7	2	2-0	2	~~1-9~~ 1-8	2	2-5	2	1-11	2	~~1-8~~ 1-7	2
	1-2 × 8	3-5	2	2-8	2	2-4	3	3-3	2	~~2-7~~ 2-6	2	2-2	3	3-1	2	2-5	3	~~2-1~~ 2-0	3
	1-2 × 10	4-0	2	3-2	3	2-9	3	3-10	2	~~3-1~~ 3-0	3	2-7	3	3-8	2	~~2-11~~ 2-10	3	2-5	3

GIRDERS AND HEADERS SUPPORTING	SIZE	ALLOWABLE STRESS DESIGN GROUND SNOW LOAD, P (psf)																	
		30						50						70					
		Building width (feet)																	
		12		24		36		12		24		36		12		24		36	
		Span	NJ	Span	NJ	Span	NJ	Span	NJ	Span	NJ	Span	NJ	Span	NJ	Span	NJ	Span	NJ
GIRDERS AND HEADERS SUPPORTING Roof, ceiling and two center-bearing floors 	1-2 × 12	4-9	3	3-9	3	3-2	4	4-6	3	3-7	3	~~3-1~~ 3-0	4	4-3	3	~~3-5~~ 3-4	3	~~2-11~~ 2-10	4
	2-2 × 4	2-8	1	2-1	1	1-9	1	2-6	1	2-0	1	1-8	1	2-5	1	~~1-11~~ 1-10	1	1-7	1
	2-2 × 6	4-0	1	3-2	2	2-8	2	3-9	1	3-0	2	~~2-7~~ 2-6	2	3-7	1	2-10	2	2-5	2
	2-2 × 8	5-0	2	4-0	2	3-5	2	~~4-10~~ 4-9	2	~~3-10~~ 3-9	2	~~3-3~~ 3-2	2	~~4-7~~ 4-6	2	3-7	2	~~3-1~~ 3-0	2
	2-2 × 10	6-0	2	4-9	2	4-0	2	5-8	2	4-6	2	3-10	3	5-5	2	4-3	2	~~3-8~~ 3-7	3
	2-2 × 12	7-0	2	5-7	2	4-9	3	6-8	2	~~5-4~~ 5-3	3	4-6	3	6-4	2	5-0	3	4-3	3
	3-2 × 8	6-4	1	5-0	2	4-3	2	6-0	1	4-9	2	~~4-1~~ 4-0	2	5-8	2	~~4-6~~ 4-5	2	~~3-10~~ 3-9	2
	3-2 × 10	7-6	2	5-11	2	5-1	2	7-1	2	~~5-8~~ 5-7	2	~~4-10~~ 4-9	2	6-9	2	~~5-4~~ 5-3	2	~~4-7~~ 4-6	2
	3-2 × 12	8-10	2	7-0	2	5-11	2	8-5	2	~~6-8~~ 6-7	2	~~5-8~~ 5-7	3	~~8-0~~ 7-11	2	~~6-4~~ 6-3	2	~~5-4~~ 5-3	3
	4-2 × 8	7-3	1	5-9	1	4-11	2	6-11	1	~~5-6~~ 5-5	2	4-8	2	6-7	1	5-2	2	~~4-5~~ 4-4	2
	4-2 × 10	8-8	1	6-10	2	5-10	2	8-3	2	6-6	2	~~5-7~~ 5-6	2	~~7-10~~ 7-9	2	~~6-2~~ 6-1	2	~~5-3~~ 5-2	2
	4-2 × 12	10-2	2	8-1	2	6-10	2	9-8	2	~~7-8~~ 7-7	2	~~6-7~~ 6-6	2	9-2	2	~~7-3~~ 7-2	2	~~6-2~~ 6-1	2
Roof, ceiling, and two clear-span floors 	1-2 × 6	2-3	2	1-9	2	1-5	2	2-3	2	1-9	2	1-5	3	2-2	2	1-8	2	1-5	3
	1-2 × 8	2-10	2	2-2	3	1-10	3	2-10	2	2-2	3	1-10	3	2-9	2	2-1	3	~~1-10~~ 1-9	3
	1-2 × 10	3-4	2	2-7	3	2-2	3	3-4	3	2-7	3	2-2	4	3-3	3	2-6	3	~~2-2~~ 2-1	4
	1-2 × 12	4-0	3	3-0	3	2-7	4	4-0	3	3-0	4	2-7	4	3-10	3	~~3-0~~ 2-11	4	2-6	4
	2-2 × 4	2-3	1	1-8	1	1-4	1	2-3	1	1-8	1	1-4	1	2-2	1	~~1-8~~ 1-7	1	1-4	2
	2-2 × 6	3-4	1	2-6	2	2-2	2	3-4	2	2-6	2	2-2	2	3-3	2	2-6	2	2-1	2
	2-2 × 8	4-3	2	3-3	2	2-8	2	4-3	2	3-3	2	2-8	2	4-1	2	~~3-2~~ 3-1	2	2-8	3
	2-2 × 10	5-0	2	3-10	2	3-2	3	5-0	2	3-10	2	3-2	3	4-10	2	~~3-9~~ 3-8	3	~~3-2~~ 3-1	3
	2-2 × 12	5-11	2	4-6	3	3-9	3	5-11	2	4-6	3	3-9	3	5-8	2	~~4-5~~ 4-4	3	~~3-9~~ 3-8	3
	3-2 × 8	5-3	1	4-0	2	3-5	2	5-3	2	4-0	2	3-5	2	5-1	2	3-11	2	3-4	2
	3-2 × 10	6-3	2	4-9	2	4-0	2	6-3	2	4-9	2	4-0	2	6-1	2	4-8	2	~~4-0~~ 3-11	3
	3-2 × 12	7-5	2	5-8	2	4-9	3	7-5	2	5-8	2	4-9	3	7-2	2	5-6	3	~~4-8~~ 4-7	3
	4-2 × 8	6-1	1	4-8	2	3-11	2	6-1	1	4-8	2	3-11	2	5-11	1	~~4-7~~ 4-6	2	3-10	2
	4-2 × 10	7-3	2	5-6	2	4-8	2	7-3	2	5-6	2	4-8	2	7-0	2	~~5-5~~ 5-4	2	~~4-7~~ 4-6	2
	4-2 × 12	8-6	2	6-6	2	5-6	2	8-6	2	6-6	2	5-6	2	8-3	2	6-4	2	5-4	3

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.

b. Spans are based on minimum design properties for No. 2 grade lumber of Douglas fir-larch, hem-fir, Southern pine, and spruce-pine-fir.

c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

d. NJ = Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

e. Use 30 psf allowable stress design ground snow load for cases in which allowable stress design ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.

f. Spans are calculated assuming a single span header or girder under uniform load where the top of the header or girder is laterally braced by perpendicular framing. Where the top of the header or girder is not laterally braced (for example, cripple studs bearing on the header), tabulated spans for headers consisting of 2 × 8, 2 × 10, or 2 × 12 sizes shall be multiplied by 0.70 or the header or girder shall be designed.

Reason: This proposal updates the header tables in multiple locations to be aligned with ASCE 7-22. The proposed spans align with those found in the ANSI/AWC *2024 Wood Frame Construction Manual (WFCM).* Additionally, language has been added to footnote f to clarify that all header and girder calculations are based on the assumption that they are single-span headers or girders. This clarification is necessary as multi-span headers are not addressed by the tables. The table heading and footnote e have been revised to reflect that the code now uses allowable stress design ground snow load.

Cost Impact: Increase

Estimated Immediate Cost Impact:

$0

Estimated Immediate Cost Impact Justification (methodology and variables):

This proposal updates the header tables in multiple locations to be aligned with ASCE 7-22. Updated spans are typically shorter by either 1 or 2 inches. This minor adjustment in span will likely not impact the lumber lengths needed for construction, as some trimming will still be necessary to accommodate the actual header span end use. As the cost impact cannot be a decrease, and any increase is minimal that may not be realized due to typical waste, the cost impact is estimated at an increase of $0.

RB190-25

RB191-25

IRC: R602.7, TABLE R602.7(1), TABLE R602.7(2) (New), TABLE R602.7(2), R602.7(4) (New)

Proponents: Shane Nilles, representing American Wood Council (snilles@awc.org); David Tyree, representing American Wood Council (dtyree@awc.org)

2024 International Residential Code

Revise as follows:

R602.7 Headers. For header spans, see Tables R602.7(1), R602.7(2), R602.7(3), R602.7(4) and R602.7(~~3~~5).

TABLE R602.7(1) LATERALLY SUPPORTED GIRDER SPANS[a] AND HEADER SPANS[a] FOR EXTERIOR BEARING WALLS (Maximum spans for Douglas fir-larch, hem-fir, Southern pine and spruce-pine-fir[b] and required number of jack studs)

Portions of table not shown remain unchanged.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.

b. Spans are based on minimum design properties for No. 2 grade lumber of Douglas fir-larch, hem-fir, Southern pine, and spruce-pine-fir.

c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

d. NJ = Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

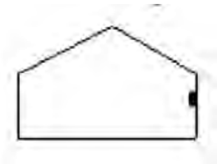
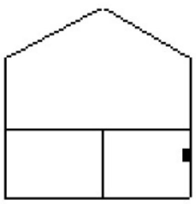
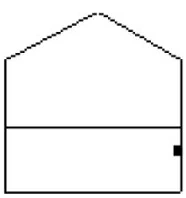
e. Use 30 psf ground snow load for cases in which ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.

f. Spans are calculated assuming a single span header or girder under uniform load where the top of the header or girder is laterally braced by perpendicular framing. Where the top of the header or girder is not laterally braced (for example, cripple studs bearing on the header), refer to Table R602.7(2). ~~tabulated spans for headers consisting of 2 × 8, 2 × 10, or 2 × 12 sizes shall be multiplied by 0.70 or the header or girder shall be designed.~~

Add new text as follows:

TABLE R602.7(2)
LATERALLY UNSUPPORTED (DROPPED) GIRDER SPANS[a] AND HEADER SPANS[a] FOR EXTERIOR BEARING WALLS (Maximum spans for Douglas Fir-Larch, Hem-Fir, Southern Pine and Spruce-Pine-Fir[b] and required number of jack studs)

GIRDERS AND HEADERS SUPPORTING	SIZE	GROUND SNOW LOAD (psf)[e]																	
		30						50						70					
		Building width[c] (feet)																	
		12		24		36		12		24		36		12		24		36	
		Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]	Span[f]	NJ[d]
Roof and ceiling	1-2 × 6	3-11	1	3-0	2	2-6	2	3-4	1	2-7	2	2-2	2	3-0	2	2-3	2	1-11	2
	1-2 × 8	4-10	2	3-9	2	3-2	2	4-2	2	3-3	2	2-8	2	3-9	2	2-10	2	2-5	3
	1-2 × 10	5-7	2	4-4	2	3-8	2	4-10	2	3-9	2	3-2	3	4-4	2	3-4	3	2-10	3
	1-2 × 12	6-2	2	4-11	2	4-3	3	5-5	2	4-4	3	3-8	3	4-11	2	3-10	3	3-3	3
	2-2 × 4	3-11	1	3-0	1	2-6	1	3-4	1	2-6	1	2-2	1	3-0	1	2-3	1	1-11	1
	2-2 × 6	5-8	1	4-4	1	3-8	1	4-11	1	3-9	1	3-2	2	4-5	1	3-4	2	2-10	2
	2-2 × 8	6-9	1	5-4	1	4-6	2	5-11	1	4-7	2	3-11	2	5-4	1	4-2	2	3-6	2

	2-2 × 10	7-6	1	6-0	2	5-2	2	6-7	2	5-3	2	4-6	2	6-0	2	4-9	2	4-1	2
	2-2 × 12	8-0	2	6-6	2	5-9	2	7-2	2	5-10	2	5-1	2	6-6	2	5-4	2	4-7	3
	3-2 × 8	8-0	1	6-5	1	5-6	1	7-1	1	5-7	1	4-10	2	6-5	1	5-1	2	4-4	2
	3-2 × 10	8-9	1	7-1	1	6-2	2	7-9	1	6-3	2	5-5	2	7-1	1	5-8	2	4-11	2
	3-2 × 12	9-4	1	7-7	2	6-8	2	8-4	2	6-9	2	5-11	2	7-7	2	6-2	2	5-5	2
	4-2 × 8	8-10	1	7-2	1	6-3	1	7-11	1	6-4	1	5-5	1	7-2	1	5-9	1	4-11	2
	4-2 × 10	9-8	1	7-11	1	6-11	1	8-8	1	7-0	1	6-1	2	7-11	1	6-5	2	5-6	2
	4-2 × 12	10-4	1	8-5	1	7-5	2	9-3	1	7-6	2	6-7	2	8-6	1	6-11	2	6-0	2
	1-2 × 6	3-2	1	2-6	2	2-2	2	2-11	2	2-4	2	1-11	2	2-8	2	2-2	2	1-10	2
	1-2 × 8	4-0	2	3-2	2	2-8	2	3-8	2	2-11	2	2-5	3	3-5	2	2-8	2	2-3	3
	1-2 × 10	4-7	2	3-8	2	3-2	3	4-3	2	3-5	3	2-11	3	3-11	2	3-2	3	2-8	3
	1-2 × 12	5-3	2	4-3	3	3-8	3	4-10	2	3-11	3	3-4	3	4-6	3	3-8	3	3-1	4
Roof, ceiling and one center-bearing floor	2-2 × 4	3-2	1	2-6	1	2-1	1	2-11	1	2-3	1	1-11	1	2-8	1	2-1	1	1-9	1
	2-2 × 6	4-8	1	3-8	1	3-2	2	4-4	1	3-4	2	2-10	2	3-11	1	3-2	2	2-8	2
	2-2 × 8	5-8	1	4-6	2	3-11	2	5-3	2	4-2	2	3-7	2	4-10	2	3-11	2	3-4	2
	2-2 × 10	6-4	2	5-2	2	4-6	2	5-11	2	4-10	2	4-2	2	5-6	2	4-6	2	3-10	2
	2-2 × 12	6-10	2	5-9	2	5-0	2	6-5	2	5-4	2	4-8	3	6-1	2	5-0	2	4-5	3
	3-2 × 8	6-9	1	5-6	1	4-9	2	6-4	1	5-1	2	4-5	2	5-11	1	4-9	2	4-1	2
	3-2 × 10	7-5	1	6-2	2	5-5	2	7-0	1	5-9	2	5-0	2	6-6	2	5-5	2	4-8	2
	3-2 × 12	8-0	2	6-8	2	5-11	2	7-6	2	6-3	2	5-6	2	7-0	2	5-11	2	5-2	2
	4-2 × 8	7-7	1	6-3	1	5-5	1	7-1	1	5-9	1	5-0	2	6-7	1	5-5	1	4-8	2
	4-2 × 10	8-4	1	6-11	2	6-1	2	7-9	1	6-5	2	5-7	2	7-4	1	6-1	2	5-3	2
	4-2 × 12	8-11	1	7-5	2	6-7	2	8-4	2	6-11	2	6-2	2	7-10	2	6-7	2	5-10	2
	1-2 × 6	2-11	2	2-3	2	1-10	2	2-8	2	2-1	2	1-9	2	2-7	2	1-11	2	1-8	2
	1-2 × 8	3-8	2	2-10	2	2-4	3	3-5	2	2-7	2	2-2	3	3-2	2	2-6	3	2-1	3
	1-2 × 10	4-3	2	3-4	3	2-9	3	4-0	2	3-1	3	2-7	3	3-9	2	2-11	3	2-5	3
	1-2 × 12	4-10	2	3-10	3	3-3	3	4-6	3	3-7	3	3-0	4	4-4	3	3-4	3	2-10	4
Roof, ceiling and one clear-span floor	2-2 × 4	2-11	1	2-3	1	1-10	1	2-8	1	2-1	1	1-9	1	2-6	1	1-11	1	1-7	1
	2-2 × 6	4-3	1	3-3	2	2-9	2	4-0	1	3-1	2	2-7	2	3-9	1	2-10	2	2-5	2
	2-2 × 8	5-2	2	4-1	2	3-6	2	4-10	2	3-10	2	3-3	2	4-7	2	3-7	2	3-0	2
	2-2 × 10	5-10	2	4-8	2	4-0	2	5-6	2	4-5	2	3-9	2	5-3	2	4-2	2	3-7	3
	2-2 × 12	6-4	2	5-3	2	4-7	3	6-1	2	4-11	2	4-3	3	5-9	2	4-8	3	4-1	3
	3-2 × 8	6-3	1	5-0	2	4-3	2	5-11	1	4-8	2	4-0	2	5-7	1	4-5	2	3-9	2
	3-2 × 10	6-11	2	5-7	2	4-10	2	6-7	2	5-3	2	4-7	2	6-3	2	5-0	2	4-4	2
	3-2 × 12	7-5	2	6-1	2	5-5	2	7-1	2	5-10	2	5-1	2	6-9	2	5-6	2	4-10	3
	4-2 × 8	7-0	1	5-8	1	4-10	2	6-8	1	5-4	2	4-6	2	6-4	1	5-0	2	4-3	2
	4-2 × 10	7-8	1	6-3	2	5-6	2	7-4	1	5-11	2	5-2	2	7-0	1	5-8	2	4-11	2
	4-2 × 12	8-3	2	6-9	2	6-0	2	7-10	2	6-5	2	5-8	2	7-6	2	6-2	2	5-5	2
	1-2 × 6	2-8	2	2-1	2	1-10	2	2-6	2	2-0	2	1-8	2	2-5	2	1-11	2	1-7	2
	1-2 × 8	3-4	2	2-8	2	2-3	3	3-2	2	2-6	2	2-2	3	3-0	2	2-4	3	2-0	3
	1-2 × 10	3-11	2	3-2	3	2-8	3	3-8	2	2-11	3	2-6	3	3-6	2	2-9	3	2-5	3
Roof, ceiling and two center-bearing floors	1-2 × 12	4-6	3	3-8	3	3-2	4	4-3	3	3-5	3	2-11	4	4-1	3	3-3	3	2-9	4
	2-2 × 4	2-8	1	2-1	1	1-9	1	2-6	1	2-0	1	1-8	1	2-4	1	1-10	1	1-7	1
	2-2 × 6	3-11	1	3-1	2	2-8	2	3-8	1	2-11	2	2-6	2	3-6	1	2-9	2	2-4	2
	2-2 × 8	4-10	2	3-11	2	3-4	2	4-7	2	3-8	2	3-2	2	4-4	2	3-5	2	2-11	2
	2-2 × 10	5-6	2	4-6	2	3-11	2	5-2	2	4-3	2	3-8	3	5-0	2	4-0	2	3-6	3
	2-2 × 12	6-0	2	5-0	2	4-5	3	5-9	2	4-9	3	4-2	3	5-6	2	4-7	3	4-0	3
	3-2 × 8	5-10	1	4-9	2	4-1	2	5-6	1	4-6	2	3-10	2	5-3	2	4-3	2	3-8	2
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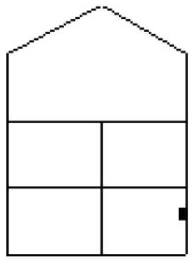
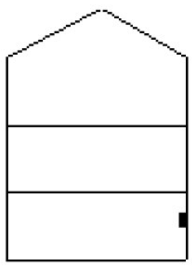
	3-2 × 12	7-0	2	5-11	2	5-3	2	6-8	2	5-7	2	5-0	3	6-5	2	5-5	2	4-9	3
	4-2 × 8	6-7	1	5-5	1	4-8	2	6-3	1	5-1	2	4-5	2	6-0	1	4-10	2	4-2	2
	4-2 × 10	7-3	1	6-0	2	5-4	2	6-11	2	5-9	2	5-0	2	6-8	2	5-6	2	4-9	2
	4-2 × 12	7-9	2	6-6	2	5-10	2	7-5	2	6-3	2	5-6	2	7-2	2	6-0	2	5-4	2
	1-2 × 6	2-3	2	1-8	2	1-5	2	2-3	2	1-8	2	1-5	3	2-2	2	1-8	2	1-5	3
	1-2 × 8	2-10	2	2-2	3	1-10	3	2-10	2	2-2	3	1-10	3	2-8	2	2-1	3	1-9	3
	1-2 × 10	3-4	2	2-6	3	2-2	3	3-4	3	2-6	3	2-2	4	3-2	3	2-6	3	2-1	4
Roof, ceiling, and two clear-span floors	1-2 × 12	3-10	3	3-0	3	2-6	4	3-10	3	3-0	4	2-6	4	3-8	3	2-10	4	2-5	4
	2-2 × 4	2-3	1	1-8	1	1-4	1	2-3	1	1-8	1	1-4	1	2-2	1	1-7	1	1-4	2
	2-2 × 6	3-3	1	2-6	2	2-1	2	3-3	2	2-6	2	2-1	2	3-2	2	2-5	2	2-1	2
	2-2 × 8	4-1	2	3-2	2	2-8	2	4-1	2	3-2	2	2-8	2	3-11	2	3-1	2	2-7	3
	2-2 × 10	4-9	2	3-8	2	3-2	3	4-8	2	3-8	2	3-2	3	4-6	2	3-7	3	3-0	3
	2-2 × 12	5-4	2	4-3	3	3-8	3	5-3	2	4-3	3	3-8	3	5-1	2	4-1	3	3-6	3
	3-2 × 8	5-0	1	3-11	2	3-4	2	5-0	2	3-11	2	3-4	2	4-10	2	3-9	2	3-2	2
	3-2 × 10	5-9	2	4-7	2	3-10	2	5-7	2	4-6	2	3-10	2	5-5	2	4-4	2	3-9	3
	3-2 × 12	6-4	2	5-2	2	4-5	3	6-2	2	5-0	2	4-5	3	5-11	2	4-10	3	4-3	3
	4-2 × 8	5-9	1	4-6	2	3-10	2	5-8	1	4-6	2	3-10	2	5-5	1	4-4	2	3-8	2
	4-2 × 10	6-6	2	5-2	2	4-5	2	6-4	2	5-1	2	4-5	2	6-1	2	4-11	2	4-3	2
	4-2 × 12	7-1	2	5-9	2	5-0	2	6-10	2	5-7	2	4-11	2	6-7	2	5-5	2	4-9	3

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.

b. Spans are based on minimum design properties for No. 2 grade lumber of Douglas Fir-Larch, Hem-Fir, Southern Pine, and Spruce-Pine-Fir.

c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

d. NJ = Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

e. Use 30 psf ground snow load for cases in which ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.

f. Spans are calculated assuming a single span header or girder under uniform load where the top of the header or girder is not laterally braced by perpendicular framing.

Revise as follows:

~~TABLE R602.7(2)~~ TABLE R602.7(3) LATERALLY SUPPORTED GIRDER SPANS[a] AND HEADER SPANS[a] FOR INTERIOR BEARING WALLS (Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir[b] and required number of jack studs)

Portions of table not shown remain unchanged.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

e. Spans are calculated assuming a single span header or girder under uniform load where the top of the header or girder is laterally braced by perpendicular framing. Where the top of the header or girder is not laterally braced (for example, cripple studs bearing on the header), refer to Table R602.7(4). ~~tabulated spans for headers consisting of 2 × 8, 2 × 10, or 2 × 12 sizes shall be multiplied by 0.70 or the header or girder shall be designed~~.

Add new text as follows:

R602.7(4)

TABLE R602.7(4)

LATERALLY UNSUPPORTED (DROPPED) GIRDER SPANS[a] AND HEADER SPANS[a] FOR INTERIOR BEARING WALLS (Maximum spans for Douglas Fir-Larch, Hem-Fir, Southern Pine and Spruce-Pine-Fir[b] and required number of jack studs)

GIRDERS AND HEADERS SUPPORTING	SIZE	Building Width[c] (feet)					
		12		24		36	
		Span[e]	NJ[d]	Span[e]	NJ[d]	Span[e]	NJ[d]
One floor only	2-2 × 4	4-0	1	2-10	1	2-4	1
	2-2 × 6	5-11	1	4-3	1	3-5	1
	2-2 × 8	7-1	1	5-2	1	4-4	2
	2-2 × 10	7-11	1	5-11	2	5-0	2
	2-2 × 12	8-6	1	6-7	2	5-7	2
	3-2 × 8	8-5	1	6-4	1	5-3	1
	3-2 × 10	9-3	1	7-1	1	6-0	2
	3-2 × 12	9-11	1	7-8	2	6-7	2
	4-2 × 8	9-5	1	7-2	1	6-0	1
	4-2 × 10	10-3	1	7-11	1	6-9	1
	4-2 × 12	11-0	1	8-7	1	7-4	2
Two floors	2-2 × 4	2-7	1	1-11	1	1-7	1
	2-2 × 6	3-10	1	2-10	2	2-5	2
	2-2 × 8	4-9	1	3-7	2	3-0	2
	2-2 × 10	5-6	2	4-2	2	3-6	2
	2-2 × 12	6-1	2	4-9	2	4-1	3
	3-2 × 8	5-10	1	4-5	2	3-9	2
	3-2 × 10	6-7	1	5-1	2	4-4	2
	3-2 × 12	7-2	2	5-8	2	4-11	2
	4-2 × 8	6-7	1	5-4	1	4-5	2
	4-2 × 10	7-5	1	5-9	2	4-11	2
	4-2 × 12	8-0	1	6-4	2	5-6	2

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Spans are given in feet and inches.
b. Spans are based on minimum design properties for No. 2 grade lumber of Douglas Fir-Larch, Hem-Fir, Southern Pine, and Spruce-Pine-Fir.
c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
d. NJ = Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.
e. Spans are calculated assuming a single span header or girder under uniform load where the top of the header or girder is not laterally braced by perpendicular framing.

Reason: Laterally unsupported header and girder spans are currently addressed by a conservative adjustment in footnote f of the existing header/girder span tables. Spans for laterally unsupported headers and girders are added consistent with ANSI/AWC 2024 Wood Frame Construction Manual to show appropriate spans, avoiding the unnecessary conservatism. With this proposal, the laterally unsupported header and girder condition is now addressed by stand-alone tables and no longer needs to be addressed through an adjustment factor footnote. Existing tables have been renumbered and titles have been revised to reflect that they are applicable to laterally supported headers and girders.

Additionally, language has been added to the footnotes to clarify that all header and girder calculations are based on the assumption that they are single-span headers or girders. This clarification is necessary as multi-span headers are not addressed by the tables.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0

Estimated Immediate Cost Impact Justification (methodology and variables):

This proposal revises the code for laterally unsupported (dropped) header and girder spans. The new tables remove unnecessary conservatism, therefore this proposal could potentially decrease construction costs where the tables are used. The decrease in cost is conservatively estimated as $0.

RB191-25

RB192-25

IRC: TABLE R602.7(2)

Proponents: Glenn Mathewson, BuildingCodeCollege.com, representing Self (glenn@glennmathewson.com)

2024 International Residential Code

Revise as follows:

TABLE R602.7(2) GIRDER SPANS[a] AND HEADER SPANS[a] FOR INTERIOR BEARING WALLS (Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir[b] and required number of jack studs)

HEADERS AND GIRDERS SUPPORTING	SIZE	BUILDING Width[c] (feet)					
		12		24		36	
		Span[e]	NJ[d]	Span[e]	NJ[d]	Span[e]	NJ[d]
One floor only	2-2 × 4	4-1	1	2-10	1	2-4	1
	2-2 × 6	6-1	1	4-4	1	3-6	1
	2-2 × 8	7-9	1	5-5	1	4-5	2
	2-2 × 10	9-2	1	6-6	2	5-3	2
	2-2 × 12	10-9	1	7-7	2	6-3	2
	3-2 × 8	9-8	1	6-10	1	5-7	1
	3-2 × 10	11-5	1	8-1	1	6-7	2
	3-2 × 12	13-6	1	9-6	2	7-9	2
	4-2 × 8	11-2	1	7-11	1	6-5	1
	4-2 × 10	13-3	1	9-4	1	7-8	1
	4-2 × 12	15-7	1	11-0	1	9-0	2
Two floors	2-2 × 4	2-7	1	1-11	1	1-7	1
	2-2 × 6	3-11	1	2-11	2	2-5	2
	2-2 × 8	5-0	1	3-8	2	3-1	2
	2-2 × 10	5-11	2	4-4	2	3-7	2
	2-2 × 12	6-11	2	5-2	2	4-3	3
	3-2 × 8	6-3	1	4-7	2	3-10	2
	3-2 × 10	7-5	1	5-6	2	4-6	2
	3-2 × 12	8-8	2	6-5	2	5-4	2
	4-2 × 8	7-2	1	5-4	1	4-5	2
	4-2 × 10	8-6	1	6-4	2	5-3	2
	4-2 × 12	10-1	1	7-5	2	6-2	2

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Spans are given in feet and inches.

b. Spans are based on minimum design properties for No. 2 grade lumber of Douglas fir-larch, hem-fir, Southern pine, and spruce-pine-fir.

c. Building width is measured perpendicular to the girder or header ~~ridge~~. For widths between those shown, spans are permitted to be interpolated.

d. NJ = Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an *approved* framing anchor attached to the full-height wall stud and to the header.

e. Spans are calculated assuming the top of the header or girder is laterally braced by perpendicular framing. Where the top of the header or girder is not laterally braced (for example, cripple studs bearing on the header), tabulated spans for headers consisting of 2 × 8, 2 × 10, or 2 × 12 sizes shall be multiplied by 0.70 or the header or girder shall be designed.

Reason: "Building width" is just a way for the IRC to figure out the rafter or joist span for the sake of sizing beams and headers. Measuring the building width needs to be in the direction parallel to the rafter or joist being supported. When sizing headers in exterior walls, rafters are being supported, and thus "building width" is perpendicular to the ridge supporting those rafters. However, for this table, girders and headers for interior walls are being sized. Under the prescriptive design method of "conventional wood frame construction" the roof is clear span and not supported by interior bearing walls. Yes... the use of purlins to support rafters mid span do transfer those loads to interior walls, but this table is appears to be based on the floor loads only. With that in mind, it seems that "building width" for use of this table would not care about the roof orientation, but rather the joist orientation. Thus the description of "building width" should be in reference to the direction of the joists and exterior walls and not the roof ridge. It is not uncommon for a building to have joists running in a direction different from the roof rafters.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal only clarifies the existing intent of the IRC and does not affect the cost of construction.

RB192-25

RB197-25

IRC: R606.2, R606.3, R606.3.4, R606.3.4.1, TABLE R606.3.4.1

Proponents: Nicholas Lang, Concrete Masonry & Hardscapes Association, representing Masonry Alliance for Codes & Standards (nlang@masonryandhardscapes.org); Charles Clark Jr, Brick Industry Association, representing Masonry Alliance for Codes and Standards (cclark@bia.org)

2024 International Residential Code

Revise as follows:

R606.2 Masonry construction materials. Masonry construction materials shall conform to the requirements of this section.

R606.3 Construction requirements. Masonry construction shall conform to the requirements of this section.

R606.3.4 Protection for reinforcement. Bars shall be completely embedded in mortar or grout. Joint reinforcement and deformed wire embedded in horizontal mortar joints shall ~~not~~ have a minimum cover of ~~less than~~ $^{5}/_{8}$-inch (15.9 mm) where exposed to earth or weather and $^{1}/_{2}$-inch (12.7 mm) where not exposed to earth or weather. ~~mortar coverage from the exposed face. Other reinforcement shall have a minimum coverage of one bar diameter over all bars, but not less than $^{3}/_{4}$-inch (19 mm), except where exposed to weather or soil, in which case the minimum coverage shall be 2 inches (51 mm).~~ Reinforcement placed in grout shall have a masonry cover not less than the following:

1. Where the masonry face is exposed to earth or weather: minimum 2 inches (50.8 mm) for bars larger than No. 5 (M#16); and 1.5 inches (38.1 mm) for deformed wire, welded wire reinforcement, and No. 5 bars (M#16) or smaller.
2. Where the masonry is not exposed to earth or weather: minimum 1.5 inches (38.1 mm).

R606.3.4.1 Corrosion protection. Minimum corrosion protection of joint reinforcement, anchor ties and wire fabric for use in masonry wall construction shall conform to TMS 602 Article 2.4L. ~~Table R606.3.4.1.~~

Delete without substitution:

~~TABLE R606.3.4.1 MINIMUM CORROSION PROTECTION~~

~~MASONRY METAL ACCESSORY~~	~~STANDARD~~
~~Joint reinforcement, interior walls~~	~~ASTM A641, Class 1~~
~~Wire ties or anchors in exterior walls completely embedded in mortar or grout~~	~~ASTM A641, Class 3~~
~~Wire ties or anchors in exterior walls not completely embedded in mortar or grout~~	~~ASTM A153, Class B-2~~
~~Joint reinforcement in exterior walls or interior walls exposed to moist environment~~	~~ASTM A153, Class B-2~~
~~Sheet metal ties or anchors exposed to weather~~	~~ASTM A153, Class B-2~~
~~Sheet metal ties or anchors completely embedded in mortar or grout~~	~~ASTM A653, Coating Designation G60~~
~~Stainless steel hardware for any exposure~~	~~ASTM A167, Type 304~~

Reason: Section R606.2.13 requires that metal reinforcement and accessories conform to Article 2.4 of The Masonry Society (TMS) 602. That article contains requirements for corrosion protection. Section R606.3.4 contains both requirements for cover of metal reinforcement an accessories, as well as a table for corrosion protection. **R606.2.13 Metal reinforcement and accessories.** Metal reinforcement and accessories shall conform to Article 2.4 of TMS 602.

The cover requirements and the corrosion protection requirements in the IRC are not consistent with that required in TMS 602. This change proposes to modify masonry reinforcement cover requirements to be consistent with TMS 602. It further proposes to remove the corrosion protection table, and replace it with a reference to the specific sub-section of TMS 602 that has corrosion protection requirements. Since that is a sub-section of Article 2.4 (already referenced in the IRC), this would make these sections consistent.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This change simply aligns the requirements in two sections of the IRC for consistency.

RB197-25

RB199-25

IRC: R606.2.8, TABLE R606.2.8

Proponents: Shamim Rashid-Sumar, representing National Ready Mixed Concrete Association (ssumar@nrmca.org); Dr. Julian Mills-Beale, representing National Ready Mixed Concrete Association (jmills-beale@nrmca.org); James Farny, Portland Cement Association, representing US cement manufacturers (jfarny@cement.org)

2024 International Residential Code

R606.2.8 Mortar. Except for mortars listed in Sections R606.2.9, R606.2.10 and R606.2.11, mortar for use in masonry construction shall meet the proportion specifications of Table R606.2.8 or the property specifications of ASTM C270. The type of mortar shall be in accordance with Sections R606.2.8.1, R606.2.8.2 and R606.2.8.3.

Revise as follows:

TABLE R606.2.8 MORTAR PROPORTIONS[a, b]

MORTAR	TYPE	PROPORTIONS BY VOLUME (cementitious materials)									
		Portland cement or blended cement	Mortar cement			Masonry cement			Hydrated lime[c] or lime putty	Aggregate ratio (measured in damp, loose conditions)
			M	S	N	M	S	N		
Cement-lime	M	1	—	—	—	—	—	—	1/4	Not less than 2 1/4 and not more than 3 times the sum of separate volumes of lime, if used, and cement
	S	1	—	—	—	—	—	—	over 1/4 to 1/2	
	N	1	—	—	—	—	—	—	over 1/2 to 1 1/4	
	O	1	—	—	—	—	—	—	over 1 1/4 to 2 1/2	
Mortar cement	M	1	—	—	1	—	—	—	—	
	M	—	1	—	—	—	—	—		
	S	1/2	—	—	1	—	—	—		
	S	—	—	1	—	—	—	—		
	N	—	—	—	1	—	—	—		
	O	—	—	—	1	—	—	—		
Masonry cement	M	1	—	—	—	—	—	1	—	
	M	—	—	—	—	1	—	—		
	S	1/2	—	—	—	—	—	1		
	S	—	—	—	—	—	1	—		
	N	—	—	—	—	—	—	1		
	O	—	—	—	—	—	—	1		

For SI: 1 cubic foot = 0.0283 m^3, 1 pound = 0.454 kg.

a. For the purpose of these specifications, the weight of 1 cubic foot of the respective materials shall be considered to be as follows:

Hydrated lime = 40 pounds

Lime putty (Quicklime) = 80 pounds

Blended cement = Weight printed on bag

Masonry cement = Weight printed on bag

Mortar cement = Weight printed on bag

Portland cement = 94 pounds

Sand, damp and loose = 80 pounds of dry sand

b. Two air-entraining materials shall not be combined in mortar.

c. Hydrated lime conforming to the requirements of ASTM C207.

Reason: This proposal is part of a series of proposals to the IBC and IRC to update cement terminology in the building codes.
The proposed revisions reflect current cement technology and market conditions, which can vary across regions. Nationally, the market is

no longer dominated by portland cement. More than sixty percent of the current cement market consists of blended cements , including portland-limestone cement (PLC) and other blended cements that meet the requirements of ASTM C595/C595M, Specification for Blended Hydraulic Cements (Portland Cement Association, 2025). ASTM C595/C595M is referenced in the International Building Code/ International Residential Code.

Bibliography: Portland Cement Association, 2025. Reducing Carbon at the Cement Plant. https://cementprogress.com/reducing-carbon-at-the-cement-plant/

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposed change is editorial and will not impact the cost of construction.

RB199-25

RB201-25

IRC: R606.3.5, TABLE R606.3.5.1

Proponents: Nicholas Lang, Concrete Masonry & Hardscapes Association, representing Masonry Alliance for Codes & Standards (nlang@masonryandhardscapes.org); Charles Clark Jr, Brick Industry Association, representing Masonry Alliance for Codes and Standards (cclark@bia.org)

2024 International Residential Code

Revise as follows:

R606.3.5 Grouting requirements. Grouted masonry construction shall conform to the requirements of this section.

TABLE R606.3.5.1 GROUT SPACE DIMENSIONS AND POUR HEIGHTS

GROUT TYPE	GROUT POUR MAXIMUM HEIGHT (feet)	MINIMUM WIDTH OF GROUT SPACES[a, b] (inches)	MINIMUM GROUT[b, c] SPACE DIMENSIONS FOR GROUTING CELLS OF HOLLOW UNITS (inches × inches)
Fine	1	0.75	1.5 × 2
	~~5~~ 5.33	2	2 × 3
	~~12~~ 12.67	2.5	2.5 × 3
	24	3	3 × 3
Coarse	1	1.5	1.5 × 3
	~~5~~ 5.33	2	2.5 × 3
	~~12~~ 12.67	2.5	3 × 3
	24	3	3 × 4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. For grouting between masonry wythes.

b. Grout space dimension is the clear dimension between any masonry protrusion and shall be increased by the horizontal projection of the diameters of the horizontal bars within the cross section of the grout space.

c. Area of vertical reinforcement shall not exceed 6 percent of the area of the grout space.

Reason: Table R606.3.5.1 lists grout pour heights and the required width and grout space dimensions for masonry construction. The included pour heights are not aligned with typical masonry modular dimensions (8 inches). In the 2022 version of TMS 602, *Specification for Masonry Structures*, a similar table was updated to provide modular dimension for the pour heights of 5 feet (changed to 5.33 feet) and 12 feet (changed to 12.67 feet). This proposal aligns Table R606.3.5.1 with that in TMS 602.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is aligning the current IRC table with provisions in the *Specification for Masonry Structures*. It has the potential to marginally increase allowable grout pour heights, which could lead to some economy in construction, but it expected to not be significant.

RB204-25

IRC: TABLE R702.7(3)

Proponents: Theresa Weston, The Holt Weston Consultancy, representing Rainscreen Association in North America (holtweston88@gmail.com)

2024 International Residential Code

Revise as follows:

TABLE R702.7(3) CLASS III VAPOR RETARDERS

CLIMATE ZONE	CLASS III VAPOR RETARDERS PERMITTED FOR:[a, b]
Marine 4	Vented or ventilated cladding over wood structural panels.
Marine 4	Vented or ventilated cladding over fiberboard.
Marine 4	Vented or ventilated cladding over gypsum.
Marine 4	Continuous insulation with *R*-value ≥ 2.5 over 2 × 4 wall.
Marine 4	Continuous insulation with *R*-value ≥ 3.75 over 2 × 6 wall.
5	Vented or ventilated cladding over wood structural panels.
5	Vented or ventilated cladding over fiberboard.
5	Vented or ventilated cladding over gypsum.
5	Continuous insulation with *R*-value ≥ 5 over 2 × 4 wall.
5	Continuous insulation with *R*-value ≥ 7.5 over 2 × 6 wall.
6	Vented or ventilated cladding over fiberboard.
6	Vented or ventilated cladding over gypsum.
6	Continuous insulation with *R*-value ≥ 7.5 over 2 × 4 wall.
6	Continuous insulation with *R*-value ≥ 11.25 over 2 × 6 wall.
7	Continuous insulation with *R*-value ≥ 10 over 2 × 4 wall.
7	Continuous insulation with *R*-value ≥ 15 over 2 × 6 wall.
8	Continuous insulation with *R*-value ≥ 12.5 over 2 × 4 wall.
8	Continuous insulation with *R*-value ≥ 20 over 2 × 6 wall.

a. Vented cladding shall include vinyl, polypropylene, or horizontal aluminum siding, brick veneer with a clear airspace as specified in Table R703.8.4(1), rainscreen systems and other approved vented claddings.

b. The requirements in this table apply only to insulation used to control moisture in order to permit the use of Class III vapor retarders. The insulation materials used to satisfy this option also contribute to but do not supersede the thermal envelope requirements of Chapter 11.

