

Part III — Building Planning and Construction

CHAPTER 3

BUILDING PLANNING

SECTION R301 DESIGN CRITERIA

R301.1 Design. Buildings and structures, and all parts thereof, shall be constructed to safely support all loads, including dead loads, live loads, roof loads, flood loads, snow loads, wind loads and seismic loads as prescribed by this code. The construction of buildings and structures shall result in a system that provides a complete load path capable of transferring all loads from their point of origin through the load-resisting elements to the foundation.

R301.1.1 Alternative provisions. As an alternative to the requirements in Section R301.1 the following standards are permitted subject to the limitations of this code and the limitations therein. When engineered design is used in conjunction with these standards the design shall comply with Appendix Chapter S or the *Oregon Structural Specialty Code*.

1. American Forest and Paper Association (AF&PA) *Wood Frame Construction Manual* (WFCM).
2. American Iron and Steel Institute (AISI), *Standard for Cold-Formed Steel Framing—Prescriptive Method for One- and Two-family Dwellings* (COFS/PM).

R301.1.2 Construction systems. The requirements of this code are based on platform and balloon-frame construction for light-frame buildings. The requirements for concrete and masonry buildings are based on a balloon framing system. Other framing systems must have equivalent detailing to ensure force transfer, continuity and compatible deformations.

R301.1.3 Engineered design. When a building of otherwise conventional construction contains structural elements exceeding the limits of Section R301 or otherwise, not conforming to this code, these elements shall be designed in accordance with accepted engineering practice. The extent of such design need only demonstrate compliance of nonconventional elements with other applicable provisions and shall be compatible with the performance of the conventional framed system. Engineered design in accordance with Appendix Chapter S or the *Oregon Structural Specialty Code* is permitted for all buildings and structures, and parts thereof, included in the scope of this code.

R301.2 Climatic and geographic design criteria. Buildings shall be constructed in accordance with the provisions of this

code as limited by the provisions of this section. Additional criteria shall be as set forth in Table R301.2(1).

R301.2.1 Wind limitations. Buildings and portions thereof shall be limited by wind speed, as defined in Table R301.2(1), and construction methods in accordance with this code. Basic wind speeds shall be determined from Figure R301.2(4). 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.

R301.2.1.1 Design criteria. Construction in regions where the basic wind speeds from Figure R301.2(4) exceed 110 miles per hour (177.1 km/h) shall be designed in accordance with one of the following:

1. American Forest and Paper Association (AF&PA) *Wood Frame Construction Manual for One- and Two-Family Dwellings* (WFCM); or
2. *Southern Building Code Congress International Standard for Hurricane Resistant Residential Construction* (SSTD 10); or
3. *Minimum Design Loads for Buildings and Other Structures* (ASCE-7); or
4. American Iron and Steel Institute (AISI), *Standard for Cold-Formed Steel Framing—Prescriptive Method for One- and Two-family Dwellings* (COFS/PM).
5. Concrete construction shall be designed in accordance with the provisions of this code.

R301.2.1.2 Internal pressure. Not adopted by the State of Oregon.

R301.2.1.3 Wind speed conversion. When referenced documents are based on fastest mile wind speeds, the three second gust wind velocities of Figure R301.2(4) shall be converted to fastest mile wind velocities using Table R301.2.1.3.

**TABLE R301.2.1.3
EQUIVALENT BASIC WIND SPEEDS^a**

3-second gust	85	90	100	105	110
Fastest mile	70	75	80	85	90

For SI: 1 mile per hour = 1.609 km/h.

a. Linear interpolation is permitted.

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**TABLE R301.2(1)
CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA**

COUNTIES	ROOF SNOW LOAD ^a 25 lbs. Per sq. ft. below elevation shown	WIND PRESSURE (lbs. per sq. ft.) ^{b,c}	SEISMIC DESIGN CATEGORY ^d	CONCRETE SUBJECT TO DAMAGE FROM		SUBJECT TO DAMAGE FROM	
				Weathering ^e	Frost depth	Termites	Decay
Baker	3,200	15	C	Severe	24	Moderate	Slight
Benton	400	18	D ₁	Moderate	12	Moderate	Moderate
Clackamas	500	18	D ₁	Moderate	12	Moderate	Moderate
Clatsop	400	23 ^f	D ₂	Moderate	12	Moderate	Moderate
Columbia	400	18	D ₁	Moderate	12	Moderate	Moderate
Coos	400	18 ^f	D ₂	Moderate	12	Moderate	Moderate
Crook	4,100	15	C	Severe	18	Moderate	Slight
Curry	400	23 ^f	D ₂	Moderate	12	Moderate	Moderate
Deschutes	4,000	15	C	Severe	18	Moderate	Slight
Douglas	1,500	18 ^f	D ₁ ^k	Moderate	18 ^g	Moderate	Moderate
Gilliam	3,000		C	Severe	24	Moderate	Moderate
S.45.5°N		15					
N.45.5°N		18					
Grant	4,100	15	C	Severe	24	Moderate	Slight
Harney	4,100	15	C	Severe	24	Moderate	Moderate
Hood River	Note g	18 ^h	D ₁	Severe	24	Moderate	Moderate
S.45.5°N		15					
N.45.5°N		23					
Jackson	2,000	18	D ₁	Moderate	18 ^g	Moderate	Slight
Jefferson	4,100	15	C	Severe	18	Moderate	Moderate
Josephine	4,100	18	D ₁	Moderate	18 ^g	Moderate	Moderate
Klamath	4,000	18	D ₁	Severe	24	Moderate	Moderate
Lake	4,200	15	D ₁	Severe	24	Moderate	Slight
Lane	500	18 ^f	D ₁ ^k	Moderate	12	Moderate	Moderate
Lincoln	400	23 ^f	D ₂	Moderate	12	Moderate	Moderate
Linn	700	18	D ₁	Moderate	12	Moderate	Moderate
Malheur	3,400	15	C	Severe	24	Moderate	Slight
Marion	500	18	D ₁	Moderate	12	Moderate	Moderate
Morrow	3,000		C	Severe	24	Moderate	Slight
S.45.5°N		15					
N.45.5°		18					
Multnomah	500	18 ^h	D ₁	Moderate	18	Moderate	Moderate
Polk	400	18	D ₁	Moderate	12	Moderate	Moderate
Sherman	2,000		C	Severe	24	Moderate	Slight
S.45.5°N		15					
N.45.5°N		18					
Tillamook	400	23 ^f	D ₂	Moderate	12	Moderate	Moderate
Umatilla	3,000		C	Severe	24	Moderate	Slight
S.45.5°N		15					
N.45.5°N ^j		18					
Union	3,000	15	C	Severe	24	Moderate	Slight
Wallowa	3,000	15	C	Severe	24	Moderate	Slight
Wasco	2,000		C	Severe	24	Moderate	Slight
S.45.5°N		15					
N.45.5°N		18					
Washington	400	18	D ₁	Moderate	12	Moderate	Moderate
Wheeler	4,100	15	C	Severe	24	Moderate	Slight
Yamhill	400	18	D ₁	Moderate	12	Moderate	Moderate

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.0929 m², 1 pound per square foot = 0.0479 kN/m².