Reason: This proposal adds "ventilated cladding" as an option along the current "vented cladding". Standardized industry definitions to distinguish between "vented" and "ventilated" are still under development but revolve around the number of vents the level of uniformity of the airflow behind the cladding. Both vented and ventilated claddings provide the moisture vapor transfer which allow for the use of vapor retarders as specified in this table. This change will allow for all claddings along the vented - ventilation spectrum to be used under these code provisions.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal provides clarification but does not change any technical requirements.

RB210-25

IRC: TABLE R702.3.5

Proponents: Jeff Grove, Chair, representing BCAC (bcac@iccsafe.org)

2024 International Residential Code

Revise as follows:

TABLE R702.3.5 MINIMUM THICKNESS AND APPLICATION OF GYPSUM BOARD AND GYPSUM PANEL PRODUCTS
Portions of table not shown remain unchanged.

THICKNESS OF GYPSUM BOARD OR GYPSUM PANEL PRODUCTS (inches)	APPLICATION	ORIENTATION OF GYPSUM BOARD OR GYPSUM PANEL PRODUCTS TO FRAMING	MAXIMUM SPACING OF FRAMING MEMBERS (inches o.c.)	MAXIMUM SPACING OF FASTENERS (inches)		SIZE OF NAILS FOR APPLICATION TO WOOD FRAMING[c]
				Nails[a]	Screws[b]	
Application without adhesive						
3/8	Ceiling[d]	Perpendicular	16	7	12	13 gage, 1 1/4″ long, 19/64″ head; 0.098″ diameter, 1 1/4″ long, ring shank; or 4d cooler nail, 0.080″ diameter, 1 3/8″ long, 7/32″ head.
	Wall	Either direction	16	8	16	
1/2	Ceiling	Either direction	16	7	12	13 gage, 1 3/8″ long, 19/64″ head; 0.098″ diameter, 1 1/4″ long, ring shank; 5d cooler nail, 0.086″ diameter, 1 5/8″ long, 15/64″ head; or gypsum board nail, 0.086″ diameter, 1 5/8″ long, 9/32″ head.
	Ceiling[d]	Perpendicular	24	7	12	
	Wall	Either direction	24	8	12	
	Wall	Either direction	16	8	16	
5/8	Ceiling	Either direction	16	7	12	13 gage, 1 5/8″ long, 19/64″ head; 0.098″ diameter, 1 3/8″ long, ring shank; 6d cooler nail, 0.092″ diameter, 1 7/8″ long, 1/4″ head; or gypsum board nail, 0.0915″ diameter, 1 7/8″ long, 19/64″ head.
	Ceiling	Perpendicular	24	7	12	
	Type X at garage ceiling beneath habitable rooms	Perpendicular	24	6	6	1 7/8″ long 0.099″ diameter galvanized nails ~~or equivalent drywall screws~~ or drywall screws with corrosion resistance in accordance with ASTM C1002. Screws shall comply with Section R702.3.5.1.
	Wall	Either direction	24	8	12	13 gage, 1 5/8″ long, 19/64″ head; 0.098″ diameter, 1 3/8″ long, ring shank; 6d cooler nail, 0.092″ diameter, 1 7/8″ long, 1/4″ head; or gypsum board nail, 0.0915″ diameter, 1 7/8″ long, 19/64″ head.
	Wall	Either direction	16	8	16	
Application with adhesive						
3/8	Ceiling[d]	Perpendicular	16	16	16	Same as above for 3/8″ gypsum board and gypsum panel products.
	Wall	Either direction	16	16	24	
1/2 or 5/8	Ceiling	Either direction	16	16	16	Same as above for 1/2″ and 5/8″ gypsum board and gypsum panel products, respectively.
	Ceiling[d]	Perpendicular	24	12	16	
	Wall	Either direction	24	16	24	
Two 3/8 layers	Ceiling	Perpendicular	16	16	16	Base ply nailed as above for 1/2″ gypsum board and gypsum panel products; face ply installed with adhesive.
	Wall	Either direction	24	24	24	

For SI: 1 inch = 25.4 mm.

a. For application without adhesive, a pair of nails spaced not less than 2 inches apart or more than 2 1/2 inches apart shall be permitted to be used with the pair of nails spaced 12 inches on center.

b. Screws shall be in accordance with Section R702.3.5.1. Screws for attaching gypsum board or gypsum panel products to structural insulated panels shall penetrate the wood structural panel facing not less than 7/16 inch.

c. Where cold-formed steel framing is used with a clinching design to receive nails by two edges of metal, the nails shall be not less than 5/8 inch longer than the gypsum board or gypsum panel product thickness and shall have ringed shanks. Where the cold-formed steel framing has a nailing groove formed to receive the nails, the nails shall have barbed shanks or be 0.086-inch diameter, 1 5/8 inches long, 15/64-inch head for 1/2-inch gypsum board or gypsum panel product; and 0.099-inch diameter, 1 7/8 inches long, 15/64-inch head for 5/8-inch gypsum board or gypsum panel product.

d. Three-eighths-inch-thick single-ply gypsum board or gypsum panel product shall not be used on a ceiling where a water-based textured finish is to be applied, or where it will be required to support insulation above a ceiling. On ceiling applications to receive a water-based texture material, either hand or spray applied, the gypsum board or gypsum panel product shall be applied perpendicular to framing. Where applying a water-based texture material, the minimum gypsum board thickness shall be increased from $^{3}/_{8}$ inch to $^{1}/_{2}$ inch for 16-inch on center framing, and from $^{1}/_{2}$ inch to $^{5}/_{8}$ inch for 24-inch on center framing or $^{1}/_{2}$-inch sag-resistant gypsum ceiling board shall be used.

Reason: This proposal clarifies the use of "galvanized nails or equivalent drywall screws" in the table since regular black drywall screws are not galvanized. This proposal resolves the confusion of when the table says galvanized nails or equivalent, does that mean the screws are also required to be galvanized. Regular black drywall screws have a rust-resistant oily coating and use a different requirement to comply with corrosion-resistant drywall screws in accordance with ASTM C1002.

This proposal is submitted by the ICC Building Code Action Committee (BCAC).

BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and 2024 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC webpage.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal clarifies the existing requirements only.

RB213-25

IRC: TABLE R702.7(1), TABLE R702.7(3), TABLE R702.7(4), TABLE R702.7(5), R702.7.1, R702.7.2

Proponents: Glenn Mathewson, BuildingCodeCollege.com, representing Self (glenn@glennmathewson.com)

2024 International Residential Code

Revise as follows:

TABLE R702.7(1) VAPOR RETARDER MATERIALS AND CLASSES

CLASS	ACCEPTABLE MATERIALS
I	Sheet polyethylene, nonperforated aluminum foil or other approved materials installed in accordance with the *manufacturer's installation instructions* for ~~with~~ a perm rating less than or equal to 0.1.
II	Kraft-faced fiberglass batts, vapor retarder paint or other approved materials installed ~~applied~~ in accordance with the manufacturer's installation instructions for a perm rating greater than 0.1 and less than or equal to 1.0.
III	Latex paint, enamel paint or other approved materials installed ~~applied~~ in accordance with the manufacturer's installation instructions for a perm rating greater than 1.0 and less than or equal to 10.0.

TABLE R702.7(3) CLASS III VAPOR RETARDERS

CLIMATE ZONE	CLASS III VAPOR RETARDERS PERMITTED FOR:[a, b]
Marine 4	Vented cladding over exterior *wood structural panel* sheathing ~~wood structural panels~~.
	Vented cladding over exterior fiberboard sheathing.
	Vented cladding over exterior *gypsum sheathing* ~~gypsum~~.
	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 2.5 over 2 × 4 wall.
	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 3.75 over 2 × 6 wall.
5	Vented cladding over exterior wood structural panel sheathing ~~wood structural panels~~.
	Vented cladding over exterior fiberboard sheathing.
	Vented cladding over exterior gypsum sheathing ~~gypsum~~.
	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 5 over 2 × 4 wall.
	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 7.5 over 2 × 6 wall.
6	Vented cladding over exterior fiberboard sheathing.
	Vented cladding over exterior *gypsum sheathing* ~~gypsum~~.
	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 7.5 over 2 × 4 wall.
	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 11.25 over 2 × 6 wall.
7	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 10 over 2 × 4 wall.
	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 15 over 2 × 6 wall.
8	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 12.5 over 2 × 4 wall.
	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 20 over 2 × 6 wall.

a. Vented cladding shall include vinyl, polypropylene, or horizontal aluminum siding, anchored stone or masonry veneer ~~brick veneer~~ with a clear airspace in accordance with ~~as specified in~~ Table R703.8.4(1), rainscreen systems and other approved vented claddings.

b. The requirements in this table ~~apply only to~~ applicable to exterior continuous insulation are ~~insulation~~ used to control moisture in order to permit the use of interior Class III vapor retarders. The insulation materials used to satisfy this option also contribute to but do not supersede the thermal envelope requirements of Chapter 11.

TABLE R702.7(4) EXTERIOR CONTINUOUS INSULATION WITH INTERIOR CLASS I OR II RESPONSIVE VAPOR RETARDER

CLIMATE ZONE	PERMITTED CONDITIONS[a]
3	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 2.
4, 5 and 6	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 3 over 2 × 4 wall.
	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 5 over 2 × 6 wall.
7	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 5 over 2 × 4 wall.
	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 7.5 over 2 × 6 wall.
8	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 7.5 over 2 × 4 wall.
	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 10 over 2 × 6 wall.

a. The requirements in this table apply only to exterior continuous insulation used to control moisture in order to permit the use of interior Class I, or II responsive vapor retarders ~~Class II vapor retarders~~. The insulation materials used to satisfy this option also contribute to but do not supersede the thermal envelope requirements of Chapter 11.

TABLE R702.7(5) EXTERIOR CONTINUOUS INSULATION ON WALLS WITHOUT A CLASS I, II OR III INTERIOR VAPOR RETARDER[a]

CLIMATE ZONE	PERMITTED CONDITIONS[b, c]
4	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 4.5
5	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 6.5
6	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 8.5
7	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 11.5
8	Exterior ~~Continuous~~ continuous insulation with *R*-value ≥ 14

a. The total insulating value of materials to the interior side of the exterior continuous insulation, including any cavity insulation, shall not exceed R-5. Where the *R*-value of materials to the interior side of the exterior continuous insulation exceeds R-5, an approved design shall be required.

b. ~~A water vapor control material layer having a permeance not greater than 1 perm in accordance with ASTM E96 Procedure A (dry cup)~~ A Class I or II vapor retarder shall be placed on the exterior side of the wall and to the interior side of the exterior continuous insulation. The exterior continuous insulation shall be permitted to serve as the vapor retarder ~~control layer~~ where, at its installed thickness or with a facer on its interior face, the exterior continuous insulation is a

Class I or II vapor retarder.

c. The requirements in this table apply only to exterior continuous insulation ~~insulation~~ used to control moisture in order to ~~allow~~ permit walls without an interior

Class I, II, or III vapor retarder.
~~a Class I, II or III interior vapor retarder.~~ The insulation materials used to satisfy this option also contribute to but do not supersede the thermal envelope requirements of Chapter 11 ~~the *International Energy Conservation Code*.~~

R702.7.1 Spray foam plastic insulation for moisture control with Class II and III vapor retarders. For purposes of compliance with Tables R702.7(3) and R702.7(4), spray ~~foam~~ *foam plastic insulation* with a maximum permeance of 1.5 perms at the installed thickness applied to the interior side of *wood structural panels*, fiberboard, *insulating sheathing* or ~~gypsum~~ *gypsum sheathing* shall be deemed to meet the *continuous insulation* moisture control requirement in accordance with one of the following conditions:

1. The spray *foam plastic insulation* ~~foam~~ *R-value* is equal to or greater than the specified *continuous insulation* ~~continuous insulation~~ *R-value*.
2. The combined *R*-value of the spray ~~foam~~ *foam plastic insulation* and *continuous insulation* is equal to or greater than the specified *continuous insulation R-value*.

R702.7.2 Vapor retarder installation. Vapor retarders shall be installed in accordance with the *manufacturer's installation instructions* ~~manufacturer's instructions~~, ~~accepted~~ *approved* installation methods or an *approved* design. Where a vapor retarder also functions as a component of a *continuous air barrier*, the vapor retarder shall be installed as an *air barrier* in accordance with Section N1102.5.1.1.

Reason: Vapor management provisions for walls have been heavily developed over the last few code cycles, thanks to the work of others. In teaching these new provisions, I noticed some things from an outside perspective that I think could be cleaned up a little.

1) I have replaced defined terms with the same terms but in italics to signify to the reader that they are defined.

2) I added the term "exterior" to the continuous insulation. By definition, the IRC allows continuous insulation on the inside or outside of the wall. There are many different wall assembly designs and the IRC supports many of them. For that reason it seems worthwhile to clarify that the condensation control use of continuous insulation is only for exterior installations.

3) In table R702.7(1) only class II and III make reference to installation instructions. Why not class I also?

4) I replaced "gypsum" with "gypsum sheathing". We have a definition for gypsum sheathing, so why not use the term.

5) Table R702.7(4) is for using a Class I or II responsive vapor retarder (see table title). However, footnote a only refers to a Class II vapor retarder.

6) In table R702.7(5) footnote b refers to the description of a "responsive vapor retarder" in the manner prior to having a definition. With a definition, we can now use the defined term.

7) In Table R702.7(5) footnote c there is no need to reference the IECC when we have Chapter 11. Keep people in the IRC when building under the IRC.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal only aims to clarify the existing intent of these provisions.

RB214-25

IRC: TABLE R702.7(4)

Proponents: Jay Crandell, P.E., ABTG / ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council (jcrandell@aresconsulting.biz)

2024 International Residential Code

Revise as follows:

TABLE R702.7(4) CONTINUOUS INSULATION WITH CLASS I OR II RESPONSIVE VAPOR RETARDER

CLIMATE ZONE	PERMITTED CONDITIONS [a]
3	Continuous insulation with *R*-value ≥ 2.
4, 5 and 6	Continuous insulation with *R*-value ≥ 3 over 2 × 4 wall. Continuous insulation with *R*-value ≥ 5 over 2 × 6 wall.
7	Continuous insulation with *R*-value ≥ 5 over 2 × 4 wall. Continuous insulation with *R*-value ≥ 7.5 over 2 × 6 wall.
8	Continuous insulation with *R*-value ≥ 7.5 over 2 × 4 wall. Continuous insulation with *R*-value ≥ 10 over 2 × 6 wall.

a. The requirements in this table apply only to insulation used to control moisture in order to permit the use of Class I or II *responsive vapor retarders* ~~vapor retarders~~. The insulation materials used to satisfy this option also contribute to but do not supersede the thermal envelope requirements of Chapter 11.

Reason: This change is proposed to correct a missed change to footnote ‘a’ of Table R702.7(4) as a result of proposal RB209-22 which added responsive vapor retarders to Section R702.7 and the inclusion of Class I and II responsive vapor retarders in Table R702.7(4). Responsive vapor retarders is also now a defined term so it is italicized in this proposal.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal clarifies and footnote and makes a correction to align it with the title and intent of the table. So, there is no cost impact.

RB217-25

IRC: R703.3, TABLE R703.3(1)

Proponents: Sara Krompholz, representing Polymeric Exterior Products Association (skrompholz@vinylsiding.org)

2024 International Residential Code

Revise as follows:

R703.3 Wall covering nominal thickness and attachments. The nominal thickness and attachment of *exterior wall coverings* shall be in accordance ~~with Table R703.3(1),~~ the wall covering material requirements of this section, and the wall covering manufacturer's installation instructions. Cladding attachment over foam sheathing shall comply with the additional requirements and limitations of Sections R703.15 through R703.17. ~~Nominal material thicknesses in Table R703.3(1) are based on a maximum stud spacing of 16 inches (406 mm) on center.~~ Where specified by the siding manufacturer's instructions and supported by a test report or other documentation, attachment to studs with greater spacing is permitted. Fasteners for *exterior wall coverings* attached to wood framing shall be in accordance with Section R703.3.3~~ and Table R703.3(1)~~. *Exterior wall coverings* shall be attached to cold-formed steel *light frame construction* in accordance with the cladding manufacturer's installation instructions~~, the requirements of Table R703.3(1) using screw fasteners substituted for the nails specified in accordance with Table R703.3(2),~~ or an *approved* design.

Delete without substitution:

~~TABLE R703.3(1) SIDING MINIMUM ATTACHMENT AND MINIMUM THICKNESS~~

SIDING MATERIAL		NOMINAL THICKNESS (inches)	JOINT TREATMENT	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud[l]	Direct to studs	Number or spacing of fasteners
Anchored veneer: brick, concrete, masonry or stone (see Section R703.8)		2	Section R703.8	Section R703.8					
Adhered veneer: concrete, stone or masonry (see Section R703.12)		—	Section R703.12	Section R703.12					
Fiber cement siding	Panel siding (see Section R703.10.1)	5/16	Section R703.10.1	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	4d common (1 1/2″ × 0.099″)	6″ panel edges 12″ inter. sup.
	Lap siding (see Section R703.10.2)	5/16	Section R703.10.2	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	6d common (2″ × 0.113″) or 0.120″ dia. (11 gage) roofing nail	Note f
Hardboard panel siding (see Section R703.5)		7/16	—	0.120″ nail (shank) with 0.225″ head	0.120″ nail (shank) with 0.225″ head	0.120″ nail (shank) with 0.225″ head	0.120″ nail (shank) with 0.225″ head	0.120″ nail (shank) with 0.225″ head	6″ panel edges 12″ inter. sup.[d]
Hardboard lap siding (see Section R703.5)		7/16	Note e	0.099″ nail (shank) with 0.240″ head	0.099″ nail (shank) with 0.240″ head	0.099″ nail (shank) with 0.240″ head	0.099″ nail (shank) with 0.240″ head	0.099″ nail (shank) with 0.240″ head	Same as stud spacing 2 per bearing
Horizontal aluminum[a]	Without insulation	0.019[b]	Lap	Siding nail 1 1/2″ × 0.120″	Siding nail 2″ × 0.120″	Siding nail 2″ × 0.120″	Siding nail[h] 1 1/2″ × 0.120″	Not allowed	Same as stud spacing
		0.024	Lap	Siding nail 1 1/2″ × 0.120″	Siding nail 2″ × 0.120″	Siding nail 2″ × 0.120″	Siding nail[h] 1 1/2″ × 0.120″	Not allowed	
	With insulation	0.019	Lap	Siding nail 1 1/2″ × 0.120″	Siding nail 2 1/2″ × 0.120″	Siding nail 2 1/2″ × 0.120″	Siding nail[h] 1 1/2″ × 0.120″	Siding nail 1 1/2″ × 0.120″	
Insulated vinyl siding[j]		0.035 (vinyl siding layer only)	Lap	0.120″ nail (shank) with a 0.313″ head or 16 gage staple with 3/8″ to 1/2″ crown[h, i]	0.120" nail (shank) with a 0.313″ head or 16 gage staple with 3/8″ to 1/2″ crown[h]	0.120" nail (shank) with a 0.313″ head or 16 gage staple with 3/8″ to 1/2″ crown[h]	0.120" nail (shank) with a 0.313" head Section R703.11.2	Not allowed	16 inches on center or specified by manufacturer instructions, test report or other sections of this code
Particleboard panels		3/8	—	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	Not allowed	6″ panel edges 12″ inter. sup.
		1/2	—	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	
		5/8	—	6d box nail (2″ × 0.099″)	8d box nail (2 1/2″ × 0.113″)	8d box nail (2 1/2″ × 0.113″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	
Polypropylene siding[k]		Not applicable	Lap	Section R703.14.1	Section R703.14.1	Section R703.14.1	Section R703.14.1	Not allowed	As specified by the manufacturer instructions, test report or other sections of this code

SIDING MATERIAL		NOMINAL THICKNESS (inches)	JOINT TREATMENT	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Steel[c]		29 ga.	Lap	Siding nail ($1\frac{3}{4}$″ × 0.113″) Staple $1\frac{3}{4}$	Siding nail ($2\frac{3}{4}$″ × 0.113″) Staple $2\frac{1}{2}$	Siding nail ($2\frac{1}{2}$″ × 0.113″) Staple $2\frac{1}{4}$	Siding nail ($1\frac{3}{4}$″ × 0.113″) Staple $1\frac{3}{4}$	Not allowed	Same as stud spacing
Vinyl siding (see Section R703.11)		0.035	Lap	0.120″ nail (shank) with a 0.313″ head or 16 gage staple with $\frac{3}{8}$ to $\frac{1}{2}$ inch crown[h,i]	0.120″ nail (shank) with a 0.313″ head or 16 gage staple with $\frac{3}{8}$″ to $\frac{1}{2}$″ crown[h]	0.120″ nail (shank) with a 0.313″ head or 16 gage staple with $\frac{3}{8}$″ to $\frac{1}{2}$″ crown[h]	0.120″ nail (shank) with a 0.313″ head Section R703.11.2	Not allowed	16 inches on center or as specified by the manufacturer instructions or test report
Wood siding (see Section R703.5)	Wood rustic, drop	$\frac{3}{8}$ min.	Lap	6d box or siding nail (2″ × 0.099″)	6d box or siding nail (2″ × 0.099″)	6d box or siding nail (2″ × 0.099″)	6d box or siding nail (2″ × 0.099″)	8d box or siding nail ($2\frac{1}{2}$″ × 0.113″) Staple 2″	Face nailing up to 6″ widths, 1 nail per bearing; 8″ widths and over, 2 nails per bearing
	Shiplap	$\frac{19}{32}$ average	Lap						
	Bevel	$\frac{7}{16}$							
	Butt tip	$\frac{3}{16}$	Lap						
Wood structural panel ANSI/APA PRP-210 siding (exterior grade) (see Section R703.5)		$\frac{3}{8}$ – $\frac{1}{2}$	Note e	2″ × 0.099″ siding nail	$2\frac{1}{2}$″ × 0.113″ siding nail	$2\frac{1}{2}$″ × 0.113″ siding nail	$2\frac{1}{2}$″ × 0.113″ siding nail	2″ × 0.099″ siding nail	6″ panel edges 12″ inter. sup.
Wood structural panel lap siding (see Section R703.5)		$\frac{3}{8}$ – $\frac{1}{2}$	Note e Note g	2″ × 0.099″ siding nail	$2\frac{1}{2}$″ × 0.113″ siding nail	$2\frac{1}{2}$″ × 0.113″ siding nail	$2\frac{1}{2}$″ × 0.113″ siding nail	2″ × 0.099″ siding nail	8″ along bottom edge

For SI: 1 inch = 25.4 mm.

l. Cladding attachment over foam sheathing shall comply with the additional requirements and limitations of Sections R703.15, R703.16 and R703.17.

k. Polypropylene siding shall comply with ASTM D7254.

j. Insulated vinyl siding shall comply with ASTM D7793.

i. Where specified by the manufacturer's instructions and supported by a test report, fasteners are permitted to penetrate into or fully through nailable sheathing or other nailable substrate of minimum thickness specified by the instructions or test report, without penetrating into framing.

h. Minimum fastener length must be sufficient to penetrate sheathing other nailable substrate and framing a total of a minimum of $1\frac{1}{4}$ inches or in accordance with the manufacturer's installation instructions.

g. Vertical joints, if staggered, shall be permitted to be away from studs if applied over wood structural panel sheathing.

f. Face nailing: one 6d common nail through the overlapping planks at each stud. Concealed nailing: one 0.120-inch diameter (11 gage) $1\frac{1}{2}$-inch-long galvanized roofing nail through the top edge of each plank at each stud in accordance with the manufacturer's installation instructions.

e. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.

d. Where used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.

c. Shall be of approved type.

b. Aluminum (0.019 inch) shall be unbacked only where the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.

a. Aluminum nails shall be used to attach aluminum siding.

Reason: This change is largely editorial as this table is replicated in specific material sections of the code. The Table is not used typically for regulatory purposes based on educational seminar surveys at building official events.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This change removes a table that is redundant and make no changes to the current code requirements.

RB217-25

RB218-25

IRC: TABLE R703.3(1)

Proponents: Matthew Dobson, representing Polymeric Exterior Products Association (mdobson@vinylsiding.org)

2024 International Residential Code

Revise as follows:

TABLE R703.3(1) SIDING MINIMUM ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL		NOMINAL THICKNESS (inches)	JOINT TREATMENT	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud[l]	Direct to studs	Number or spacing of fasteners
Anchored veneer: brick, concrete, masonry or stone (see Section R703.8)		2	Section R703.8	Section R703.8					
Adhered veneer: concrete, stone or masonry (see Section R703.12)		—	Section R703.12	Section R703.12					
Fiber cement siding	Panel siding (see Section R703.10.1)	5/16	Section R703.10.1	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	4d common (1 1/2″ × 0.099″)	6″ panel edges 12″ inter. sup.
	Lap siding (see Section R703.10.2)	5/16	Section R703.10.2	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	6d common (2″ × 0.113″) or 0.120″ dia. (11 gage) roofing nail	Note f
Hardboard panel siding (see Section R703.5)		7/16	—	0.120″ nail (shank) with 0.225″ head	0.120″ nail (shank) with 0.225″ head	0.120″ nail (shank) with 0.225″ head	0.120″ nail (shank) with 0.225″ head	0.120″ nail (shank) with 0.225″ head	6″ panel edges 12″ inter. sup.[d]
Hardboard lap siding (see Section R703.5)		7/16	Note e	0.099″ nail (shank) with 0.240″ head	0.099″ nail (shank) with 0.240″ head	0.099″ nail (shank) with 0.240″ head	0.099″ nail (shank) with 0.240″ head	0.099″ nail (shank) with 0.240″ head	Same as stud spacing 2 per bearing
Horizontal aluminum[a]	Without insulation	0.019[b]	Lap	Siding nail 1 1/2″ × 0.120″	Siding nail 2″ × 0.120″	Siding nail 2″ × 0.120″	Siding nail[h] 1 1/2″ × 0.120″	Not allowed	Same as stud spacing
		0.024	Lap	Siding nail 1 1/2″ × 0.120″	Siding nail 2″ × 0.120″	Siding nail 2″ × 0.120″	Siding nail[h] 1 1/2″ × 0.120″	Not allowed	
	With insulation	0.019	Lap	Siding nail 1 1/2″ × 0.120″	Siding nail 2 1/2″ × 0.120″	Siding nail 2 1/2″ × 0.120″	Siding nail[h] 1 1/2″ × 0.120″	Siding nail 1 1/2″ × 0.120″	
~~Insulated vinyl siding[j]~~		~~0.035 (vinyl siding layer only)~~	~~Lap~~	~~0.120″ nail (shank) with a 0.313″ head or 16 gage staple with 3/8″ to 1/2″ crown[h, i]~~	~~0.120″ nail (shank) with a 0.313″ head or 16 gage staple with 3/8″ to 1/2″ crown[h]~~	~~0.120″ nail (shank) with a 0.313″ head or 16 gage staple with 3/8″ to 1/2″ crown[h]~~	~~0.120″ nail (shank) with a 0.313″ head Section R703.11.2~~	~~Not allowed~~	~~16 inches on center or specified by manufacturer instructions, test report or other sections of this code~~
Particleboard panels		3/8	—	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	Not allowed	6″ panel edges 12″ inter. sup.
		1/2	—	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	
		5/8	—	6d box nail (2″ × 0.099″)	8d box nail (2 1/2″ × 0.113″)	8d box nail (2 1/2″ × 0.113″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	
~~Polypropylene siding[k]~~		~~Not applicable~~	~~Lap~~	~~Section R703.14.1~~	~~Section R703.14.1~~	~~Section R703.14.1~~	~~Section R703.14.1~~	~~Not allowed~~	~~As specified by the manufacturer instructions, test report or other sections of this code~~
Steel[c]		29 ga.	Lap	Siding nail (1 3/4″ × 0.113″) Staple–1 3/4	Siding nail (2 3/4″ × 0.113″) Staple–2 1/2	Siding nail (2 1/2″ × 0.113″) Staple–2 1/4	Siding nail (1 3/4″ × 0.113″) Staple–1 3/4	Not allowed	Same as stud spacing
~~Vinyl siding (see Section R703.11)~~		~~0.035~~	~~Lap~~	~~0.120″ nail (shank) with a 0.313″ head or 16 gage staple with 3/8 to 1/2 inch crown[h, i]~~	~~0.120″ nail (shank) with a 0.313″ head or 16 gage staple with 3/8″ to 1/2″ crown[h]~~	~~0.120″ nail (shank) with a 0.313″ head or 16 gage staple with 3/8″ to 1/2″ crown[h]~~	~~0.120″ nail (shank) with a 0.313″ head Section R703.11.2~~	~~Not allowed~~	~~16 inches on center or as specified by the manufacturer instructions or test report~~
Wood siding (see Section R703.5)	Wood rustic, drop	3/8 min.	Lap	6d box or siding nail (2″ × 0.099″)	6d box or siding nail (2″ ×0.099″)	6d box or siding nail (2″ × 0.099″)	6d box or siding nail (2″ × 0.099″)	8d box or siding nail (2 1/2″ × 0.113″) Staple–2″	Face nailing up to 6″ widths, 1 nail per bearing; 8″ width sand over, 2 nails per bearing
	Shiplap	19/32 average	Lap						
	Bevel	7/16							
	Butt tip	3/16	Lap						
Wood structural panel ANSI/APA PRP-210 siding (exterior grade) (see Section R703.5)		3/8 – 1/2	Note e	2″ × 0.099″ siding nail	2 1/2″ × 0.113″ siding nail	2 1/2″ × 0.113″ siding nail	2 1/2″ × 0.113″ siding nail	2″ × 0.099″ siding nail	6″ panel edges 12″ inter. sup.
Wood structural panel lap siding (see Section R703.5)		3/8 – 1/2	Note e Note g	2″ × 0.099″ siding nail	2 1/2″ × 0.113″ siding nail	2 1/2″ × 0.113″ siding nail	2 1/2″ × 0.113″ siding nail	2″ × 0.099″ siding nail	8″ along bottom edge

For SI: 1 inch = 25.4 mm.

a. Aluminum nails shall be used to attach aluminum siding.

b. Aluminum (0.019 inch) shall be unbacked only where the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.

c. Shall be of approved type.

d. Where used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.

e. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.

f. Face nailing: one 6d common nail through the overlapping planks at each stud. Concealed nailing: one 0.120-inch diameter (11-gage) $1^{1}/_{2}$-inch-long galvanized roofing nail through the top edge of each plank at each stud in accordance with the manufacturer's installation instructions.

g. Vertical joints, if staggered, shall be permitted to be away from studs if applied over wood structural panel sheathing.

~~h. Minimum fastener length must be sufficient to penetrate sheathing other nailable substrate and framing a total of a minimum of $1^{1}/_{4}$ inches or in accordance with the manufacturer's installation instructions.~~

i. ~~Where specified by the manufacturer's instructions and supported by a test report, fasteners are permitted to penetrate into or fully through nailable sheathing or other nailable substrate of minimum thickness specified by the instructions or test report, without penetrating into framing.~~

j. ~~Insulated vinyl siding shall comply with ASTM D7793.~~

k. ~~Polypropylene siding shall comply with ASTM D7254.~~

l. Cladding attachment over foam sheathing shall comply with the additional requirements and limitations of Sections R703.15, R703.16 and R703.17.

Reason: This change removes redundant information that is contained in the specific material section of the code. It is partially complimentary to a companion code change for vinyl siding and insulated vinyl siding. In addition the change removes the provisions for polypropylene siding which are largely dependent on the manufacturer's installation instructions anyway, so the prescriptive table has no utility anyway it's simply a pointer.

It is worth noting in trainings provided to building officials, there have been no building officials who have indicated they even reference this table, it's entire deletion may be worth considering, which is offered in another proposal.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

We are removing redundant information especially related to the creation of a material specific table vs. the elimination of a broad unused table in the code.

RB218-25

RB219-25

IRC: TABLE R703.3(1)

Proponents: Alexander Haldeman, representing James Hardie Building Products (alex.haldeman@jameshardie.com)

2024 International Residential Code

Revise as follows:

TABLE R703.3(1) SIDING MINIMUM ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL		NOMINAL THICKNESS (inches)	JOINT TREATMENT	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud[l]	Direct to studs	Number or spacing of fasteners
Anchored veneer: brick, concrete, masonry or stone (see Section R703.8)		2	Section R703.8	Section R703.8					
Adhered veneer: concrete, stone or masonry (see Section R703.12)		—	Section R703.12	Section R703.12					
Fiber cement siding	Panel siding (see Section R703.10.1)	5/16[m]	Section R703.10.1	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	4d common (1 1/2″ × 0.099″)	6″ panel edges 12″ inter. sup.
	Lap siding (see Section R703.10.2)	5/16[m]	Section R703.10.2	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	6d common (2″ × 0.113″)	6d common (2″ × 0.113″) or 0.120″ dia. (11 gage) roofing nail	Note f
Hardboard panel siding (see Section R703.5)		7/16	—	0.120″ nail (shank) with 0.225″ head	0.120″ nail (shank) with 0.225″ head	0.120″ nail (shank) with 0.225″ head	0.120″ nail (shank) with 0.225″ head	0.120″ nail (shank) with 0.225″ head	6″ panel edges 12″ inter. sup.[d]
Hardboard lap siding (see Section R703.5)		7/16	Note e	0.099″ nail (shank) with 0.240″ head	0.099″ nail (shank) with 0.240″ head	0.099″ nail (shank) with 0.240″ head	0.099″ nail (shank) with 0.240″ head	0.099″ nail (shank) with 0.240″ head	Same as stud spacing 2 per bearing
Horizontal aluminum[a]	Without insulation	0.019[b]	Lap	Siding nail 1 1/2″ × 0.120″	Siding nail 2″ × 0.120″	Siding nail 2″ × 0.120″	Siding nail[h] 1 1/2″ × 0.120″	Not allowed	Same as stud spacing
		0.024	Lap	Siding nail 1 1/2″ × 0.120″	Siding nail 2″ × 0.120″	Siding nail 2″ × 0.120″	Siding nail[h] 1 1/2″ × 0.120″	Not allowed	
	With insulation	0.019	Lap	Siding nail 1 1/2″ × 0.120″	Siding nail 2 1/2″ × 0.120″	Siding nail 2 1/2″ × 0.120″	Siding nail[h] 1 1/2″ × 0.120″	Siding nail 1 1/2″ × 0.120″	
Insulated vinyl siding[j]		0.035 (vinyl siding layer only)	Lap	0.120″ nail (shank) with a 0.313″ head or 16-gage staple with 3/8″ to 1/2″ crown[h, i]	0.120" nail (shank) with a 0.313″ head or 16-gage staple with 3/8″ to 1/2″ crown[h]	0.120" nail (shank) with a 0.313″ head or 16-gage staple with 3/8″ to 1/2″ crown[h]	0.120" nail (shank) with a 0.313" head Section R703.11.2	Not allowed	16 inches on center or specified by manufacturer instructions, test report or other sections of this code
Particleboard panels		3/8	—	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	Not allowed	6″ panel edges 12″ inter. sup.
		1/2	—	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	
		5/8	—	6d box nail (2″ × 0.099″)	8d box nail (2 1/2″ × 0.113″)	8d box nail (2 1/2″ × 0.113″)	6d box nail (2″ × 0.099″)	6d box nail (2″ × 0.099″)	
Polypropylene siding[k]		Not applicable	Lap	Section R703.14.1	Section R703.14.1	Section R703.14.1	Section R703.14.1	Not allowed	As specified by the manufacturer instructions, test report or other sections of this code
Steel[c]		29 ga.	Lap	Siding nail (1 3/4″ × 0.113″) Staple–1 3/4	Siding nail (2 3/4″ × 0.113″) Staple–2 1/2	Siding nail (2 1/2″ × 0.113″) Staple–2 1/4	Siding nail (1 3/4″ × 0.113″) Staple–1 3/4	Not allowed	Same as stud spacing
Vinyl siding (see Section R703.11)		0.035	Lap	0.120″ nail (shank) with a 0.313″ head or 16-gage staple with 3/8- to 1/2-inch crown[h, i]	0.120″ nail (shank) with a 0.313″ head or 16-gage staple with 3/8″ to 1/2″ crown[h]	0.120″ nail (shank) with a 0.313″ head or 16- gage staple with 3/8″ to 1/2″ crown[h]	0.120″ nail (shank) with a 0.313" head Section R703.11.2	Not allowed	16 inches on center or as specified by the manufacturer instructions or test report
Wood siding (see Section R703.5)	Wood rustic, drop	3/8 min.	Lap	6d box or siding nail (2″ × 0.099″)	6d box or siding nail (2″ ×0.099″)	6d box or siding nail (2″ × 0.099″)	6d box or siding nail (2″ × 0.099″)	8d box or siding nail (2 1/2″ × 0.113″) Staple–2″	Face nailing up to 6″ widths, 1 nail per bearing; 8″ width sand over, 2 nails per bearing
	Shiplap	19/32 average	Lap						
	Bevel	7/16							
	Butt tip	3/16	Lap						
Wood structural panel ANSI/APA PRP-210 siding (exterior grade) (see Section R703.5)		3/8 – 1/2	Note e	2″ × 0.099″ siding nail	2 1/2″ × 0.113″ siding nail	2 1/2″ × 0.113″ siding nail	2 1/2″ × 0.113″ siding nail	2″ × 0.099″ siding nail	6″ panel edges 12″ inter. sup.
Wood structural panel lap siding (see Section R703.5)		3/8 – 1/2	Note e Note g	2″ × 0.099″ siding nail	2 1/2″ × 0.113″ siding nail	2 1/2″ × 0.113″ siding nail	2 1/2″ × 0.113″ siding nail	2″ × 0.099″ siding nail	8″ along bottom edge

For SI: 1 inch = 25.4 mm.

a. Aluminum nails shall be used to attach aluminum siding.

b. Aluminum (0.019 inch) shall be unbacked only where the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.

c. Shall be of approved type.

d. Where used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.

e. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.

f. Face nailing: one 6d common nail through the overlapping planks at each stud. Concealed nailing: one 0.120-inch diameter (11-gage) $1^1/_2$-inch-long galvanized roofing nail through the top edge of each plank at each stud in accordance with the manufacturer's installation instructions.

g. Vertical joints, if staggered, shall be permitted to be away from studs if applied over wood structural panel sheathing.

h. Minimum fastener length must be sufficient to penetrate sheathing other nailable substrate and framing a total of a minimum of $1^1/_4$ inches or in accordance with the manufacturer's installation instructions.

i. Where specified by the manufacturer's instructions and supported by a test report, fasteners are permitted to penetrate into or fully through nailable sheathing or other nailable substrate of minimum thickness specified by the instructions or test report, without penetrating into framing.

j. Insulated vinyl siding shall comply with ASTM D7793.

k. Polypropylene siding shall comply with ASTM D7254.

l. Cladding attachment over foam sheathing shall comply with the additional requirements and limitations of Sections R703.15, R703.16 and R703.17.

m. Nominal thickness less than 5/16" is permitted when installed in accordance with the manufacturer's instructions and is supported by a test report or other documentation showing compliant performance.

Reason: Nominal thickness of fiber-cement less than 5/16" (e.g. minimum 1/4") is not uncommon for these products and is already mentioned in codes (see IRC Section R704.2.2 - Fiber-cement exterior soffit panels, and IBC Table 1404.2 - Minimum Thickness of Weather Coverings.)

While R703.3 allows for stud spacing greater than 16 inches (e.g. 24 inches) where "*specified by the siding manufacturer's instructions and supported by a test report or other documentation*", similarly, highlighting that minimum allowable material thickness using performance-based evidence to show compliance with this code should be included so as to not stifle innovation and increase choices for consumers.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0. Dependent on material availability.
The cost differences between 5/16" panel and 1/4" panel (for example) would be a cost savings of approximately 10-20% .

The decrease in material thickness equates to less raw-materials required (reducing cost to some degree) and also allows for additional sqft per truckload (reducing shipping costs per sqft)

Estimated Immediate Cost Impact Justification (methodology and variables):

performance-based allowance of thinner materials allows innovation of products compliant with this code, and generally (usually) less material used costs less overall.

RB222-25

IRC: SECTION 202 (New), R703.7.3, R703.7.3.1, R703.7.3.2, TABLE 703.7.3 (New)

Proponents: Jay Crandell, P.E., ABTG / ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council (jcrandell@aresconsulting.biz)

2024 International Residential Code

Add new definition as follows:

STUCCO BOND BREAK. A substantially nonwater-absorbing layer placed directly behind the stucco to prevent adhesion of the stucco to the surface of the *water-resistive barrier*.

Delete and substitute as follows:

~~**R703.7.3 Water-resistive barriers.** Water-resistive barriers shall be installed as required in Section R703.2 and shall comply with Section R703.7.3.1 or R703.7.3.2.~~

~~**Exception:** Sections R703.7.3.1 and R703.7.3.2 shall not apply to construction where accumulation, condensation or freezing of moisture will not damage the materials.~~

R703.7.3 Weather protection. A *water-resistive barrier*, *stucco bond break*, means of drainage, and flashing shall be provided in accordance with Section R703.1.1 and one of the methods in Table R703.7.3.

Exceptions:

1. The requirement for a means of drainage shall not apply to construction where accumulation, condensation or freezing of moisture will not damage the materials.
2. Masonry or concrete wall construction in accordance with exception 1 of Section R703.1.1.
3. An *approved* design complying with exception 2 of Section R703.1.1.

~~**R703.7.3.1 Dry climates.** . In Dry (B) *climate zones* indicated in Figure N1101.7, *water-resistive barriers* shall comply with one of the following:~~

1. ~~The *water-resistive barrier* shall be two layers of 10-minute Grade D paper or have a water resistance equal to or greater than two layers of a *water-resistive barrier* complying with ASTM E2556, Type I. The individual layers shall be installed independently such that each layer provides a separate continuous plane. Flashing installed in accordance with Section R703.4 and intended to drain to the *water-resistive barrier* shall be directed between the layers.~~
2. ~~The *water-resistive barrier* shall be 60-minute Grade D paper or have a water resistance equal to or greater than one layer of a *water-resistive barrier* complying with ASTM E2556, Type II. The *water-resistive barrier* shall be separated from the stucco by a layer of foam plastic *insulating sheathing,* other non-water-absorbing layer, a drainage space or means of drainage complying with Section R703.7.3.2. Flashing installed in accordance with Section 703.4 and intended to drain to the *water-resistive barrier* shall be directed to the exterior side of the *water-resistive barrier.*~~

R703.7.3.1 Installation. The continuous *water-resistive barrier* shall be installed in accordance with Section R703.2. The *water-resistive barrier*, *stucco bond break*, and means of drainage shall be installed in accordance with Table R703.7.3. Water shall be directed to the exterior at the base of the stucco application and at any transition between building stories or other conditions where the means of drainage terminates.

~~**R703.7.3.2 Moist or marine climates.** In the Moist (A) or Marine (C) *climate zones* indicated in Figure N1101.7, *water-resistive barriers* shall comply with one of the following:~~

1. ~~In addition to complying with Section R703.7.3.1, a space or drainage material not less than 3/16 inch (5 mm) in depth shall be added to the exterior side of the *water-resistive barrier*.~~
2. ~~In addition to complying with Section R703.7.3.1, Item 2, drainage on the exterior of the *water-resistive barrier* shall have a drainage efficiency of not less than 90 percent, as measured in accordance with ASTM E2273 or Annex A2 of ASTM E2925.~~

R703.7.3.2 Flashing. Flashing installed in accordance with Section R703.4 and intended to drain to the *water-resistive barrier* shall be directed to the exterior side of the *water-resistive barrier*.

Add new text as follows:

TABLE 703.7.3 WEATHER PROTECTION REQUIREMENTS FOR EXTERIOR PLASTER (STUCCO)

Method	Moisture Regime[a]	Water-Resistive Barrier (WRB)	Stucco Bond Break (SBB)	Means of Drainage
1	Moist (A), Dry (B), or Marine (C) (any moisture regime)	10-minute Grade D paper or WRB with water resistance equal to or greater than one layer of ASTM E2556, Type I	10-minute Grade D paper or WRB with water resistance equal to or greater than one layer of ASTM E2556, Type I	Drainage cavity with min. 3/16-inch (4.6 mm) depth between WRB and SBB layers
2		60-minute Grade D paper or WRB with water resistance equal to or greater than one layer of ASTM E2556, Type II	Foam plastic insulating sheathing or other *stucco bond break*	
3			Foam plastic insulating sheathing or other *stucco bond break*	Drainage between WRB and SBB layers with drainage efficiency of at least 90% per ASTM E2273 or Annex A2 of ASTM E2925
4	Dry (B)	10-minute Grade D paper or WRB with water resistance equal to or greater than one layer of ASTM E2556, Type I	10-minute Grade D paper or WRB with water resistance equal to or greater than one layer of ASTM E2556, Type I	Drainage is between WRB and SBB layers
5		60-minute Grade D paper or WRB with water resistance equal to or greater than one layer of ASTM E2556, Type II	Foam plastic insulating sheathing or other *stucco bond break*	
6			Not Required	Means of drainage in accordance with Method 1, 2 or 3 with means to separate stucco from direct contact with WRB

a. The appropriate moisture regime shall be selected in accordance with Chapter 3 of the *International Energy Conservation Code* commercial or residential provisions.

Reason: This proposal coordinates the IRC with an identical Group A proposal, S9-24, approved by the IBC FS committee and on the consent agenda for public hearing in 2026. This proposal represents a collaborative effort supported by a broad group of stakeholders.

The previous two code cycles resulted in technical improvements to Section R703.7.3 to address water management of conventional 3-coat stucco installations in moist (A) and marine (C) climate regimes. However, these changes brought about increased complexity of the provisions that vary based on wall assembly conditions and climate conditions with options and requirements that are cross-referenced between the two subsections (existing R703.7.3.1 and R703.7.3.2 shown as deleted and replaced). This formatting approach made determining a particular solution difficult and confusing. Therefore, this proposal clarifies the existing technical requirements and options by making them more "visual" in a table format without changing the technical intent of the code. The multiple requirements and interrelated options of Sections R703.7.3.1 and R703.7.3.2 (deleted) are now incorporated in Table R703.7.3 in a straightforward manner. Also, a definition for "STUCCO BOND BREAK" is provided to facilitate clarity and accuracy in code reading and understanding of different components (and their functions) currently required for 3-coat stucco applications but vaguely described within the code text.

Beyond the overall formatting changes and new definition described above, some specific clarifications addressed by this proposal are as follows:

Section 2510.6 Weather Protection. This section is retitled to better address the scope that goes beyond just water-resistive barriers. New Table R703.7.3 is referenced for requirements instead of the existing two subsections (proposed for deletion and replacement). The ability to use an approved design is also provided as a clarification that other solutions than identified in this section and Table R703.7.3 are possible.

Section R703.7.3.1 Installation. This new subsection consolidates installation requirements that were not addressed consistently across the existing code subsections R703.7.3.1 and R703.7.3.2. Also, a sentence is added to require drainage to the exterior at the base of the stucco application and at transitions between stories or other conditions where the drainage plane or drainage space terminates. This was based on stucco performance field research in Florida (see Bibliography).

Section R703.7.3.2 Flashing. This new subsection simply captures existing code content related to installation of flashing and its integration with the water-resistive barrier.

Table R703.7.3. This new table replaces the inter-twined and cross-referenced requirements of existing subsections R703.7.3.1 and R703.7.3.2 (shown as deleted). The requirements of these subsections are now mapped into Table R703.7.3 as distinctly different solutions or methods for combining the various required components and options for those components (one combination of components is shown for each row of the table). Therefore, the user simply determines the correct climate “moisture regime” (see footnote a) and then selects an appropriate (or preferred) method and follows the required combination of components in that row of the table. This eliminates the need for a user to decipher the existing code text and cross-referenced requirements between different subsections of code to determine what is required.

Bibliography: Lstiburek, J.W. (2005). Rainwater Management Performance of Newly Constructed Residential Building Enclosures During August and Septemeber 2004. Prepared for Home Builders Association of Metro Orlando and the Florida Home Builders Association by: Building Science Corporation, Westord, MA. January 11, 2005

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal strives to make no technical changes to the requirements in 2510.6 and focuses on formatting improvements and clarifications to better convey the various inter-related requirements and options in Section R703.7.3 and particularly the cross-referenced requirements in existing subsections R703.7.3.1 and R703.7.3.2 for dry and moist/marine climates. The primary change is to reformat the subsections to address topics that apply regardless of the climate moisture regime and to place specific climate-dependent requirements and options (methods) in a table format where they can be easily visualized and selected without having to decipher the logic of the current code language.

RB226-25

IRC: R703.11.1, TABLE R703.11.1 (New), R703.11.1.3, R703.11.1.4, R703.11.1.5, ASTM Chapter 44 (New)

Proponents: Matthew Dobson, representing Polymeric Exterior Products Association (mdobson@vinylsiding.org)

2024 International Residential Code

Revise as follows:

R703.11.1 Installation. *Vinyl siding, insulated vinyl siding* and compatible accessories shall be installed in accordance with the *manufacturer's installation instructions*. For *vinyl siding* and *insulated vinyl siding* applied in accordance with the wind speed and exposure limits of Table R703.3.2 and rated for minimum wind load design pressure rating of 30 psf or greater in accordance with ASTM D3679 or ASTM D7793, respectively, the prescriptive fastening requirements of Table R703.11.1 shall be permitted as an alternative to the manufacturer's installation instructions.

Add new text as follows:

TABLE R703.11.1 PRESCRIPTIVE FASTENER REQUIREMENTS FOR VINYL AND INSULATED VINYL SIDING

Fastener[a]	Substrate[b]	Penetration Depth[c]	Spacing
Smooth shank nail, not less than 0.120" nail shank with 0.313(5/16)" head or 16 gage staple with 3/8- to 1/2- inch crown	Nailable substrate	Not less than 1-1/4"	Horizontal siding - not greater than 16-inches on center
Ring shank nail, not less than 0.120" nail shank with 0.313(5/16)" head	min. 7/16" nailable substrate	Through substrate a minimum of 1/4"	Horizontal siding - not greater than 12-inches on center
Ring shank nail, not less than 0.120" nail shank with 0.313(5/16)" head	> 15/32" thick nailable subtrate	Through substrate a minimum of 1/4"	Horizontal siding - Not greater than-16 inches on center
Either smooth shank or ring shank (a specified above)	min. 7/16" nailable subtrate	Through substrate a minimum of 1/4"	Vertical siding - Not greater than 12-inches on center each way
Ring shank nail, not less than 0.120" nail shank with 0.313(5/16)" head or screw not less than 0.138 screw shank with a .423" truss or pan head	min. 3/4" thick wood furring	Into furring 3/4"	Horizontal sidng - Not greater than 12-inches on center
24" o.c. framing (For 20 psf or less design wind pressure)[d]			
All fastener types	Nailable substrate	Not less than 1-1/4"	Horizontal siding - Not greater than 24-inches on center

a. Smooth and ring shank roofing nails shall comply with ASTM F1667.

b. Wood framing and furring shall have a minimum specific gravity of 0.42. Other *nailable* substrates with equal or greater fastener withdrawal performance shall also be permitted. Where fiberboard, gypsum, foam plastic or other non-nailable substrate is used, fasteners must penetrate studs or other form of *nailable substrate.*

c. The total thickness of *wood structural panel*, wood furring, wood framing, and other *nailable substrates* shall satisfying the required penetration depth.

d. 24" o.c. fastener spacing for horizontal siding shall be permitted where design wind pressure is 20 psf or less in accordance with Tables R301.2.1(1) and (2) for 10 ft^2 tributary area and wall zone 5. Alternatively, it shall be permitted where the mean roof height of the building is 30 feet (9.1 m) or less and the design wind speed does not exceed 115 mph for Exposure B or 110 mph Exposure C.

Delete without substitution:

R703.11.1.3 Fasteners. Unless specified otherwise by the manufacturer's instructions, fasteners for *vinyl siding* shall be 0.120-inch (3 mm) shank diameter nails with a 0.313-inch (8 mm) head, 16-gage staples with a $^3/_8$-inch (9.5 mm) to $^1/_2$-inch (12.7 mm) crown or in accordance with Table R703.3(1).

~~**R703.11.1.4 Penetration depth.** Unless specified otherwise by the manufacturer's instructions or in accordance with Table R703.3(1), fasteners shall penetrate into building framing. The total penetration into sheathing, furring framing or other *nailable substrate* shall be a minimum 1 $^{1}/_{4}$ inches (32 mm).~~

~~**R703.11.1.5 Spacing.** Unless specified otherwise by the manufacturer's instructions, the maximum spacing between fasteners shall be 16 inches (406 mm) for horizontal siding and 12 inches (305 mm) for vertical siding. Where specified by the manufacturer's instructions and supported by a test report, alternative fastener spacing such as 24 inches (610 mm) is permitted.~~

Add new standard(s) as follows:

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428

F1667-21a Specification of Driven Fasteners: Nails, Spikes and Staples.

Reason: This change moves away from the long-standing "standard" installation prescription of 16" oc into the stud to a prescriptive table that offers practical fastener alternatives to installation depending the framing and sheathing patterns. It is based on industry testing using ASTM D5206 and engineering calculations and in short it requires the use of ring shank nails where it's more difficult to hit the stud framing.

In addition in "low wind" areas (a good portion of the country), 20 psf or less where 24" oc framing is used and nailable sheathing is not being used, it provides and allowance for this construction method.

We will remove references to installation practices in the code in Table R703.3(1) as the table is redundant and not used in an additional proposal.

This change will offer options of installation while addressing trends in construction related to energy efficiency and alternative framing concepts.

Cost Impact: Increase

Estimated Immediate Cost Impact:

Estimated additional cost for and average 20 square home is between $50-$150.

Estimated Immediate Cost Impact Justification (methodology and variables):

This change offers alternatives to installation which will add additional fasteners and ring shank nails vs. smooth shank nails which are more expensive.
5lbs of 1 1/4" Roofing Smooth Shank Nails $19

5lb of 1 1/4" Roofing Ring Shank Nails $25

Adds about 25% in material costs, and potential additional labor costs.

Estimated Life Cycle Cost Impact:

Life cycle costs it not relevant here as the change in fastener type will not impact this issue.

Estimated Life Cycle Cost Impact Justification (methodology and variables):

NA

Staff Analysis: A review of the following standard proposed for inclusion in the code regarding some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before April 1, 2025:
ASTMF1667-21a Specification of Driven Fasteners: Nails, Spikes and Staples.

RB234-25

IRC: TABLE R802.4.1(1), TABLE R802.4.1(3), TABLE R802.4.1(5), TABLE R802.4.1(7), TABLE R802.4.1(2), TABLE R802.4.1(4), TABLE R802.4.1(6), TABLE R802.4.1(8)

Proponents: Glenn Mathewson, BuildingCodeCollege.com, representing Self (glenn@glennmathewson.com)

2024 International Residential Code

Revise as follows:

TABLE R802.4.1(1) RAFTER SPANS FOR COMMON LUMBER SPECIES (Roof live load = 20 psf, ceiling not attached to rafters, L/Δ = 180, minimum rafter slope greater than 3:12)

Portions of table not shown remain unchanged.

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Douglas fir-larch	SS	11-6	18-0	23-9	Note b	Note b	11-6	18-0	23-9	Note b	Note b
	Douglas fir-larch	#1	11-1	17-4	22-5	Note b	Note b	10-6	15-4	19-5	23-9	Note b
	Douglas fir-larch	#2	10-10	16-10	21-4	26-0	Note b	10-0	14-7	18-5	22-6	26-0
	Douglas fir-larch	#3	8-9	12-10	16-3	19-10	23-0	7-7	11-1	14-1	17-2	19-11
	Hem-fir	SS	10-10	17-0	22-5	Note b	Note b	10-10	17-0	22-5	Note b	Note b
	Hem-fir	#1	10 -7	16-8	22-0	Note b	Note b	10-4	15-2	19-2	23-5	Note b
	Hem-fir	#2	10-1	15-11	20-8	25-3	Note b	9-8	14-2	17-11	21-11	25-5
	Hem-fir	#3	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
	Southern pine	SS	11-3	17-8	23-4	Note b	Note b	11-3	17-8	23-4	Note b	Note b
	Southern pine	#1	10-10	17-0	22-5	Note b	Note b	10-6	15-8	19-10	23-2	Note b
	Southern pine	#2	10-4	15-7	19-8	23-5	Note b	9-0	13-6	17-1	20-3	23-10
	Southern pine	#3	8-0	11-9	14-10	18-0	21-4	6-11	10-2	12-10	15-7	18-6
	Spruce-pine-fir	SS	10-7	16-8	21-11	Note b	Note b	10-7	16-8	21-9	Note b	Note b
	Spruce-pine-fir	#1	10-4	16-3	21-0	25-8	Note b	9-10	14-4	18-2	22-3	25-9
	Spruce-pine-fir	#2	10-4	16-3	21-0	25-8	Note b	9-10	14-4	18-2	22-3	25-9
	Spruce-pine-fir	#3	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
16	Douglas fir-larch	SS	10-5	16-4	21-7	Note b	Note b	10-5	16-3	20-7	25-2	Note b
	Douglas fir-larch	#1	10-0	15-4	19-5	23-9	Note b	9-1	13-3	16-10	20-7	23-10
	Douglas fir-larch	#2	9-10	14-7	18-5	22-6	26-0	8-7	12-7	16-0	19-6	22-7
	Douglas fir-larch	#3	7-7	11-1	14-1	17-2	19-11	6-7	9-8	12-12	14-11	17-3
	Hem-fir	SS	9-10	15-6	20-5	Note b	Note b	9-10	15-6	19-11	24-4	Note b
	Hem-fir	#1	9-8	15-2	19-2	23-5	Note b	9-0	13-1	16-7	20-4	23-7
	Hem-fir	#2	9-2	14-2	17-11	21-11	25-5	8-5	12-3	15-6	18-11	22-0
	Hem-fir	#3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10
	Southern pine	SS	10-3	16-1	21-2	Note b	Note b	10-3	16-1	21-2	25-7	Note b
	Southern pine	#1	9-10	15-6	19-10	23-2	Note b	9-1	13-7	17-2	20-1	23-10
	Southern pine	#2	9-0	13-6	17-1	20-3	23-10	7-9	11-8	14-9	17-6	20-8
	Southern pine	#3	6-11	10-2	12-10	15-7	18-6	6-0	8-10	11-2	13-6	16-0
	Spruce-pine-fir	SS	9-8	15-2	19-11	25-5	Note b	9-8	14-10	18-10	23-0	Note b
	Spruce-pine-fir	#1	9-5	14-4	18-2	22-3	25-9	8-6	12-5	15-9	19-3	22-4
	Spruce-pine-fir	#2	9-5	14-4	18-2	22-3	25-9	8-6	12-5	15-9	19-3	22-4
	Spruce-pine-fir	#3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10
19.2	Douglas fir-larch	SS	9-10	15-5	20-4	25-11	Note b	9-10	14-10	18-10	23-0	Note b
	Douglas fir-larch	#1	9-5	14-0	17-9	21-8	25-2	8-4	12-2	15-4	18-9	21-9
	Douglas fir-larch	#2	9-1	13-3	16-10	20-7	23-10	7-10	11-6	14-7	17-10	20-8
	Douglas fir-larch	#3	6-11	10-2	12-10	15-8	18-3	6-0	8-9	11-2	12-7	15-9
	Hem-fir	SS	9-3	14-7	19-2	24-6	Note b	9-3	14-4	18-2	22-3	25-9
	Hem-fir	#1	9-1	13-10	17-6	21-5	24-10	8-2	12-0	15-2	18-6	21-6
	Hem-fir	#2	8-8	12-11	16-4	20-0	23-2	7-8	11-2	14-2	17-4	20-1
	Hem-fir	#3	6-9	9-11	12-7	15-4	17-9	5-10	8-7	10-10	13-3	15-5
	Southern pine	SS	9-8	15-2	19-11	25-5	Note b	9-8	15-2	19-7	23-4	Note b
	Southern pine	#1	9-3	14-3	18-1	21-2	25-2	8-4	12-4	15-8	18-4	21-9
	Southern pine	#2	8-2	12-3	15-7	18-6	21-9	7-1	10-8	13-6	16-0	18-10
	Southern pine	#3	6-4	9-4	11-9	14-3	16-10	5-6	8-1	10-2	12-4	14-7
	Spruce-pine-fir	SS	9-1	14-3	18-9	23-11	Note b	9-1	13-7	17-2	21-0	24-4
	Spruce-pine-fir	#1	8-10	13-1	16-7	20-3	23-6	7-9	11-4	14-4	17-7	20-4
	Spruce-pine-fir	#2	8-10	13-1	16-7	20-3	23-6	7-9	11-4	14-4	17-7	20-4
	Spruce-pine-fir	#3	6-9	9-11	12-7	15-4	17-9	5-10	8-7	10-10	13-3	15-5
	Douglas fir-larch	SS	9-1	14-4	18-10	23-9	Note b	9-1	13-3	16-10	20-7	23-10

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
24	Douglas fir-larch	#1	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
	Douglas fir-larch	#2	8-2	11-11	15-1	18-5	21-4	7-0	10-4	13-0	15-11	18-6
	Douglas fir-larch	#3	6-2	9-1	11-6	14-1	16-3	5-4	7-10	10-0	12-2	14-1
	Hem-fir	SS	8-7	13-6	17-10	22-9	Note b	8-7	12-10	16-3	19-10	23-0
	Hem-fir	#1	8-5	12-4	15-8	19-2	22-2	7-4	10-9	13-7	16-7	19-3
	Hem-fir	#2	7-11	11-7	14-8	17-10	20-9	6-10	10-0	12-8	15-6	17-11
	Hem-fir	#3	6-1	8-10	11-3	13-8	15-11	5-3	7-8	9-9	11-10	13-9
	Southern pine	SS	8-11	14-1	18-6	23-8	Note b	8-11	13-10	17-6	20-10	24-8
	Southern pine	#1	8-7	12-9	16-2	18-11	22-6	7-5	11-1	14-0	16-5	19-6
	Southern pine	#2	7-4	11-0	13-11	16-6	19-6	6-4	9-6	12-1	14-4	16-10
	Southern pine	#3	5-8	8-4	10-6	12-9	15-1	4-11	7-3	9-1	11-0	13-1
	Spruce-pine-fir	SS	8-5	13-3	17-5	21-8	25-2	8-4	12-2	15-4	18-9	21-9
	Spruce-pine-fir	#1	8-0	11-9	14-10	18-2	21-0	6-11	10-2	12-10	15-8	18-3
	Spruce-pine-fir	#2	8-0	11-9	14-10	18-2	21-0	6-11	10-2	12-10	15-8	18-3
	Spruce-pine-fir	#3	6-1	8-10	11-3	13-8	15-11	5-3	7-8	9-9	11-10	13-9

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the adjustment factors in Table R802.4.1(9).

b. Span exceeds 26 feet in length.

TABLE R802.4.1(3) RAFTER SPANS FOR COMMON LUMBER SPECIES (Ground snow load = 30 psf, ceiling not attached to rafters, L/Δ = 180, minimum rafter slope greater than 3:12)

Portions of table not shown remain unchanged.

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Douglas fir-larch	SS	10-0	15-9	20-9	Note b	Note b	10-0	15-9	20-5	24-11	Note b
	Douglas fir-larch	#1	9-8	14-9	18-8	22-9	Note b	9-0	13-2	16-8	20-4	23-7
	Douglas fir-larch	#2	9-6	14-0	17-8	21-7	25-1	8-6	12-6	15-10	19-4	22-5
	Douglas fir-larch	#3	7-3	10-8	13-6	16-6	19-2	6-6	9-6	12-1	14-9	17-1
	Hem-fir	SS	9-6	14-10	19-7	25-0	Note b	9-6	14-10	19-7	24-1	Note b
	Hem-fir	#1	9-3	14-6	18-5	22-6	26-0	8-11	13-0	16-6	20-1	23-4
	Hem-fir	#2	8-10	13-7	17-2	21-0	24-4	8-4	12-2	15-4	18-9	21-9
	Hem-fir	#3	7-1	10-5	13-2	16-1	18-8	6-4	9-4	11-9	14-5	16-8
	Southern pine	SS	9-10	15-6	20-5	Note b	Note b	9-10	15-6	20-5	25-4	Note b
	Southern pine	#1	9-6	14-10	19-0	22-3	Note b	9-0	13-5	17-0	19-11	23-7
	Southern pine	#2	8-7	12-11	16-4	19-5	22-10	7-8	11-7	14-8	17-4	20-5
	Southern pine	#3	6-7	9-9	12-4	15-0	17-9	5-11	8-9	11-0	13-5	15-10
	Spruce-pine-fir	SS	9-3	14-7	19-2	24-6	Note b	9-3	14-7	18-8	22-9	Note b
	Spruce-pine-fir	#1	9-1	13-9	17-5	21-4	24-8	8-5	12-4	15-7	19-1	22-1
	Spruce-pine-fir	#2	9-1	13-9	17-5	21-4	24-8	8-5	12-4	15-7	19-1	22-1
	Spruce-pine-fir	#3	7-1	10-5	13-2	16-1	18-8	6-4	9-4	11-9	14-5	16-8
16	Douglas fir-larch	SS	9-1	14-4	18-10	24-1	Note b	9-1	14-0	17-8	21-7	25-1
	Douglas fir-larch	#1	8-9	12-9	16-2	19-9	22-10	7-10	11-5	14-5	17-8	20-5
	Douglas fir-larch	#2	8-3	12-1	15-4	18-9	21-8	7-5	10-10	13-8	16-9	19-5
	Douglas fir-larch	#3	6-4	9-3	11-8	14-3	16-7	5-8	8-3	10-6	12-9	14-10
	Hem-fir	SS	8-7	13-6	17-10	22-9	Note b	8-7	13-6	17-1	20-10	24-2
	Hem-fir	#1	8-5	12-7	15-11	19-6	22-7	7-8	11-3	14-3	17-5	20-2
	Hem-fir	#2	8-0	11-9	14-11	18-2	21-1	7-2	10-6	13-4	16-3	18-10
	Hem-fir	#3	6-2	9-0	11-5	13-11	16-2	5-6	8-1	10-3	12-6	14-6
	Southern pine	SS	8-11	14-1	18-6	23-8	Note b	8-11	14-1	18-5	1-11	25-11
	Southern pine	#1	8-7	13-0	16-6	19-3	22-10	7-10	11-7	14-9	17-3	20-5
	Southern pine	#2	7-6	11-2	14-2	16-10	19-10	6-8	10-0	12-8	15-1	17-9
	Southern pine	#3	5-9	8-6	10-8	13-0	15-4	5-2	7-7	9-7	11-7	13-9
	Spruce-pine-fir	SS	8-5	13-3	17-5	22-1	25-7	8-5	12-9	16-2	19-9	22-10

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
	Spruce-pine-fir	#1	8-2	11-11	15-1	18-5	21-5	7-3	10-8	13-6	16-6	19-2
	Spruce-pine-fir	#2	8-2	11-11	15-1	18-5	21-5	7-3	10-8	13-6	16-6	19-2
	Spruce-pine-fir	#3	6-2	9-0	11-5	13-11	16-2	5-6	8-1	10-3	12-6	14-6
19.2	Douglas fir-larch	SS	8-7	13-6	17-9	22-1	25-7	8-7	12-9	16-2	19-9	22-10
	Douglas fir-larch	#1	7-11	11-8	14-9	18-0	20-11	7-1	10-5	13-2	16-1	18-8
	Douglas fir-larch	#2	7-7	11-0	14-0	17-1	19-10	6-9	9-10	12-6	15-3	17-9
	Douglas fir-larch	#3	5-9	8-5	10-8	13-1	15-2	5-2	7-7	9-7	11-8	13-6
	Hem-fir	SS	8-1	12-9	16-9	21-4	24-8	8-1	12-4	15-7	19-1	22-1
	Hem-fir	#1	7-10	11-6	14-7	17-9	20-7	7-0	10-3	13-0	15-11	18-5
	Hem-fir	#2	7-4	10-9	13-7	16-7	19-3	6-7	9-7	12-2	14-10	17-3
	Hem-fir	#3	5-7	8-3	10-5	12-9	14-9	5-0	7-4	9-4	11-5	13-2
	Southern pine	SS	8-5	13-3	17-5	22-3	Note b	8-5	13-3	16-10	20-0	23-7
	Southern pine	#1	8-0	11-10	15-1	17-7	20-11	7-1	10-7	13-5	15-9	18-8
	Southern pine	#2	6-10	10-2	12-11	15-4	18-1	6-1	9-2	11-7	13-9	16-2
	Southern pine	#3	5-3	7-9	9-9	11-10	14-0	4-8	6-11	8-9	10-7	12-6
	Spruce-pine-fir	SS	7-11	12-5	16-5	20-2	23-4	7-11	11-8	14-9	18-0	20-11
	Spruce-pine-fir	#1	7-5	10-11	13-9	16-10	19-6	6-8	9-9	12-4	15-1	17-6
	Spruce-pine-fir	#2	7-5	10-11	13-9	16-10	19-6	6-8	9-9	12-4	15-1	17-6
	Spruce-pine-fir	#3	5-7	8-3	10-5	12-9	14-9	5-0	7-4	9-4	11-5	13-2
24	Douglas fir-larch	SS	8-0	12-6	16-2	19-9	22-10	7-10	11-5	14-5	17-8	20-5
	Douglas fir-larch	#1	7-1	10-5	13-2	16-1	18-8	6-4	9-4	11-9	14-5	16-8
	Douglas fir-larch	#2	6-9	9-10	12-6	15-3	17-9	6-0	8-10	11-2	13-8	15-10
	Douglas fir-larch	#3	5-2	7-7	9-7	11-8	13-6	4-7	6-9	8-7	10-5	12-1
	Hem-fir	SS	7-6	11-10	15-7	19-1	22-1	7-6	11-0	13-11	17-0	19-9
	Hem-fir	#1	7-0	10-3	13-0	15-11	18-5	6-3	9-2	11-8	14-3	16-6
	Hem-fir	#2	6-7	9-7	12-2	14-10	17-3	5-10	8-7	10-10	13-3	15-5
	Hem-fir	#3	5-0	7-4	9-4	11-5	13-2	4-6	6-7	8-4	10-2	11-10
	Southern pine	SS	7-10	12-3	16-2	20-0	23-7	7-10	11-10	15-0	17-11	21-2
	Southern pine	#1	7-1	10-7	13-5	15-9	18-8	6-4	9-6	12-0	14-1	16-8
	Southern pine	#2	6-1	9-2	11-7	13-9	16-2	5-5	8-2	10-4	12-3	14-6
	Southern pine	#3	4-8	6-11	8-9	10-7	12-6	4-2	6-2	7-10	9-6	11-2
	Spruce-pine-fir	SS	7-4	11-7	14-9	18-0	20-11	7-1	10-5	13-2	16-1	18-8
	Spruce-pine-fir	#1	6-8	9-9	12-4	15-1	17-6	5-11	8-8	11-0	13-6	15-7
	Spruce-pine-fir	#2	6-8	9-9	12-4	15-1	17-6	5-11	8-8	11-0	13-6	15-7
	Spruce-pine-fir	#3	5-0	7-4	9-4	11-5	13-2	4-6	6-7	8-4	10-2	11-10

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the adjustment factors in Table R802.4.1(9).

b. Span exceeds 26 feet in length.

TABLE R802.4.1(5) RAFTER SPANS FOR COMMON LUMBER SPECIES (Ground snow load = 50 psf, ceiling not attached to rafters, L/Δ = 180, minimum rafter slope greater than 3:12)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
	Douglas fir-larch	SS	8-5	13-3	17-6	22-4	26-0	8-5	13-3	17-3	21-1	24-5
	Douglas fir-larch	#1	8-2	12-0	15-3	18-7	21-7	7-7	11-2	14-1	17-3	20-0
	Douglas fir-larch	#2	7-10	11-5	14-5	17-8	20-5	7-3	10-7	13-4	16-4	18-11
	Douglas fir-larch	#3	6-0	8-9	11-0	13-6	15-7	5-6	8-1	10-3	12-6	14-6
	Hem-fir	SS	8-0	12-6	16-6	21-1	25-6	8-0	12-6	16-6	20-4	23-7
	Hem-fir	#1	7-10	11-10	15-0	18-4	21-3	7-6	11-0	13-11	17-0	19-9
	Hem-fir	#2	7-5	11-1	14-0	17-2	19-11	7-0	10-3	13-0	15-10	18-5
	Hem-fir	#3	5-10	8-6	10-9	13-2	15-3	5-5	7-10	10-0	12-2	14-1
	Southern pine	SS	8-4	13-1	17-2	21-11	Note b	8-4	13-1	17-2	21-5	25-3
	Southern pine	#1	8-0	12-3	15-6	18-2	21-7	7-7	11-4	14-5	16-10	20-0

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Southern pine	#2	7-0	10-6	13-4	15-10	18-8	6-6	9-9	12-4	14-8	17-3
	Southern pine	#3	5-5	8-0	10-1	12-3	14-6	5-0	7-5	9-4	11-4	13-5
	Spruce-pine-fir	SS	7-10	12-3	16-2	20-8	24-1	7-10	12-3	15-9	19-3	22-4
	Spruce-pine-fir	#1	7-8	11-3	14-3	17-5	20-2	7-1	10-5	13-2	16-1	18-8
	Spruce-pine-fir	#2	7-8	11-3	14-3	17-5	20-2	7-1	10-5	13-2	16-1	18-8
	Spruce-pine-fir	#3	5-10	8-6	10-9	13-2	15-3	5-5	7-10	10-0	12-2	14-1
16	Douglas fir-larch	SS	7-8	12-1	15-11	19-9	22-10	7-8	11-10	14-11	18-3	21-2
	Douglas fir-larch	#1	7-1	10-5	13-2	16-1	18-8	6-7	9-8	12-2	14-11	17-3
	Douglas fir-larch	#2	6-9	9-10	12-6	15-3	17-9	6-3	9-2	11-7	14-2	16-5
	Douglas fir-larch	#3	5-2	7-7	9-7	11-8	13-6	4-9	7-0	8-10	10-10	12-6
	Hem-fir	SS	7-3	11-5	15-0	19-1	22-1	7-3	11-5	14-5	17-8	20-5
	Hem-fir	#1	7-0	10-3	13-0	15-11	18-5	6-6	9-6	12-1	14-9	17-1
	Hem-fir	#2	6-7	9-7	12-2	14-10	17-3	6-1	8-11	11-3	13-9	15-11
	Hem-fir	#3	5-0	7-4	9-4	11-5	13-2	4-8	6-10	8-8	10-6	12-3
	Southern pine	SS	7-6	11-10	15-7	19-11	23-7	7-6	11-10	15-7	18-6	21-10
	Southern pine	#1	7-1	10-7	13-5	15-9	18-8	6-7	9-10	12-5	14-7	17-3
	Southern pine	#2	6-1	9-2	11-7	13-9	16-2	5-8	8-5	10-9	12-9	15-0
	Southern pine	#3	4-8	6-11	8-9	10-7	12-6	4-4	6-5	8-1	9-10	11-7
	Spruce-pine-fir	SS	7-1	11-2	14-8	18-0	20-11	7-1	10-9	13-8	15-11	19-4
	Spruce-pine-fir	#1	6-8	9-9	12-4	15-1	17-6	6-2	9-0	11-5	13-11	16-2
	Spruce-pine-fir	#2	6-8	9-9	12-4	15-1	17-6	6-2	9-0	11-5	13-11	16-2
	Spruce-pine-fir	#3	5-0	7-4	9-4	11-5	13-2	4-8	6-10	8-8	10-6	12-3
19.2	Douglas fir-larch	SS	7-3	11-4	14-9	18-0	20-11	7-3	10-9	13-8	16-8	19-4
	Douglas fir-larch	#1	6-6	9-6	12-0	14-8	17-1	6-0	8-10	11-2	13-7	15-9
	Douglas fir-larch	#2	6-2	9-0	11-5	13-11	16-2	5-8	8-4	10-9	12-11	15-0
	Douglas fir-larch	#3	4-8	6-11	8-9	10-8	12-4	4-4	6-4	8-1	9-10	11-5
	Hem-fir	SS	6-10	10-9	14-2	17-5	20-2	6-10	10-5	13-2	16-1	18-8
	Hem-fir	#1	6-5	9-5	11-11	14-6	16-10	8-11	8-8	11-0	13-5	15-7
	Hem-fir	#2	6-0	8-9	11-1	13-7	15-9	5-7	8-1	10-3	12-7	14-7
	Hem-fir	#3	4-7	6-9	8-6	10-5	12-1	4-3	6-3	7-11	9-7	11-2
	Southern pine	SS	7-1	11-2	14-8	18-3	21-7	7-1	11-2	14-2	16-11	20-0
	Southern pine	#1	6-6	9-8	12-3	14-4	17-1	6-0	9-0	11-4	13-4	15-9
	Southern pine	#2	5-7	8-4	10-7	12-6	14-9	5-2	7-9	9-9	11-7	13-8
	Southern pine	#3	4-3	6-4	8-0	9-8	11-5	4-0	5-10	7-4	8-11	10-7
	Spruce-pine-fir	SS	6-8	10-6	13-5	16-5	19-1	6-8	9-10	12-5	15-3	17-8
	Spruce-pine-fir	#1	6-1	8-11	11-3	13-9	15-11	5-7	8-3	10-5	12-9	14-9
	Spruce-pine-fir	#2	6-1	8-11	11-3	13-9	15-11	5-7	8-3	10-5	12-9	14-9
	Spruce-pine-fir	#3	4-7	6-9	8-6	10-5	12-1	4-3	6-3	7-11	9-7	11-2
24	Douglas fir-larch	SS	6-8	10-5	13-2	16-1	18-8	6-7	9-8	12-2	14-11	17-3
	Douglas fir-larch	#1	5-10	8-6	10-9	13-2	15-3	5-5	7-10	10-0	12-2	14-1
	Douglas fir-larch	#2	5-6	8-1	10-3	12-6	14-6	5-1	7-6	9-5	11-7	13-5
	Douglas fir-larch	#3	4-3	6-2	7-10	9-6	11-1	3-11	5-8	7-3	8-10	10-3
	Hem-fir	SS	6-4	9-11	12-9	15-7	18-0	6-4	9-4	11-9	14-5	16-8
	Hem-fir	#1	5-9	8-5	10-8	13-0	15-1	8-4	7-9	9-10	12-0	13-11
	Hem-fir	#2	5-4	7-10	9-11	12-1	14-1	4-11	7-3	9-2	11-3	13-0
	Hem-fir	#3	4-1	6-0	7-7	9-4	10-9	3-10	5-7	7-1	8-7	10-0
	Southern pine	SS	6-7	10-4	13-8	16-4	19-3	6-7	10-0	12-8	15-2	17-10
	Southern pine	#1	5-10	8-8	11-0	12-10	15-3	5-5	8-0	10-2	11-11	14-1
	Southern pine	#2	5-0	7-5	9-5	11-3	13-2	4-7	6-11	8-9	10-5	12-3
	Southern pine	#3	3-10	5-8	7-1	8-8	10-3	3-6	5-3	6-7	8-0	9-6
	Spruce-pine-fir	SS	6-2	9-6	12-0	14-8	17-1	6-0	8-10	11-2	13-7	15-9
	Spruce-pine-fir	#1	5-5	7-11	10-1	12-4	14-3	5-0	7-4	9-4	11-5	13-2
	Spruce-pine-fir	#2	5-5	7-11	10-1	12-4	14-3	5-0	7-4	9-4	11-5	13-2
	Spruce-pine-fir	#3	4-1	6-0	7-7	9-4	10-9	3-10	5-7	7-1	8-7	10-0

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the adjustment factors in Table R802.4.1(9).

b. Span exceeds 26 feet in length.