- a. For elevations above elevations shown, see Snow Load Analysis of Oregon, published by the Structural Engineers of Oregon, revised 2/78.
- b. The values in this column were calculated using Exposure C.
- c. Wind design loads are determined from the Oregon Basic Wind Speeds for 50-year Mean Recurrence Interval, Figure R301.2(4).
- d. See Seismic Risk map in Figure R301.2(2).
- e. A severe classification is where weather conditions result in significant snowfall combined with extended periods during which there is little or no natural thawing causing deicing salts to be used extensively.
- f. All areas with full exposure to ocean winds shall be constructed to 28 pounds per square foot requirements.
- g. For elevations below 500 feet, the snow load is 50 pounds per square foot. Above 500 feet, see Note a.
- h. Areas in Multnomah and Hood River Counties with full exposure to Columbia River Gorge winds shall be designed/constructed to 28 pounds per square foot.
- i. The frost depth below 2,500 feet in Jackson and Josephine Counties is 12 inches.
- j. Umatilla County north of 45.5° and east of 118.5° is at 25 pounds per square foot.
- k. That portion of Douglas and Lane Counties which lies westerly of Range 10 West of the Willamette Meridian shall be designated as Seismic Design Category D₂.

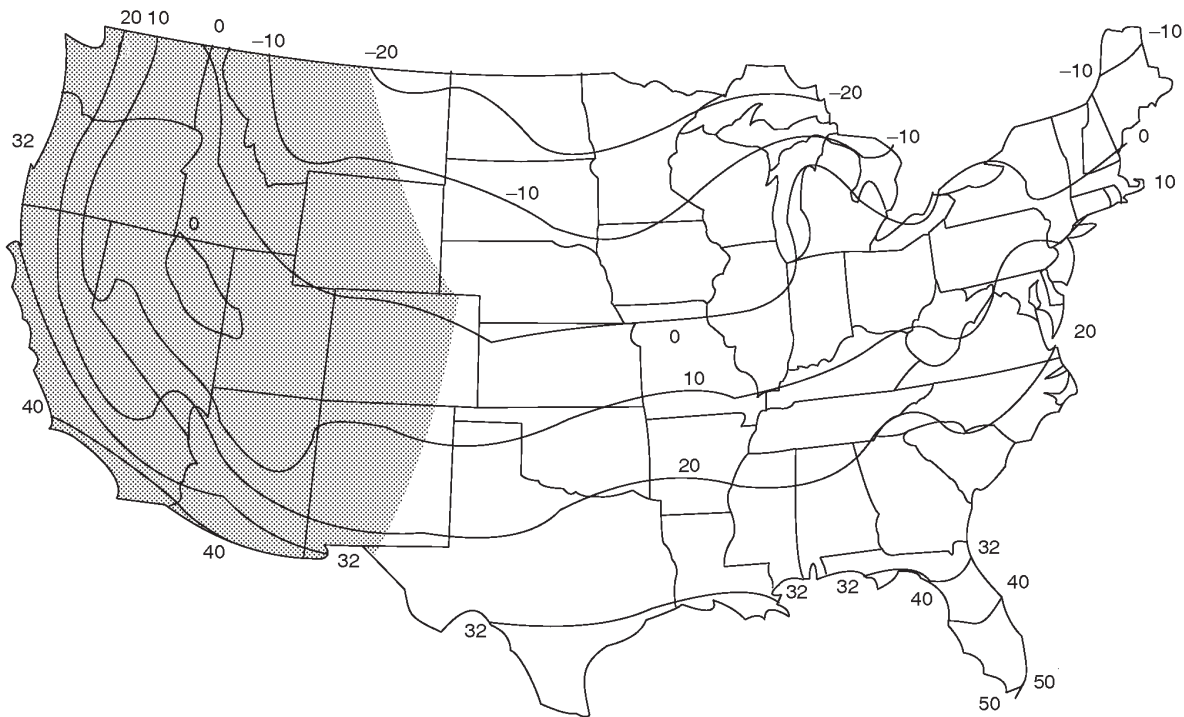
TABLE R301.2(2)
DESIGN WIND LOADS (pounds per square foot)

EXPOSURE CLASSIFICATION ^b	BASIC WIND SPEED ^a	BUILDING HEIGHT ^{c,f}					
		One Story		Two Story		Three Story	
		Walls	Roof Uplift ^d	Walls	Roof Uplift ^d	Walls	Roof Uplift ^d
A/B	100	NA ^e	NA ^e	NA ^e	NA ^e	NA ^e	NA ^e
	110	NA ^e	NA ^e	NA ^e	NA ^e	NA ^e	20
C	85	NA ^e	NA ^e	NA ^e	NA ^e	NA ^e	NA ^e
	100	NA ^e	20	NA ^e	22	NA ^e	25
	110	NA ^e	26	NA ^e	28	NA ^e	31
D	85	NA ^e	20	NA ^e	22	NA ^e	24
	100	NA ^e	27	NA ^e	28	NA ^e	31
	110	32	37	36	40	39	43

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 47.88 Pa, 1 mile per hour = 0.44 m/s.

Notes:

- a. Basic wind speed is based on 3-second gust wind speeds in miles per hour at 33 feet above ground.
- b. Exposure Classification to be determined using Section R301.2.1.4.
- c. Building heights used to determine design wind loads are: One story = 20 feet, Two story = 30 feet and Three story = 50 feet.
- d. Uplift loads act normal to the roof or overhang.
- e. NA = No design is required in accordance with Sections R602.3 and R802.11
- f. Buildings over 50 feet in height, or with unusual construction or geometric shapes, with overhanging eave projections greater than 24 inches, or located in special wind regions or localities, shall be designed in accordance with the provisions the *Oregon Structural Specialty Code*.