TABLE R802.4.1(7) RAFTER SPANS FOR COMMON LUMBER SPECIES (Ground snow load = 70 psf, ceiling not attached to rafters, L/Δ = 180, minimum rafter slope greater than 3:12)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Douglas fir-larch	SS	7-7	11-10	15-8	19-9	22-10	7-7	11-10	15-3	18-7	21-7
	Douglas fir-larch	#1	7-1	10-5	13-2	16-1	18-8	6-8	9-10	12-5	15-2	17-7
	Douglas fir-larch	#2	6-9	9-10	12-6	15-3	17-9	6-4	9-4	11-9	14-5	16-8
	Douglas fir-larch	#3	5-2	7-7	9-7	11-8	13-6	4-10	7-1	9-0	11-0	12-9
	Hem-fir	SS	7-2	11-3	14-9	18-10	22-1	7-2	11-3	14-8	18-0	20-10
	Hem-fir	#1	7-0	10-3	13-0	15-11	18-5	6-7	9-8	12-3	15-0	17-5
	Hem-fir	#2	6-7	9-7	12-2	14-10	17-3	6-2	9-1	11-5	14-0	16-3
	Hem-fir	#3	5-0	7-4	9-4	11-5	13-2	4-9	6-11	8-9	10-9	12-5
	Southern pine	SS	7-5	11-8	15-4	19-7	23-7	7-5	11-8	15-4	18-10	22-3
	Southern pine	#1	7-1	10-7	13-5	15-9	18-8	6-9	10-0	12-8	14-10	17-7
	Southern pine	#2	6-1	9-2	11-7	13-9	16-2	5-9	8-7	10-11	12-11	15-3
	Southern pine	#3	4-8	6-11	8-9	10-7	12-6	4-5	6-6	8-3	10-0	11-10
	Spruce-pine-fir	SS	7-0	11-0	14-6	18-0	20-11	7-0	11-0	13-11	17-0	19-8
	Spruce-pine-fir	#1	6-8	9-9	12-4	15-1	17-6	6-3	9-2	11-8	14-2	16-6
	Spruce-pine-fir	#2	6-8	9-9	12-4	15-1	17-6	6-3	9-2	11-8	14-2	16-6
	Spruce-pine-fir	#3	5-0	7-4	9-4	11-5	13-2	4-9	6-11	8-9	10-9	12-5
16	Douglas fir-larch	SS	6-10	10-9	14-0	17-1	19-10	6-10	10-5	13-2	16-1	18-8
	Douglas fir-larch	#1	6-2	9-0	11-5	13-11	16-2	5-10	8-6	10-9	13-2	15-3
	Douglas fir-larch	#2	5-10	8-7	10-10	13-3	15-4	5-6	8-1	10-3	12-6	14-6
	Douglas fir-larch	#3	4-6	6-6	8-3	10-1	11-9	4-3	6-2	7-10	9-6	11-1
	Hem-fir	SS	6-6	10-2	13-5	16-6	19-2	6-6	10-1	12-9	15-7	18-0
	Hem-fir	#1	6-1	8-11	11-3	13-9	16-0	5-9	8-5	10-8	13-0	15-1
	Hem-fir	#2	5-8	8-4	10-6	12-10	14-11	5-4	7-10	9-11	12-1	14-1
	Hem-fir	#3	4-4	6-4	8-1	9-10	11-5	4-1	6-0	7-7	9-4	10-9
	Southern pine	SS	6-9	10-7	14-0	17-4	20-5	6-9	10-7	13-9	16-4	19-3
	Southern pine	#1	6-2	9-2	11-8	13-8	16-2	5-10	8-8	11-0	12-10	15-3
	Southern pine	#2	5-3	7-11	10-0	11-11	14-0	5-0	7-5	9-5	11-3	13-2
	Southern pine	#3	4-1	6-0	7-7	9-2	10-10	3-10	5-8	7-1	8-8	10-3
	Spruce-pine-fir	SS	6-4	10-0	12-9	15-7	18-1	6-4	9-6	12-0	14-8	17-1
	Spruce-pine-fir	#1	5-9	8-5	10-8	13-1	15-2	5-5	7-11	10-1	12-4	14-3
	Spruce-pine-fir	#2	5-9	8-5	10-8	13-1	15-2	5-5	7-11	10-1	12-4	14-3
	Spruce-pine-fir	#3	4-4	6-4	8-1	9-10	11-5	4-1	6-0	7-7	9-4	10-9
19.2	Douglas fir-larch	SS	6-6	10-1	12-9	15-7	18-1	6-6	9-6	12-0	14-8	17-1
	Douglas fir-larch	#1	5-7	8-3	10-5	12-9	14-9	5-4	7-9	9-10	12-0	13-11
	Douglas fir-larch	#2	5-4	7-10	9-11	12-1	14-0	5-0	7-4	9-4	11-5	13-2
	Douglas fir-larch	#3	4-1	6-0	7-7	9-3	10-8	3-10	5-7	7-1	8-8	10-1
	Hem-fir	SS	6-1	9-7	12-4	15-1	17-4	6-1	9-2	11-8	14-2	15-5
	Hem-fir	#1	5-7	8-2	10-3	12-7	14-7	5-3	7-8	9-8	11-10	13-9
	Hem-fir	#2	5-2	7-7	9-7	11-9	13-7	4-11	7-2	9-1	11-1	12-10
	Hem-fir	#3	4-0	5-10	7-4	9-0	10-5	3-9	5-6	6-11	8-6	9-10
	Southern pine	SS	6-4	10-0	13-2	15-10	18-8	6-4	9-10	12-6	14-11	17-7
	Southern pine	#1	5-8	8-5	10-8	12-5	14-9	5-4	7-11	10-0	11-9	13-11
	Southern pine	#2	4-10	7-3	9-2	10-10	12-9	4-6	6-10	8-8	10-3	12-1
	Southern pine	#3	3-8	5-6	6-11	8-4	9-11	3-6	5-2	6-6	7-11	9-4
	Spruce-pine-fir	SS	6-0	9-2	11-8	14-3	16-6	5-11	8-8	11-0	13-5	15-7
	Spruce-pine-fir	#1	5-3	7-8	9-9	11-11	13-10	5-0	7-3	9-2	11-3	13-0
	Spruce-pine-fir	#2	5-3	7-8	9-9	11-11	13-10	5-0	7-3	9-2	11-3	13-0
	Spruce-pine-fir	#3	4-0	5-10	7-4	9-0	10-5	3-9	5-6	6-11	8-6	9-10
24	Douglas fir-larch	SS	6-0	9-0	11-5	13-11	16-2	5-10	8-6	10-9	13-2	15-3
	Douglas fir-larch	#1	5-0	7-4	9-4	11-5	13-2	4-9	6-11	8-9	10-9	12-5
	Douglas fir-larch	#2	4-9	7-0	8-10	10-10	12-6	4-6	6-7	8-4	10-2	11-10
	Douglas fir-larch	#3	3-8	5-4	6-9	8-3	9-7	3-5	5-0	6-4	7-9	9-10
	Hem-fir	SS	5-8	8-8	11-0	13-6	13-11	5-7	8-3	10-5	12-4	12-4
	Hem-fir	#1	5-0	7-3	9-2	11-3	13-0	4-8	6-10	8-8	10-7	12-4
	Hem-fir	#2	4-8	6-9	8-7	10-6	12-2	4-4	6-5	8-1	9-11	11-6
	Hem-fir	#3	3-7	5-2	6-7	8-1	9-4	3-4	4-11	6-3	7-7	8-10
	Southern pine	SS	5-11	9-3	11-11	14-2	16-8	5-11	8-10	11-2	13-4	15-9
	Southern pine	#1	5-0	7-6	9-6	11-1	13-2	4-9	7-1	9-0	10-6	12-5
	Southern pine	#2	4-4	6-5	8-2	9-9	11-5	4-1	6-1	7-9	9-2	10-9
	Southern pine	#3	3-4	4-11	6-2	7-6	8-10	3-1	4-7	5-10	7-1	8-4

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
	Spruce-pine-fir	SS	5-6	8-3	10-5	12-9	14-9	5-4	7-9	9-10	12-0	12-11
	Spruce-pine-fir	#1	4-8	6-11	8-9	10-8	12-4	4-5	6-6	8-3	10-0	11-8
	Spruce-pine-fir	#2	4-8	6-11	8-9	10-8	12-4	4-5	6-6	8-3	10-0	11-8
	Spruce-pine-fir	#3	3-7	5-2	6-7	8-1	9-4	3-4	4-11	6-3	7-7	8-10

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the adjustment factors in Table R802.4.1(9).

TABLE R802.4.1(2) RAFTER SPANS FOR COMMON LUMBER SPECIES (Roof live load = 20 psf, flexible ceiling finish attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Douglas fir-larch	SS	10-5	16-4	21-7	Note b	Note b	10-5	16-4	21-7	Note b	Note b
	Douglas fir-larch	#1	10-0	15-9	20-10	Note b	Note b	10-0	15-4	19-5	23-9	Note b
	Douglas fir-larch	#2	9-10	15-6	20-5	26-0	Note b	9-10	14-7	18-5	22-6	26-0
	Douglas fir-larch	#3	8-9	12-10	16-3	19-10	23-0	7-7	11-1	14-1	17-2	19-11
	Hem-fir	SS	9-10	15-6	20-5	Note b	Note b	9-10	15-6	20-5	Note b	Note b
	Hem-fir	#1	9-8	15-2	19-11	25-5	Note b	9-8	15-2	19-2	23-5	Note b
	Hem-fir	#2	9-2	14-5	19-0	24-3	Note b	9-2	14-2	17-11	21-11	25-5
	Hem-fir	#3	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
	Southern pine	SS	10-3	16-1	21-2	Note b	Note b	10-3	16-1	21-2	Note b	Note b
	Southern pine	#1	9-10	15-6	20-5	Note b	Note b	9-10	15-6	19-10	23-2	Note b
	Southern pine	#2	9-5	14-9	19-6	23-5	Note b	9-0	13-6	17-1	20-3	23-10
	Southern pine	#3	8-0	11-9	14-10	18-0	21-4	6-11	10-2	12-10	15-7	18-6
	Spruce-pine-fir	SS	9-8	15-2	19-11	25-5	Note b	9-8	15-2	19-11	25-5	Note b
	Spruce-pine-fir	#1	9-5	14-9	19-6	24-10	Note b	9-5	14-4	18-2	22-3	25-9
	Spruce-pine-fir	#2	9-5	14-9	19-6	24-10	Note b	9-5	14-4	18-2	22-3	25-9
	Spruce-pine-fir	#3	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
16	Douglas fir-larch	SS	9-6	14-11	19-7	25-0	Note b	9-6	14-11	19-7	25-0	Note b
	Douglas fir-larch	#1	9-1	14-4	18-11	23-9	Note b	9-1	13-3	16-10	20-7	23-10
	Douglas fir-larch	#2	8-11	14-1	18-5	22-6	26-0	8-7	12-7	16-0	19-6	22-7
	Douglas fir-larch	#3	7-7	11-1	14-1	17-2	19-11	6-7	9-8	12-2	14-11	17-3
	Hem-fir	SS	8-11	14-1	18-6	23-8	Note b	8-11	14-1	18-6	23-8	Note b
	Hem-fir	#1	8-9	13-9	18-1	23-1	Note b	8-9	13-1	16-7	20-4	23-7
	Hem-fir	#2	8-4	13-1	17-3	21-11	25-5	8-4	12-3	15-6	18-11	22-0
	Hem-fir	#3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10
	Southern pine	SS	9-4	14-7	19-3	24-7	Note b	9-4	14-7	19-3	24-7	Note b
	Southern pine	#1	8-11	14-1	18-6	23-2	Note b	8-11	13-7	17-2	20-1	23-10
	Southern pine	#2	8-7	13-5	17-1	20-3	23-10	7-9	11-8	14-9	17-6	20-8
	Southern pine	#3	6-11	10-2	12-10	15-7	18-6	6-0	8-10	11-2	13-6	16-0
	Spruce-pine-fir	SS	8-9	13-9	18-1	23-1	Note b	8-9	13-9	18-1	23-0	Note b
	Spruce-pine-fir	#1	8-7	13-5	17-9	22-3	25-9	8-6	12-5	15-9	19-3	22-4
	Spruce-pine-fir	#2	8-7	13-5	17-9	22-3	25-9	8-6	12-5	15-9	19-3	22-4
	Spruce-pine-fir	#3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10
19.2	Douglas fir-larch	SS	8-11	14-0	18-5	23-7	Note b	8-11	14-0	18-5	23-0	Note b
	Douglas fir-larch	#1	8-7	13-6	17-9	21-8	25-2	8-4	12-2	15-4	18-9	21-9
	Douglas fir-larch	#2	8-5	13-3	16-10	20-7	23-10	7-10	11-6	14-7	17-10	20-8
	Douglas fir-larch	#3	6-11	10-2	12-10	15-8	18-3	6-0	8-9	11-2	13-7	15-9
	Hem-fir	SS	8-5	13-3	17-5	22-3	Note b	8-5	13-3	17-5	22-3	25-9
	Hem-fir	#1	8-3	12-11	17-1	21-5	24-10	8-2	12-0	15-2	18-6	21-6
	Hem-fir	#2	7-10	12-4	16-3	20-0	23-2	7-8	11-2	14-2	17-4	20-1
	Hem-fir	#3	6-9	9-11	12-7	15-4	17-9	5-10	8-7	10-10	13-3	15-5
	Southern pine	SS	8-9	13-9	18-2	23-1	Note b	8-9	13-9	18-2	23-1	Note b
	Southern pine	#1	8-5	13-3	17-5	21-2	25-2	8-4	12-4	15-8	18-4	21-9
	Southern pine	#2	8-1	12-3	15-7	18-6	21-9	7-1	10-8	13-6	16-0	18-10
	Southern pine	#3	6-4	9-4	11-9	14-3	16-10	5-6	8-1	10-2	12-4	14-7

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
	Spruce-pine-fir	SS	8-3	12-11	17-1	21-9	Note b	8-3	12-11	17-1	21-0	24-4
	Spruce-pine-fir	#1	8-1	12-8	16-7	20-3	23-6	7-9	11-4	14-4	17-7	20-4
	Spruce-pine-fir	#2	8-1	12-8	16-7	20-3	23-6	7-9	11-4	14-4	17-7	20-4
	Spruce-pine-fir	#3	6-9	9-11	12-7	15-4	17-9	5-10	8-7	10-10	13-3	15-5
24	Douglas fir-larch	SS	8-3	13-0	17-2	21-10	Note b	8-3	13-0	16-10	20-7	23-10
	Douglas fir-larch	#1	8-0	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
	Douglas fir-larch	#2	7-10	11-11	15-1	18-5	21-4	7-0	10-4	13-0	15-11	18-6
	Douglas fir-larch	#3	6-2	9-1	11-6	14-1	16-3	5-4	7-10	10-0	12-2	14-1
	Hem-fir	SS	7-10	12-3	16-2	20-8	25-1	7-10	12-3	16-2	19-10	23-0
	Hem-fir	#1	7-8	12-0	15-8	19-2	22-2	7-4	10-9	13-7	16-7	19-3
	Hem-fir	#2	7-3	11-5	14-8	17-10	20-9	6-10	10-0	12-8	15-6	17-11
	Hem-fir	#3	6-1	8-10	11-3	13-8	15-11	5-3	7-8	9-9	11-10	13-9
	Southern pine	SS	8-1	12-9	16-10	21-6	Note b	8-1	12-9	16-10	20-10	24-8
	Southern pine	#1	7-10	12-3	16-2	18-11	22-6	7-5	11-1	14-0	16-5	19-6
	Southern pine	#2	7-4	11-0	13-11	16-6	19-6	6-4	9-6	12-1	14-4	16-10
	Southern pine	#3	5-8	8-4	10-6	12-9	15-1	4-11	7-3	9-1	11-0	13-1
	Spruce-pine-fir	SS	7-8	12-0	15-10	20-2	24-7	7-8	12-0	15-4	18-9	21-9
	Spruce-pine-fir	#1	7-6	11-9	14-10	18-2	21-0	6-11	10-2	12-10	15-8	18-3
	Spruce-pine-fir	#2	7-6	11-9	14-10	18-2	21-0	6-11	10-2	12-10	15-8	18-3
	Spruce-pine-fir	#3	6-1	8-10	11-3	13-8	15-11	5-3	7-8	9-9	11-10	13-9

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the adjustment factors in Table R802.4.1(9).

b. Span exceeds 26 feet in length.

TABLE R802.4.1(4) RAFTER SPANS FOR COMMON LUMBER SPECIES (Ground snow load = 30 psf, flexible ceiling finish attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Douglas fir-larch	SS	9-1	14-4	18-10	24-1	Note b	9-1	14-4	18-10	24-1	Note b
	Douglas fir-larch	#1	8-9	13-9	18-2	22-9	Note b	8-9	13-2	16-8	20-4	23-7
	Douglas fir-larch	#2	8-7	13-6	17-8	21-7	25-1	8-6	12-6	15-10	19-4	22-5
	Douglas fir-larch	#3	7-3	10-8	13-6	16-6	19-2	6-6	9-6	12-1	14-9	17-1
	Hem-fir	SS	8-7	13-6	17-10	22-9	Note b	8-7	13-6	17-10	22-9	Note b
	Hem-fir	#1	8-5	13-3	17-5	22-3	26-0	8-5	13-0	16-6	20-1	23-4
	Hem-fir	#2	8-0	12-7	16-7	21-0	24-4	8-0	12-2	15-4	18-9	21-9
	Hem-fir	#3	7-1	10-5	13-2	16-1	18-8	6-4	9-4	11-9	14-5	16-8
	Southern pine	SS	8-11	14-1	18-6	23-8	Note b	8-11	14-1	18-6	23-8	Note b
	Southern pine	#1	8-7	13-6	17-10	22-3	Note b	8-7	13-5	17-0	19-11	23-7
	Southern pine	#2	8-3	12-11	16-4	19-5	22-10	7-8	11-7	14-8	17-4	20-5
	Southern pine	#3	6-7	9-9	12-4	15-0	17-9	5-11	8-9	11-0	13-5	15-10
	Spruce-pine-fir	SS	8-5	13-3	17-5	22-3	Note b	8-5	13-3	17-5	22-3	Note b
	Spruce-pine-fir	#1	8-3	12-11	17-0	21-4	24-8	8-3	12-4	15-7	19-1	22-1
	Spruce-pine-fir	#2	8-3	12-11	17-0	21-4	24-8	8-3	12-4	15-7	19-1	22-1
	Spruce-pine-fir	#3	7-1	10-5	13-2	16-1	18-8	6-4	9-4	11-9	14-5	16-8
	Douglas fir-larch	SS	8-3	13-0	17-2	21-10	Note b	8-3	13-0	17-2	21-7	25-1
	Douglas fir-larch	#1	8-0	12-6	16-2	19-9	22-10	7-10	11-5	14-5	17-8	20-5
	Douglas fir-larch	#2	7-10	12-1	15-4	18-9	21-8	7-5	10-10	13-8	16-9	19-5
	Douglas fir-larch	#3	6-4	9-3	11-8	14-3	16-7	5-8	8-3	10-6	12-9	14-10
	Hem-fir	SS	7-10	12-3	16-2	20-8	25-1	7-10	12-3	16-2	20-8	24-2
	Hem-fir	#1	7-8	12-0	15-10	19-6	22-7	7-8	11-3	14-3	17-5	20-2
	Hem-fir	#2	7-3	11-5	14-11	18-2	21-1	7-2	10-6	13-4	16-3	18-10
	Hem-fir	#3	6-2	9-0	11-5	13-11	16-2	5-6	8-1	10-3	12-6	14-6
	Southern pine	SS	8-1	12-9	16-10	21-6	Note b	8-1	12-9	16-10	21-6	25-11
	Southern pine	#1	7-10	12-3	16-2	19-3	22-10	7-10	11-7	14-9	17-3	20-5

16 RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
	Southern pine	#2	7-6	11-2	14-2	16-10	19-10	6-8	10-0	12-8	15-1	17-9
	Southern pine	#3	5-9	8-6	10-8	13-0	15-4	5-2	7-7	9-7	11-7	13-9
	Spruce-pine-fir	SS	7-8	12-0	15-10	20-2	24-7	7-8	12-0	15-10	19-9	22-10
	Spruce-pine-fir	#1	7-6	11-9	15-1	18-5	21-5	7-3	10-8	13-6	16-6	19-2
	Spruce-pine-fir	#2	7-6	11-9	15-1	18-5	21-5	7-3	10-8	13-6	16-6	19-2
	Spruce-pine-fir	#3	6-2	9-0	11-5	13-11	16-2	5-6	8-1	10-3	12-6	14-6
19.2	Douglas fir-larch	SS	7-9	12-3	16-1	20-7	25-0	7-9	12-3	16-1	19-9	22-10
	Douglas fir-larch	#1	7-6	11-8	14-9	18-0	20-11	7-1	10-5	13-2	16-1	18-8
	Douglas fir-larch	#2	7-4	11-0	14-0	17-1	19-10	6-9	9-1	12-6	15-3	17-9
	Douglas fir-larch	#3	5-9	8-5	10-8	13-1	15-2	5-2	7-7	9-7	11-8	13-6
	Hem-fir	SS	7-4	11-7	15-3	19-5	23-7	7-4	11-7	15-3	19-1	22-1
	Hem-fir	#1	7-2	11-4	14-7	17-9	20-7	7-0	16-3	13-0	15-11	18-5
	Hem-fir	#2	6-10	10-9	13-7	16-7	19-3	6-7	9-7	12-2	14-10	17-3
	Hem-fir	#3	5-7	8-3	10-5	12-9	14-9	5-0	7-4	9-4	11-5	13-2
	Southern pine	SS	7-8	12-0	15-10	20-2	24-7	7-8	12-0	15-10	20-0	23-7
	Southern pine	#1	7-4	11-7	15-1	17-7	20-11	7-1	10-7	13-5	15-9	18-8
	Southern pine	#2	6-10	10-2	12-11	15-4	18-1	6-1	9-2	11-7	13-9	16-2
	Southern pine	#3	5-3	7-9	9-9	11-10	14-0	4-8	6-11	8-9	10-7	12-6
	Spruce-pine-fir	SS	7-2	11-4	14-11	19-0	23-1	7-2	11-4	14-9	18-0	20-11
	Spruce-pine-fir	#1	7-0	10-11	13-9	16-10	19-6	6-8	9-9	12-4	15-1	17-6
	Spruce-pine-fir	#2	7-0	10-11	13-9	16-10	19-6	6-8	9-9	12-4	15-1	17-6
	Spruce-pine-fir	#3	5-7	8-3	10-5	12-9	14-9	5-0	7-4	9-4	11-5	13-2
24	Douglas fir-larch	SS	7-3	11-4	15-0	19-1	22-10	7-3	11-4	14-5	17-8	20-5
	Douglas fir-larch	#1	7-0	10-5	13-2	16-1	18-8	6-4	9-4	11-9	14-5	16-8
	Douglas fir-larch	#2	6-9	9-10	12-6	15-3	17-9	6-0	8-10	11-2	13-8	15-10
	Douglas fir-larch	#3	5-2	7-7	9-7	11-8	13-6	4-7	6-9	8-7	10-5	12-1
	Hem-fir	SS	6-10	10-9	14-2	18-0	21-11	6-10	10-9	13-11	17-0	19-9
	Hem-fir	#1	6-8	10-3	13-0	15-11	18-5	6-3	9-2	11-8	14-3	16-6
	Hem-fir	#2	6-4	9-7	12-2	14-10	17-3	5-10	8-7	10-10	13-3	15-5
	Hem-fir	#3	5-0	7-4	9-4	11-5	13-2	4-6	6-7	8-4	10-2	11-10
	Southern pine	SS	7-1	11-2	14-8	18-9	22-10	7-1	11-2	14-8	17-11	21-2
	Southern pine	#1	6-10	10-7	13-5	15-9	18-8	6-4	9-6	12-0	14-1	16-8
	Southern pine	#2	6-1	9-2	11-7	13-9	16-2	5-5	8-2	10-4	12-3	14-6
	Southern pine	#3	4-8	6-11	8-9	10-7	12-6	4-2	6-2	7-10	9-6	11-2
	Spruce-pine-fir	SS	6-8	10-6	13-10	17-8	20-11	6-8	10-5	13-2	16-1	18-8
	Spruce-pine-fir	#1	6-6	9-9	12-4	15-1	17-6	5-11	8-8	11-0	13-6	15-7
	Spruce-pine-fir	#2	6-6	9-9	12-4	15-1	17-6	5-11	8-8	11-0	13-6	15-7
	Spruce-pine-fir	#3	5-0	7-4	9-4	11-5	13-2	4-6	6-7	8-4	10-2	11-10

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the adjustment factors in Table R802.4.1(9).

b. Span exceeds 26 feet in length.

TABLE R802.4.1(6) RAFTER SPANS FOR COMMON LUMBER SPECIES (Ground snow load = 50 psf, flexible ceiling finish attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)
	Douglas fir-larch	SS	7-8	12-1	15-11	20-3	24-8	7-8	12-1	15-11	20-3	24-5
	Douglas fir-larch	#1	7-5	11-7	15-3	18-7	21-7	7-5	11-2	14-1	17-3	20-0
	Douglas fir-larch	#2	7-3	11-5	14-5	17-8	20-5	7-3	10-7	13-4	16-4	18-11
	Douglas fir-larch	#3	6-0	8-9	11-0	13-6	15-7	5-6	8-1	10-3	12-6	14-6
	Hem-fir	SS	7-3	11-5	15-0	19-2	23-4	7-3	11-5	15-0	19-2	23-4
	Hem-fir	#1	7-1	11-2	14-8	18-4	21-3	7-1	11-0	13-11	17-0	19-9

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans									
12			(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)
	Hem-fir	#2	6-9	10-8	14-0	17-2	19-11	6-9	10-3	13-0	15-10	18-5
	Hem-fir	#3	5-10	8-6	10-9	13-2	15-3	5-5	7-10	10-0	12-2	14-1
	Southern pine	SS	7-6	11-10	15-7	19-11	24-3	7-6	11-10	15-7	19-11	24-3
	Southern pine	#1	7-3	11-5	15-0	18-2	21-7	7-3	11-4	14-5	16-10	20-0
	Southern pine	#2	6-11	10-6	13-4	15-10	18-8	6-6	9-9	12-4	14-8	17-3
	Southern pine	#3	5-5	8-0	10-1	12-3	14-6	5-0	7-5	9-4	11-4	13-5
	Spruce-pine-fir	SS	7-1	11-2	14-8	18-9	22-10	7-1	11-2	14-8	18-9	22-4
	Spruce-pine-fir	#1	6-11	10-11	14-3	17-5	20-2	6-11	10-5	13-2	16-1	18-8
	Spruce-pine-fir	#2	6-11	10-11	14-3	17-5	20-2	6-11	10-5	13-2	16-1	18-8
	Spruce-pine-fir	#3	5-10	8-6	10-9	13-2	15-3	5-5	7-10	10-0	12-2	14-1
16	Douglas fir-larch	SS	7-0	11-0	14-5	18-5	22-5	7-0	11-0	14-5	18-3	21-2
	Douglas fir-larch	#1	6-9	10-5	13-2	16-1	18-8	6-7	9-8	12-2	14-11	17-3
	Douglas fir-larch	#2	6-7	9-10	12-6	15-3	17-9	6-3	9-2	11-7	14-2	16-5
	Douglas fir-larch	#3	5-2	7-7	9-7	11-8	13-6	4-9	7-0	8-10	10-10	12-6
	Hem-fir	SS	6-7	10-4	13-8	17-5	21-2	6-7	10-4	13-8	17-5	20-5
	Hem-fir	#1	6-5	10-2	13-0	15-11	18-5	6-5	9-6	12-1	14-9	17-1
	Hem-fir	#2	6-2	9-7	12-2	14-10	17-3	6-1	8-11	11-3	13-9	15-11
	Hem-fir	#3	5-0	7-4	9-4	11-5	13-2	4-8	6-10	8-8	10-6	12-3
	Southern pine	SS	6-10	10-9	14-2	18-1	22-0	6-10	10-9	14-2	18-1	21-10
	Southern pine	#1	6-7	10-4	13-5	15-9	18-8	6-7	9-10	12-5	14-7	17-3
	Southern pine	#2	6-1	9-2	11-7	13-9	16-2	5-8	8-5	10-9	12-9	15-0
	Southern pine	#3	4-8	6-11	8-9	10-7	12-6	4-4	6-5	8-1	9-10	11-7
	Spruce-pine-fir	SS	6-5	10-2	13-4	17-0	20-9	6-5	10-2	13-4	16-8	19-4
	Spruce-pine-fir	#1	6-4	9-9	12-4	15-1	17-6	6-2	9-0	11-5	13-11	16-2
	Spruce-pine-fir	#2	6-4	9-9	12-4	15-1	17-6	6-2	9-0	11-5	13-11	16-2
	Spruce-pine-fir	#3	5-0	7-4	9-4	11-5	13-2	4-8	6-10	8-8	10-6	12-3
19.2	Douglas fir-larch	SS	6-7	10-4	13-7	17-4	20-11	6-7	10-4	13-7	16-8	19-4
	Douglas fir-larch	#1	6-4	9-6	12-0	14-8	17-1	6-0	8-10	11-2	13-7	15-9
	Douglas fir-larch	#2	6-2	9-0	11-5	13-11	16-2	5-8	8-4	10-7	12-11	15-0
	Douglas fir-larch	#3	4-8	6-11	8-9	10-8	12-4	4-4	6-4	8-1	9-10	11-5
	Hem-fir	SS	6-2	9-9	12-10	16-5	19-11	6-2	9-9	12-10	16-1	18-8
	Hem-fir	#1	6-1	9-5	11-11	14-6	16-10	5-11	8-8	11-0	13-5	15-7
	Hem-fir	#2	5-9	8-9	11-1	13-7	15-9	5-7	8-1	10-3	12-7	14-7
	Hem-fir	#3	4-7	6-9	8-6	10-5	12-1	4-3	6-3	7-11	9-7	11-2
	Southern pine	SS	6-5	10-2	13-4	17-0	20-9	6-5	10-2	13-4	16-11	20-0
	Southern pine	#1	6-2	9-8	12-3	14-4	17-1	6-0	9-0	11-4	13-4	15-9
	Southern pine	#2	5-7	8-4	10-7	12-6	14-9	5-2	7-9	9-9	11-7	13-8
	Southern pine	#3	4-3	6-4	8-0	9-8	11-5	4-0	5-10	7-4	8-11	10-7
	Spruce-pine-fir	SS	6-1	9-6	12-7	16-0	19-1	6-1	9-6	12-5	15-3	17-8
	Spruce-pine-fir	#1	5-11	8-11	11-3	13-9	15-11	5-7	8-3	10-5	12-9	14-9
	Spruce-pine-fir	#2	5-11	8-11	11-3	13-9	15-11	5-7	8-3	10-5	12-9	14-9
	Spruce-pine-fir	#3	4-7	6-9	8-6	10-5	12-1	4-3	6-3	7-11	9-7	11-2
24	Douglas fir-larch	SS	6-1	9-7	12-7	16-1	18-8	6-1	9-7	12-2	14-11	17-3
	Douglas fir-larch	#1	5-10	8-6	10-9	13-2	15-3	5-5	7-10	10-0	12-2	14-1
	Douglas fir-larch	#2	5-6	8-1	10-3	12-6	14-6	5-1	7-6	9-5	11-7	13-5
	Douglas fir-larch	#3	4-3	6-2	7-10	9-6	11-1	3-11	5-8	7-3	8-10	10-3
	Hem-fir	SS	5-9	9-1	11-11	15-2	18-0	5-9	9-1	11-9	14-5	15-11
	Hem-fir	#1	5-8	8-5	10-8	13-0	15-1	5-4	7-9	9-10	12-0	13-11
	Hem-fir	#2	5-4	7-10	9-11	12-1	14-1	4-11	7-3	9-2	11-3	13-0
	Hem-fir	#3	4-1	6-0	7-7	9-4	10-9	3-10	5-7	7-1	8-7	10-0
	Southern pine	SS	6-0	9-5	12-5	15-10	19-3	6-0	9-5	12-5	15-2	17-10
	Southern pine	#1	5-9	8-8	11-0	12-10	15-3	5-5	8-0	10-2	11-11	14-1
	Southern pine	#2	5-0	7-5	9-5	11-3	13-2	4-7	6-11	8-9	10-5	12-3
	Southern pine	#3	3-10	5-8	7-1	8-8	10-3	3-6	5-3	6-7	8-0	9-6
	Spruce-pine-fir	SS	5-8	8-10	11-8	14-8	17-1	5-8	8-10	11-2	13-7	15-9
	Spruce-pine-fir	#1	5-5	7-11	10-1	12-4	14-3	5-0	7-4	9-4	11-5	13-2
	Spruce-pine-fir	#2	5-5	7-11	10-1	12-4	14-3	5-0	7-4	9-4	11-5	13-2
	Spruce-pine-fir	#3	4-1	6-0	7-7	9-4	10-9	3-10	5-7	7-1	8-7	10-0

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the adjustment factors in Table R802.4.1(9).

TABLE R802.4.1(8) RAFTER SPANS FOR COMMON LUMBER SPECIES (Ground snow load = 70 psf, <u>flexible</u> ceiling <u>finish</u> attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Douglas fir-larch	SS	6-10	10-9	14-3	18-2	22-1	6-10	10-9	14-3	18-2	21-7
	Douglas fir-larch	#1	6-7	10-5	13-2	16-1	18-8	6-7	9-10	12-5	15-2	17-7
	Douglas fir-larch	#2	6-6	9-10	12-6	15-3	17-9	6-4	9-4	11-9	14-5	16-8
	Douglas fir-larch	#3	5-2	7-7	9-7	11-8	13-6	4-10	7-1	9-0	11-0	12-9
	Hem-fir	SS	6-6	10-2	13-5	17-2	20-10	6-6	10-2	13-5	17-2	20-10
	Hem-fir	#1	6-4	10-0	13-0	15-11	18-5	6-4	9-8	12-3	15-0	17-5
	Hem-fir	#2	6-1	9-6	12-2	14-10	17-3	6-1	9-1	11-5	14-0	16-3
	Hem-fir	#3	5-0	7-4	9-4	11-5	13-2	4-9	6-11	8-9	10-9	12-5
	Southern pine	SS	6-9	10-7	14-0	17-10	21-8	6-9	10-7	14-0	17-10	21-8
	Southern pine	#1	6-6	10-2	13-5	15-9	18-8	6-6	10-0	12-8	14-10	17-7
	Southern pine	#2	6-1	9-2	11-7	13-9	16-2	5-9	8-7	10-11	12-11	15-3
	Southern pine	#3	4-8	6-11	8-9	10-7	12-6	4-5	6-6	8-3	10-0	11-10
	Spruce-pine-fir	SS	6-4	10-0	13-2	16-9	20-5	6-4	10-0	13-2	16-9	19-8
	Spruce-pine-fir	#1	6-2	9-9	12-4	15-1	17-6	6-2	9-2	11-8	14-2	16-6
	Spruce-pine-fir	#2	6-2	9-9	12-4	15-1	17-6	6-2	9-2	11-8	14-2	16-6
	Spruce-pine-fir	#3	5-0	7-4	9-4	11-5	13-2	4-9	6-11	8-9	10-9	12-5
16	Douglas fir-larch	SS	6-3	9-10	12-11	16-6	19-10	6-3	9-10	12-11	16-1	18-8
	Douglas fir-larch	#1	6-0	9-0	11-5	13-11	16-2	5-10	8-6	10-9	13-2	15-3
	Douglas fir-larch	#2	5-10	8-7	10-10	13-3	15-4	5-6	8-1	10-3	12-6	14-6
	Douglas fir-larch	#3	4-6	6-6	8-3	10-1	11-9	4-3	6-2	7-10	9-6	11-1
	Hem-fir	SS	5-11	9-3	12-2	15-7	18-11	5-11	9-3	12-2	15-7	18-0
	Hem-fir	#1	5-9	8-11	11-3	13-9	16-0	5-9	8-5	10-8	13-0	15-1
	Hem-fir	#2	5-6	8-4	10-6	12-10	14-11	5-4	7-10	9-11	12-1	14-1
	Hem-fir	#3	4-4	6-4	8-1	9-10	11-5	4-1	6-0	7-7	9-4	10-9
	Southern pine	SS	6-1	9-7	12-8	16-2	19-8	6-1	9-7	12-8	16-2	19-3
	Southern pine	#1	5-11	9-2	11-8	13-8	16-2	5-10	8-8	11-0	12-10	15-3
	Southern pine	#2	5-3	7-11	10-0	11-11	14-0	5-0	7-5	9-5	11-3	13-2
	Southern pine	#3	4-1	6-0	7-7	9-2	10-10	3-10	5-8	7-1	8-8	10-3
	Spruce-pine-fir	SS	5-9	9-1	11-11	15-3	18-1	5-9	9-1	11-11	14-8	17-1
	Spruce-pine-fir	#1	5-8	8-5	10-8	13-1	15-2	5-5	7-11	10-1	12-4	14-3
	Spruce-pine-fir	#2	5-8	8-5	10-8	13-1	15-2	5-5	7-11	10-1	12-4	14-3
	Spruce-pine-fir	#3	4-4	6-4	8-1	9-10	11-5	4-1	6-0	7-7	9-4	10-9
19.2	Douglas fir-larch	SS	5-10	9-3	12-2	15-6	18-1	5-10	9-3	12-0	14-8	17-1
	Douglas fir-larch	#1	5-7	8-3	10-5	12-9	14-9	5-4	7-9	9-10	12-0	13-11
	Douglas fir-larch	#2	5-4	7-10	9-11	12-1	14-0	5-0	7-4	9-4	11-5	13-2
	Douglas fir-larch	#3	4-1	6-0	7-7	9-3	10-8	3-10	5-7	7-1	8-8	10-1
	Hem-fir	SS	5-6	8-8	11-6	14-8	17-4	5-6	8-8	11-6	14-2	15-5
	Hem-fir	#1	5-5	8-2	10-3	12-7	14-7	5-3	7-8	9-8	11-10	13-9
	Hem-fir	#2	5-2	7-7	9-7	11-9	13-7	4-11	7-2	9-1	11-1	12-10
	Hem-fir	#3	4-0	5-10	7-4	9-0	10-5	3-9	5-6	6-11	8-6	9-10
	Southern pine	SS	5-9	9-1	11-11	15-3	18-6	5-9	9-1	11-11	14-11	17-7
	Southern pine	#1	5-6	8-5	10-8	12-5	14-9	5-4	7-11	10-0	11-9	13-11
	Southern pine	#2	4-10	7-3	9-2	10-10	12-9	4-6	6-10	8-8	10-3	12-1
	Southern pine	#3	3-8	5-6	6-11	8-4	9-11	3-6	5-2	6-6	7-11	9-4
	Spruce-pine-fir	SS	5-5	8-6	11-3	14-3	16-6	5-5	8-6	11-0	13-5	15-7
	Spruce-pine-fir	#1	5-3	7-8	9-9	11-11	13-10	5-0	7-3	9-2	11-3	13-0
	Spruce-pine-fir	#2	5-3	7-8	9-9	11-11	13-10	5-0	7-3	9-2	11-3	13-0
	Spruce-pine-fir	#3	4-0	5-10	7-4	9-0	10-5	3-9	5-6	6-11	8-6	9-10
	Douglas fir-larch	SS	5-5	8-7	11-3	13-11	16-2	5-5	8-6	10-9	13-2	15-3
	Douglas fir-larch	#1	5-0	7-4	9-4	11-5	13-2	4-9	6-11	8-9	10-9	12-5
	Douglas fir-larch	#2	4-9	7-0	8-10	10-10	12-6	4-6	6-7	8-4	10-2	11-10
	Douglas fir-larch	#3	3-8	5-4	6-9	8-3	9-7	3-5	5-0	6-4	7-9	9-0
	Hem-fir	SS	5-2	8-1	10-8	13-6	13-11	5-2	8-1	10-5	12-4	12-4
	Hem-fir	#1	5-0	7-3	9-2	11-3	13-0	4-8	6-10	8-8	10-7	12-4
	Hem-fir	#2	4-8	6-9	8-7	10-6	12-2	4-4	6-5	8-1	9-11	11-6
	Hem-fir	#3	3-7	5-2	6-7	8-1	9-4	3-4	4-11	6-3	7-7	8-10
	Southern pine	SS	5-4	8-5	11-1	14-2	16-8	5-4	8-5	11-1	13-4	15-9

24 RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
	Southern pine	#1	5-0	7-6	9-6	11-1	13-2	4-9	7-1	9-0	10-6	12-5
	Southern pine	#2	4-4	6-5	8-2	9-9	11-5	4-1	6-1	7-9	9-2	10-9
	Southern pine	#3	3-4	4-11	6-2	7-6	8-10	3-1	4-7	5-10	7-1	8-4
	Spruce-pine-fir	SS	5-0	7-11	10-5	12-9	14-9	5-0	7-9	9-10	12-0	12-11
	Spruce-pine-fir	#1	4-8	6-11	8-9	10-8	12-4	4-5	6-6	8-3	10-0	11-8
	Spruce-pine-fir	#2	4-8	6-11	8-9	10-8	12-4	4-5	6-6	8-3	10-0	11-8
	Spruce-pine-fir	#3	3-7	5-2	6-7	8-1	9-4	3-4	4-11	6-3	7-7	8-10

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the adjustment factors in Table R802.4.1(9).

Reason: Table R301.7 provides the maximum allowable deflection for rafters, regardless of how they are designed. Chapter 8 provides prescriptive rafters span tables to satisfy the requirements in Chapter 3, but they are missing important criteria.

1) Rafters with a maximum allowable deflection of L/180 must have no ceiling attached, but must also be greater than 3:12 slope. The slope criteria for using the rafter span tables is not provided in the L/180 tables.