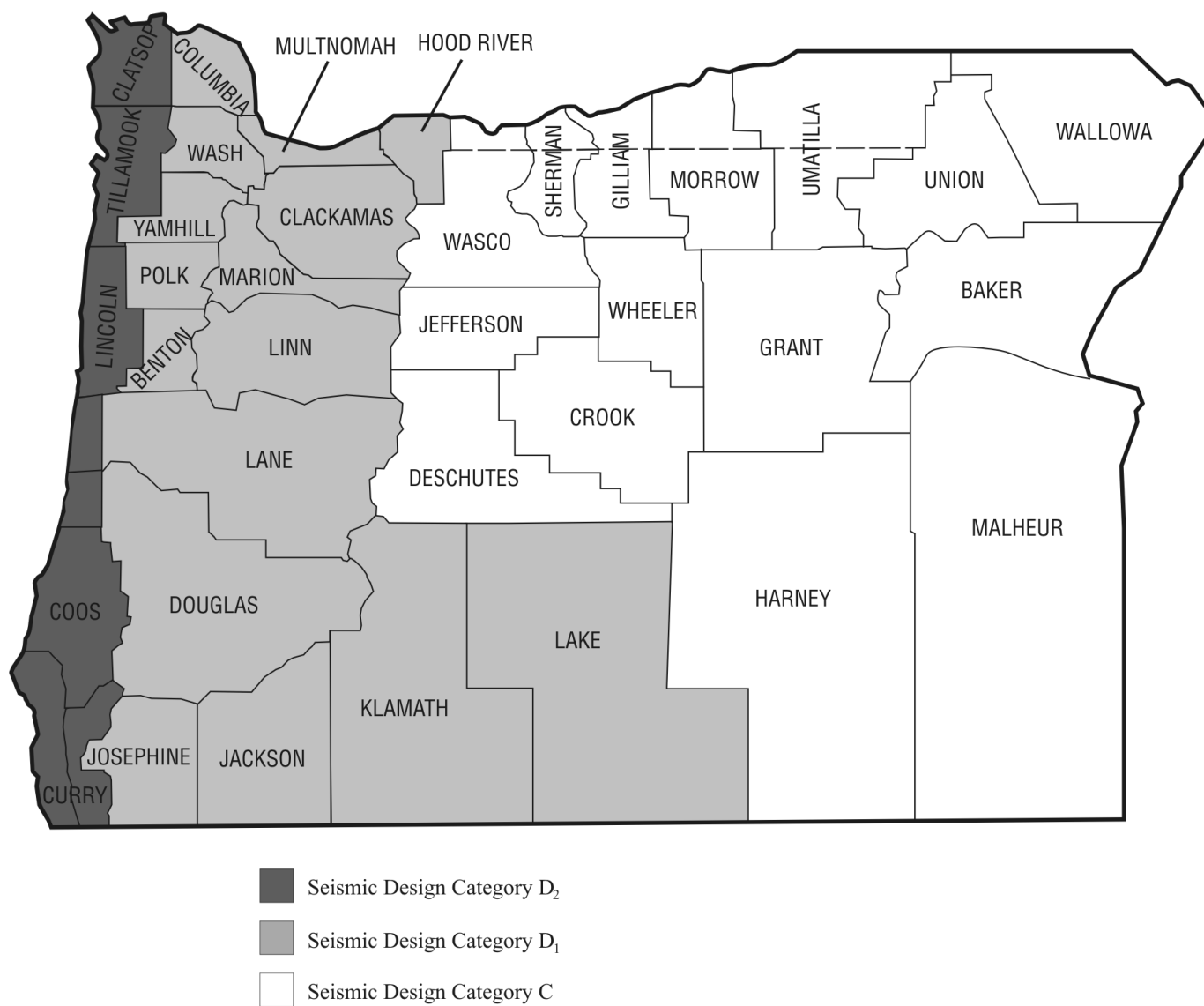


DESIGN TEMPERATURES IN THIS AREA MUST BE BASED ON ANALYSIS OF LOCAL CLIMATE AND TOPOGRAPHY

For SI: °C = [(°F)-32] / 1.8.

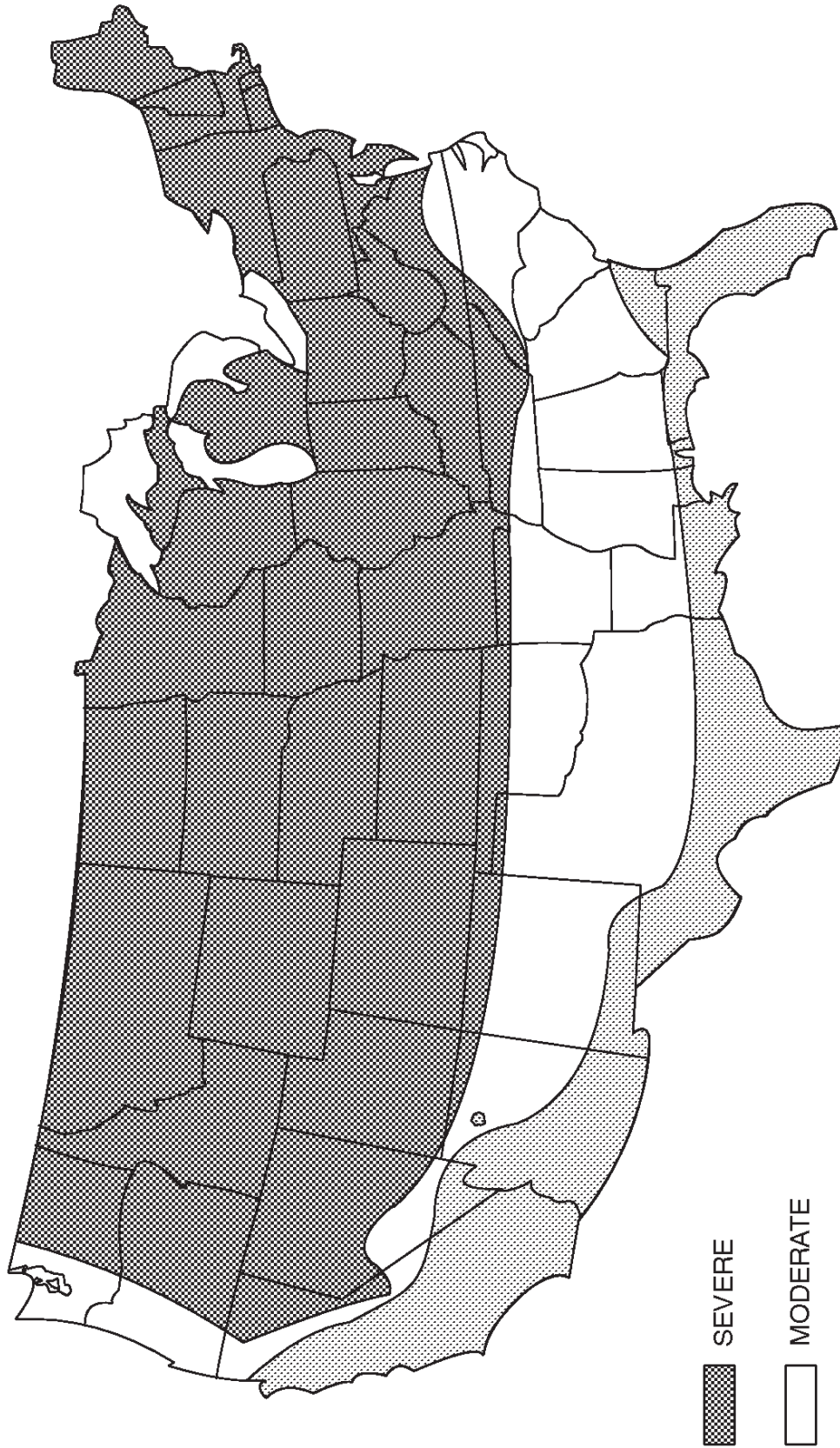
FIGURE R301.2(1)
ISOLINES OF THE 97 1/2 PERCENT WINTER (DECEMBER, JANUARY AND FEBRUARY) DESIGN TEMPERATURES (°F)
Not adopted by the State of Oregon

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The boundary of Seismic Design Category D₂ in Douglas and Lane Counties is that land which lies westerly of Range 10 west of the Willamette Meridian.

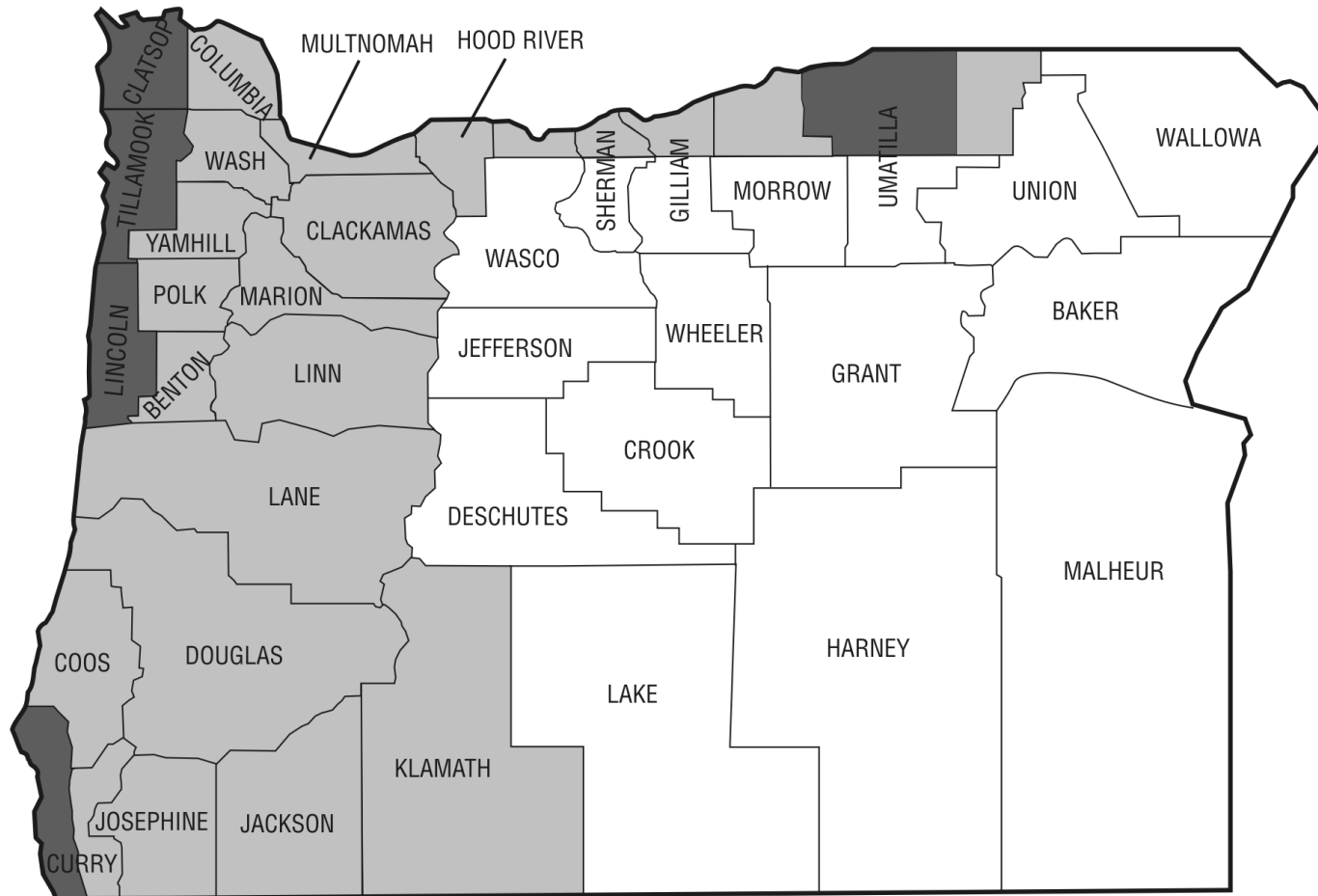
**FIGURE R301.2(2)
OREGON SEISMIC DESIGN CATEGORIES—SITE CLASS D**



a. Alaska and Hawaii are classified as severe and negligible, respectively.
b. Lines defining areas are approximate only. Local conditions may be more or less severe than indicated by region classification. A severe classification is where weather conditions result in significant snowfall combined with extended periods during which there is little or no natural thawing causing deicing salts to be used extensively.

[B] FIGURE R301.2(3)
WEATHERING PROBABILITY MAP FOR CONCRETE

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- a. All areas with full exposure to the ocean winds shall be designated 110 mph areas.
- b. Values are nominal design 3-second gust wind speeds in miles per hour at 33 feet above ground for Exposure C category.

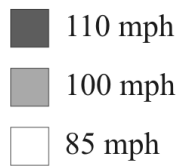


FIGURE R301.2(4)
OREGON BASIC WIND SPEEDS FOR 50-YEAR MEAN RECURRENCE INTERVAL

R301.2.1.4 Exposure category. For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. For a site located in the transition zone between categories, the category resulting in the largest wind forces shall apply. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features. For any given wind direction, the exposure in which a specific building or other structure is sited shall be assessed as being one of the following categories:

1. Exposure A. Large city centers with at least 50 percent of the buildings having a height in excess of 70 feet (21 336 mm). Use of this exposure category shall be limited to those areas for which terrain representative of Exposure A prevails in the upwind direction for a distance of at least 0.5 mile (0.8 km) or 10 times the height of the building or other structure, whichever is greater. Possible channeling effects or increased velocity pressures due to the building or structure being located in the wake of adjacent buildings shall be taken into account.
2. Exposure B. Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Exposure B shall be assumed unless the site meets the definition of another type exposure.
3. Exposure C. Open terrain with scattered obstructions, including surface undulations or other irregularities, having heights generally less than 30 feet (9144 mm) extending more than 1,500 feet (457 m) from the building site in any quadrant. This exposure shall also apply to any building located within Exposure B type terrain where the building is directly adjacent to open areas of Exposure C type terrain in any quadrant for a distance of more than 600 feet (183 m). This category includes flat open country, grasslands and shorelines in hurricane prone regions.
4. Exposure D. Flat, unobstructed areas exposed to wind flowing over open water (excluding shorelines in hurricane prone regions) for a distance of at least 1 mile (1.61 km). Shorelines in Exposure D include inland waterways, the Great Lakes and coastal areas of California, Oregon, Washington and Alaska. This exposure shall apply only to those buildings and other structures exposed to the wind coming from over the water. Exposure D ex-

tends inland from the shoreline a distance of 1,500 feet (457 m) or 10 times the height of the building or structure, whichever is greater.

R301.2.2 Seismic provisions. The seismic provisions of this code shall apply to buildings constructed in Seismic Design Categories C, D₁, and D₂, as determined in accordance with this section.

Exception: Detached one- and two-family dwellings located in Seismic Design Category C are exempt from the seismic requirements of this code.

The weight and irregularity limitations of Section R301.2.2.2 shall apply to buildings in all Seismic Design Categories regulated by the seismic provision of this code. Buildings in Seismic Design Category C shall be constructed in accordance with the additional requirements of Sections R301.2.2.3. Buildings in Seismic Design Categories D₁ and D₂ shall be constructed in accordance with the additional requirements of Section R301.2.2.4.