2) Rafters with a maximum allowable deflection of L/240 can only have a "flexible ceiling finish" installed and not a "brittle ceiling finish", such as plaster, which would require L/360. The tables for L/240 only say "ceiling attached" and that could be misleading as a brittle ceiling (plaster) could not be designed from the L/240 tables.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal only makes the current intent of the IRC more easily understood. There is no change to the cost of construction.

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IRC: TABLE R802.4.1(1), TABLE R802.4.1(2), TABLE R802.4.1(3), TABLE R802.4.1(4), TABLE R802.4.1(5), TABLE R802.4.1(6), TABLE R802.4.1(7), TABLE R802.4.1(8)

Proponents: Shane Nilles, representing American Wood Council (snilles@awc.org); David Tyree, representing American Wood Council (dtyree@awc.org)

2024 International Residential Code

Revise as follows:

TABLE R802.4.1(1) RAFTER SPANS FOR COMMON LUMBER SPECIES (Roof live load = 20 psf, ceiling not attached to rafters, L/Δ = 180)

Portions of table not shown remain unchanged.

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Douglas fir-larch	SS	11-6	18-0	23-9	Note b	Note b	11-6	18-0	23-9	Note b	Note b
	Douglas fir-larch	#1	11-1	17-4	22-5	Note b	Note b	10-6	15-4	19-5	23-9	Note b
	Douglas fir-larch	#2	10-10	16-10	21-4	~~26-0~~ Note b	Note b	~~10-0~~ 9-11	14-7	18-5	22-6	~~26-0~~ Note b
	Douglas fir-larch	#3	8-9	12-10	16-3	19-10	23-0	7-7	11-1	14-1	17-2	19-11
	Hem-fir	SS	10-10	17-0	22-5	Note b	Note b	10-10	17-0	22-5	Note b	Note b
	Hem-fir	#1	10 -7	16-8	~~22-0~~ 21-11	Note b	Note b	10-4	15-2	19-2	23-5	Note b
	Hem-fir	#2	10-1	15-11	20-8	25-3	Note b	9-8	14-2	17-11	21-11	25-5
	Hem-fir	#3	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
16	Douglas fir-larch	SS	10-5	16-4	21-7	Note b	Note b	10-5	16-3	20-7	25-2	Note b
	Douglas fir-larch	#1	10-0	15-4	19-5	23-9	Note b	9-1	13-3	16-10	20-7	23-10
	Douglas fir-larch	#2	9-10	14-7	18-5	22-6	26-0	8-7	12-7	16-0	19-6	22-7
	Douglas fir-larch	#3	7-7	11-1	14-1	17-2	19-11	6-7	9-8	~~12-12~~ 12-2	14-11	17-3
19.2	Douglas fir-larch	SS	9-10	15-5	20-4	25-11	Note b	9-10	14-10	18-10	23-0	Note b
	Douglas fir-larch	#1	9-5	14-0	17-9	21-8	25-2	8-4	12-2	15-4	18-9	21-9
	Douglas fir-larch	#2	9-1	13-3	16-10	20-7	23-10	7-10	11-6	14-7	17-10	20-8
	Douglas fir-larch	#3	6-11	10-2	12-10	15-8	18-3	6-0	8-9	11-2	~~12-7~~ 13-7	15-9

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the adjustment factors in Table R802.4.1(9).

b. Span exceeds 26 feet in length.

TABLE R802.4.1(2) RAFTER SPANS FOR COMMON LUMBER SPECIES (Roof live load = 20 psf, ceiling attached to rafters, L/Δ = 240)

Portions of table not shown remain unchanged.

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
16	Hem-fir	SS	8-11	14-1	18-6	23-8	Note b	8-11	14-1	18-6	23-8	Note b
	Hem-fir	#1	8-9	13-9	~~18-1~~ 18-2	23-1	Note b	8-9	13-1	16-7	20-4	23-7
	Hem-fir	#2	8-4	13-1	17-3	21-11	25-5	8-4	12-3	15-6	18-11	22-0
	Hem-fir	#3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10
	Spruce-pine-fir	SS	8-9	13-9	~~18-1~~ 18-2	23-1	Note b	8-9	13-9	~~18-1~~ 18-2	23-0	Note b
	Spruce-pine-fir	#1	8-7	13-5	17-9	22-3	25-9	8-6	12-5	15-9	19-3	22-4
	Spruce-pine-fir	#2	8-7	13-5	17-9	22-3	25-9	8-6	12-5	15-9	19-3	22-4

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
	Spruce-pine-fir	#3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the adjustment factors in Table R802.4.1(9).

b. Span exceeds 26 feet in length.

TABLE R802.4.1(3) RAFTER SPANS FOR COMMON LUMBER SPECIES (Ground snow load = 30 psf, ceiling not attached to rafters, L/Δ = 180)

Portions of table not shown remain unchanged.

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Douglas fir-larch	SS	10-0	15-9	~~20-9~~ Note b	Note b	Note b	10-0	15-9	~~20-5~~ Note b	~~24-11~~ Note b	Note b
	Douglas fir-larch	#1	9-8	14-9	18-8	~~22-9~~ Note b	Note b	9-0	13-2	16-8	~~20-4~~ Note b	~~23-7~~ Note b
	Douglas fir-larch	#2	9-6	14-0	17-8	~~21-7~~ Note b	~~25-1~~ Note b	8-6	12-6	15-10	19-4	~~22-5~~ Note b
	Douglas fir-larch	#3	7-3	10-8	13-6	16-6	19-2	6-6	9-6	12-1	14-9	17-1
	Hem-fir	SS	9-6	14-10	19-7	~~25-0~~ Note b	Note b	9-6	14-10	19-7	~~24-1~~ Note b	Note b
	Hem-fir	#1	9-3	14-6	18-5	~~22-6~~ Note b	~~26-0~~ Note b	8-11	13-0	16-6	~~20-1~~ Note b	~~23-4~~ Note b
	Hem-fir	#2	8-10	13-7	17-2	~~21-0~~ Note b	~~24-4~~ Note b	8-4	12-2	15-4	18-9	~~21-9~~ Note b
	Hem-fir	#3	7-1	10-5	13-2	16-1	18-8	6-4	9-4	11-9	14-5	16-8
	Southern pine	SS	9-10	15-6	~~20-5~~ Note b	Note b	Note b	9-10	15-6	~~20-5~~ Note b	~~25-4~~ Note b	Note b
	Southern pine	#1	9-6	14-10	19-0	~~22-3~~ Note b	Note b	9-0	13-5	17-0	19-11	~~23-7~~ Note b
	Southern pine	#2	8-7	12-11	16-4	19-5	~~22-10~~ Note b	7-8	11-7	14-8	17-4	~~20-5~~ Note b
	Southern pine	#3	6-7	9-9	12-4	15-0	17-9	5-11	8-9	11-0	13-5	15-10
	Spruce-pine-fir	SS	9-3	14-7	19-2	~~24-6~~ Note b	Note b	9-3	14-7	18-8	~~22-9~~ Note b	Note b
	Spruce-pine-fir	#1	9-1	13-9	17-5	~~21-4~~ Note b	~~24-8~~ Note b	8-5	12-4	15-7	19-1	~~22-1~~ Note b
	Spruce-pine-fir	#2	9-1	13-9	17-5	~~21-4~~ Note b	~~24-8~~ Note b	8-5	12-4	15-7	19-1	~~22-1~~ Note b
	Spruce-pine-fir	#3	7-1	10-5	13-2	16-1	18-8	6-4	9-4	11-9	14-5	16-8
16	Douglas fir-larch	SS	9-1	14-4	18-10	~~24-1~~ Note b	Note b	9-1	14-0	17-8	~~21-7~~ Note b	~~25-1~~ Note b
	Douglas fir-larch	#1	8-9	12-9	16-2	19-9	~~22-10~~ Note b	7-10	11-5	14-5	17-8	~~20-5~~ Note b
	Douglas fir-larch	#2	8-3	12-1	15-4	18-9	~~21-8~~ Note b	7-5	10-10	13-8	16-9	19-5
	Douglas fir-larch	#3	6-4	9-3	11-8	14-3	16-7	5-8	8-3	10-6	12-9	14-10
	Hem-fir	SS	8-7	13-6	17-10	~~22-9~~ Note b	Note b	8-7	13-6	17-1	~~20-10~~ Note b	~~24-2~~ Note b
	Hem-fir	#1	8-5	12-7	15-11	19-6	~~22-7~~ Note b	7-8	11-3	14-3	17-5	~~20-2~~ Note b
	Hem-fir	#2	8-0	11-9	14-11	18-2	~~21-1~~ Note b	7-2	10-6	13-4	16-3	18-10
	Hem-fir	#3	6-2	9-0	11-5	13-11	16-2	5-6	8-1	10-3	12-6	14-6
	Southern pine	SS	8-11	14-1	18-6	~~23-8~~ Note b	Note b	8-11	14-1	18-5	~~1-11~~ Note b	~~25-11~~ Note b
	Southern pine	#1	8-7	13-0	16-6	19-3	~~22-10~~ Note b	7-10	11-7	14-9	17-3	~~20-5~~ Note b
	Southern pine	#2	7-6	11-2	14-2	16-10	19-10	6-8	10-0	12-8	15-1	17-9
	Southern pine	#3	5-9	8-6	10-8	13-0	15-4	5-2	7-7	9-7	11-7	13-9
	Spruce-pine-fir	SS	8-5	13-3	17-5	~~22-1~~ Note b	~~25-7~~ Note b	8-5	12-9	16-2	19-9	~~22-10~~ Note b
	Spruce-pine-fir	#1	8-2	11-11	15-1	18-5	~~21-5~~ Note b	7-3	10-8	13-6	16-6	19-2
	Spruce-pine-fir	#2	8-2	11-11	15-1	18-5	~~21-5~~ Note b	7-3	10-8	13-6	16-6	19-2
	Spruce-pine-fir	#3	6-2	9-0	11-5	13-11	16-2	5-6	8-1	10-3	12-6	14-6
19.2	Douglas fir-larch	SS	8-7	13-6	17-9	~~22-1~~ Note b	~~25-7~~ Note b	8-7	12-9	16-2	19-9	~~22-10~~ Note b
	Douglas fir-larch	#1	7-11	11-8	14-9	18-0	~~20-11~~ Note b	7-1	10-5	13-2	16-1	18-8
	Douglas fir-larch	#2	7-7	11-0	14-0	17-1	19-10	6-9	9-10	12-6	15-3	17-9
	Douglas fir-larch	#3	5-9	8-5	10-8	13-1	15-2	5-2	7-7	9-7	11-8	13-6
	Hem-fir	SS	8-1	12-9	16-9	~~21-4~~ Note b	~~24-8~~ Note b	8-1	12-4	15-7	19-1	~~22-1~~ Note b
	Hem-fir	#1	7-10	11-6	14-7	17-9	~~20-7~~ Note b	7-0	10-3	13-0	15-11	18-5
	Hem-fir	#2	7-4	10-9	13-7	16-7	19-3	6-7	9-7	12-2	14-10	17-3
	Hem-fir	#3	~~5-7~~ 5-8	8-3	10-5	12-9	14-9	5-0	7-4	9-4	11-5	13-2
	Southern pine	SS	8-5	13-3	17-5	~~22-3~~ Note b	Note b	8-5	13-3	16-10	~~20-0~~ Note b	~~23-7~~ Note b
	Southern pine	#1	~~8-0~~ 7-11	11-10	15-1	17-7	~~20-11~~ Note b	7-1	10-7	13-5	15-9	18-8
	Southern pine	#2	6-10	10-2	12-11	15-4	18-1	6-1	9-2	11-7	13-9	16-2

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
	Southern pine	#3	5-3	7-9	9-9	11-10	14-0	4-8	6-11	8-9	10-7	12-6
	Spruce-pine-fir	SS	7-11	12-5	16-5	~~20-2~~ Note b	~~23-4~~ Note b	7-11	11-8	14-9	18-0	~~20-11~~ Note b
	Spruce-pine-fir	#1	7-5	10-11	13-9	16-10	19-6	6-8	9-9	12-4	15-1	17-6
	Spruce-pine-fir	#2	7-5	10-11	13-9	16-10	19-6	6-8	9-9	12-4	15-1	17-6
	Spruce-pine-fir	#3	~~5-7~~ 5-8	8-3	10-5	12-9	14-9	5-0	7-4	9-4	11-5	13-2
24	Douglas fir-larch	SS	~~8-0~~ 7-11	12-6	16-2	19-9	~~22-10~~ Note b	7-10	11-5	14-5	17-8	~~20-5~~ Note b
	Douglas fir-larch	#1	7-1	10-5	13-2	16-1	18-8	6-4	9-4	11-9	14-5	16-8
	Douglas fir-larch	#2	6-9	9-10	12-6	15-3	17-9	6-0	8-10	11-2	13-8	15-10
	Douglas fir-larch	#3	5-2	7-7	9-7	11-8	13-6	4-7	6-9	8-7	10-5	12-1
	Hem-fir	SS	7-6	11-10	15-7	19-1	~~22-1~~ Note b	7-6	11-0	13-11	~~17-0~~ 17-1	19-9
	Hem-fir	#1	7-0	10-3	13-0	15-11	18-5	6-3	9-2	11-8	14-3	16-6
	Hem-fir	#2	6-7	9-7	12-2	14-10	17-3	5-10	8-7	10-10	13-3	15-5
	Hem-fir	#3	5-0	7-4	9-4	11-5	13-2	4-6	6-7	8-4	10-2	11-10
	Southern pine	SS	7-10	12-3	16-2	~~20-0~~ Note b	~~23-7~~ Note b	7-10	11-10	15-0	17-11	~~21-2~~ Note b
	Southern pine	#1	7-1	10-7	13-5	15-9	18-8	6-4	9-6	12-0	14-1	16-8
	Southern pine	#2	6-1	9-2	11-7	13-9	16-2	5-5	8-2	10-4	12-3	14-6
	Southern pine	#3	4-8	6-11	8-9	10-7	12-6	4-2	6-2	7-10	9-6	11-2
	Spruce-pine-fir	SS	7-4	11-7	14-9	18-0	~~20-11~~ Note b	7-1	10-5	13-2	16-1	18-8
	Spruce-pine-fir	#1	6-8	9-9	12-4	15-1	17-6	5-11	~~8-8~~ 8-9	11-0	13-6	15-7
	Spruce-pine-fir	#2	6-8	9-9	12-4	15-1	17-6	5-11	~~8-8~~ 8-9	11-0	13-6	15-7
	Spruce-pine-fir	#3	5-0	7-4	9-4	11-5	13-2	4-6	6-7	8-4	10-2	11-10

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the adjustment factors in Table R802.4.1(9).

b. Span exceeds ~~26~~ 20 feet in length.

TABLE R802.4.1(4) RAFTER SPANS FOR COMMON LUMBER SPECIES (Ground snow load = 30 psf, ceiling attached to rafters, L/Δ = 240)

Portions of table not shown remain unchanged.

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Douglas fir-larch	SS	9-1	14-4	18-10	~~24-1~~ Note b	Note b	9-1	14-4	18-10	~~24-1~~ Note b	Note b
	Douglas fir-larch	#1	8-9	13-9	18-2	~~22-9~~ Note b	Note b	8-9	13-2	16-8	~~20-4~~ Note b	~~23-7~~ Note b
	Douglas fir-larch	#2	8-7	13-6	17-8	~~21-7~~ Note b	~~25-1~~ Note b	8-6	12-6	15-10	19-4	~~22-5~~ Note b
	Douglas fir-larch	#3	7-3	10-8	13-6	16-6	19-2	6-6	9-6	12-1	14-9	17-1
	Hem-fir	SS	8-7	13-6	17-10	~~22-9~~ Note b	Note b	8-7	13-6	17-10	~~22-9~~ Note b	Note b
	Hem-fir	#1	8-5	13-3	17-5	~~22-3~~ Note b	~~26-0~~ Note b	8-5	13-0	16-6	~~20-1~~ Note b	~~23-4~~ Note b
	Hem-fir	#2	8-0	12-7	16-7	~~21-0~~ Note b	~~24-4~~ Note b	8-0	12-2	15-4	18-9	~~21-9~~ Note b
	Hem-fir	#3	7-1	10-5	13-2	16-1	18-8	6-4	9-4	11-9	14-5	16-8
	Southern pine	SS	8-11	14-1	18-6	~~23-8~~ Note b	Note b	8-11	14-1	18-6	~~23-8~~ Note b	Note b
	Southern pine	#1	8-7	13-6	17-10	~~22-3~~ Note b	Note b	8-7	13-5	17-0	19-11	~~23-7~~ Note b
	Southern pine	#2	8-3	12-11	16-4	19-5	~~22-10~~ Note b	7-8	11-7	14-8	17-4	~~20-5~~ Note b
	Southern pine	#3	6-7	9-9	12-4	15-0	17-9	5-11	8-9	11-0	13-5	15-10
	Spruce-pine-fir	SS	8-5	13-3	17-5	~~22-3~~ Note b	Note b	8-5	13-3	17-5	~~22-3~~ Note b	Note b
	Spruce-pine-fir	#1	8-3	12-11	17-0	~~21-4~~ Note b	~~24-8~~ Note b	8-3	12-4	15-7	19-1	~~22-1~~ Note b
	Spruce-pine-fir	#2	8-3	12-11	17-0	~~21-4~~ Note b	~~24-8~~ Note b	8-3	12-4	15-7	19-1	~~22-1~~ Note b
	Spruce-pine-fir	#3	7-1	10-5	13-2	16-1	18-8	6-4	9-4	11-9	14-5	16-8
	Douglas fir-larch	SS	8-3	13-0	17-2	~~21-10~~ Note b	Note b	8-3	13-0	17-2	~~21-7~~ Note b	~~25-1~~ Note b
	Douglas fir-larch	#1	8-0	12-6	16-2	19-9	~~22-10~~ Note b	7-10	11-5	14-5	17-8	~~20-5~~ Note b
	Douglas fir-larch	#2	7-10	12-1	15-4	18-9	~~21-8~~ Note b	7-5	10-10	13-8	16-9	19-5
	Douglas fir-larch	#3	6-4	9-3	11-8	14-3	16-7	5-8	8-3	10-6	12-9	14-10
	Hem-fir	SS	7-10	12-3	16-2	~~20-8~~ Note b	~~25-1~~ Note b	7-10	12-3	16-2	~~20-8~~ Note b	~~24-2~~ Note b
	Hem-fir	#1	7-8	12-0	15-10	19-6	~~22-7~~ Note b	7-8	11-3	14-3	17-5	~~20-2~~ Note b
	Hem-fir	#2	7-3	11-5	14-11	18-2	~~21-1~~ Note b	7-2	10-6	13-4	16-3	18-10

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans									
16			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
	Hem-fir	#3	6-2	9-0	11-5	13-11	16-2	5-6	8-1	10-3	12-6	14-6
	Southern pine	SS	8-1	12-9	16-10	~~21-6~~ Note b	Note b	8-1	12-9	16-10	~~21-6~~ Note b	~~25-11~~ Note b
	Southern pine	#1	7-10	12-3	16-2	19-3	~~22-10~~ Note b	7-10	11-7	14-9	17-3	~~20-5~~ Note b
	Southern pine	#2	7-6	11-2	14-2	16-10	19-10	6-8	10-0	12-8	15-1	17-9
	Southern pine	#3	5-9	8-6	10-8	13-0	15-4	5-2	7-7	9-7	11-7	13-9
	Spruce-pine-fir	SS	7-8	12-0	15-10	~~20-2~~ Note b	~~24-7~~ Note b	7-8	12-0	15-10	19-9	~~22-10~~ Note b
	Spruce-pine-fir	#1	7-6	11-9	15-1	18-5	~~21-5~~ Note b	7-3	10-8	13-6	16-6	19-2
	Spruce-pine-fir	#2	7-6	11-9	15-1	18-5	~~21-5~~ Note b	7-3	10-8	13-6	16-6	19-2
	Spruce-pine-fir	#3	6-2	9-0	11-5	13-11	16-2	5-6	8-1	10-3	12-6	14-6
19.2	Douglas fir-larch	SS	7-9	12-3	16-1	~~20-7~~ Note b	~~25-0~~ Note b	7-9	12-3	16-1	19-9	~~22-10~~ Note b
	Douglas fir-larch	#1	7-6	11-8	14-9	18-0	~~20-11~~ Note b	7-1	10-5	13-2	16-1	18-8
	Douglas fir-larch	#2	7-4	11-0	14-0	17-1	19-10	6-9	~~9-1~~ 9-10	12-6	15-3	17-9
	Douglas fir-larch	#3	5-9	8-5	10-8	13-1	15-2	5-2	7-7	9-7	11-8	13-6
	Hem-fir	SS	7-4	11-7	15-3	19-5	~~23-7~~ Note b	7-4	11-7	15-3	19-1	~~22-1~~ Note b
	Hem-fir	#1	7-2	11-4	14-7	17-9	~~20-7~~ Note b	7-0	~~16-3~~ 10-3	13-0	15-11	18-5
	Hem-fir	#2	6-10	10-9	13-7	16-7	19-3	6-7	9-7	12-2	14-10	17-3
	Hem-fir	#3	~~5-7~~ 5-8	8-3	10-5	12-9	14-9	5-0	7-4	9-4	11-5	13-2
	Southern pine	SS	7-8	12-0	15-10	~~20-2~~ Note b	~~24-7~~ Note b	7-8	12-0	15-10	~~20-0~~ Note b	~~23-7~~ Note b
	Southern pine	#1	7-4	11-7	15-1	17-7	~~20-11~~ Note b	7-1	10-7	13-5	15-9	18-8
	Southern pine	#2	6-10	10-2	12-11	15-4	18-1	6-1	9-2	11-7	13-9	16-2
	Southern pine	#3	5-3	7-9	9-9	11-10	14-0	4-8	6-11	8-9	10-7	12-6
	Spruce-pine-fir	SS	7-2	11-4	14-11	19-0	~~23-1~~ Note b	7-2	11-4	14-9	18-0	~~20-11~~ Note b
	Spruce-pine-fir	#1	7-0	10-11	13-9	16-10	19-6	6-8	9-9	12-4	15-1	17-6
	Spruce-pine-fir	#2	7-0	10-11	13-9	16-10	19-6	6-8	9-9	12-4	15-1	17-6
	Spruce-pine-fir	#3	~~5-7~~ 5-8	8-3	10-5	12-9	14-9	5-0	7-4	9-4	11-5	13-2
24	Douglas fir-larch	SS	7-3	11-4	15-0	19-1	~~22-10~~ Note b	7-3	11-4	14-5	17-8	~~20-5~~ Note b
	Douglas fir-larch	#1	7-0	10-5	13-2	16-1	18-8	6-4	9-4	11-9	14-5	16-8
	Douglas fir-larch	#2	6-9	9-10	12-6	15-3	17-9	6-0	8-10	11-2	13-8	15-10
	Douglas fir-larch	#3	5-2	7-7	9-7	11-8	13-6	4-7	6-9	8-7	10-5	12-1
	Hem-fir	SS	6-10	10-9	14-2	18-0	~~21-11~~ Note b	6-10	10-9	13-11	~~17-0~~ 17-1	19-9
	Hem-fir	#1	6-8	10-3	13-0	15-11	18-5	6-3	9-2	11-8	14-3	16-6
	Hem-fir	#2	6-4	9-7	12-2	14-10	17-3	5-10	8-7	10-10	13-3	15-5
	Hem-fir	#3	5-0	7-4	9-4	11-5	13-2	4-6	6-7	8-4	10-2	11-10
	Southern pine	SS	7-1	11-2	14-8	18-9	~~22-10~~ Note b	7-1	11-2	14-8	17-11	~~21-2~~ Note b
	Southern pine	#1	6-10	10-7	13-5	15-9	18-8	6-4	9-6	12-0	14-1	16-8
	Southern pine	#2	6-1	9-2	11-7	13-9	16-2	5-5	8-2	10-4	12-3	14-6
	Southern pine	#3	4-8	6-11	8-9	10-7	12-6	4-2	6-2	7-10	9-6	11-2
	Spruce-pine-fir	SS	6-8	10-6	13-10	17-8	~~20-11~~ Note b	6-8	10-5	13-2	16-1	18-8
	Spruce-pine-fir	#1	6-6	9-9	12-4	15-1	17-6	5-11	~~8-8~~ 8-9	11-0	13-6	15-7
	Spruce-pine-fir	#2	6-6	9-9	12-4	15-1	17-6	5-11	~~8-8~~ 8-9	11-0	13-6	15-7
	Spruce-pine-fir	#3	5-0	7-4	9-4	11-5	13-2	4-6	6-7	8-4	10-2	11-10

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the adjustment factors in Table R802.4.1(9).

b. Span exceeds ~~26~~ 20 feet in length.

TABLE R802.4.1(5) RAFTER SPANS FOR COMMON LUMBER SPECIES (Ground snow load = 50 psf, ceiling not attached to rafters, L/Δ = 180)

Portions of table not shown remain unchanged.

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
	Douglas fir-larch	SS	8-5	13-3	17-6	~~22-4~~ Note b	~~26-0~~ Note b	8-5	13-3	17-3	~~21-1~~ Note b	~~24-5~~ Note b
	Douglas fir-larch	#1	8-2	12-0	15-3	18-7	~~21-7~~ Note b	7-7	11-2	14-1	17-3	20-0

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Douglas fir-larch	#2	7-10	11-5	14-5	17-8	~~20-5~~ Note b	7-3	10-7	13-4	16-4	18-11
	Douglas fir-larch	#3	~~6-0~~ 5-11	8-9	11-0	13-6	15-7	5-6	8-1	10-3	12-6	14-6
	Hem-fir	SS	8-0	12-6	16-6	~~21-1~~ Note b	~~25-6~~ Note b	8-0	12-6	16-6	~~20-4~~ Note b	~~23-7~~ Note b
	Hem-fir	#1	7-10	11-10	15-0	18-4	~~21-3~~ Note b	7-6	11-0	13-11	17-0	19-9
	Hem-fir	#2	7-5	11-1	14-0	17-2	19-11	7-0	10-3	13-0	15-10	18-5
	Hem-fir	#3	5-10	8-6	10-9	13-2	15-3	5-5	7-10	10-0	12-2	14-1
	Southern pine	SS	8-4	13-1	17-2	~~21-11~~ Note b	Note b	8-4	13-1	17-2	~~21-5~~ Note b	~~25-3~~ Note b
	Southern pine	#1	8-0	12-3	15-6	18-2	~~21-7~~ Note b	7-7	11-4	14-5	16-10	20-0
	Southern pine	#2	7-0	10-6	13-4	15-10	18-8	6-6	9-9	12-4	14-8	17-3
	Southern pine	#3	5-5	8-0	10-1	12-3	14-6	5-0	7-5	9-4	11-4	13-5
	Spruce-pine-fir	SS	7-10	12-3	16-2	~~20-8~~ Note b	~~24-1~~ Note b	7-10	12-3	15-9	19-3	~~22-4~~ Note b
	Spruce-pine-fir	#1	7-8	11-3	14-3	17-5	~~20-2~~ Note b	7-1	10-5	13-2	16-1	18-8
	Spruce-pine-fir	#2	7-8	11-3	14-3	17-5	~~20-2~~ Note b	7-1	10-5	13-2	16-1	18-8
	Spruce-pine-fir	#3	5-10	8-6	10-9	13-2	15-3	5-5	7-10	10-0	12-2	14-1
16	Douglas fir-larch	SS	7-8	12-1	15-11	19-9	~~22-10~~ Note b	7-8	11-10	14-11	18-3	~~21-2~~ Note b
	Douglas fir-larch	#1	7-1	10-5	13-2	16-1	18-8	6-7	9-8	12-2	14-11	17-3
	Douglas fir-larch	#2	6-9	9-10	12-6	15-3	17-9	6-3	9-2	11-7	14-2	16-5
	Douglas fir-larch	#3	5-2	7-7	9-7	11-8	13-6	4-9	7-0	8-10	10-10	12-6
	Hem-fir	SS	7-3	11-5	15-0	19-1	~~22-1~~ Note b	7-3	11-5	14-5	17-8	~~20-5~~ Note b
	Hem-fir	#1	7-0	10-3	13-0	15-11	18-5	6-6	9-6	12-1	14-9	17-1
	Hem-fir	#2	6-7	9-7	12-2	14-10	17-3	6-1	8-11	11-3	13-9	15-11
	Hem-fir	#3	5-0	7-4	9-4	11-5	13-2	4-8	6-10	8-8	~~10-6~~ 10-7	12-3
	Southern pine	SS	7-6	11-10	15-7	19-11	~~23-7~~ Note b	7-6	11-10	15-7	18-6	~~21-10~~ Note b
	Southern pine	#1	7-1	10-7	13-5	15-9	18-8	6-7	9-10	12-5	14-7	17-3
	Southern pine	#2	6-1	9-2	11-7	13-9	16-2	5-8	8-5	10-9	12-9	15-0
	Southern pine	#3	4-8	6-11	8-9	10-7	12-6	4-4	6-5	8-1	9-10	11-7
	Spruce-pine-fir	SS	7-1	11-2	14-8	18-0	~~20-11~~ Note b	7-1	10-9	13-8	~~15-11~~ 16-8	19-4
	Spruce-pine-fir	#1	6-8	9-9	12-4	15-1	17-6	6-2	9-0	11-5	13-11	16-2
	Spruce-pine-fir	#2	6-8	9-9	12-4	15-1	17-6	6-2	9-0	11-5	13-11	16-2
	Spruce-pine-fir	#3	5-0	7-4	9-4	11-5	13-2	4-8	6-10	8-8	~~10-6~~ 10-7	12-3
19.2	Douglas fir-larch	SS	7-3	11-4	14-9	18-0	~~20-11~~ Note b	7-3	10-9	13-8	16-8	19-4
	Douglas fir-larch	#1	6-6	9-6	12-0	14-8	17-1	6-0	8-10	11-2	13-7	15-9
	Douglas fir-larch	#2	6-2	9-0	11-5	13-11	16-2	5-8	8-4	~~10-9~~ 10-7	12-11	15-0
	Douglas fir-larch	#3	4-8	6-11	8-9	10-8	12-4	4-4	6-4	8-1	9-10	11-5
	Hem-fir	SS	6-10	10-9	14-2	17-5	~~20-2~~ Note b	6-10	10-5	13-2	16-1	18-8
	Hem-fir	#1	6-5	9-5	11-11	14-6	16-10	~~8-11~~ 5-11	8-8	11-0	13-5	15-7
	Hem-fir	#2	6-0	8-9	11-1	13-7	15-9	5-7	8-1	10-3	12-7	14-7
	Hem-fir	#3	4-7	6-9	8-6	10-5	12-1	4-3	6-3	7-11	9-7	11-2
	Southern pine	SS	7-1	11-2	14-8	18-3	~~21-7~~ Note b	7-1	11-2	14-2	16-11	20-0
	Southern pine	#1	6-6	9-8	12-3	14-4	17-1	6-0	9-0	11-4	13-4	15-9
	Southern pine	#2	5-7	8-4	10-7	12-6	14-9	5-2	7-9	9-9	11-7	13-8
	Southern pine	#3	4-3	6-4	8-0	9-8	11-5	4-0	5-10	7-4	8-11	10-7
	Spruce-pine-fir	SS	6-8	10-6	13-5	16-5	19-1	6-8	9-10	12-5	15-3	17-8
	Spruce-pine-fir	#1	6-1	8-11	11-3	13-9	15-11	~~5-7~~ 5-8	8-3	10-5	12-9	14-9
	Spruce-pine-fir	#2	6-1	8-11	11-3	13-9	15-11	~~5-7~~ 5-8	8-3	10-5	12-9	14-9
	Spruce-pine-fir	#3	4-7	6-9	8-6	10-5	12-1	4-3	6-3	7-11	9-7	11-2
24	Hem-fir	SS	6-4	9-11	12-9	15-7	18-0	6-4	9-4	11-9	14-5	16-8
	Hem-fir	#1	5-9	8-5	10-8	13-0	15-1	~~8-4~~ 5-4	7-9	9-10	12-0	13-11
	Hem-fir	#2	5-4	7-10	9-11	12-1	14-1	~~4-11~~ 5-0	7-3	9-2	11-3	13-0
	Hem-fir	#3	4-1	6-0	7-7	9-4	10-9	3-10	5-7	7-1	8-7	10-0

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the adjustment factors in Table R802.4.1(9).

b. Span exceeds ~~26~~ 20 feet in length.

TABLE R802.4.1(6) RAFTER SPANS FOR COMMON LUMBER SPECIES (Ground snow load = 50 psf, ceiling attached to rafters, L/Δ = 240)

Portions of table not shown remain unchanged.

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)	(feet- inches)
12	Douglas fir-larch	SS	7-8	12-1	15-11	~~20-3~~ Note b	~~24-8~~ Note b	7-8	12-1	15-11	~~20-3~~ Note b	~~24-5~~ Note b
	Douglas fir-larch	#1	7-5	~~11-7~~ 11-8	15-3	18-7	~~21-7~~ Note b	7-5	11-2	14-1	17-3	20-0
	Douglas fir-larch	#2	7-3	11-5	14-5	17-8	~~20-5~~ Note b	7-3	10-7	13-4	16-4	18-11
	Douglas fir-larch	#3	~~6-0~~ 5-11	8-9	11-0	13-6	15-7	5-6	8-1	10-3	12-6	14-6
	Hem-fir	SS	7-3	11-5	15-0	19-2	~~23-4~~ Note b	7-3	11-5	15-0	19-2	~~23-4~~ Note b
	Hem-fir	#1	7-1	11-2	14-8	18-4	~~21-3~~ Note b	7-1	11-0	13-11	17-0	19-9
	Hem-fir	#2	6-9	10-8	14-0	17-2	19-11	6-9	10-3	13-0	15-10	18-5
	Hem-fir	#3	5-10	8-6	10-9	13-2	15-3	5-5	7-10	10-0	12-2	14-1
	Southern pine	SS	7-6	11-10	15-7	19-11	~~24-3~~ Note b	7-6	11-10	15-7	19-11	~~24-3~~ Note b
	Southern pine	#1	7-3	11-5	15-0	18-2	~~21-7~~ Note b	7-3	11-4	14-5	16-10	20-0
	Southern pine	#2	6-11	10-6	13-4	15-10	18-8	6-6	9-9	12-4	14-8	17-3
	Southern pine	#3	5-5	8-0	10-1	12-3	14-6	5-0	7-5	9-4	11-4	13-5
	Spruce-pine-fir	SS	7-1	11-2	14-8	18-9	~~22-10~~ Note b	7-1	11-2	14-8	18-9	~~22-4~~ Note b
	Spruce-pine-fir	#1	6-11	10-11	14-3	17-5	~~20-2~~ Note b	6-11	10-5	13-2	16-1	18-8
	Spruce-pine-fir	#2	6-11	10-11	14-3	17-5	~~20-2~~ Note b	6-11	10-5	13-2	16-1	18-8
	Spruce-pine-fir	#3	5-10	8-6	10-9	13-2	15-3	5-5	7-10	10-0	12-2	14-1
16	Douglas fir-larch	SS	7-0	11-0	14-5	18-5	~~22-5~~ Note b	7-0	11-0	14-5	18-3	~~21-2~~ Note b
	Douglas fir-larch	#1	6-9	10-5	13-2	16-1	18-8	6-7	9-8	12-2	14-11	17-3
	Douglas fir-larch	#2	6-7	9-10	12-6	15-3	17-9	6-3	9-2	11-7	14-2	16-5
	Douglas fir-larch	#3	5-2	7-7	9-7	11-8	13-6	4-9	7-0	8-10	10-10	12-6
	Hem-fir	SS	6-7	10-4	13-8	17-5	~~21-2~~ Note b	6-7	10-4	13-8	17-5	~~20-5~~ Note b
	Hem-fir	#1	6-5	10-2	13-0	15-11	18-5	6-5	9-6	12-1	14-9	17-1
	Hem-fir	#2	6-2	9-7	12-2	14-10	17-3	6-1	8-11	11-3	13-9	15-11
	Hem-fir	#3	5-0	7-4	9-4	11-5	13-2	4-8	6-10	8-8	~~10-6~~ 10-7	12-3
	Southern pine	SS	6-10	10-9	14-2	18-1	~~22-0~~ Note b	6-10	10-9	14-2	18-1	~~21-10~~ Note b
	Southern pine	#1	6-7	10-4	13-5	15-9	18-8	6-7	9-10	12-5	14-7	17-3
	Southern pine	#2	6-1	9-2	11-7	13-9	16-2	5-8	8-5	10-9	12-9	15-0
	Southern pine	#3	4-8	6-11	8-9	10-7	12-6	4-4	6-5	8-1	9-10	11-7
	Spruce-pine-fir	SS	6-5	10-2	13-4	17-0	~~20-9~~ Note b	6-5	10-2	13-4	16-8	19-4
	Spruce-pine-fir	#1	6-4	9-9	12-4	15-1	17-6	6-2	9-0	11-5	13-11	16-2
	Spruce-pine-fir	#2	6-4	9-9	12-4	15-1	17-6	6-2	9-0	11-5	13-11	16-2
	Spruce-pine-fir	#3	5-0	7-4	9-4	11-5	13-2	4-8	6-10	8-8	~~10-6~~ 10-7	12-3
19.2	Douglas fir-larch	SS	6-7	10-4	13-7	17-4	~~20-11~~ Note b	6-7	10-4	13-7	16-8	19-4
	Douglas fir-larch	#1	6-4	9-6	12-0	14-8	17-1	6-0	8-10	11-2	13-7	15-9
	Douglas fir-larch	#2	6-2	9-0	11-5	13-11	16-2	5-8	8-4	10-7	12-11	15-0
	Douglas fir-larch	#3	4-8	6-11	8-9	10-8	12-4	4-4	6-4	8-1	9-10	11-5
	Southern pine	SS	6-5	10-2	13-4	17-0	~~20-9~~ Note b	6-5	10-2	13-4	16-11	20-0
	Southern pine	#1	6-2	9-8	12-3	14-4	17-1	6-0	9-0	11-4	13-4	15-9
	Southern pine	#2	5-7	8-4	10-7	12-6	14-9	5-2	7-9	9-9	11-7	13-8
	Southern pine	#3	4-3	6-4	8-0	9-8	11-5	4-0	5-10	7-4	8-11	10-7
	Spruce-pine-fir	SS	6-1	9-6	12-7	16-0	19-1	6-1	9-6	12-5	15-3	17-8
	Spruce-pine-fir	#1	5-11	8-11	11-3	13-9	15-11	~~5-7~~ 5-8	8-3	10-5	12-9	14-9
	Spruce-pine-fir	#2	5-11	8-11	11-3	13-9	15-11	~~5-7~~ 5-8	8-3	10-5	12-9	14-9
	Spruce-pine-fir	#3	4-7	6-9	8-6	10-5	12-1	4-3	6-3	7-11	9-7	11-2
24	Hem-fir	SS	5-9	9-1	11-11	15-2	18-0	5-9	9-1	11-9	14-5	~~15-11~~ 16-8
	Hem-fir	#1	5-8	8-5	10-8	13-0	15-1	5-4	7-9	9-10	12-0	13-11
	Hem-fir	#2	5-4	7-10	9-11	12-1	14-1	~~4-11~~ 5-0	7-3	9-2	11-3	13-0
	Hem-fir	#3	4-1	6-0	7-7	9-4	10-9	3-10	5-7	7-1	8-7	10-0

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the adjustment factors in Table R802.4.1(9).

b. Span exceeds 20 feet in length.

TABLE R802.4.1(7) RAFTER SPANS FOR COMMON LUMBER SPECIES (Ground snow load = 70 psf, ceiling not attached to rafters, L/Δ = 180)

Portions of table not shown remain unchanged.

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Douglas fir-larch	SS	7-7	11-10	15-8	19-9	~~22-10~~ Note b	7-7	11-10	15-3	18-7	~~21-7~~ Note b
	Douglas fir-larch	#1	7-1	10-5	13-2	16-1	18-8	6-8	9-10	12-5	15-2	17-7
	Douglas fir-larch	#2	6-9	9-10	12-6	15-3	17-9	6-4	9-4	11-9	14-5	16-8
	Douglas fir-larch	#3	5-2	7-7	9-7	11-8	13-6	4-10	7-1	9-0	11-0	12-9
	Hem-fir	SS	7-2	11-3	14-9	18-10	~~22-1~~ Note b	7-2	11-3	14-8	18-0	~~20-10~~ Note b
	Hem-fir	#1	7-0	10-3	13-0	15-11	18-5	6-7	9-8	12-3	15-0	17-5
	Hem-fir	#2	6-7	9-7	12-2	14-10	17-3	6-2	9-1	~~11-5~~ 11-6	14-0	16-3
	Hem-fir	#3	5-0	7-4	9-4	11-5	13-2	4-9	6-11	8-9	10-9	12-5
	Southern pine	SS	7-5	11-8	15-4	19-7	~~23-7~~ Note b	7-5	11-8	15-4	18-10	~~22-3~~ Note b
	Southern pine	#1	7-1	10-7	13-5	15-9	18-8	6-9	10-0	12-8	14-10	17-7
	Southern pine	#2	6-1	9-2	11-7	13-9	16-2	5-9	8-7	10-11	12-11	15-3
	Southern pine	#3	4-8	6-11	8-9	10-7	12-6	4-5	6-6	8-3	10-0	11-10
	Spruce-pine-fir	SS	7-0	11-0	14-6	18-0	~~20-11~~ Note b	7-0	11-0	13-11	17-0	19-8
	Spruce-pine-fir	#1	6-8	9-9	12-4	15-1	17-6	6-3	9-2	11-8	14-2	16-6
	Spruce-pine-fir	#2	6-8	9-9	12-4	15-1	17-6	6-3	9-2	11-8	14-2	16-6
	Spruce-pine-fir	#3	5-0	7-4	9-4	11-5	13-2	4-9	6-11	8-9	10-9	12-5
16	Southern pine	SS	6-9	10-7	14-0	17-4	~~20-5~~ Note b	6-9	10-7	13-9	16-4	19-3
	Southern pine	#1	6-2	9-2	11-8	13-8	16-2	5-10	8-8	11-0	12-10	15-3
	Southern pine	#2	5-3	7-11	10-0	11-11	14-0	5-0	7-5	9-5	11-3	13-2
	Southern pine	#3	4-1	6-0	7-7	9-2	10-10	3-10	5-8	7-1	8-8	10-3
19.2	Douglas fir-larch	SS	6-6	10-1	12-9	15-7	18-1	6-6	9-6	12-0	14-8	17-1
	Douglas fir-larch	#1	~~5-7~~ 5-8	8-3	10-5	12-9	14-9	5-4	7-9	9-10	12-0	13-11
	Douglas fir-larch	#2	5-4	7-10	9-11	12-1	14-0	5-0	7-4	9-4	11-5	13-2
	Douglas fir-larch	#3	4-1	6-0	7-7	9-3	10-8	3-10	5-7	7-1	8-8	10-1
	Hem-fir	SS	6-1	9-7	12-4	15-1	~~17-4~~ 17-6	6-1	9-2	11-8	14-2	~~15-5~~ 16-6
	Hem-fir	#1	5-7	8-2	10-3	12-7	14-7	5-3	7-8	9-8	11-10	13-9
	Hem-fir	#2	5-2	7-7	9-7	11-9	13-7	4-11	7-2	9-1	11-1	12-10
	Hem-fir	#3	4-0	5-10	7-4	9-0	10-5	3-9	5-6	6-11	8-6	9-10
24	Douglas fir-larch	SS	6-0	9-0	11-5	13-11	16-2	5-10	8-6	10-9	13-2	15-3
	Douglas fir-larch	#1	5-0	7-4	9-4	11-5	13-2	4-9	6-11	8-9	10-9	12-5
	Douglas fir-larch	#2	4-9	7-0	8-10	10-10	12-6	4-6	6-7	8-4	10-2	11-10
	Douglas fir-larch	#3	3-8	5-4	6-9	8-3	9-7	3-5	5-0	6-4	7-9	~~9-10~~ 9-0
	Hem-fir	SS	5-8	~~8-8~~ 8-9	11-0	13-6	~~13-11~~ 15-7	5-7	8-3	10-5	~~12-4~~ 12-8	~~12-4~~ 14-9
	Hem-fir	#1	5-0	7-3	9-2	11-3	13-0	4-8	6-10	8-8	10-7	12-4
	Hem-fir	#2	4-8	6-9	8-7	10-6	12-2	4-4	6-5	8-1	9-11	11-6
	Hem-fir	#3	3-7	5-2	6-7	8-1	9-4	3-4	4-11	6-3	7-7	8-10
	Spruce-pine-fir	SS	5-6	8-3	10-5	12-9	14-9	5-4	7-9	9-10	12-0	~~12-11~~ 13-11
	Spruce-pine-fir	#1	4-8	6-11	8-9	10-8	12-4	4-5	6-6	8-3	~~10-0~~ 10-1	11-8
	Spruce-pine-fir	#2	4-8	6-11	8-9	10-8	12-4	4-5	6-6	8-3	~~10-0~~ 10-1	11-8
	Spruce-pine-fir	#3	3-7	5-2	6-7	8-1	9-4	3-4	4-11	6-3	7-7	8-10

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the adjustment factors in Table R802.4.1(9).

b. Span exceeds 20 feet in length.

TABLE R802.4.1(8) RAFTER SPANS FOR COMMON LUMBER SPECIES (Ground snow load = 70 psf, ceiling attached to rafters, L/Δ = 240)

Portions of table not shown remain unchanged.

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans[a]									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
	Douglas fir-larch	SS	6-10	10-9	14-3	18-2	~~22-1~~ Note b	6-10	10-9	14-3	18-2	~~21-7~~ Note b
	Douglas fir-larch	#1	6-7	10-5	13-2	16-1	18-8	6-7	9-10	12-5	15-2	17-7

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans									
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Douglas fir-larch	#2	6-6	9-10	12-6	15-3	17-9	6-4	9-4	11-9	14-5	16-8
	Douglas fir-larch	#3	5-2	7-7	9-7	11-8	13-6	4-10	7-1	9-0	11-0	12-9
	Hem-fir	SS	6-6	10-2	13-5	17-2	~~20-10~~ Note b	6-6	10-2	13-5	17-2	~~20-10~~ Note b
	Hem-fir	#1	6-4	10-0	13-0	15-11	18-5	6-4	9-8	12-3	15-0	17-5
	Hem-fir	#2	6-1	9-6	12-2	14-10	17-3	6-1	9-1	~~11-5~~ 11-6	14-0	16-3
	Hem-fir	#3	5-0	7-4	9-4	11-5	13-2	4-9	6-11	8-9	10-9	12-5
	Southern pine	SS	6-9	10-7	14-0	17-10	~~21-8~~ Note b	6-9	10-7	14-0	17-10	~~21-8~~ Note b
	Southern pine	#1	6-6	10-2	13-5	15-9	18-8	6-6	10-0	12-8	14-10	17-7
	Southern pine	#2	6-1	9-2	11-7	13-9	16-2	5-9	8-7	10-11	12-11	15-3
	Southern pine	#3	4-8	6-11	8-9	10-7	12-6	4-5	6-6	8-3	10-0	11-10
	Spruce-pine-fir	SS	6-4	10-0	13-2	16-9	~~20-5~~ Note b	6-4	10-0	13-2	16-9	19-8
	Spruce-pine-fir	#1	6-2	9-9	12-4	15-1	17-6	6-2	9-2	11-8	14-2	16-6
	Spruce-pine-fir	#2	6-2	9-9	12-4	15-1	17-6	6-2	9-2	11-8	14-2	16-6
	Spruce-pine-fir	#3	5-0	7-4	9-4	11-5	13-2	4-9	6-11	8-9	10-9	12-5
19.2	Douglas fir-larch	SS	5-10	9-3	12-2	15-6	18-1	5-10	9-3	12-0	14-8	17-1
	Douglas fir-larch	#1	~~5-7~~ 5-8	8-3	10-5	12-9	14-9	5-4	7-9	9-10	12-0	13-11
	Douglas fir-larch	#2	5-4	7-10	9-11	12-1	14-0	5-0	7-4	9-4	11-5	13-2
	Douglas fir-larch	#3	4-1	6-0	7-7	9-3	10-8	3-10	5-7	7-1	8-8	10-1
	Hem-fir	SS	5-6	8-8	11-6	14-8	~~17-4~~ 17-6	5-6	8-8	11-6	14-2	~~15-5~~ 16-6
	Hem-fir	#1	5-5	8-2	10-3	12-7	14-7	5-3	7-8	9-8	11-10	13-9
	Hem-fir	#2	5-2	7-7	9-7	11-9	13-7	4-11	7-2	9-1	11-1	12-10
	Hem-fir	#3	4-0	5-10	7-4	9-0	10-5	3-9	5-6	6-11	8-6	9-10
24	Hem-fir	SS	5-2	8-1	10-8	13-6	~~13-11~~ 15-7	5-2	8-1	10-5	~~12-4~~ 12-8	~~12-4~~ 14-9
	Hem-fir	#1	5-0	7-3	9-2	11-3	13-0	4-8	6-10	8-8	10-7	12-4
	Hem-fir	#2	4-8	6-9	8-7	10-6	12-2	4-4	6-5	8-1	9-11	11-6
	Hem-fir	#3	3-7	5-2	6-7	8-1	9-4	3-4	4-11	6-3	7-7	8-10
	Spruce-pine-fir	SS	5-0	7-11	10-5	12-9	14-9	5-0	7-9	9-10	12-0	~~12-11~~ 13-11
	Spruce-pine-fir	#1	4-8	6-11	8-9	10-8	12-4	4-5	6-6	8-3	~~10-0~~ 10-1	11-8
	Spruce-pine-fir	#2	4-8	6-11	8-9	10-8	12-4	4-5	6-6	8-3	~~10-0~~ 10-1	11-8
	Spruce-pine-fir	#3	3-7	5-2	6-7	8-1	9-4	3-4	4-11	6-3	7-7	8-10

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the adjustment factors in Table R802.4.1(9).

b. Span exceeds 20 feet in length.

Reason: This proposal updates the span tables in multiple locations to be aligned with ASCE 7-22 and corrects errors in spans that could not be corrected by ICC staff using ICC's editorial process. The proposed spans align with those found in the ANSI/AWC 2024 *Wood Frame Construction Manual* (WFCM). To address complexity of ASCE 7 requirements for unbalanced snow loads, horizontally-projected rafter spans over 20' have been removed from prescriptive values in the IRC, which also matches the method used in the WFCM. New calculations for horizontally-projected spans over 20' require the use of additional factors including wind exposure of the building, attic insulation, heat differential of a building, and a new winter wind provision. In order to provide prescriptive values for horizontally-projected rafter spans over 20', many conservative assumptions would need to be made so that the tables can be used prescriptively in all locations. These assumptions would create conservative spans for these rafters. It should be noted that rafters with a horizontally-projected span over 20' will typically be 25'-30' long. These longer spans are often associated with use of trusses or other engineered wood solutions. Therefore, the impact of reducing the tabulated span length limit from 26' to 20' may be negligible.

Cost Impact: Increase

Estimated Immediate Cost Impact:

$0 - $300 for engineering of spans between 20' and 26'

Estimated Immediate Cost Impact Justification (methodology and variables):

This proposal updates the span tables in multiple locations to be aligned with ASCE 7-22 and corrects errors in spans. The adjustment in spans due to alignment with ASCE 7-22 will likely not impact the lumber lengths needed for construction, as some trimming will still be necessary to accommodate the actual span end use. The error corrections are considered editorial. As Note b has changed, where a project involves spans between 20' and 26', the cost impact is estimated to be up to $300 for engineering.

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IRC: TABLE R802.5.1(1), TABLE R802.5.1(2)

Proponents: Shane Nilles, representing American Wood Council (snilles@awc.org); David Tyree, representing American Wood Council (dtyree@awc.org)

2024 International Residential Code

Revise as follows:

TABLE R802.5.1(1) CEILING JOIST SPANS FOR COMMON LUMBER SPECIES (Uninhabitable attics without storage, live load = 10 psf, L/Δ = 240)

Portions of table not shown remain unchanged.

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 5 psf			
			2 × 4	2 × 6	2 × 8	2 × 10
			Maximum ceiling joist spans			
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
16	Southern pine	SS	11-9	18-5	24-3	Note a
	Southern pine	#1	11-3	17-8	~~23-10~~23-4	Note a
	Southern pine	#2	10-9	16-11	21-7	25-7
	Southern pine	#3	8-9	12-11	16-3	19-9
19.2	Southern -pine	SS	11-0	17-4	22-10	Note a
	Southern pine	#1	10-7	16-8	~~22-0~~21-11	Note a
	Southern pine	#2	10-2	15-7	19-8	23-5
	Southern pine	#3	8-0	11-9	14-10	18-0
24	Southern pine	SS	10-3	16-1	21-2	Note a
	Southern pine	#1	9-10	15-6	20-5	~~24-0~~23-11
	Southern pine	#2	9-3	13-11	17-7	20-11
	Southern pine	#3	7-2	10-6	13-3	16-1

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Span exceeds 26 feet in length.

TABLE R802.5.1(2) CEILING JOIST SPANS FOR COMMON LUMBER SPECIES (Uninhabitable attics with limited storage, live load = 20 psf, L/Δ = 240)

Portions of table not shown remain unchanged.

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf			
			2 × 4	2 × 6	2 × 8	2 × 10
			Maximum ceiling joist spans			
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Southern pine	SS	10-3	16-1	21-2	Note a
	Southern pine	#1	9-10	15-6	20-5	~~24-0~~23-11
	Southern pine	#2	9-3	13-11	17-7	20-11
	Southern pine	#3	7-2	10-6	13-3	16-1
16	Southern pine	SS	9-4	14-7	19-3	24-7
	Southern pine	#1	8-11	14-0	17-9	20-9
	Southern pine	#2	8-0	12-0	15-3	18-1
	Southern pine	#3	6-2	9-2	11-6	~~14-0~~13-11
	Spruce-pine-fir	SS	8-9	13-9	~~18-1~~18-2	23-1
	Spruce-pine-fir	#1	8-7	12-10	16-3	19-10
	Spruce-pine-fir	#2	8-7	12-10	16-3	19-10
	Spruce-pine-fir	#3	6-8	9-8	12-4	15-0

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Span exceeds 26 feet in length.

Reason: This proposal updates the span tables to be aligned with ASCE 7-22 and corrects errors in spans that could not be corrected by ICC staff using ICC's editorial process. The proposed spans align with those found in the ANSI/AWC 2024 *Wood Frame Construction Manual* (WFCM).

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal corrects errors and updates for ceiling joist spans to align with the WFCM.

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IRC: TABLE R802.5.2(1)

Proponents: Glenn Mathewson, BuildingCodeCollege.com, representing Self (glenn@glennmathewson.com)

2024 International Residential Code

Revise as follows:

TABLE R802.5.2(1) ~~RAFTER/CEILING JOIST~~ RAFTER/RAFTER TIE HEEL JOINT CONNECTIONS[g]

RAFTER SLOPE	RAFTER TIE SPACING (inches)	GROUND SNOW LOAD (psf)											
		20[e]			30			50			70		
		Roof span (feet)											
		12	24	36	12	24	36	12	24	36	12	24	36
		Required number of 16d common nails per heel joint connection[a, b, c, d, f]											
3:12	12	3	5	8	3	6	9	5	9	13	6	12	17
	16	4	7	10	4	8	12	6	12	17	8	15	23
	19.2	4	8	12	5	10	14	7	14	21	9	18	27
	24	5	10	15	6	12	18	9	17	26	12	23	34
4:12	12	3	4	6	3	5	7	4	7	10	5	9	13
	16	3	5	8	3	6	9	5	9	13	6	12	17
	19.2	3	6	9	4	7	11	6	11	16	7	14	21
	24	4	8	11	5	9	13	7	13	19	9	17	26
5:12	12	3	3	5	3	4	6	3	6	8	4	7	11
	16	3	4	6	3	5	7	4	7	11	5	9	14
	19.2	3	5	7	3	6	9	5	9	13	6	11	17
	24	3	6	9	4	7	11	6	11	16	7	14	21
7:12	12	3	3	4	3	3	4	3	4	6	3	5	8
	16	3	3	5	3	4	5	3	5	8	4	7	10
	19.2	3	4	5	3	4	6	3	6	9	4	8	12
	24	3	5	7	3	5	8	4	8	11	5	10	15
9:12	12	3	3	3	3	3	3	3	3	5	3	4	6
	16	3	3	4	3	3	4	3	4	6	3	5	8
	19.2	3	3	4	3	4	5	3	5	7	3	6	9
	24	3	4	5	3	4	6	3	6	9	4	8	12
12:12	12	3	3	3	3	3	3	3	3	4	3	3	5
	16	3	3	3	3	3	3	3	3	5	3	4	6
	19.2	3	3	3	3	3	4	3	4	6	3	5	7
	24	3	3	4	3	3	5	3	5	7	3	6	9

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

g. Tabulated requirements are based on 10 psf roof dead load in combination with the specified roof snow load and roof live load.

f. Tabulated heel joint connection requirements assume that ceiling joists or rafter ties are located at the bottom of the attic space. Where ceiling joists or rafter ties are located higher in the attic, heel joint connection requirements shall be increased by the adjustment factors in Table 802.5.2(2).

e. Applies to roof live load of 20 psf or less.

d. Equivalent nailing patterns are required for ~~ceiling joist to ceiling joist~~ rafter tie to rafter tie lap splices.

c. Where intermediate support of the rafter is provided by vertical struts or purlins to a load-bearing wall, the tabulated heel joint connection requirements shall be permitted to be reduced proportionally to the reduction in span.

b. Heel joint connections are not required where the ridge is supported by a load-bearing wall, header or ridge beam.

a. 10d common (3″ × 0.148″) nails shall be permitted to be substituted for 16d common ($3^1/_2$″ × 0.162″) nails where the required number of nails is taken as 1.2 times the required number of 16d common nails, rounded up to the next full nail.

Reason: A ceiling joist can function as a rafter tie, but is not always a rafter tie. The fastening required in this table is for rafter ties. Whether that be rafter ties or ceiling joists acting as rafter ties. However, using the term "ceiling joist" in the title of this table is misleading and can lead to misinterpretation. Section R802.5 is specific to ceiling joists and requires they only be fastened to the top plate in accordance with the basic fastening found in Table R602.3(1). The ceiling joist does not need to be fastened to the rafter at all, if the ceiling joist is not functioning as a rafter tie, such as in these examples:

A "shed roof" type of assembly, where the rafter is directly supported at the top and no rafter thrust exists.

When the rafter is supported by a ridge BEAM, there is no rafter thrust

When a rafter tie is installed above the ceiling joists due to the ceiling joists being perpendicular to the rafters and not able to function as rafter ties.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Clarification of terms for better interpretation of existing intent and purpose. No impact to cost of construction.

RB238-25

RB250-25

IRC: TABLE R905.1.1(1)

Proponents: T. Eric Stafford, representing Insurance Institute for Business and Home Safety (testafford@charter.net); Milad Shabanian, representing Insurance Institute for Business & Home Safety (mshabanian@ibhs.org)

2024 International Residential Code

Revise as follows:

TABLE R905.1.1(1) UNDERLAYMENT TYPES

ROOF COVERING	SECTION	AREAS WHERE WIND DESIGN IS NOT REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1	AREAS WHERE WIND DESIGN IS REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1
Asphalt shingles	R905.2	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D6757 ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257 ASTM D6757
Clay and concrete tile	R905.3	ASTM D226 Type II ASTM D1970 ASTM D2626 ASTM D6380 Class M ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D8257
Metal roof shingles	R905.4	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Mineral-surfaced roll roofing	R905.5	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Slate and slate-type shingles	R905.6	ASTM D226 Type I ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Wood shingles	R905.7	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV	ASTM D226 Type II ASTM D4869 Type III or IV
Wood shakes on solid sheathing	R905.8	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV	ASTM D226 Type II ASTM D4869 Type III or IV
Metal panels on solid sheathing	R905.10	ASTM D226 Type I or II ASTM D4869 Type I, II III or IV	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
BIPV roof coverings	R905.15	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D6757 ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257 ASTM D6757

For SI: 1 mile per hour = 0.447 m/s.

Reason: This code change proposal adds an additional underlayment material for use in areas where wind design is required. Underlayment complying with ASTM D6757 has long been permitted for asphalt shingle roof coverings in the International Codes and is currently permitted to be used in areas where wind design is not required in the IRC. In the 2021 IRC, the underlayment requirements for areas requiring wind design were updated to be consistent with the IBHS Fortified Home requirements for a sealed roof deck (SRD). At the time, Fortified did not specifically permit the use of underlayment complying with ASTM D6757 for a SRD. Since then, Fortified has been updated and now specifically permits the use of underlayment complying with ASTM D6757 to create a SRD. Support of this proposal will align the underlayment requirements in areas requiring wind design in the IRC with the IBHS Fortified SRD and add an additional underlayment option to be used in these areas.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal adds an additional underlayment material for use in areas where wind design is required.

RB250-25

RB251-25

IRC: TABLE R905.1.1(1), TABLE R905.1.1(2), TABLE R905.1.1(3), R905.16.3.1, R905.16.4

Proponents: T. Eric Stafford, representing Insurance Institute for Business and Home Safety (testafford@charter.net); Milad Shabanian, representing Insurance Institute for Business & Home Safety (mshabanian@ibhs.org)

2024 International Residential Code

Revise as follows:

TABLE R905.1.1(1) UNDERLAYMENT TYPES

ROOF COVERING	SECTION	AREAS WHERE WIND DESIGN IS NOT REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1	AREAS WHERE WIND DESIGN IS REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1
Asphalt shingles	R905.2	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D6757 ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Clay and concrete tile	R905.3	ASTM D226 Type II ASTM D1970 ASTM D2626 ASTM D6380 Class M ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D8257
Metal roof shingles	R905.4	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Mineral-surfaced roll roofing	R905.5	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Slate and slate-type shingles	R905.6	ASTM D226 Type I ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Wood shingles	R905.7	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV	ASTM D226 Type II ASTM D4869 Type III or IV
Wood shakes on solid sheathing	R905.8	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV	ASTM D226 Type II ASTM D4869 Type III or IV
Metal panels on solid sheathing	R905.10	ASTM D226 Type I or II ASTM D4869 Type I, II III or IV	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
BIPV roof coverings	R905.15 R905.16	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D6757 ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257

For SI: 1 mile per hour = 0.447 m/s.

TABLE R905.1.1(2) UNDERLAYMENT APPLICATION

ROOF COVERING	SECTION	AREAS WHERE WIND DESIGN IS NOT REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1	AREAS WHERE WIND DESIGN IS REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1

ROOF COVERING	SECTION	AREAS WHERE WIND DESIGN IS NOT REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1	AREAS WHERE WIND DESIGN IS REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1
Asphalt shingles	R905.2	Underlayment shall be one of the following: 1. For roof slopes from 2 units vertical in 12 units horizontal (2:12), up to 4 units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied in the following manner: apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply full-width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. 2. For roof slopes of 4 units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied in the following manner: underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. 3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.	Underlayment shall be one of the following: 1. Two layers of mechanically fastened underlayment applied in the following manner: Apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply full-width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. 2. A minimum 4-inch-wide strip of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the manufacturer's installation instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment complying with Table R905.1.1(1) for the applicable roof covering shall be applied over the entire roof over the 4-inch- wide membrane strips. 3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.
Clay and concrete tile	R905.3	Underlayment shall be one of the following: 1. For roof slopes from $2^1/_2$ units vertical in 12 units horizontal ($2^1/_2$:12), up to 4 units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied in the following manner: apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply full-width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. End laps shall be 4 inches and shall be offset by 6 feet. 2. For roof slopes of 4 units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied in the following manner: underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches. End laps shall be 4 inches and shall be offset by 6 feet. 3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.	Underlayment shall be one of the following: 1. Two layers of mechanically fastened underlayment applied in the following manner: Apply a strip of underlayment felt that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply full width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. Distortionsin the underlayment shall not interferewith the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. 2. A minimum 4-inch-wide strip of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the manufacturer's installation instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment complying with Table R905.1.1(1) for the applicable roof covering shall be applied over the entire roof over the 4-inch-wide membrane strips. 3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.
Metal roof shingles	R905.4	Apply in accordance with the manufacturer's installation instructions.	Underlayment shall be be one of the following: 1. Two layers of mechanically fastened underlayment applied in the following manner: Apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply full width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. End laps shall be 4 inches and shall be offset by 6 feet. 2. A minimum 4-inch-wide strip of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the manufacturer's installation instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment complying with Table R905.1.1(1) for the applicable roof covering shall be applied over the entire roof over the 4-inch-wide membrane strips. 3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.
Mineral-surfaced roll roofing	R905.5		
Slate and slate-type shingles	R905.6		
Wood shingles	R905.7		
Wood shakes	R905.8		
Metal panels	R905.10		

ROOF COVERING	SECTION	AREAS WHERE WIND DESIGN IS NOT REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1	AREAS WHERE WIND DESIGN IS REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1
BIPV roof coverings	R905.15 R905.16	Underlayment shall be one of the following: 1. For roof slopes from 2 units vertical in 12 units horizontal (2:12), up to 4 units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied in the following manner: apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply full width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. 2. For roof slopes of 4 units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied in the following manner: underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. 3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.	Underlayment shall be one of the following: 1. Two layers of mechanically fastened underlayment applied in the following manner: Apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply full width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. 2. A minimum 4-inch-wide strip of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the manufacturer's installation instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment complying with Table R905.1.1(1) for the applicable roof covering shall be applied over the entire roof over the 4-inch-wide membrane strips. 3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.

TABLE R905.1.1(3) UNDERLAYMENT ATTACHMENT

ROOF COVERING	SECTION	AREAS WHERE WIND DESIGN IS NOT REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1	AREAS WHERE WIND DESIGN IS REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1
Asphalt shingles	R905.2	Fastened sufficiently to hold in place	Mechnically fastened underlayment shall be fastened with corrosion-resistant fasteners in a grid pattern of 12 inches between side laps with a 6-inch spacing at side and end laps. Underlayment shall be attached using annular ring or deformed shank nails with 1-inch-diameter metal or plastic caps. Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch. The cap nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than $^3/_4$ inch into the roof sheathing. Self-adhering polymer modified bitumen underlayment shall be installed in accordance with the underlayment and roof covering manufacturers' installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.
Clay and concrete tile	R905.3		
BIPV roof covering	R905.15 R905.16		
Metal roof shingles	R905.4	Manufacturer's installation instructions.	Mechnically fastened underlayment shall be fastened with corrosion-resistant fasteners in a grid pattern of 12 inches between side laps with a 6-inch spacing at side and end laps. Underlayment shall be attached using annular ring or deformed shank nails with 1-inch-diameter metal or plastic caps. Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch. The cap nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than $^3/_4$ inch into the roof sheathing. Self-adhering polymer modified bitumen underlayment shall be installed in accordance with the underlayment and roof covering manufacturers' installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering. **Exception:** Self-adhering polymer modified bitumen underlayment shall not be installed under wood shakes or wood shingles.
Mineral-surfaced roll roofing	R905.5		
Slate and slate-type shingles	R905.6		
Wood shingles	R905.7		
Wood shakes	R905.8		
Metal panels	R905.10		

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

Delete without substitution:

~~**R905.16.3.1 Ice barrier.** Where required, an ice barrier shall comply with Section R905.1.2.~~

Revise as follows:

R905.16.4 Ice barrier. Where required, ice barriers shall comply with Section R905.1.2. ~~In areas where there has been a history of ice forming along the eaves causing a backup of water, as designated in Table R301.2, an ice barrier that consists of not less than two layers of *underlayment* cemented together or of a self-adhering polymer-modified bitumen sheet shall be used in lieu of normal *underlayment* and extend from the lowest edges of all roof surfaces to a point not less than 24 inches (610 mm) inside the exterior wall line of the *building*.~~

~~**Exception:** Detached *accessory structures* that do not contain *conditioned floor area*.~~

Reason: This code change is simply a cleanup. It adds the appropriate section reference in the underlayment tables for BIPV roof panels that is currently missing. Additionally, it cleans up the multiple sections addressing ice barriers. There are no technical changes in this proposal.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is editorial.

RB251-25

RB252-25

IRC: TABLE R905.1.1(1), TABLE R905.1.1(2), TABLE R905.1.1(3)

Proponents: T. Eric Stafford, representing Insurance Institute for Business and Home Safety (testafford@charter.net); Milad Shabanian, representing Insurance Institute for Business & Home Safety (mshabanian@ibhs.org)

2024 International Residential Code

Revise as follows:

TABLE R905.1.1(1) UNDERLAYMENT TYPES

ROOF COVERING	SECTION	AREAS OUTSIDE HURRICANE-PRONE REGIONS ~~WHERE WIND DESIGN IS NOT REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1~~	AREAS WITHIN HURRICANE-PRONE REGIONS ~~WHERE WIND DESIGN IS REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1~~
Asphalt shingles	R905.2	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D6757 ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Clay and concrete tile	R905.3	ASTM D226 Type II ASTM D1970 ASTM D2626 ASTM D6380 Class M ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D8257
Metal roof shingles	R905.4	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Mineral-surfaced roll roofing	R905.5	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Slate and slate-type shingles	R905.6	ASTM D226 Type I ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
Wood shingles	R905.7	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV	ASTM D226 Type II ASTM D4869 Type III or IV
Wood shakes on solid sheathing	R905.8	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV	ASTM D226 Type II ASTM D4869 Type III or IV
Metal panels on solid sheathing	R905.10	ASTM D226 Type I or II ASTM D4869 Type I, II III or IV	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257
BIPV roof coverings	R905.15	ASTM D226 Type I or II ASTM D1970 ASTM D4869 Type I, II, III or IV ASTM D6757 ASTM D8257	ASTM D226 Type II ASTM D1970 ASTM D4869 Type III or IV ASTM D8257

For SI: 1 mile per hour = 0.447 m/s.

TABLE R905.1.1(2) UNDERLAYMENT APPLICATION

ROOF COVERING	SECTION	AREAS OUTSIDE HURRICANE-PRONE REGIONS ~~WHERE WIND DESIGN IS NOT REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1~~	AREAS WITHIN HURRICANE-PRONE REGIONS ~~WHERE WIND DESIGN IS REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1~~

<table>
<tr><th>ROOF COVERING</th><th>SECTION</th><th>AREAS OUTSIDE HURRICANE-PRONE REGIONS ~~WHERE WIND DESIGN IS NOT REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1~~</th><th>AREAS WITHIN HURRICANE-PRONE REGIONS ~~WHERE WIND DESIGN IS REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1~~</th></tr>
<tr><td>Asphalt shingles</td><td>R905.2</td><td>Underlayment shall be one of the following:
3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer’s installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.
2. For roof slopes of 4 units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied in the following manner: underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet.
1. For roof slopes from 2 units vertical in 12 units horizontal (2:12), up to 4 units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied in the following manner: apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply full-width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet.</td><td>Underlayment shall be one of the following:
3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer’s installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.
2. A minimum 4-inch-wide strip of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the manufacturer’s installation instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment complying with Table R905.1.1(1) for the applicable roof covering shall be applied over the entire roof over the 4-inch- wide membrane strips.
1. Two layers of mechanically fastened underlayment applied in the following manner: Apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply full-width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet.</td></tr>
<tr><td>Clay and concrete tile</td><td>R905.3</td><td>Underlayment shall be one of the following:
3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer’s installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.
2. For roof slopes of 4 units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied in the following manner: underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches. End laps shall be 4 inches and shall be offset by 6 feet.
1. For roof slopes from 2$^{1}/_{2}$ units vertical in 12 units horizontal (2$^{1}/_{2}$:12), up to 4 units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied in the following manner: apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply full-width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. End laps shall be 4 inches and shall be offset by 6 feet.</td><td>Underlayment shall be one of the following:
3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer’s installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.
2. A minimum 4-inch-wide strip of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the manufacturer’s installation instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment complying with Table R905.1.1(1) for the applicable roof covering shall be applied over the entire roof over the 4-inch-wide membrane strips.
1. Two layers of mechanically fastened underlayment applied in the following manner: Apply a strip of underlayment felt that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply full width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. Distortionsin the underlayment shall not interferewith the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet.</td></tr>
<tr><td>Metal roof shingles</td><td>R905.4</td><td rowspan="6">Apply in accordance with the manufacturer’s installation instructions.</td><td rowspan="6">Underlayment shall be be one of the following:
3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer’s installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.
2. A minimum 4-inch-wide strip of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the manufacturer’s installation instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment complying with Table R905.1.1(1) for the applicable roof covering shall be applied over the entire roof over the 4-inch-wide membrane strips.
1. Two layers of mechanically fastened underlayment applied in the following manner: Apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply full width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. End laps shall be 4 inches and shall be offset by 6 feet.</td></tr>
<tr><td>Mineral-surfaced roll roofing</td><td>R905.5</td></tr>
<tr><td>Slate and slate-type shingles</td><td>R905.6</td></tr>
<tr><td>Wood shingles</td><td>R905.7</td></tr>
<tr><td>Wood shakes</td><td>R905.8</td></tr>
<tr><td>Metal panels</td><td>R905.10</td></tr>
</table>

ROOF COVERING	SECTION	AREAS OUTSIDE HURRICANE-PRONE REGIONS ~~WHERE WIND DESIGN IS NOT REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1~~	AREAS WITHIN HURRICANE-PRONE REGIONS ~~WHERE WIND DESIGN IS REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1~~
BIPV roof coverings	R905.15	Underlayment shall be one of the following: 3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering. 2. For roof slopes of 4 units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied in the following manner: underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. 1. For roof slopes from 2 units vertical in 12 units horizontal (2:12), up to 4 units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied in the following manner: apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply full width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet.	Underlayment shall be one of the following: 3. A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering. 2. A minimum 4-inch-wide strip of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the manufacturer's installation instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment complying with Table R905.1.1(1) for the applicable roof covering shall be applied over the entire roof over the 4-inch-wide membrane strips. 1. Two layers of mechanically fastened underlayment applied in the following manner: Apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply full width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.

TABLE R905.1.1(3) UNDERLAYMENT ATTACHMENT

ROOF COVERING	SECTION	AREAS OUTSIDE HURRICANE-PRONE REGIONS ~~WHERE WIND DESIGN IS NOT REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1~~	AREAS WITHIN HURRICANE-PRONE REGIONS ~~WHERE WIND DESIGN IS REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1~~
Asphalt shingles	R905.2	Fastened sufficiently to hold in place	Mechnically fastened underlayment shall be fastened with corrosion-resistant fasteners in a grid pattern of 12 inches between side laps with a 6-inch spacing at side and end laps. Underlayment shall be attached using annular ring or deformed shank nails with 1-inch-diameter metal or plastic caps. Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch. The cap nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than $^{3}/_{4}$ inch into the roof sheathing. Self-adhering polymer modified bitumen underlayment shall be installed in accordance with the underlayment and roof covering manufacturers' installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.
Clay and concrete tile	R905.3		
BIPV roof covering	R905.15		
Metal roof shingles	R905.4	Manufacturer's installation instructions.	Mechnically fastened underlayment shall be fastened with corrosion-resistant fasteners in a grid pattern of 12 inches between side laps with a 6-inch spacing at side and end laps. Underlayment shall be attached using annular ring or deformed shank nails with 1-inch-diameter metal or plastic caps. Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch. The cap nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than $^{3}/_{4}$ inch into the roof sheathing. Self-adhering polymer modified bitumen underlayment shall be installed in accordance with the underlayment and roof covering manufacturers' installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering. **Exception:** Self-adhering polymer modified bitumen underlayment shall not be installed under wood shakes or wood shingles.
Mineral-surfaced roll roofing	R905.5		
Slate and slate-type shingles	R905.6		
Wood shingles	R905.7		
Wood shakes	R905.8		
Metal panels	R905.10		

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

Attached Files

- **Reroof SRD Cost Impact.pdf**
  https://www.cdpaccess.com/proposal/10963/34923/files/download/9050/
- **New Roof SRD Cost Impact.pdf**
  https://www.cdpaccess.com/proposal/10963/34923/files/download/9049/
- **ICWE14_ID02149.pdf**
  https://www.cdpaccess.com/proposal/10963/34923/files/download/9017/
- **Auburn_Home Innovation_WindstormDamageDataset.pdf**
  https://www.cdpaccess.com/proposal/10963/34923/files/download/9016/

Reason: This proposal expands the requirements for improved roof covering underlayment from the Wind Design Required Region to the Hurricane-prone Region. This effectively expands the secondary roof underlayment strategies recommended by the IBHS Fortified Home - Hurricane program (sealed roof deck) from areas where the design wind speed is 130 mph and greater to areas where the design wind speed is 115 mph and greater.

Damage due to water intrusion continues to be a significant problem for buildings impacted by hurricanes. Water entry can occur where it is able to infiltrate through the roof, walls, vents, windows, and/or doors, or at interfaces between these items. The roof deck, where the roof covering is lost or damaged, is particularly susceptible. Water intrusion can cause extensive damage to interior finishes, furnishings, and other contents, and can lead to ceiling collapse when attic insulation is saturated. When power is lost and/or a building cannot otherwise be dried out within 24–48 hours, additional issues such as mold can develop, potentially extending the period during which the property may not be available for use.

Tests performed by IBHS at the Research Center have consistently shown that a sealed roof deck as recommended by the IBHS Fortified Home - Hurricane program consistently show significantly reduced water intrusion rates when one of these strategies was employed. A summary of the results of the demonstration can be viewed at the following link:

http://ibhstest.wpengine.com/ibhsnews- releases/ibhs-hurricane-demonstration-illustrates-importance-of-sealed-roof-deck-3/.

The wind driven rain demonstration can be viewed at the following link:

https://disastersafety.org/thunderstorms/winddriven-rain-demo/.

These underlayment strategies required reduce water entry into the attic space by 70% or more.

This expansion is being proposed primarily for 2 reasons. The adoption of ASCE 7-22 in the 2024 IRC resulted in numerous changes to the wind design requirements including changes to the wind speed maps. While some wind speeds in the hurricane-prone region are increasing, notably, the 130 mph contour, which is the Wind Design Required Region trigger in the Hurricane-prone Region, is being reduced in many areas near the Gulf coast and North Atlantic coast. The following figures overlays the ASCE 7-22 design wind speeds for Risk Category II over the ASCE 7-16 design wind speeds for Risk Category II near the Gulf and Atlantic coasts. The areas shaded in blue indicate where the 130 mph contour has shifted more towards the coast effectively reducing wind speeds in these areas. As shown, the North Atlantic coast has been completely removed from the Wind Design Required Region. Without this proposed expansion, these areas would non longer be required to use the improved underlayment strategies.