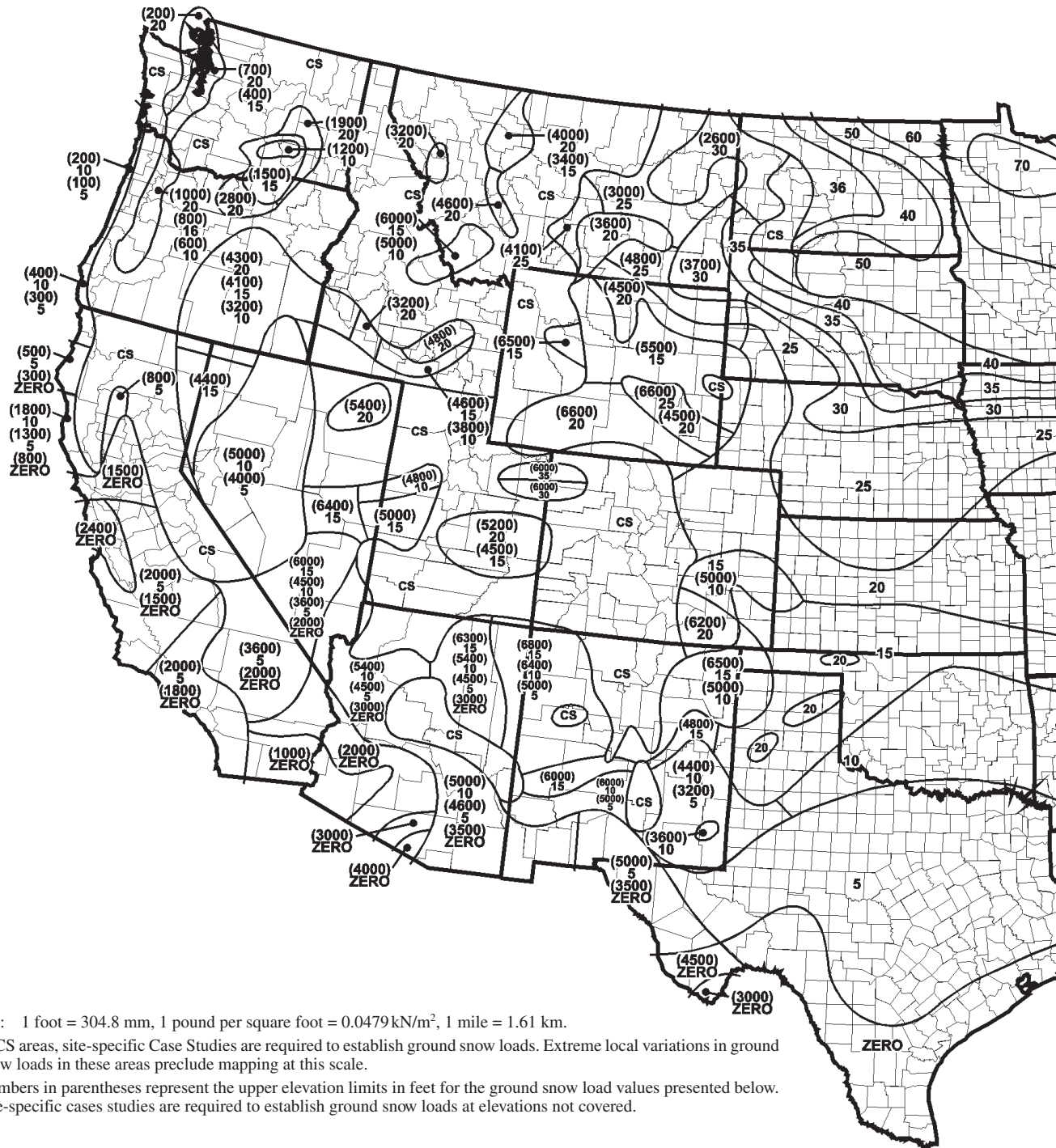
R301.2.2.1 Determination of seismic design category. Buildings shall be assigned a Seismic Design Category in accordance with Table R301.2(1).

R301.2.2.1.1 Alternate determination of seismic design category. The Seismic Design Categories and corresponding Short Period Design Spectral Response Accelerations, S_{DS} shown in Figure R301.2(2) are based on soil Site Class D, as defined in Section 1615.1.1 of the *Oregon Structural Specialty Code*. If soil conditions are other than Site Class D, the Short Period Design Spectral Response Acceleration, S_{DS} , for a site can be determined according to Section 1615.1 of the *Oregon Structural Specialty Code*. The value of S_{DS} determined according to Section 1615.1 of the *Oregon Structural Specialty Code* is permitted to be used to set the Seismic Design Category according to Table R301.2.2.1.1, and to interpolate between values in Tables R602.10.3(1), R602.10.3(2), R603.7, and other seismic design requirements of this code.

TABLE R301.2.2.1.1
 SEISMIC DESIGN CATEGORY DETERMINATION

CALCULATED S_{DS}	SEISMIC DESIGN CATEGORY
$S_{DS} \leq 0.17g$	A
$0.17g < S_{DS} \leq 0.33g$	B
$0.33g < S_{DS} \leq 0.50g$	C
$0.50g < S_{DS} \leq 0.83g$	D ₁
$0.83g < S_{DS} \leq 1.17g$	D ₂
$1.17g < S_{DS}$	E

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For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kN/m², 1 mile = 1.61 km.

- a. In CS areas, site-specific Case Studies are required to establish ground snow loads. Extreme local variations in ground snow loads in these areas preclude mapping at this scale.
- b. Numbers in parentheses represent the upper elevation limits in feet for the ground snow load values presented below. Site-specific cases studies are required to establish ground snow loads at elevations not covered.



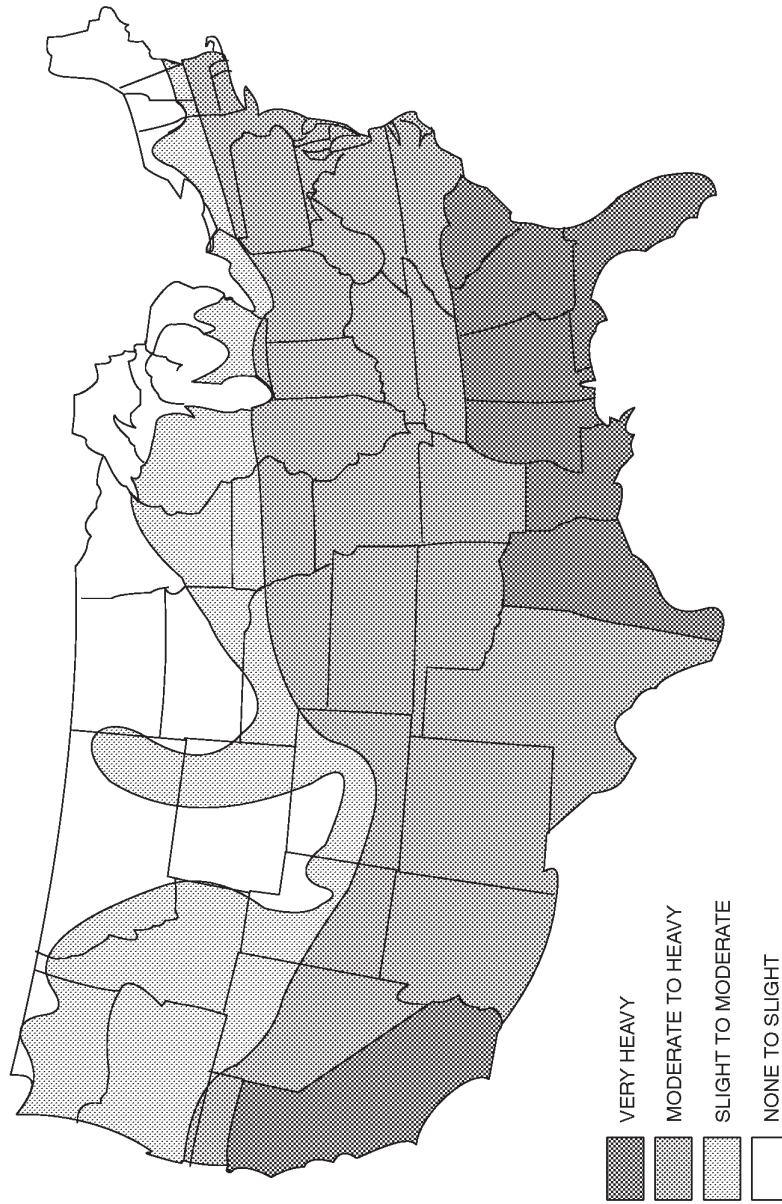
[B] FIGURE R301.2(5)
GROUND SNOW LOADS, P_g , FOR THE UNITED STATES (lb/ft²). (Not adopted by the State of Oregon)
Refer to Snow Load Analysis for Oregon published by Structural Engineers Association of Oregon, 1971.