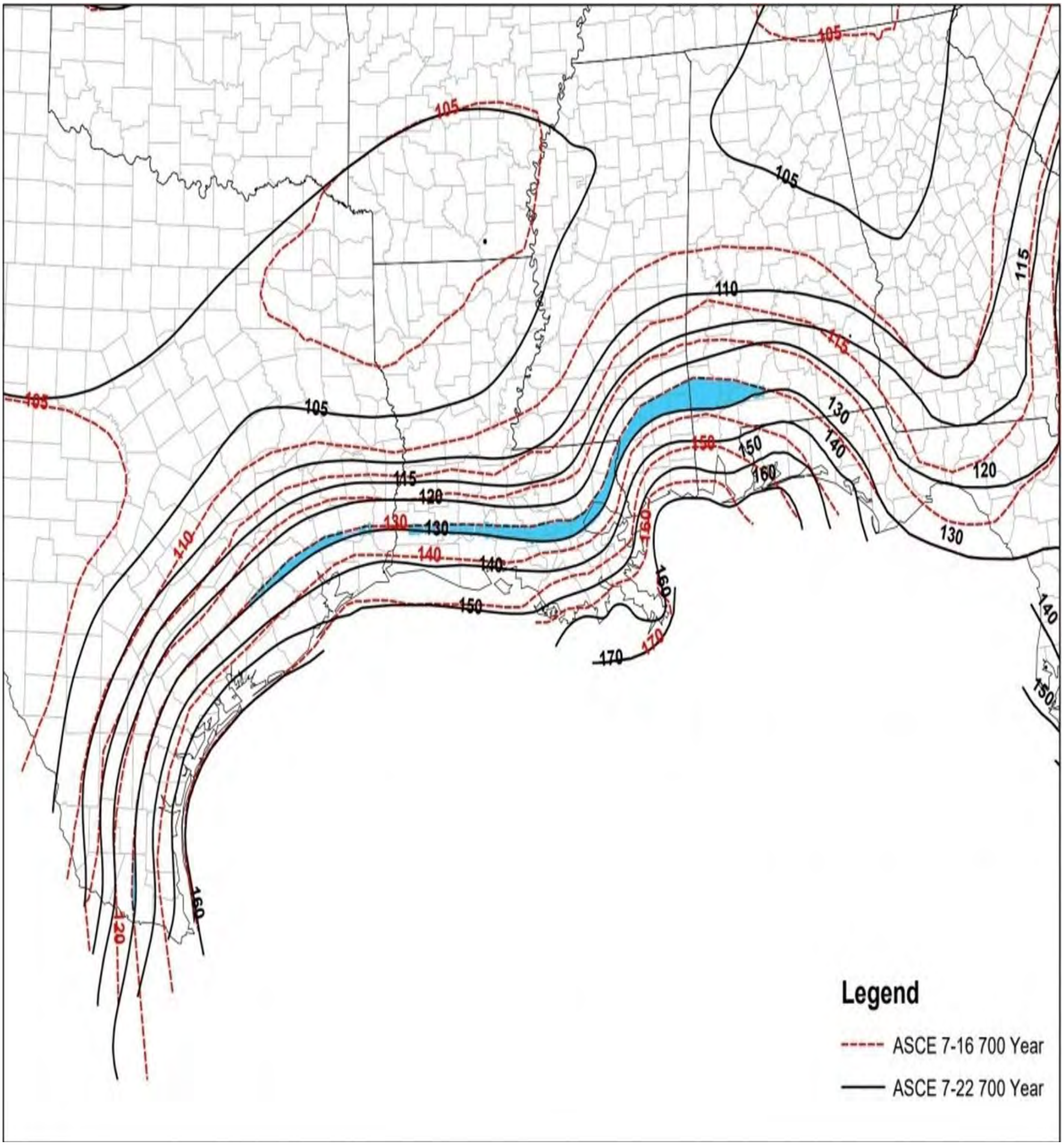


Figure 1
Loss of Wind Design Required Region in the Gulf Region Due to ASCE 7-22 Wind Speed Updates

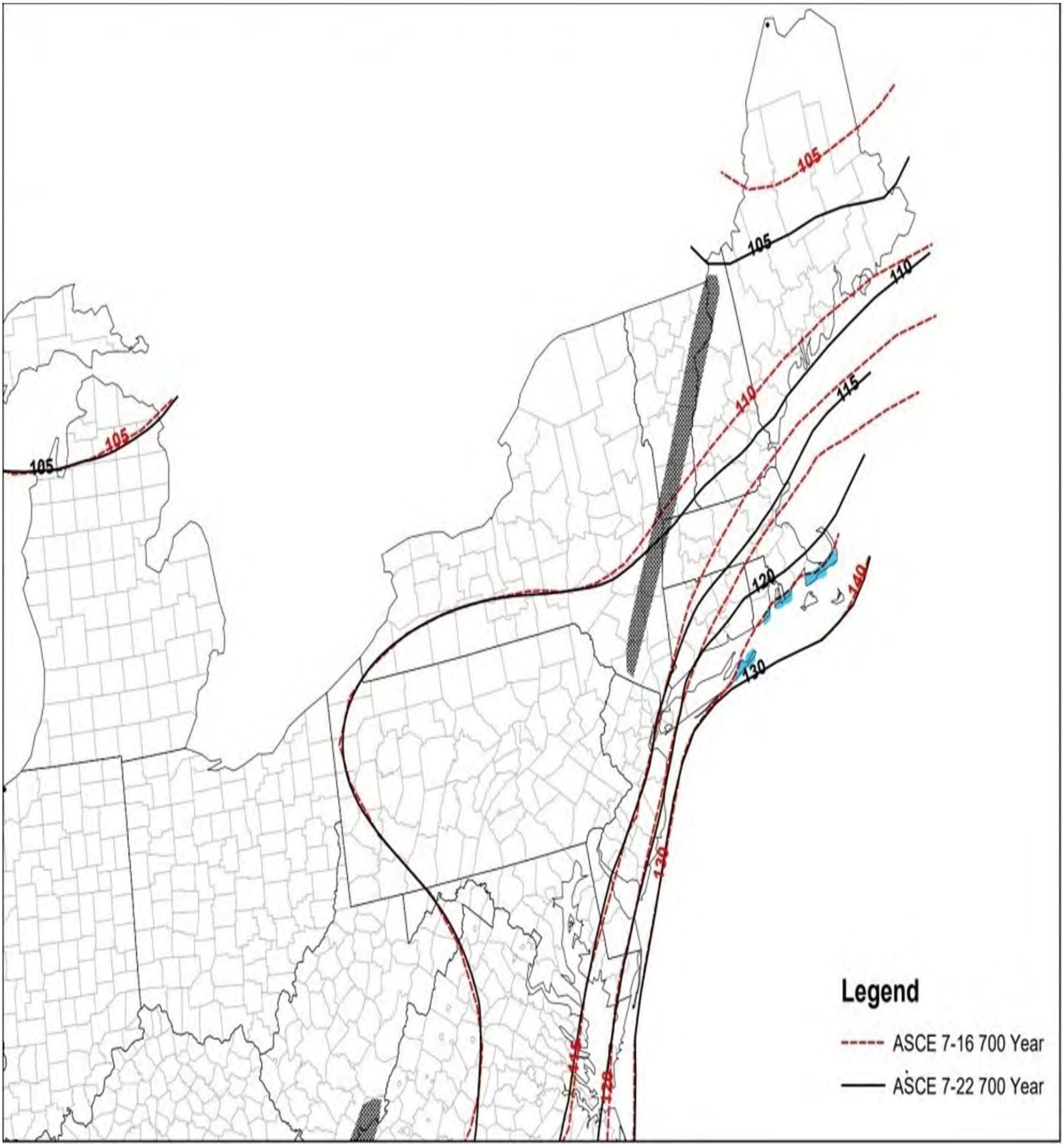


Figure 2
Loss of Wind Design Required Region in the North Atlantic Region Due to ASCE 7-22 Wind Speed Updates

Additionally, a recent report published by David Roueche with Auburn University for Home Innovation Research Labs shows that roof covering damage is by far the most common cladding damage and that even at lower wind speeds roof covering damage is frequently observed. The full report is attached to this proposal. The report is a curation of the windstorm building performance dataset collected by the StEER (Structural Extreme Events Reconnaissance) network. The dataset quantifies common wind damage patterns from recent windstorms. The following windstorm events were included in the dataset:

Joplin Tornado
Garland Tornado
Hurricane Harvey
Hurricane Irma
Hurricane Michael
Nashville/Cookeville Tornadoes
Hurricane Laura

When stratified by hazard intensity, the data shows for wind speeds between 116 mph and 140 mph the frequency of roof covering damage is near 80%. Even for wind speeds between 91 mph and 115 mph the frequency of roof covering damage is near 70%.

The report notes that "considering all hazard intensities and years of construction, 26-50% of the roof cover on a single-family home is typically damaged in an extreme windstorm."

It should also be noted that the 7th Edition (2020) and the 8th Edition (2023) Florida Building Code adopted these underlayment strategies for the entire state. For Risk Category II buildings, design wind speeds in the state of Florida range from approximately 115 mph to 180 mph.
Installing a sealed roof deck is the most cost effective method for reducing water intrusion through the roof deck where the primary roof covering has been damaged or lost.

Bibliography: Brown, T.M., Quarles, S.L., Giammanco, I.M., Brown, R., Insurance Institute for Business and Home Safety, "Building Vulnerability to Wind-Driven Rain Entry and Effectiveness of Mitigation Techniques." 14th International Conference on Wind Engineering (ICWE).

Roueche, D.B., Nakayama, J., Department of Civil Engineering, Auburn University Ginn Colege of Engineering, "Quantification of Common Wind Damage Patterns in Recent Windstorms." May 202

Cost Impact: Increase

Estimated Immediate Cost Impact:

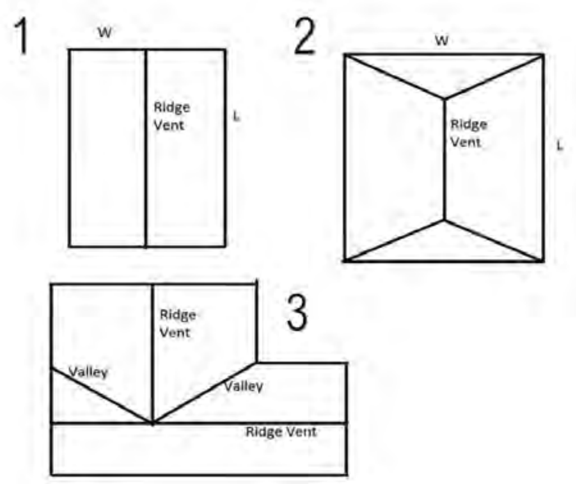
For our cost impact estimates, we used Xactimate which is a construction cost estimating software program. Select markets that would be affected by this code change were analyzed in all the hurricane-prone states.

Two sealed roof deck options were analyzed –

Option 1: Installing 4-inch-wide strips of self-adhering polymer modified bitumen over all joints in the roof deck and covering the strips with a 30# (ASTM D226 Type II, ASTM D4869 Type III or IV) felt underlayment and fastened as specified in the code.

Option 2: Installing a self-adhering polymer modified bitumen underlayment over the entire roof deck.

Three roof configurations were analyzed – 3 gable, 2 gable, and hip. Additionally, we estimated the cost impacts for large roofs (2800 square feet to 3016 square feet) and small roofs (1575 square feet to 1696 square feet). Estimated costs were developed for an asphalt shingle roof.



A copy of the Xactimate report for this analysis is attached to this code change.

The cost for either option varies according to the markets analyzed but are within close ranges.

Option 1 – (taped joints with 30# underlayment over the taped joints)

For large roofs the increased cost for Option 1 ranges from a low of $917.32 in Dothan, AL to a high of $1714.83 on Long Island, NY. For new construction, these costs represent increases of 9.5% and 9.1% respectively of the total cost of the roof (roof covering, underlayment, ventilation components, etc). For reroofing, these costs represent increases of 8.1% and 7.6% respectively of the total cost of the reroofing job.

For small roofs the increased cost for Option 1 ranges from a low of $512.29 in Dothan, AL to a high of $959.66 on Long Island, NY. For new construction, these costs represent increases of 8.9% and 8.3% respectively of the total cost of the roof (roof covering, underlayment, ventilation components, etc). For reroofing, these costs represent increases of 7.6% and 7.6% respectively of the total cost of the reroofing job.

Option 2 – (self-adhering polymer modified bitumen underlayment over the entire roof deck)

For large roofs the increased cost for Option 2 ranges from a low of $1428.39 in Florence, SC to a high of $1909.49 in Stamford, CT. For new construction, these costs represent increases of 13.4% and 10.4% respectively of the total cost of the roof (roof covering, underlayment, ventilation components, etc). For reroofing, these costs represent increases of 11.5% and 8.9% of the total cost of the reroofing job.

For small roofs the increased cost for Option 2 ranges from a low of $793.41 in Dover, DE to a high of $1065.74 in Stamford, CT. For new construction, these costs represent increases of 9.3% and 9.5% respectively of the total cost of the roof (roof covering, underlayment, ventilation components, etc). For reroofing, these costs represent increases of 8.2% and 8.2% respectively of the total cost of the reroofing job.

Estimated Immediate Cost Impact Justification (methodology and variables):

Xactimate, which is a construction cost estimating software program, was used to analyze the cost impacts of this proposal.

RB253-25

IRC: TABLE R905.1.1(3)

Proponents: T. Eric Stafford, representing Insurance Institute for Business and Home Safety (testafford@charter.net); Milad Shabanian, representing Insurance Institute for Business & Home Safety (mshabanian@ibhs.org)

2024 International Residential Code

Revise as follows:

TABLE R905.1.1(3) UNDERLAYMENT ATTACHMENT

Portions of table not shown remain unchanged.

ROOF COVERING	SECTION	AREAS WHERE WIND DESIGN IS NOT REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1	AREAS WHERE WIND DESIGN IS REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1
Asphalt shingles	R905.2	Fastened sufficiently to hold in place	Mechnically fastened underlayment shall be fastened at 6 inches on center 3 inches from the eave and 6 inches on center at all side and end laps. ~~with corrosion-resistant fasteners~~ Underlayment shall be fastened in a grid pattern of not greater than 12 inches on center horizontally and vertically between side laps ~~with a 6-inch spacing at side and end laps~~. Underlayment shall be attached using corrosion-resistant annular ring or deformed shank nails with 1-inch-diameter metal or plastic caps. Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch. The cap nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than $^3/_4$ inch into the roof sheathing. Self-adhering polymer modified bitumen underlayment shall be installed in accordance with the underlayment and roof covering manufacturers' installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.
Clay and concrete tile	R905.3		
BIPV roof covering	R905.15		
Metal roof shingles	R905.4	Manufacturer's installation instructions.	Mechnically fastened underlayment shall be fastened at 6 inches on center 3 inches from the eave and 6 inches on center at all side and end laps. ~~with corrosion-resistant fasteners~~ Underlayment shall be fastened in a grid pattern of not greater than 12 inches on center horizontally and vertically between side laps ~~with a 6-inch spacing at side and end laps~~. Underlayment shall be attached using corrosion-resistant annular ring or deformed shank nails with 1-inch-diameter metal or plastic caps. Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch. The cap nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than $^3/_4$ inch into the roof sheathing. Self-adhering polymer modified bitumen underlayment shall be installed in accordance with the underlayment and roof covering manufacturers' installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering. **Exception:** Self-adhering polymer modified bitumen underlayment shall not be installed under wood shakes or wood shingles.
Mineral-surfaced roll roofing	R905.5		
Slate and slate-type shingles	R905.6		
Wood shingles	R905.7		
Wood shakes	R905.8		
Metal panels	R905.10		

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

Reason: This code change proposal intends to clarify fastening requirements for underlayment at eave locations in areas prone to high winds and hurricanes. The code currently requires corrosion-resistant fasteners in a grid pattern no greater than 12 inches horizontally and vertically, with a 6-inch spacing at side and end laps. However, it does not specifically state how to properly fasten the underlayment at the eave edge, where wind pressures can be significantly higher than on the roof field.

The roof underlayment methods required in high wind areas (V ≥ 130 mph in hurricane-prone regions, and V ≥ 140 mph outside hurricane-prone regions) are intended to provide a secondary barrier against water infiltration through the roof deck if the primary roofing material fails. Given its importance, properly securing underlayment is vital to this function For many roof configurations, wind pressures are highest along the eave edge, particularly the eave edge corners, due to the wind's interaction with the roof structure.

Considering that underlayment is installed shingle fashion, inadequate fastening at the edge can lead to underlayment failure at the eave during high-wind events, potentially causing a cascading failure across other rows of underlayment and compromise the entire underlayment system. This proposal addresses this vulnerability by specifically requiring the first course of underlayment to be fastened at 6 inches on center 3 inches from the eave edge.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is primarily a clarification and is not expected to add any meaningful cost to construction.

RB254-25

IRC: TABLE R905.1.1(3)

Proponents: Mark S. Graham, representing National Roofing Contractors Association (NRCA) (mgraham@nrca.net)

2024 International Residential Code

Revise as follows:

TABLE R905.1.1(3) UNDERLAYMENT ATTACHMENT

Portions of table not shown remain unchanged.

<table>
<tr><th>ROOF COVERING</th><th>SECTION</th><th>AREAS WHERE WIND DESIGN IS NOT REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1</th><th>AREAS WHERE WIND DESIGN IS REQUIRED IN ACCORDANCE WITH FIGURE R301.2.1.1</th></tr>
<tr><td>Asphalt shingles</td><td>R905.2</td><td rowspan="3">~~Fastened sufficiently to hold in place~~ Apply in accordance with the manufacturer's installation instructions.</td><td rowspan="3">Mechnically fastened underlayment shall be fastened with corrosion-resistant fasteners in a grid pattern of 12 inches between side laps with a 6-inch spacing at side and end laps. Underlayment shall be attached using annular ring or deformed shank nails with 1-inch-diameter metal or plastic caps. Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch. The cap nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than $^{3}/_{4}$ inch into the roof sheathing. Self-adhering polymer modified bitumen underlayment shall be installed in accordance with the underlayment and roof covering manufacturers' installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.</td></tr>
<tr><td>Clay and concrete tile</td><td>R905.3</td></tr>
<tr><td>*BIPV roof covering*</td><td>R905.15</td></tr>
<tr><td>Metal roof shingles</td><td>R905.4</td><td rowspan="6">~~Manufacturer's installation instructions~~. Apply in accordance with the manufacturer's installation instructions.</td><td rowspan="6">Mechnically fastened underlayment shall be fastened with corrosion-resistant fasteners in a grid pattern of 12 inches between side laps with a 6-inch spacing at side and end laps. Underlayment shall be attached using annular ring or deformed shank nails with 1-inch-diameter metal or plastic caps. Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch. The cap nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than $^{3}/_{4}$ inch into the roof sheathing. Self-adhering polymer modified bitumen underlayment shall be installed in accordance with the underlayment and roof covering manufacturers' installation instructions for the deck material, roof ventilation configuration and climate exposure of the roof covering.
Exception: Self-adhering polymer modified bitumen underlayment shall not be installed under wood shakes or wood shingles.</td></tr>
<tr><td>Mineral-surfaced roll roofing</td><td>R905.5</td></tr>
<tr><td>Slate and slate-type shingles</td><td>R905.6</td></tr>
<tr><td>Wood shingles</td><td>R905.7</td></tr>
<tr><td>Wood shakes</td><td>R905.8</td></tr>
<tr><td>Metal panels</td><td>R905.10</td></tr>
</table>

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

Reason: This code change proposal is intended to add clarity to the code by consistently addressing underlayment attachment where conventional underlayment attchment applies--that is, areas where wind design is not required. Section R905.1 already requires installation in accordance with the manufacturer's instalaltion instructions. The current notations in Table R905.1.1(3)-Underlayment Attachment differ from that slightly. These are made consistent with this code change proposal.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The code change proposal is clarifying in nature and does not change the code's technical requirements or stringency. As a result, there is no increase or decrease in the cost of construction.

RB261-25

IRC: TABLE R906.2, ASTM Chapter 44

Proponents: Marcin Pazera, representing Polyisocyanurate Insulation Manufacturers Association (mpazera@pima.org); Richard Justin Koscher, representing Polyisocyanurate Insulation Manufacturers Association (jkoscher@pima.org)

2024 International Residential Code

Revise as follows:

TABLE R906.2 MATERIAL STANDARDS FOR ROOF INSULATION

MATERIAL	STANDARD
Cellular glass board	ASTM C552 **or ASTM C1902**
Composite polyisocyanurate boards	ASTM C1289, Type III, IV, V or VI
Expanded polystyrene	ASTM C578
Extruded polystyrene board	ASTM C578
Fiber-reinforced gypsum board	ASTM C1278
Glass-faced gypsum board	ASTM C1177
High-density polyisocyanurate board	ASTM C1289, Type II, Class 4 or 5
Mineral wool board	ASTM C726
Perlite board	ASTM C728
Polyisocyanurate board	ASTM C1289, Type I or II
Wood fiberboard	ASTM C208

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428

C1289—~~22~~25 Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

Reason: The proposed code change includes several changes to Table 1508.2 that lists material standards for roof insulation. The high-density polyisocyanurate board is added to Table R906.2. Type II, Class 4 high-density polyisocyanurate board are already recognized and have been included in the International Building Code (IBC) Table 1508.2 but have not been added to the International Residential Code (IRC). This aligns the requirements in the IRC with the IBC. A new class (Type II, Class 5) of high-density polyisocyanurate board is added to reflect the change in the ASTM C1289 standard. The Type II, Class 5 high-density polyisocyanurate board has glass fiber-reinforced cellulosic facer, and has been recently added to the ASTM C1289 standard along with general requirements for physical properties. The addition of requirements to ASTM C1289 for Type II, Class 5 high-density polyisocyanurate cover boards as well as addition of referenced standard to the IBC's Table 1508.2 will help ensure that products manufactured and installed in roof systems comply with required standards. Additionally, clarification is added that composite boards refer to polyisocyanurate insulation as this is already intended by the referenced ASTM C1289 standard.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The code change proposal has no cost impact. This proposal provides additional option for high-density polyisocyanurate board in certain roofing applications.

RB262-25

IRC: R908.3.1 (New), R908.3.1.1 (New), TABLE R908.3.1.1 (New), R908.3.1.2 (New)

Proponents: T. Eric Stafford, representing Insurance Institute for Business and Home Safety (testafford@charter.net); Milad Shabanian, representing Insurance Institute for Business & Home Safety (mshabanian@ibhs.org)

2024 International Residential Code

Add new text as follows:

R908.3.1 Wood roof deck attachment. Where the roof covering is removed down to the roof deck in *hurricane-prone regions*, the attachment of the roof deck shall be in accordance with Section R908.3.1.1 or R908.3.1.2.

R908.3.1.1 Wood structural panel roof sheathing attachment. The attachment of wood structural panel roof decks shall comply with Table R908.3.1.1. Supplemental fasteners, where required, shall be RSRS-01 (2 3/8" x 0.113" x 0.281" head) ring shank nails.

TABLE R908.3.1.1 SUPPLEMENTAL ROOF DECK FASTENERS AT PANEL EDGES AND INTERMEDIATE FRAMING

Existing Fasteners	Existing Fastener Spacing at Panel Edges or Intermediate Framing	Maximum Supplemental Fastener Spacing at Panel Edges or Intermediate Framing		
		115 mph < V_{ULT} ≤ 140 mph	140 mph < V_{ULT} ≤ 160 mph	160 mph < V_{ULT} ≤ 180 mph
Staples or 6d (2" x 0.113" x 0.266" head)	Any	6 inches on center[a]	6 inches on center[a]	4 inches on center[a]
8d (2 1/2" x 0.131" x 0.281" head) clipped head or round head smooth shank or round head ring shank	6 inches on center or less	None Necessary	None Necessary	4 inches on center[b]
8d (2 1/2" x 0.131" x 0.281" head) clipped head or round head smooth shank or round head ring shank	Greater than 6 inches on center	6 inches on center[b]	6 inches on center[b]	4 inches on center[b]

a. Maximum spacing determined based on supplemental fasteners only.

b. Maximum spacing determined based on existing fasteners and supplemental fasteners

R908.3.1.2 Solid sawn lumber or wood plank roof decking attachment. Roof decks consisting of sawn lumber or wood planks up to 12 inches wide shall be fastened with at least two 8d (2 1/2" x 0.131" x 0.281" head) nails at each roof framing member. For sawn lumber or wood plank decking attached with smaller fasteners or with fewer than two fasteners, additional fasteners shall be added so that the roof decking is attached wth at the 2 fasteners with a minimum size of 8d (2 1/2" x 0.131" x 0.281" head) nails at each roof framing member.

Attached Files

- **Renailing the roof deck cost impacts.pdf**
  https://www.cdpaccess.com/proposal/11186/35372/files/download/9121/

Reason: Performing wind mitigation on existing older buildings to make them more resilient and resistant to wind loads specified by modern building codes can often be challenging and expensive. However, mitigation on one of the most vulnerable elements can be performed rather effortlessly and inexpensively during a roof replacement. The attachment of the roof deck to the roof framing is one of the more critical connections for typical buildings covered by the IRC. Wind loads on the roof deck are typically the largest loads imparted on the building during a windstorm. When windows or doors fail or are breached by wind-borne debris, the wind loads on roof decking are even higher. Failure of the roof decking can result in significant wind and water intrusion into the building causing significant damage to the interior contents and furnishings. Additionally, failure of the roof decking can also result in progressive failure of the roof framing and gable ends due to a lack of support. A securely attached roof deck is critical to the resilience of buildings impacted by windstorms.

When a roof covering is replaced, the existing roofing materials including the underlayment are removed down to the roof deck. This is an opportune and particularly convenient time to evaluate the attachment of the roof deck and add supplemental fasteners as necessary to strengthen the roof deck attachment.The nail spacings shown in Table R903.1.1 are derived from Appendix C Table C202.1.2 in the 2024 International Existing Building Code with some simplifications. They are derived from research conducted in the 1990's at Clemson University tempered by the requirements for roof sheathing attachment for high winds in the Wood Frame Construction Manual. They differ somewhat from the requirements for new construction. Blindly applying the same fastening requirements where fasteners already exist could potentially compromise performance because of damage to roof decking or framing members. The assumption is that there is an optimum spacing of existing and new fasteners that is a function of the number and type of existing connectors. Adding fasteners where fasteners already exist is different than installing fasteners in new construction because of the greater potential for damaging sheathing or framing members. Smaller diameter fasteners such as staples damage framing members less than larger diameter fasteners and they provide significantly lower uplift resistance. Consequently, in these situations supplemental fasteners can be installed at typical new construction spacing without concern for splitting the structural members. The addition of supplemental fasteners will approach fastening requirements in the current code to approach a similar performance level. This code change provides the guidance that is needed when adding fasteners where fasteners already exist.This code change will align the IRC with the requirements for an IBHS Fortified designation and is also supported by FEMA's post-disaster assessments of residential buildings. The FEMA Hurricane Michael MAT report noted several instances of severe roof sheathing failures pre-FBC (buildings built before the effective date of the FBC) with asphalt shingles that were recovered with metal roof panels. The report recommended that when reroofing, the existing layer of roof covering be removed down to the deck and the roof sheathing attachment be evaluated. If the sheathing attachment was inadequate, supplemental fasteners should be added to strengthen the roof deck.

The FORTIFIED Home™ program was developed to reduce avoidable suffering and financial loss caused by hurricanes, high winds, and hail. The program requirements provide a systems-based, multi tiered approach for improving the resistance of homes and their contents to damage caused by wind, wind-driven rain, and hail. There are three designation levels—FORTIFIED Roof™, FORTIFIED Silver™, and FORTIFIED Gold™—that build on each other and address different systems of the home.
The Florida Building Code has required renailing of the roof deck during roof replacements for pre-FBC buildings since the 2007 Florida Building Code.

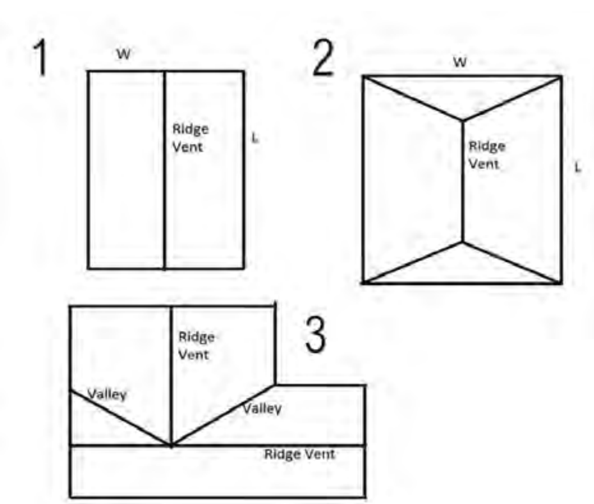
Cost Impact: Increase

Estimated Immediate Cost Impact:

$284.92 to $679.48 see justification.

For our cost impact estimates, we used Xactimate which is a construction cost estimating software program. Select markets in the following states within the hurricane-prone region were analyzed: Texas, Louisiana, Mississippi, Alabama, Georgia, South Carolina, North Carolina, Delaware, Connecticut, New Jersey, and New York.

Three roof configurations were analyzed – 3 gable, 2 gable, and hip. Additionally, we estimated the cost impacts for large roofs (2800 square feet to 3016 square feet) and small roofs (1575 square feet to 1696 square feet).



This cost estimate is a "worst-case" scenario for re-nailing the roof deck at 6 inches on center. It assumes that the entire deck has to be re-nailed at 6 inches on center. Depending on the existing fastener type and spacing, this may not be necessary.

A copy of the Xactimate report for this analysis is attached to this code change.

The cost varies according to the markets analyzed but are within close ranges.

Large Roofs – (2800 square feet to 3016 square feet)

For large roofs the cost for re-nailing the roof deck ranges from a low of $506.52 in Alabama to a high of $1208.32 in Connecticut for the markets analyzed. These costs represent increases of 4.4% and 6.4% respectively of the total cost of the roof replacement (roof covering, underlayment, ventilation components, etc.) for the markets analyzed.

Small Roofs – (1575 square feet to 1696 square feet)

For small roofs the cost for re-nailing the roof deck ranges from a low of $284.92 in Alabama to a high of $679.48 in Connecticut for the markets analyzed. These costs represent increases of 4.2% and 5.2% respectively of the total cost of the roof replacement (roof covering, underlayment, ventilation components, etc.) for the markets analyzed.

Although this code change will increase roof replacement costs, the additional costs are modest and will significantly reduce the likelihood of failure under anticipated wind loads, and thus will decrease future costs associated with repairs and rebuilding after high wind events.

Estimated Immediate Cost Impact Justification (methodology and variables):

Xactimate, which is a construction cost estimating software program, was used to analyze the cost impacts of this proposal.

RB273-25

IRC: APPENDIX AB, SECTION AB101, AB101.1, TABLE AB101.1

Proponents: Jeff Grove, Chair, representing BCAC (bcac@iccsafe.org)

2024 International Residential Code

Delete without substitution:

~~APPENDIX AB~~
~~PERMIT FEES~~

~~SECTION AB101~~
~~GENERAL~~

~~**AB101.1 Permit fee schedule.** *Permit* fees shall be in accordance with Table AB101.1.~~

~~TABLE AB101.1 PERMIT FEE SCHEDULE~~

~~TOTAL VALUATION~~	~~FEE~~
~~$1 to $500~~	~~$24~~
~~$501 to $2,000~~	~~$24 for the first $500; plus $3 for each additional $100 or fraction thereof, up to and including $2,000~~
~~$2,001 to $40,000~~	~~$69 for the first $2,000; plus $11 for each additional $1,000 or fraction thereof, up to and including $40,000~~
~~$40,001 to $100,000~~	~~$487 for the first $40,000; plus $9 for each additional $1,000 or fraction thereof, up to and including $100,000~~
~~$100,000 to $500,000~~	~~$1,027 for the first $100,000; plus $7 for each additional $1,000 or fraction thereof, up to and including $500,000~~
~~$500,001 to $1,000,000~~	~~$3,827 for the first $500,000; plus $5 for each additional $1,000 or fraction thereof, up to and including $1,000,000~~
~~$1,000,001 to $5,000,000~~	~~$6,327 for the first $1,000,000; plus $3 for each additional $1,000 or fraction thereof, up to and including $5,000,000~~
~~$5,000,001 and over~~	~~$18,327 for the first $5,000,000; plus $1 for each additional $1,000 or fraction thereof~~

Reason: ADM27-19 removed fees schedules from being inserted at the time of adoption into the IMC, IPC, IPMC, IFGC and ISPSC. If the jurisdiction is on a code for 3 to 6 years, this would prohibit them from adjusting their fees. Adoption of an appendix with fees (IRC) would have the same effect. This appendix should be deleted. A similar change to remove the fees appendix from the IPC and IMC was approved in P159-24 Part I and II.

This proposal is submitted by the ICC Building Code Action Committee (BCAC).

BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and 2024 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC webpage.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is editorial. See reason statement.

RB274-25

IRC: BE101.1, FIGURE BE101.1, TABLE BE101.1

Proponents: Thomas Bowles, representing USEPA (bowles.thomas@epa.gov); Jane Malone, representing Indoor Environments Association (janemalonedc@gmail.com); Kevin Stewart, Director, Environmental Health, representing American Lung Association (kevin.stewart@lung.org); Jonathan Wilson, representing National Center for Healthy Housing (jwilson@nchh.org); Joshua Kerber, Minnesota Department of Health, representing Minnesota Department of Health and CRCPD E25 Committee on Radon (joshua.kerber@state.mn.us); Ruth McBurney, representing Conference of Radiation Control Program Directors, Inc. (rmcburney@crcpd.org)

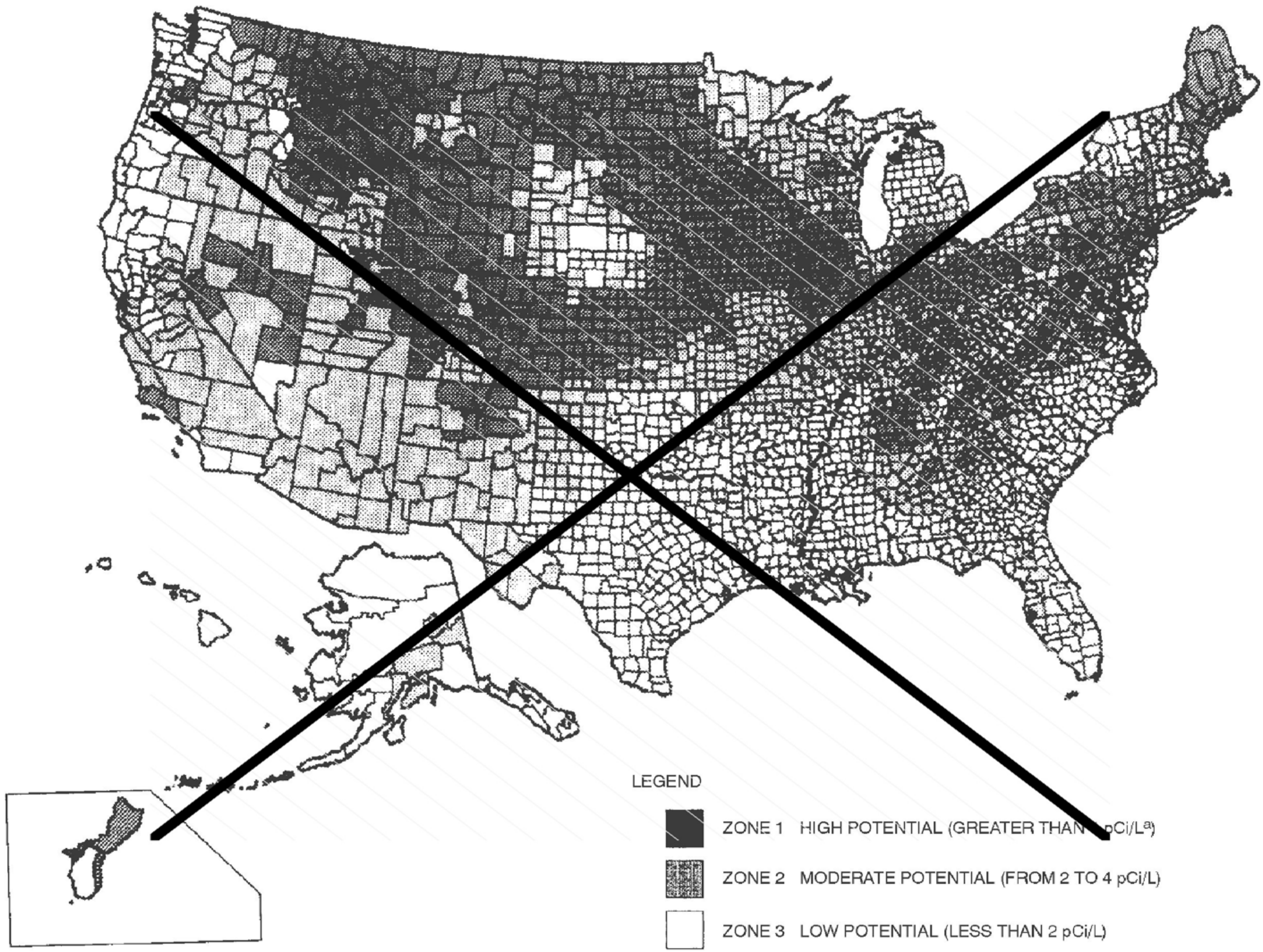
2024 International Residential Code

APPENDIX BE
RADON CONTROL METHODS

Revise as follows:

BE101.1 General. This appendix contains requirements for new construction in jurisdictions where radon-resistant construction is required. ~~Inclusion of this appendix by *jurisdictions* shall be determined through the use of locally available data or determination of Zone 1 designation in Figure AF101.1 and Table AF101.1.~~

Delete without substitution:


LEGEND
ZONE 1 HIGH POTENTIAL (GREATER THAN pCi/La)
ZONE 2 MODERATE POTENTIAL (FROM 2 TO 4 pCi/L)
ZONE 3 LOW POTENTIAL (LESS THAN 2 pCi/L)

a. pCi/L stands for picocuries per liter of radon gas. The US Environmental Protection Agency (EPA) recommends that homes that measure 4 pCi/L and greater be mitigated.

The EPA and the US Geological Survey have evaluated the radon potential in the United States and have developed a map of radon zones designed to assist building officials in deciding whether radon-resistant features are applicable in new construction.

The map assigns each of the 3,141 counties in the United States to one of three zones based on radon potential. Each zone designation reflects the average short-term radon measurement that can be expected to be measured in a *building* without the implementation of radon-control methods. The radon zone designation of highest priority is Zone 1. Table BE101.1 lists the Zone 1 counties illustrated on the map. More detailed information can be obtained from state-specific booklets (EPA-401-R-93-021 through 070) available through the State Radon Offices or from the EPA Regional Offices.