For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kN/m²

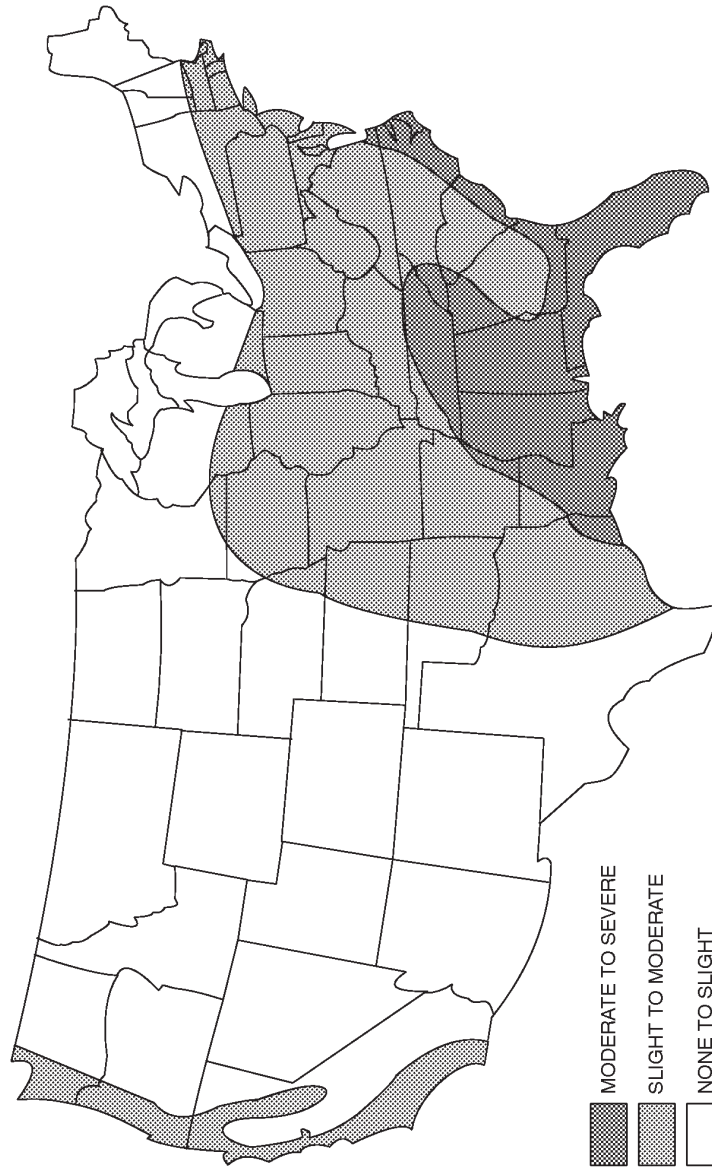
[B] FIGURE R301.2(5)—continued
GROUND SNOW LOADS, P_g , FOR THE UNITED STATES (lb/ft²). (Not adopted by the State of Oregon)
Refer to Snow Load Analysis for Oregon published by Structural Engineers Association of Oregon, 1971.

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NOTE: Lines defining areas are approximate only. Local conditions may be more or less severe than indicated by the region classification.

FIGURE R301.2(6)
TERMITE INFESTATION PROBABILITY MAP



NOTES: Lines defining areas are approximate only. Local conditions may be more or less severe than indicated by the region classification.

FIGURE R301.2(7)
DECAY PROBABILITY MAP

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R301.2.2.1.2 Alternative determination of Seismic Design Category E. Not adopted by the State of Oregon.

R301.2.2.2 Seismic limitations. The following limitations apply to buildings in all Seismic Design Categories regulated by the seismic provisions of this code.

R301.2.2.2.1 Weights of materials. Average dead loads shall not exceed 15 psf (0.72 kN/m²) for roofs/ceiling assemblies or 15 psf (0.72 kN/m²) for floor assemblies, except as further limited by Section R301.2.2. Dead loads for walls above grade shall not exceed:

1. Fifteen psf (0.72 kN/m²) for exterior light-frame wood walls.
2. Fourteen psf (0.67 kN/m²) for exterior light-frame cold-formed steel walls.
3. Ten psf (0.48 kN/m²) for interior light-frame wood walls.
4. Five psf (0.24 kN/m²) for interior light-frame cold-formed steel walls.
5. Eighty psf (3.83 kN/m²) for 8-inch-thick (203 mm) masonry walls.
6. Eighty-five psf (4.07 kN/m²) for 6-inch-thick (152 mm) concrete walls.

Exception: Roof/ceiling dead loads 15 psf but not exceeding 25 psf (1.19 kN/m²) shall be permitted provided the wall bracing amounts in Chapter 6 are increased in accordance with Table R301.2.2.2.1.

**TABLE R301.2.2.2.1
WALL BRACING ADJUSTMENT FACTORS BY
ROOF COVERING DEAD LOAD^a**

WALL SUPPORTING	ROOF/CEILING DEAD LOAD	ROOF/CEILING DEAD LOAD
	15 psf or less	25 psf
Roof only	1.0	1.2
Roof plus one story	1.0	1.1

For SI: 1 pound per square foot = 0.049 kN/m².

a. Linear interpolation shall be permitted.

R301.2.2.2.2 Irregular buildings. Concrete construction complying with Section R611 or R612 and conventional light-frame construction shall not be used in irregular portions of structures in Seismic Design Categories C, D₁ and D₂. Only such irregular portions of structures shall be designed in accordance with accepted engineering practice to the extent such irregular features affect the performance of the conventional framing system. A portion of a building shall be considered to be irregular when one or more of the following conditions occur:

1. When exterior shear wall lines or braced wall panels are not in one plane vertically from the foundation to the uppermost story in which they are required.

Exception: For wood light-frame construction, floors with cantilevers or setbacks not exceeding four times the nominal depth of

the wood floor joists are permitted to support braced wall panels that are out of plane with braced wall panels below provided that:

1. Floor joists are nominal 2 inches by 10 inches (51 mm by 254 mm) or larger and spaced not more than 16 inches (406 mm) on center.
 2. The ratio of the back span to the cantilever is at least 2 to 1.
 3. Floor joists at ends of braced wall panels are doubled.
 4. For wood-frame construction, a continuous rim joist is connected to ends of all cantilever joists. When spliced, the rim joists shall be spliced using a galvanized metal tie not less than 0.058 inch (1.47 mm) (16 gage) and 1½ inches (38 mm) wide fastened with six 16d nails on each side of the splice or a block of the same size as the rim joist of sufficient length to fit securely between the joist space at which the splice occurs fastened with eight 16d nails on each side of the splice; and
 5. Gravity loads carried at the end of cantilevered joists are limited to uniform wall and roof load and the reactions from headers having span of 8 feet (2438 mm) or less.
2. When a section of floor or roof is not laterally supported by shear walls or braced wall lines on all edges.

Exception: Portions of floors that do not support shear walls or braced wall panels above, or roofs, shall be permitted to extend no more than 6 feet (1829 mm) beyond a shear wall or braced wall line.

3. When the end of a braced wall panel occurs over an opening in the wall below and ends at a horizontal distance greater than 1 foot (305 mm) from the edge of the opening. This provision is applicable to shear walls and braced wall panels offset in plane and to braced wall panels offset out of plane as permitted by the exception to Item 1 above.

Exception: For wood light-frame wall construction, one end of a braced wall panel shall be permitted to extend more than 1 foot (305 mm) over an opening of not more than eight feet (2438 mm) in width in the wall below provided that the opening includes a header in accordance with the following:

1. The building width, loading condition, and member species limitations of Table R502.5(1) shall apply and
2. Not less than 1-2x12 or 2-2x10 for an opening not more than 6 feet in width or

3. Not less than 2-2x12 or 3-2x10 for an opening not more than 6 feet in width or
 4. Not less than 3-2x12 or 4-2x10 for an opening not more than 8 feet in width and
 5. The entire length of the braced wall panel shall not occur over an opening in the wall below.
4. Where openings in the floor or roof diaphragms having a maximum dimension of greater than 50 percent of the distance between lines of bracing or an area greater than 25 percent of the area between orthogonal pairs of braced wall lines are present, the structure shall be considered irregular.
 5. When portions of a floor level are vertically offset.

Exceptions:

1. Framing supported directly by continuous foundations at the perimeter of the building.
2. For wood light-frame construction, floors shall be permitted to be vertically offset when the floor framing is lapped or tied together as required by Section R502.6.1.
6. When shear walls and braced wall lines do not occur in two perpendicular directions.
7. When an exterior braced wall line is constructed with dissimilar braced wall panels.

Exception: Alternate braced wall panels as permitted by Section R602.10.3 and R602.10.6.

R301.2.2.3 Seismic Design Category C. Structures assigned to Seismic Design Category C shall conform to the requirements of this section.

R301.2.2.3.1 Anchored stone and masonry veneer. Anchored stone and masonry veneer shall be limited to the height allowed in Section R703.7 and shall not exceed 5 inches (127 mm) in thickness.

R301.2.2.3.2 Masonry construction. Masonry construction shall comply with the requirements of Section R606.11.2.

R301.2.2.3.3 Concrete construction. Concrete construction shall comply with the requirements of Section R611 or R612.

R301.2.2.4 Seismic Design Categories D₁ and D₂. Structures assigned to Seismic Design Categories D₁ and D₂ shall conform to the requirements for Seismic Design Category C and the additional requirements of this section.

R301.2.2.4.1 Height limitations. Wood framed buildings shall be limited to three stories above grade

or the limits given in Table R602.10.1 or Table R602.10.2. Cold-formed steel framed buildings shall be limited to two stories above grade in accordance with COFS/PM. Mezzanines as defined in Section 202 shall not be considered as stories.

R301.2.2.4.2 Anchored stone and masonry veneer. Buildings with anchored stone and masonry veneer shall be designed in accordance with accepted engineering practice.

Exceptions:

1. In Seismic Design Category D₁, exterior masonry veneer with a maximum nominal thickness of 4 inches (102 mm) is permitted in accordance with Section R703.7.
2. In Seismic Design Category D₂, exterior masonry veneer with a maximum actual thickness of 3 inches (76 mm) is permitted in accordance with Section R703.7.

R301.2.2.4.3 Masonry construction. Masonry construction in Seismic Design Category D₁ shall comply with the requirements of Section R606.11.3. Masonry construction in Seismic Design Category D₂ shall comply with the requirements of Section R606.11.4.

R301.2.2.4.4 Concrete construction. Buildings with above-grade concrete walls shall be in accordance with Section R611, R612, or designed in accordance with accepted engineering practice.

R301.2.2.4.5 Cold-formed steel framing in Seismic Design Category D₁ and D₂. In Seismic Design Category D₁ and D₂ in addition to the requirements of this code, cold-formed steel framing shall comply with the requirements of COFS/PM.

R301.2.3 Snow loads. Wood framed construction, cold-formed steel framed construction and masonry and concrete construction in regions with ground snow loads 70 psf (3.35 kN/m²) or less, shall be in accordance with Chapters 5, 6 and 8. Buildings in regions with ground snow loads greater than 70 psf (3.35 kN/m²) shall be designed in accordance with accepted engineering practice.

Exception: Wood-framed construction shall be permitted to be constructed in accordance with WWSA Western Lumber Span Tables.

R301.2.4 Floodplain construction. Buildings and structures constructed in flood hazard areas (including A or V Zones) as established by the local jurisdiction shall be designed and constructed in accordance with Section R327.

Exception: Buildings in floodways that are designated on the Flood Insurance Rate Maps (FIRM) or the Flood Boundary and Floodway Maps (FBFM) that are provided by the National Flood Insurance Program (NFIP) shall not be approved under this section; the provisions of the *Oregon Structural Specialty Code* shall apply.

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R301.3 Story height. Buildings constructed in accordance with these provisions shall be limited to story heights of not more than the following:

1. For wood wall framing, the laterally unsupported bearing wall stud height permitted by Table R602.3(5) plus a height of floor framing not to exceed sixteen inches.

Exception: For wood framed wall buildings with bracing in accordance with Table R602.10.1 or Table R602.10.2, the wall stud clear height used to determine the maximum permitted story height may be increased to 12 feet without requiring an engineered design for the building wind and seismic force resisting systems provided that the length of bracing required by Table R602.10.1 or Table R602.10.2 is increased by multiplying by a factor of 1.20. For the continuously sheathed wall bracing method, the increased height of wall studs is still subject to the minimum aspect ratio for corner braced wall panels as provided in Note b of the Table R602.10.5. Wall studs are still subject to the requirements of this section.

2. For steel wall framing, a stud height of 10 feet, plus a height of floor framing not to exceed 16 inches.
3. For masonry walls, a maximum bearing wall clear height of 12 feet plus a height of floor framing not to exceed 16 inches.

Exception: An additional 8 feet is permitted for gable end walls.

4. For insulating concrete form walls, the maximum bearing wall height per story as permitted by Section 611 tables plus a height of floor framing not to exceed 16 inches.

Individual walls or walls studs shall be permitted to exceed these limits as permitted by Chapter 6 provisions, provided story heights are not exceeded. An engineered design shall be provided for the wall or wall framing members when they exceed the limits of Chapter 6. Where the story height limits are exceeded, an engineered design shall be provided in accordance with the *Oregon Structural Specialty Code* for the overall wind and seismic force resisting systems.

R301.4 Dead load. The actual weights of materials and construction shall be used for determining dead load with consideration for the dead load of fixed service equipment.

R301.5 Live load. The minimum uniformly distributed live load shall be as provided in Table R301.5.

R301.6 Roof load. Roof shall be designed for the live load indicated in Table R301.6 or the snow load indicated in Table R301.2(1), whichever is greater.

R301.7 Deflection. The allowable deflection of any structural member under the live load listed in Sections R301.5 and R301.6 shall not exceed the values in Table R301.7.

**TABLE R301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS
(in pounds per square foot)**

USE	LIVE LOAD
Attics with storage ^b	20
Attics without storage	10
Decks ^c	40
Exterior balconies	60
Fire escapes	40
Guardrails and handrails ^d	200
Guardrails in-fill components ^f	200
Passenger vehicle garages ^a	50 ^a
Dwelling units	40
Stairs	40 ^e

For SI: 1 pound per square foot = 0.0479 kN/m², 1 square inch = 645 mm², 1 pound = 4.45 N.

- a. Elevated garage floors shall be capable of supporting a 2,000-pound load applied over a 6-inch square area anywhere when on the floor and shall be capable of supporting two 2,000-pound loads each applied over 6-inch-square areas centered 5 feet apart perpendicular to the direction of vehicle entry and a second pair of 2,000-pound loads 9 feet from and aligned with the first pair of 2,000-pound loads. These loads shall be applied anywhere on the floor but need not be applied closer than 2 feet from the interior end wall nor closer than 1 foot from interior sidewalls.
- b. No storage with roof slope not over 3 units in 12 units.
- c. Individual stair treads shall be designed for the uniformly distributed live load or a 300-pound concentrated load acting over an area of 4 square inches, whichever produces the greater stresses.
- d. A single concentrated load applied in any direction at any point along the top.
- e. See Section R502.2.1 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.