FIGURE BE101.1 EPA MAP OF RADON ZONES

TABLE BE101.1 HIGH RADON-POTENTIAL (ZONE 1) COUNTIES[a]

ALABAMA
Calhoun
Clay
Cleburne
Colbert
Coosa
Franklin
Jackson
Lauderdale
Lawrence
Limestone
Madison
Morgan
Talladega
CALIFORNIA
Santa Barbara
Ventura
COLORADO
Adams
Arapahoe
Baca
Bent
Boulder
Chaffee
Cheyenne
Clear Creek
Crowley
Custer
Delta
Denver
Dolores
Douglas
El Paso
Elbert
Fremont
Garfield
Gilpin
Grand
Gunnison
Huerfano
Jackson
Jefferson
Kiowa
Kit Carson
Lake
Larimer
Las Animas
Lincoln

~~Logan~~
~~Mesa~~
~~Moffat~~
~~Montezuma~~
~~Montrose~~
~~Morgan~~
~~Otero~~
~~Ouray~~
~~Park~~
~~Phillips~~
~~Pitkin~~
~~Prowers~~
~~Pueblo~~
~~Rio Blanco~~
~~San Miguel~~
~~Summit~~
~~Teller~~
~~Washington~~
~~Weld~~
~~Yuma~~
~~CONNECTICUT~~
~~Fairfield~~
~~Middlesex~~
~~New Haven~~
~~New London~~
~~GEORGIA~~
~~Cobb~~
~~De Kalb~~
~~Fulton~~
~~Gwinnett~~
~~IDAHO~~
~~Benewah~~
~~Blaine~~
~~Boise~~
~~Bonner~~
~~Boundary~~
~~Butte~~
~~Camas~~
~~Clark~~
~~Clearwater~~
~~Custer~~
~~Elmore~~
~~Fremont~~
~~Gooding~~
~~Idaho~~
~~Kootenai~~
~~Latah~~
~~Lemhi~~
~~Shoshone~~
~~Valley~~
~~ILLINOIS~~
~~Adams~~
~~Boone~~
~~Brown~~
~~Bureau~~
~~Calhoun~~
~~Carroll~~
~~Cass~~
~~Champaign~~
~~Coles~~
~~De Kalb~~
~~De Witt~~
~~Douglas~~
~~Edgar~~
~~Ford~~
~~Fulton~~
~~Greene~~
~~Grundy~~
~~Hancock~~
~~Henderson~~
~~Henry~~

~~Iroquois~~
~~Jersey~~
~~Jo Daviess~~
~~Kane~~
~~Kendall~~
~~Knox~~
~~La Salle~~
~~Lee~~
~~Livingston~~
~~Logan~~
~~Macon~~
~~Marshall~~
~~Mason~~
~~McDonough~~
~~McLean~~
~~Menard~~
~~Mercer~~
~~Morgan~~
~~Moultrie~~
~~Ogle~~
~~Peoria~~
~~Piatt~~
~~Pike~~
~~Putnam~~
~~Rock Island~~
~~Sangamon~~
~~Schuyler~~
~~Scott~~
~~Stark~~
~~Stephenson~~
~~Tazewell~~
~~Vermilion~~
~~Warren~~
~~Whiteside~~
~~Winnebago~~
~~Woodford~~
~~INDIANA~~
~~Adams~~
~~Allen~~
~~Bartholomew~~
~~Benton~~
~~Blackford~~
~~Boone~~
~~Carroll~~
~~Cass~~
~~Clark~~
~~Clinton~~
~~De Kalb~~
~~Decatur~~
~~Delaware~~
~~Elkhart~~
~~Fayette~~
~~Fountain~~
~~Fulton~~
~~Grant~~
~~Hamilton~~
~~Hancock~~
~~Harrison~~
~~Hendricks~~
~~Henry~~
~~Howard~~
~~Huntington~~
~~Jay~~
~~Jennings~~
~~Johnson~~
~~Kosciusko~~
~~LaGrange~~
~~Lawrence~~
~~Madison~~
~~Marion~~
~~Marshall~~
~~Miami~~

~~Monroe~~
~~Montgomery~~
~~Noble~~
~~Orange~~
~~Putnam~~
~~Randolph~~
~~Rush~~
~~Scott~~
~~Shelby~~
~~St. Joseph~~
~~Steuben~~
~~Tippecanoe~~
~~Tipton~~
~~Union~~
~~Vermillion~~
~~Wabash~~
~~Warren~~
~~Washington~~
~~Wayne~~
~~Wells~~
~~White~~
~~Whitley~~
~~IOWA~~
~~All Counties~~
~~KANSAS~~
~~Atchison~~
~~Barton~~
~~Brown~~
~~Cheyenne~~
~~Clay~~
~~Cloud~~
~~Decatur~~
~~Dickinson~~
~~Douglas~~
~~Ellis~~
~~Ellsworth~~
~~Finney~~
~~Ford~~
~~Geary~~
~~Gove~~
~~Graham~~
~~Grant~~
~~Gray~~
~~Greeley~~
~~Hamilton~~
~~Haskell~~
~~Hodgeman~~
~~Jackson~~
~~Jewell~~
~~Johnson~~
~~Kearny~~
~~Kingman~~
~~Kiowa~~
~~Lane~~
~~Leavenworth~~
~~Lincoln~~
~~Logan~~
~~Marion~~
~~Marshall~~
~~McPherson~~
~~Meade~~
~~Mitchell~~
~~Nemaha~~
~~Ness~~
~~Norton~~
~~Osborne~~
~~Ottawa~~
~~Pawnee~~
~~Phillips~~
~~Pottawatomie~~
~~Pratt~~
~~Rawlins~~

~~Republic~~
~~Rice~~
~~Riley~~
~~Rooks~~
~~Rush~~
~~Saline~~
~~Scott~~
~~Sheridan~~
~~Sherman~~
~~Smith~~
~~Stanton~~
~~Thomas~~
~~Trego~~
~~Wallace~~
~~Washington~~
~~Wichita~~
~~Wyandotte~~
~~KENTUCKY~~
~~Adair~~
~~Allen~~
~~Barren~~
~~Bourbon~~
~~Boyle~~
~~Bullitt~~
~~Casey~~
~~Clark~~
~~Cumberland~~
~~Fayette~~
~~Franklin~~
~~Green~~
~~Harrison~~
~~Hart~~
~~Jefferson~~
~~Jessamine~~
~~Lincoln~~
~~Marion~~
~~Mercer~~
~~Metcalfe~~
~~Monroe~~
~~Nelson~~
~~Pendleton~~
~~Pulaski~~
~~Robertson~~
~~Russell~~
~~Scott~~
~~Taylor~~
~~Warren~~
~~Woodford~~
~~MAINE~~
~~Androscoggin~~
~~Aroostook~~
~~Cumberland~~
~~Franklin~~
~~Hancock~~
~~Kennebec~~
~~Lincoln~~
~~Oxford~~
~~Penobscot~~
~~Piscataquis~~
~~Somerset~~
~~York~~
~~MARYLAND~~
~~Baltimore~~
~~Calvert~~
~~Carroll~~
~~Frederick~~
~~Harford~~
~~Howard~~
~~Montgomery~~
~~Washington~~
~~MASS.~~

~~Essex~~
~~Middlesex~~
~~Worcester~~
~~**MICHIGAN**~~
~~Branch~~
~~Calhoun~~
~~Cass~~
~~Hillsdale~~
~~Jackson~~
~~Kalamazoo~~
~~Lenawee~~
~~St. Joseph~~
~~Washtenaw~~
~~**MINNESOTA**~~
~~Becker~~
~~Big Stone~~
~~Blue Earth~~
~~Brown~~
~~Carver~~
~~Chippewa~~
~~Clay~~
~~Cottonwood~~
~~Dakota~~
~~Dodge~~
~~Douglas~~
~~Faribault~~
~~Fillmore~~
~~Freeborn~~
~~Goodhue~~
~~Grant~~
~~Hennepin~~
~~Houston~~
~~Hubbard~~
~~Jackson~~
~~Kanabec~~
~~Kandiyohi~~
~~Kittson~~
~~Lac Qui Parle~~
~~Le Sueur~~
~~Lincoln~~
~~Lyon~~
~~Mahnomen~~
~~Marshall~~
~~Martin~~
~~McLeod~~
~~Meeker~~
~~Mower~~
~~Murray~~
~~Nicollet~~
~~Nobles~~
~~Norman~~
~~Olmsted~~
~~Otter Tail~~
~~Pennington~~
~~Pipestone~~
~~Polk~~
~~Pope~~
~~Ramsey~~
~~Red Lake~~
~~Redwood~~
~~Renville~~
~~Rice~~
~~Rock~~
~~Roseau~~
~~Scott~~
~~Sherburne~~
~~Sibley~~
~~Stearns~~
~~Steele~~
~~Stevens~~
~~Swift~~
~~Todd~~

~~Traverse~~
~~Wabasha~~
~~Wadena~~
~~Waseca~~
~~Washington~~
~~Watonwan~~
~~Wilkin~~
~~Winona~~
~~Wright~~
~~Yellow Medicine~~
~~MISSOURI~~
~~Andrew~~
~~Atchison~~
~~Buchanan~~
~~Cass~~
~~Clay~~
~~Clinton~~
~~Holt~~
~~Iron~~
~~Jackson~~
~~Nodaway~~
~~Platte~~
~~MONTANA~~
~~Beaverhead~~
~~Big Horn~~
~~Blaine~~
~~Broadwater~~
~~Carbon~~
~~Carter~~
~~Cascade~~
~~Chouteau~~
~~Custer~~
~~Daniels~~
~~Dawson~~
~~Deer Lodge~~
~~Fallon~~
~~Fergus~~
~~Flathead~~
~~Gallatin~~
~~Garfield~~
~~Glacier~~
~~Granite~~
~~Hill~~
~~Jefferson~~
~~Judith Basin~~
~~Lake~~
~~Lewis and Clark~~
~~Madison~~
~~McCone~~
~~Meagher~~
~~Missoula~~
~~Park~~
~~Phillips~~
~~Pondera~~
~~Powder River~~
~~Powell~~
~~Prairie~~
~~Ravalli~~
~~Richland~~
~~Roosevelt~~
~~Rosebud~~
~~Sanders~~
~~Sheridan~~
~~Silver Bow~~
~~Stillwater~~
~~Teton~~
~~Toole~~
~~Valley~~
~~Wibaux~~
~~Yellowstone~~
~~NEBRASKA~~
~~Adams~~

~~Boone~~
~~Boyd~~
~~Burt~~
~~Butler~~
~~Cass~~
~~Cedar~~
~~Clay~~
~~Colfax~~
~~Cuming~~
~~Dakota~~
~~Dixon~~
~~Dodge~~
~~Douglas~~
~~Fillmore~~
~~Franklin~~
~~Frontier~~
~~Furnas~~
~~Gage~~
~~Gosper~~
~~Greeley~~
~~Hamilton~~
~~Harlan~~
~~Hayes~~
~~Hitchcock~~
~~Hurston~~
~~Jefferson~~
~~Johnson~~
~~Kearney~~
~~Knox~~
~~Lancaster~~
~~Madison~~
~~Nance~~
~~Nemaha~~
~~Nuckolls~~
~~Otoe~~
~~Pawnee~~
~~Phelps~~
~~Pierce~~
~~Platte~~
~~Polk~~
~~Red Willow~~
~~Richardson~~
~~Saline~~
~~Sarpy~~
~~Saunders~~
~~Seward~~
~~Stanton~~
~~Thayer~~
~~Washington~~
~~Wayne~~
~~Webster~~
~~York~~
~~NEVADA~~
~~Carson City~~
~~Douglas~~
~~Eureka~~
~~Lander~~
~~Lincoln~~
~~Lyon~~
~~Mineral~~
~~Pershing~~
~~White Pine~~
~~NEW HAMPSHIRE~~
~~Carroll~~
~~NEW JERSEY~~
~~Hunterdon~~
~~Mercer~~
~~Monmouth~~
~~Morris~~
~~Somerset~~
~~Sussex~~
~~Warren~~

~~**NEW MEXICO**~~
~~Bernalillo~~
~~Colfax~~
~~Mora~~
~~Rio Arriba~~
~~San Miguel~~
~~Santa Fe~~
~~Taos~~
~~**NEW YORK**~~
~~Albany~~
~~Allegany~~
~~Broome~~
~~Cattaraugus~~
~~Cayuga~~
~~Chautauqua~~
~~Chemung~~
~~Chenango~~
~~Columbia~~
~~Cortland~~
~~Delaware~~
~~Dutchess~~
~~Erie~~
~~Genesee~~
~~Greene~~
~~Livingston~~
~~Madison~~
~~Onondaga~~
~~Ontario~~
~~Orange~~
~~Otsego~~
~~Putnam~~
~~Rensselaer~~
~~Schoharie~~
~~Schuyler~~
~~Seneca~~
~~Steuben~~
~~Sullivan~~
~~Tioga~~
~~Tompkins~~
~~Ulster~~
~~Washington~~
~~Wyoming~~
~~Yates~~
~~**N. CAROLINA**~~
~~Alleghany~~
~~Buncombe~~
~~Cherokee~~
~~Henderson~~
~~Mitchell~~
~~Rockingham~~
~~Transylvania~~
~~Watauga~~
~~**N. DAKOTA**~~
~~All Counties~~
~~**OHIO**~~
~~Adams~~
~~Allen~~
~~Ashland~~
~~Auglaize~~
~~Belmont~~
~~Butler~~
~~Carroll~~
~~Champaign~~
~~Clark~~
~~Clinton~~
~~Columbiana~~
~~Coshocton~~
~~Crawford~~
~~Darke~~
~~Delaware~~
~~Fairfield~~
~~Fayette~~

~~Franklin~~
~~Greene~~
~~Guernsey~~
~~Hamilton~~
~~Hancock~~
~~Hardin~~
~~Harrison~~
~~Holmes~~
~~Huron~~
~~Jefferson~~
~~Knox~~
~~Licking~~
~~Logan~~
~~Madison~~
~~Marion~~
~~Mercer~~
~~Miami~~
~~Montgomery~~
~~Morrow~~
~~Muskingum~~
~~Perry~~
~~Pickaway~~
~~Pike~~
~~Preble~~
~~Richland~~
~~Ross~~
~~Seneca~~
~~Shelby~~
~~Stark~~
~~Summit~~
~~Tuscarawas~~
~~Union~~
~~Van Wert~~
~~Warren~~
~~Wayne~~
~~Wyandot~~
~~PENNSYLVANIA~~
~~Adams~~
~~Allegheny~~
~~Armstrong~~
~~Beaver~~
~~Bedford~~
~~Berks~~
~~Blair~~
~~Bradford~~
~~Bucks~~
~~Butler~~
~~Cameron~~
~~Carbon~~
~~Centre~~
~~Chester~~
~~Clarion~~
~~Clearfield~~
~~Clinton~~
~~Columbia~~
~~Cumberland~~
~~Dauphin~~
~~Delaware~~
~~Franklin~~
~~Fulton~~
~~Huntingdon~~
~~Indiana~~
~~Juniata~~
~~Lackawanna~~
~~Lancaster~~
~~Lebanon~~
~~Lehigh~~
~~Luzerne~~
~~Lycoming~~
~~Mifflin~~
~~Monroe~~
~~Montgomery~~

~~Montour~~
~~Northampton~~
~~Northumberland~~
~~Perry~~
~~Schuylkill~~
~~Snyder~~
~~Sullivan~~
~~Susquehanna~~
~~Tioga~~
~~Union~~
~~Venango~~
~~Westmoreland~~
~~Wyoming~~
~~York~~
~~**RHODE ISLAND**~~
~~Kent~~
~~Washington~~
~~**S. CAROLINA**~~
~~Greenville~~
~~**S. DAKOTA**~~
~~Aurora~~
~~Beadle~~
~~Bon Homme~~
~~Brookings~~
~~Brown~~
~~Brule~~
~~Buffalo~~
~~Campbell~~
~~Charles Mix~~
~~Clark~~
~~Clay~~
~~Codington~~
~~Corson~~
~~Davison~~
~~Day~~
~~Deuel~~
~~Douglas~~
~~Edmunds~~
~~Faulk~~
~~Grant~~
~~Hamlin~~
~~Hand~~
~~Hanson~~
~~Hughes~~
~~Hutchinson~~
~~Hyde~~
~~Jerauld~~
~~Kingsbury~~
~~Lake~~
~~Lincoln~~
~~Lyman~~
~~Marshall~~
~~McCook~~
~~McPherson~~
~~Miner~~
~~Minnehaha~~
~~Moody~~
~~Perkins~~
~~Potter~~
~~Roberts~~
~~Sanborn~~
~~Spink~~
~~Stanley~~
~~Sully~~
~~Turner~~
~~Union~~
~~Walworth~~
~~Yankton~~
~~**TENNESSEE**~~
~~Anderson~~
~~Bedford~~

~~Blount~~
~~Bradley~~
~~Claiborne~~
~~Davidson~~
~~Giles~~
~~Grainger~~
~~Greene~~
~~Hamblen~~
~~Hancock~~
~~Hawkins~~
~~Hickman~~
~~Humphreys~~
~~Jackson~~
~~Jefferson~~
~~Knox~~
~~Lawrence~~
~~Lewis~~
~~Lincoln~~
~~Loudon~~
~~Marshall~~
~~Maury~~
~~McMinn~~
~~Meigs~~
~~Monroe~~
~~Moore~~
~~Perry~~
~~Roane~~
~~Rutherford~~
~~Smith~~
~~Sullivan~~
~~Trousdale~~
~~Union~~
~~Washington~~
~~Wayne~~
~~Williamson~~
~~Wilson~~
~~UTAH~~
~~Carbon~~
~~Duchesne~~
~~Grand~~
~~Piute~~
~~Sanpete~~
~~Sevier~~
~~Uintah~~
~~VIRGINIA~~
~~Alleghany~~
~~Amelia~~
~~Appomattox~~
~~Augusta~~
~~Bath~~
~~Bland~~
~~Botetourt~~
~~Bristol~~
~~Brunswick~~
~~Buckingham~~
~~Buena Vista~~
~~Campbell~~
~~Chesterfield~~
~~Clarke~~
~~Clifton Forge~~
~~Covington~~
~~Craig~~
~~Cumberland~~
~~Danville~~
~~Dinwiddie~~
~~Fairfax~~
~~Falls Church~~
~~Fluvanna~~
~~Frederick~~
~~Fredericksburg~~
~~Giles~~
~~Goochland~~

~~Harrisonburg~~
~~Henry~~
~~Highland~~
~~Lee~~
~~Lexington~~
~~Louisa~~
~~Martinsville~~
~~Montgomery~~
~~Nottoway~~
~~Orange~~
~~Page~~
~~Patrick~~
~~Pittsylvania~~
~~Powhatan~~
~~Pulaski~~
~~Radford~~
~~Roanoke~~
~~Rockbridge~~
~~Rockingham~~
~~Russell~~
~~Salem~~
~~Scott~~
~~Shenandoah~~
~~Smyth~~
~~Spotsylvania~~
~~Stafford~~
~~Staunton~~
~~Tazewell~~
~~Warren~~
~~Washington~~
~~Waynesboro~~
~~Winchester~~
~~Wythe~~
~~WASHINGTON~~
~~Clark~~
~~Ferry~~
~~Okanogan~~
~~Pend Oreille~~
~~Skamania~~
~~Spokane~~
~~Stevens~~
~~W. VIRGINIA~~
~~Berkeley~~
~~Brooke~~
~~Grant~~
~~Greenbrier~~
~~Hampshire~~
~~Hancock~~
~~Hardy~~
~~Jefferson~~
~~Marshall~~
~~Mercer~~
~~Mineral~~
~~Monongalia~~
~~Monroe~~
~~Morgan~~
~~Ohio~~
~~Pendleton~~
~~Pocahontas~~
~~Preston~~
~~Summers~~
~~Wetzel~~
~~WISCONSIN~~
~~Buffalo~~
~~Crawford~~
~~Dane~~
~~Dodge~~
~~Door~~
~~Fond du Lac~~
~~Grant~~
~~Green~~

~~Green Lake~~
~~Iowa~~
~~Jefferson~~
~~Lafayette~~
~~Langlade~~
~~Marathon~~
~~Menominee~~
~~Pepin~~
~~Pierce~~
~~Portage~~
~~Richland~~
~~Rock~~
~~Shawano~~
~~St. Croix~~
~~Vernon~~
~~Walworth~~
~~Washington~~
~~Waukesha~~
~~Waupaca~~
~~Wood~~
~~**WYOMING**~~
~~Albany~~
~~Big Horn~~
~~Campbell~~
~~Carbon~~
~~Converse~~
~~Crook~~
~~Fremont~~
~~Goshen~~
~~Hot Springs~~
~~Johnson~~
~~Laramie~~
~~Lincoln~~
~~Natrona~~
~~Niobrara~~
~~Park~~
~~Sheridan~~
~~Sublette~~
~~Sweetwater~~
~~Teton~~
~~Uinta~~
~~Washakie~~

~~a. The EPA recommends that this county listing be supplemented with other available state and local data to further understand the radon potential of a Zone 1 area.~~

Reason: The EPA map and Zone 1 county list are based in part on a 1993 survey that measured radon in 5694 homes, less than two per each of the 3141counties in the US. As more recent data have been compiled by states and the US Centers for Disease Control and Prevention, it is evident that more counties' have homes that exceed the EPA action level.

Radon Zone 1 counties are defined as having a predicted year-round average indoor radon screening level in the lowest livable area of a structure greater than or equal to four picocuries per liter of air (pCi/L). Relying on an average radon level does not address the full range of risk within a given county. Levels greater than 4 have been found in 85% of US counties tested.

Restricting localities as to when or how they may include the appendix("shall be determined through") can cause this appendix to conflict with local authority.

While opponents may suggest otherwise, deleting the county information does not impose a requirement for adoption in Zones 2 and 3.Appendix BE will remain an optional appendix that is only in effect where the jurisdiction has adopted it.

The purpose of the EPA radon zone map, since its inception, has been to show potential of risk not ACTUAL risk. While it is still a useful tool, the map unintentionally creates a false sense of security for those in Zone 2 and Zone 3 that risk in those areas is nonexistent. The fact remains that radon is found in all zones and to truly protect against radon you need to test regardless of zone.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Removing a reference will have no impact on cost. Appendix BE is an optional requirement that can be adopted by a jurisdiction.

RB274-25

RB275-25

IRC: BE103.1, SECTION BE105 (New), BE105.1 (New), TABLE 105.1 (New)

Proponents: Jane Malone, representing Indoor Environments Association (janemalonedc@gmail.com); Kevin Stewart, Director, Environmental Health, representing American Lung Association (kevin.stewart@lung.org); Jonathan Wilson, representing National Center for Healthy Housing (jwilson@nchh.org); Thomas Bowles, representing USEPA (bowles.thomas@epa.gov); Joshua Kerber, Minnesota Department of Health, representing Minnesota Department of Health and CRCPD E25 Committee on Radon (joshua.kerber@state.mn.us); Ruth McBurney, representing Conference of Radiation Control Program Directors, Inc. (rmcburney@crcpd.org); Kyle Hoylman, representing Indoor Environments Association

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APPENDIX BE
RADON CONTROL METHODS

Revise as follows:

BE103.1 General. The following construction techniques are intended to resist radon entry and prepare the *building* for post-construction radon mitigation, if necessary (see Figure BE103.1). These techniques are required in areas where designated by the *jurisdiction*. Radon control systems shall comply with Sections BE103.2 through BE103.12 or ANSI/AARST RRNC.

Add new text as follows:

SECTION BE105
REFERENCED STANDARDS

BE105.1 General. See Table BE105.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, the standard title, and the section or sections of this appendix that reference the standard.

TABLE 105.1 REFERENCED STANDARDS

STANDARD ACRONYM	STANDARD NAME	SECTIONS HEREIN REFERENCED
ANSI/AARST RRNC 2020 Rev.10/22	Rough-in of Radon Control Components in New Construction of 1 and 2 Family Dwellings and Townhouses	BE103.1

Reason: Adding the ANSI/AARSTRRNC standard asan alternative method allowsthe builderto fulfill a jurisdictional requirementfor radoncontrolby followinganEPA-recommendedvoluntary consensus standardfor radoncontrolsystem components innewdwelling units. Its moredetailedguidancecanassist builders inthe successfulinstallationof radonsystems, preventinghighradonlevels and reducing buyer callbacks.

Thestandardhasbeendevelopedandismaintainedbyadiversegroupof stakeholdersrepresentingnot onlyradonexpertsbut also home builders,design professionals,state government,federal agencies,and public health leadership.
TheCommonwealthofMassachusettsallows a similar ANSI/AARST new construction standard asanalternativetoitsstatewidebuildingcode’s versionof IRC AppendixBE.
ANSI/AARSTRRNC supports code officials, building inspectors,and otherpartieswho inspectsystem componentsinstalledunderthestandardwitha visual review checklist inthecompanionguidance.
Thisstandardcanbeviewed atnocostontheStandardsConsortium'swebsite.

The full name and address of the promulgator is: American Association of Radon Scientists and Technologists, 527 N. Justice Street, Hendersonville NC 28739

Bibliography:

RRNC 2020 Rev. 10/22 ***Rough-in of Radon Control Components in New Construction of 1 & 2 family dwellings and townhouses***

https://standards.aarst.org/RRNC-2020-1022/index.html#zoom=z

US Environmental Protection Agency - *Current Standards of Practice*
https://www.epa.gov/radon/radon-standards-practice

Massachusetts State Board of Building Regulation and Standards - *Building Code*
https://www.mass.gov/doc/bbrs-10th-edition-building-code/download

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Since this alternative method would not be required, there is no inherent change in the cost of construction.

Staff Analysis: A review of the following standards proposed for inclusion in the code regarding some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before April 1, 2025.
ANSI/AARST RRNC 2020 Rev.10/22 Rough-in of Radon Control Components in New Construction of 1 & 2 family dwellings and townhouses

RB275-25

RB282-25

IRC: APPENDIX BH, BH101.1, SECTION BH103, BH103.1, BH103.2, BH103.3 (New), TABLE BH104.1

Proponents: Catherine Mills-Reynolds, American Fence Association, representing AFA (catherine@americanfenceassociation.com); Ben Shirley, Ameristar Perimeter Security, representing ASTM F14 (ben.shirley@assaabloy.com); Dave Monsour, Thomas Associates, representing DASMA (dmonsour@thomasamc.com); Richard Sedivy, DoorKing, Inc., representing DASMA (rsedivy@doorking.com); Kevin Ward, Miller Edge Inc, representing American Fence Association (kward@milleredge.com); Don Jeppson, representing City of San Rafael (don.jeppson@cityofsanrafael.org); Scott Kinney, D&D Technologies, representing ASTM F14.15 Gates (skinney@ddtechusa.com); Eric Quanbeck, representing The Hummingbird Alliance (eric.m.quanbeck@gmail.com); Jeff Grove, Chair, representing BCAC (bcac@iccsafe.org)

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Revise as follows:

APPENDIX BH
~~AUTOMATIC VEHICULAR~~ GATES

BH101.1 General. The provisions of this appendix shall control the design and construction of horizontal, swing or automatic vehicular gates, installed on the *lot* of a one- or two-family dwelling or a *townhouse*.

SECTION BH103
HORIZONTAL, SWING AND ~~AUTOMATIC~~ VEHICULAR GATES

Add new text as follows:

BH103.1 General. A horizontal slide gate or a swing gate installed in an opening more than 48 inches (1219 mm) measured horizontally or 84 inches (2134 mm) or greater measured vertically shall comply with this section. *Vehicular gates* of any size shall comply with this section.

BH103.2 Slide gates. A gate that slides in the plane of the gate shall be designed, constructed, and installed in accordance with ASTM F1184.

BH103.3 Swing gates. A hinged or swing gate shall be designed, constructed, and installed in accordance with ASTM F900.

Revise as follows:

BH103.4 ~~BH103.1~~ Vehicular gates intended for automation. *Vehicular gates* intended for automation shall be designed, constructed and installed to comply with the requirements of ASTM F2200.

BH103.5 ~~BH103.2~~ Vehicular gate openers. *Vehicular gate* openers, where provided, shall be *listed* in accordance with UL 325.

SECTION BH104
REFERENCED STANDARDS

BH104.1 General. See Table BH104.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, the standard title, and the section or sections of this appendix that reference the standard.

TABLE BH104.1 REFERENCED STANDARDS

STANDARD ACRONYM	STANDARD NAME	SECTIONS HEREIN REFERENCED
ASTM F1184-23	*Standard Specification for Industrial and Commercial Horizontal Slide Gates*	BH103.1.2
ASTM F900-24	*Standard Specification for Industrial and Commercial Swing Gates*	BH103.1.3
ASTM F2200—20	*Standard Specification for Automated Vehicular Gate Construction*	BH103.1
UL 325—2017	*Door, Drapery, Gate, Louver and Window Operations and Systems—with Revisions through February 2020*	BH103.2

Reason: Gates are used, and depended on for our safety and security, throughout our society. Be it for residential use, at a sports arena, on schoolgrounds, a public park, in a parking garage, at a factory, in a multi-family dwelling or countless other applications, people are potentially in contact with a gate every day. Gates are so commonplace that most people don't think twice about their ability to operate safely until something goes wrong.

This is why it is of paramount importance that gates are designed and installed to the highest safety standard. The need for safe, functioning gates has been underscored in recent years with stories like that of, Alex Quanbeck, the 7-year-old child who was killed by a poorly maintained gate in his school yard at recess in San Rafael, California. Under deeper review, it has been discovered that numerous fatalities and life-altering injuries have occurred in the United States because of these gate issues. A map of known gate fatalities and serious injuries from gates is provided from the Hummingbird Alliance

(www.thehummingbirdalliance.com).

Having knowledge of the scope of this problem, ASTM International's F14 Committee on Fences, (which also holds jurisdiction for gate standards) updated their manual gate standards to reflect new safety requirements on slide gates (ASTM F1184) and swing gates (ASTM F900). ASTM had already updated its electric gate standard (ASTM F2200) to meet new requirements in 2002.

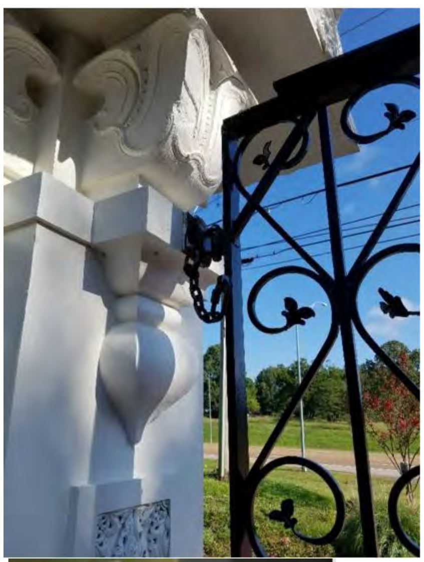
Cal/OSHA is currently reviewing these standards as well, to potentially include them in their own rules. While they do have a rule on gates, (Title 8 section 3324) it does not currently contain the provisions laid out in our proposal. In assessing these potential new standards, they reviewed some of their own accident data and found that their data from 1990 through 2005, showed that 15 out of 31 incidents (48%) involved failed or missing end stops/positive stops of gates. They then compared this data from data collected from 2014 through 2024 and found that 13 out of 16 incidents (81%) involved failed or missing end-stops/positive-stops of gates.

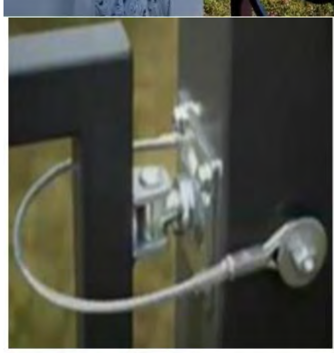
Because of these factors, they determined that, "The relatively low decrease in serious injuries and fatalities per year of only 8.2 percent after the promulgation of section 3324 in 2007 illustrates the need to amend and improve section 3324 to better protect California workers" (DOSH Evaluation, 2024).

The standards we are requesting be adopted would in no way impede first responders in accessing a property, in fact ensuring a gate is functioning properly would only provide them with safer and easier ingress and/or egress. It is when these gates go without the proper safety requirements, they are likely to fail to operate as intended or run the risk of injuring those who use them. The ICC/AFA Gate Safety Code Development Work Group consists of a wide range of gate and security experts, consumers and code enforcement officials, who have diligently reviewed ASTM standards, current safety standards and the I-Codes to confirm that this addition to the I-Codes is needed and non-duplicative. The work group decided to alter the existing section 3110 to include all gates as well as maintaining the provision currently in place for automatic vehicular gates. The new provision would only apply to gates that are 7' (84 inches) in height or greater OR 4' (48") in length or greater. The code change references industry approved national standards for gate design and construction ASTM F900 for Swing Gates and ASTM F1184 for Slide Gates. The code also includes two new standards to be referenced in Chapter

35 that are necessary for the code change. The group also looked at where gates are required for permitting and inspection and discovered that gates are not specifically referenced in the permit exemption list in Section 105. The group decided to clarify that fences and gates are unique in their own application and as such both need specific permit exceptions.

The general requirements for Swing Gates require a keeper in accordance with ASTM F900. The gate keeper is a mechanical device for securing the free end of the gate when in the fully open position. The compliance for swing gates could be a chain connected to both the gate frame and the end post (or column/structure to which the gate is attached), see the pictures below.





The general requirements for slide gates in accordance with ASTM F1184 include:

A performance statement that gates that are installed shall not fall over more than 45 degrees from the vertical plane;

- Positive stops to limit travel;

- Weight bearing rollers are covered;
- Gap no greater then 2-1/4”;
- Gates designed for lateral stability; and
- Gates design that will not move under the force of gravity.

Please see pictures below of ASTM 1184 compatible gates. Two options for fall post are shown. The first is the standard post cemented in the ground; it is the post with the yellow cap. The second is of an upside-down J bracket that has been welded on.


(Receiver Guide/ Gate Stop Below)

These standards and the code change proposal only address swing and slide gates. Overhead roll down (or up) doors, roll down security type doors (like those at the tenant space and the mall circulation areas), and parking garage entry, exit or point of sale barrier arms are not within the scope of the proposed code change or within the scope of the two reference standards. In addition, we believe that these requirements in no way negatively impact building egress required by Chapter 10 of this code. Any swing or slide gate installed within the means of egress should be in compliance with chapter 10, as well as any other technical provision of the code and compliance with any other code application is referenced in 3110.1, as proposed.

Compliance with the ASTM standards will greatly improve safety in and around the built environment by incorporating these simple changes, (like adding fall over protection and gate stops) lives like Alex’s, can be saved. Alex’s father, Eric Quanbeck was an active participant in this work group, as well as the local building official from the city where the tragedy occurred, along with representatives from the American Fence Association, ASTM International, DASMA and UL. After thorough review, we see a need to incorporate these standards through adoption into the I-Codes.

BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and 2024 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC webpage.

Cost Impact: Increase

Estimated Immediate Cost Impact:

Compared to the overall cost of these large gates, which can run anywhere from a couple thousand dollars to tens of thousands of dollars, depending on the size, material used, and whether they have an electric operator, the safety requirement costs are negligible. The material costs for the safety parts mentioned average $50.00, with many being less than that amount. For instance, a metal gate stop can be just a few dollars. Items like a Gate Keeper and the safety chain for swing gates can be found at several retailers, including on Amazon, both for under $50.00. Labor would depend on geographical area, but overall, it would average somewhere between $150.00 to $250.00.

Estimated Immediate Cost Impact Justification (methodology and variables):

Posts for this type of application typically run $50.00 a piece or less.
Example of some product costs on Amazon:

Amazon.com: OKG Heavy Duty Security Chain, 3.9ft x 5/16" Thick Outdoor Gate Chain, Cut Proof Chain Made of Hardened Alloy Steel Chain, Ideal for Fence Gates, Bicycles, Moped, Trailers, Generator, etc : Sports & Outdoors

Amazon.com: Chain Link Fence GATE HOLD BACK: Duck Bill Gate Holdback (1-5/8" to 2-3/8"). Holds The gate open for You while You work! : Tools & Home Improvement

Staff Analysis: A review of the following standards proposed for inclusion in the code regarding some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before April 1, 2025.
ASTM F1184-23 Standard Specification for Industrial and Commercial Horizontal Slide Gates
ASTM F900-24 Standard Specification for Industrial and Commercial Swing Gates

RB282-25

RB290-25

IRC: BL103.3.7, TABLE BL103.3.7, BL103.6.5.2

Proponents: Martin Hammer, representing Martin Hammer - Architect (mfhammer@pacbell.net); David Eisenberg, representing The Development Center for Appropriate Technology (strawnet@gmail.com); Timothy Callahan, representing Callahan Home Designs (t.l.callahan@icloud.com); Tom Rossmassler, representing Hempstone, LLC (tom@hempstone.net); Cameron McIntosh, representing Americhanvre LLC (cameron@americhanvre.com); Anthony Dente, representing Verdant Structural Engineers (anthony@verdantstructural.com)

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APPENDIX BL
HEMP-LIME (HEMPCRETE) CONSTRUCTION

Revise as follows:

BL103.3.7 Openings in walls. Doors, windows and similar openings in *hemp-lime* walls shall be in accordance with the following:

1. Rough framing for doors and windows shall be part of, or be fastened to, the wall framing in accordance with this code.
2. An *approved water-resistive barrier* shall be installed at openings in *hemp-lime* walls in accordance with Sections BL103.7.4 and BL104.5.1.
3. Header size and their maximum span above openings in bearing walls with *hemp-lime* infill shall be determined with Tables R602.7(1) and BL103.3.7 or an *approved* design by a *registered design professional*.
4. Cast-in-place *hemp-lime* ~~over and~~ overhanging the face of a header more than 3 inches (76 mm) shall require an *approved* design of its support by a *registered design professional*.
5. *Hemp-lime* blocks overhanging headers shall require an *approved* design of their support by a *registered design professional*.

TABLE BL103.3.7 ALLOWABLE HEADER SPAN ~~MULTIPLIER~~<u>ADJUSTMENT FACTORS</u>[a]

WALL HEIGHT ABOVE HEADER	UNIT WALL WEIGHT (psf)			
	15	30	45	65
1′-0″	1.00	1.00	1.00	1.00
1′-6″	1.00	1.00	0.90	0.90
2′-0″	1.00	0.90	0.90	0.85
2′-6″	1.00	0.90	0.90	0.85
3′-0″	1.00	0.90	0.90	0.80

For SI: 1 foot = 304.8 mm, 1 pound per square foot = 4.882 kg/m^2.

a. Multiply the maximum allowable spans from Table R602.7(1) by the applicable factor to determine the adjusted maximum allowable header span.

BL103.6.5.2 Casting. *Hemp-lime* blocks shall be cast in accordance with Sections BL103.6.1 through ~~BL103.6.6~~<u>BL103.6.5</u>, as applicable, or by other means that produce *approved* blocks.

Reason: This proposal improves code language in a section, improves the title of a table, and corrects a section number.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal improves code language and the title of a table, and corrects a section number, so there is no impact on the cost of construction.

RB304-25

IRC: APPENDIX BP (New), SECTION BP101 (New), BP101.1 (New), BP101.2 (New), SECTION BP102 (New), BP102.1 (New), BP102.1.1 (New), BP102.1.2 (New), BP102.1.3 (New), BP102.1.4 (New), BP102.1.5 (New), SECTION BP103 (New), BP103.1 (New), BP103.1.1 (New), BP103.1.2 (New), BP103.1.3 (New), SECTION BP104 (New), BP104.1 (New), BP104.1.1 (New), BP104.1.2 (New), BP104.1.3 (New), BP104.1.4 (New), SECTION BP105 (New), BP105.1 (New), TABLE BP105.1 (New)

Proponents: Eirene Knott, representing BRR Architecture (eirene.knott@brrarch.com)

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Add new text as follows:

APPENDIX BP
PHYSICAL SECURITY

SECTION BP101
GENERAL

BP101.1 Purpose. The purpose of this appendix is to establish minimum standards that incorporate physical security to make dwelling units resistant to unlawful entry.

BP101.2 Application. The provisions of this appendix shall apply to all new structures and to additions and alterations made to existing buildings as provided for in R102.6.1.

SECTION BP102
DOORS

BP102.1 Doors. All exterior doors and doors leading from the garage area into the dwelling unit, shall comply with Sections BP102.1.1 through BP102.1.5 based on the type of door installed.

Exceptions:

1. Vehicle access doors
2. Storm or screen doors

BP102.1.1 Wood doors. Wood doors shall be of solid core construction such as high-density particleboard, solid wood, or wood block core with a minimum thickness of 1-3/4 inches (45 mm) when measured at the locking device or hinge.

BP102.1.2 Steel doors. Steel doors shall be a minimum skin thickness of 24 gauge and have reinforcement material at the location of the deadbolt.

BP102.1.3 Fiberglass doors. Fiberglass doors shall have a minimum skin thickness of one-sixteenth inch and have reinforcement material at the location of the deadbolt.

BP102.1.4 Double doors. The inactive leaf of an exterior double door shall be provided with flush bolts having an engagement of not less than 1-inch (25.4 mm) into the head and threshold of the door frame, or by other approved methods.

BP102.1.5 Sliding doors. Sliding doors shall be installed to prevent the removal of the panels from the exterior.

SECTION BP103
DOOR FRAMES

BP103.1 Door frames. The exterior door frames shall be installed prior to the rough-in inspection. Two-inch nominal wood blocking shall be placed horizontally between studs at the door lock height for at least one stud space on each side of the door opening. Door frames shall comply with ATSM F476 Grade 40 for the bolt and hinge impact. Door frames shall comply with Sections BP103.1.1 through BP103.1.3 based on the type of door installed.

BP103.1.1 Wood frames. Wood frame doors shall be set in frame openings constructed of double studding or equivalent construction. Door frames, including those with sidelites, shall be reinforced.

BP103.1.2 Steel frames. Steel door frames shall be constructed of 18 gauge or heavier steel. Doors shall be anchored to the wall in accordance with the manufacturer's instructions.

BP103.1.3 Sidelight entry. Sidelite door units shall have framing of double stud construction or equivalent construction. Double stud construction or equivalent construction shall exist between the glazing unit of the sidelite and the wall structure of the dwelling.

SECTION BP104
DOOR HARDWARE

BP104.1 Door hardware. Exterior door hardware shall comply with Sections BP104.1.1 through BP104.1.4.

BP104.1.1 Hinges. Hinges for exterior swinging doors shall comply with the following:

1. At least two screws, 3 inches (76 mm) in length, penetrating at least 1-inch (25.4 mm) into the wall structure. Solid wood fillers or shims shall be used to eliminate any space between the wall structure and the door frame behind each hinge.
2. Hinges for out-swinging doors shall be equipped with mechanical interlock to prevent removal of the door from the exterior.

Exception: Sidelite doors complying with ASTM F476 for the bolt and hinge impact test.

BP104.1.2 Escutcheon plates. All exterior doors shall have escutcheon plates protecting the door's edge at the location of the deadbolt. Exception: Doors provided with a multi-point lock.

BP104.1.3 Locks. Exterior doors shall be provided with a deadbolt with a minimum grade B as determined by ANSI/BHMA A156.40.

BP104.1.4 Entry vision and glazing. Front entry doors to dwelling units shall be arranged so that the occupant has a 180 degree view of the area immediately outside the door without opening the door.

SECTION BP105
REFERENCED STANDARDS

BP105.1 General.. See Table BP105.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, the standard title, and the section or sections of this appendix that references the standard.

TABLE BP105.1 REFERENCED STANDARDS

STANDARD ACRONYM	STANDARD NAME	SECTIONS HEREIN REFERENCED

ASTM F476-2014	Standard Test Methods for Security of Swinging Door Assemblies	BP103.1, BP104.1.1
ANSI/BMHA A156.40-2020	Standard for Residential Deadbolts	BP104.3

Reason: In the summer of 1996, Overland Park, Kansas, experienced a series of home invasions resulting in the sexual assault of several women. For the victims of a home invasion, it's more than a property crime; it scares the victim into thinking that the criminal will return only to commit a more violent or heinous crime. To have an emotional investment in their residence is priceless. As a result of these home invasions, the City's Police Department conducted hundreds of surveys of residents in an effort to develop a solution to the home invasions. The results of the surveys lead the City to develop a building code that makes home more safe and secure. You may ask, why secure the front door? What about installing an alarm? Communities across the country continue to report a growing increase in false alarms. In an effort to provide physical security to the homeowner, there needs to be a more reliable option available.

The longer a criminal spends trying to gain access to a home, the greater the risk of detection. In addition, most home invaders will not attempt to break a window, as that makes noise that neighbors could potentially hear. Rather than face these risks, the invader is more likely to try to kick in an exterior door, where they can easily gain access without being detected.

This code change will provide for minimal provisions to be made to a new home under construction that will give the homeowner safety and peace of mind, while delaying and frustrating the criminal. Since this proposal is not dependent on electrical power, these provisions will always be available to the homeowner and will require no further action after installation. There is no on-going cost to the homeowner and these provisions will not affect the overall aesthetics of the home.

Cost Impact: Increase

Estimated Immediate Cost Impact:

The cost to secure a single door ranges from $40-$60 for a single door unit and between $140 and $180 for a double sidelite unit.

Estimated Immediate Cost Impact Justification (methodology and variables):

The cost to secure a single door ranges from $40-$60 for a single door unit and between $140 and $180 for a double sidelite unit.

Staff Analysis: A review of the following standards proposed for inclusion in the code regarding some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before April 1, 2025.
ASTM F476-2014   Standard Test Methods for Security of Swinging Door Assemblies
ANSI/BMHA A156.40-2020   Standard for Residential Deadbolts

RB304-25