**TABLE R301.6
MINIMUM ROOF LIVE LOADS IN POUNDS-FORCE
PER SQUARE FOOT OF HORIZONTAL PROJECTION**

ROOF SLOPE	TRIBUTARY LOADED AREA IN SQUARE FEET FOR ANY STRUCTURAL MEMBER		
	0 to 200	201 to 600	Over 600
Flat or rise less than 4 inches per foot (1:3)	20	16	12
Rise 4 inches per foot (1:3) to less than 12 inches per foot (1:1)	16	14	12
Rise 12 inches per foot (1:1) and greater	12	12	12

For SI: 1 square foot = 0.0929 m², 1 pound per square foot = 0.0479 kN/m², 1 inch per foot = 0.0833 mm/m.

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS^{a,b}

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Rafters having slopes greater than 3/12 with no finished ceiling attached to rafters	L/180
Interior walls and partitions	H/180
Floors and plastered ceilings	L/360
All other structural members	L/240
Exterior walls with plaster or stucco finish	H/360
Exterior walls—wind loads ^a with brittle finishes	L/240
Exterior walls—wind loads ^a with flexible finishes	L/120

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

- a. For cantilever members, L shall be taken as twice the length of the cantilever.
b. 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 sandwich panels used in roofs or walls of sunroom additions or patio covers, the total load deflection shall not exceed L/120.

R301.8 Nominal sizes. For the purposes of this code, where dimensions of lumber are specified, they shall be deemed to be nominal dimensions unless specifically designated as actual dimensions.

SECTION R302 LOCATION ON LOT

R302.1 Exterior walls. Exterior walls with a fire separation distance less than 3 feet (914 mm) shall have not less than a one-hour fire-resistive rating with exposure from both sides. Projections shall not extend to a point closer than 2 feet (610 mm) from the line used to determine the fire separation distance.

Exception: Detached garages accessory to a dwelling located within 2 feet of a lot line shall be permitted to have roof eave projections not exceeding 4 inches.

Projections extending into the fire separation distance shall have not less than one-hour fire-resistive construction on the underside. The above provisions shall not apply to walls which are perpendicular to the line used to determine the fire separation distance.

Exception: Tool and storage sheds, playhouses and similar structures exempted from permits by R105.2 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.

R302.2 Openings. Openings shall not be permitted in the exterior wall of a dwelling or accessory building with a fire separation distance less than 3 feet (914 mm). This distance shall be measured perpendicular to the line used to determine the fire separation distance.

Exceptions:

1. Openings shall be permitted in walls that are perpendicular to the line used to determine the fire separation distance.

2. Foundation vents installed in compliance with this code are permitted.

R302.3 Penetrations. Penetrations located in the exterior wall of a dwelling with a fire separation distance less than 3 feet (914 mm) shall be protected in accordance with Section R317.3.

Exception: Penetrations shall be permitted in walls that are perpendicular to the line used to determine the fire separation distance.

SECTION R303 LIGHT, VENTILATION AND HEATING

R303.1 Habitable rooms. All habitable rooms shall be provided with aggregate glazing area of not less than 8 percent of the floor area of such rooms. Natural ventilation shall be through windows, doors, louvers or other approved openings to the outdoor air. Such openings shall be provided with ready access or shall otherwise be readily controllable by the building occupants. The minimum openable area to the outdoors shall be 4 percent of the floor area being ventilated.

Exceptions:

1. The glazed areas need not be openable where the opening is not required by Section R310 and an approved mechanical ventilation system is provided capable of producing 0.35 air change per hour in the room or a whole-house mechanical ventilation system is installed capable of supplying outdoor ventilation air of 15 cubic feet per minute (cfm) (7.08 L/s) per occupant computed on the basis of two occupants for the first bedroom and one occupant for each additional bedroom.
2. The glazed areas need not be provided in rooms where Exception 1 above is satisfied and artificial light is provided capable of producing an average illumination of 6 footcandles (6.46 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.

R303.2 Adjoining rooms. For the purpose of determining light and ventilation requirements, any room shall be considered as a portion of an adjoining room when at least one-half of the area of the common wall is open and unobstructed and provides an opening of not less than one-tenth of the floor area of the interior room but not less than 25 square feet (2.32 m²).

Exception: Openings required for light and/or ventilation shall be permitted to open into a thermally isolated sunroom addition or patio cover, provided that there is an openable area between the adjoining room and the sunroom addition or patio cover of not less than one-tenth of the floor area of the interior room but not less than 20 square feet (1.86 m²). The minimum openable area to the outdoors shall be based upon the total floor area being ventilated.

R303.3 Bathrooms.

R303.3.1 Bathroom or spa facilities. All bathrooms or combination of rooms thereof with bathing or spa facilities shall be provided with a mechanical ventilation system and shall be designed to have the capacity to exhaust the mini-

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imum flow rate determined in accordance with Section M1506.4.

R303.3.2 Bathrooms without bathing or spa facilities. Bathrooms, water closet compartments and other similar rooms shall be provided with an aggregate glazing area in windows of not less than 3 square feet (0.279 m²), one-half of which must be openable.

Exception: The glazed areas shall not be required where artificial light and a mechanical ventilation system are provided. The minimum ventilation rates shall be 50 cfm (23.6 L/s) for intermittent ventilation for rooms which are 75 square feet (23 m²) or less in area. For rooms larger than 75 square feet (23 m²), the intermittent ventilation system shall be capable of producing a change of air every 12 minutes or 20 cfm (0.009 m) for continuous ventilation. Ventilation air from the space shall be exhausted directly to the outside.

R303.4 Opening location. Outdoor intake and exhaust openings shall be located in accordance with Sections R303.4.1 and R303.4.2.

R303.4.1 Intake openings. Mechanical and gravity outdoor air intake openings shall be located a minimum of 10 feet (3048 mm) from any hazardous or noxious contaminant, such as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks, except as otherwise specified in this code. Where a source of contaminant is located within 10 feet (3048 mm) of an intake opening, such opening shall be located a minimum of 2 feet (610 mm) below the contaminant source.

For the purpose of this section, the exhaust from dwelling unit toilet rooms, bathrooms and kitchens shall not be considered as hazardous or noxious.

R303.4.2 Exhaust openings. Outside exhaust openings shall be located so as not to create a nuisance. Exhaust air shall not be directed onto walkways.

R303.5 Outside opening protection. Air exhaust and intake openings that terminate outdoors shall be protected with corrosion-resistant screens, louvers or grilles having a minimum opening size of 1/4 inch (6.4 mm) and a maximum opening size of 1/2 inch (12.7 mm), in any dimension. Openings shall be protected against local weather conditions. Outdoor air exhaust and intake openings shall meet the provisions for exterior wall opening protectives in accordance with this code.

R303.6 Stairway illumination. All interior and exterior stairways shall be provided with a means to illuminate the stairs, including the landings and treads. Interior stairways shall be provided with an artificial light source located in the immediate vicinity of each landing of the stairway. Exterior stairways shall be provided with an artificial light source located in the immediate vicinity of the top landing of the stairway. Exterior stairways providing access to a basement from the outside grade level shall be provided with an artificial light source located in the immediate vicinity of the bottom landing of the stairway.

Exception: An artificial light source is not required at the top and bottom landing, provided an artificial light source is located directly over each stairway section.

R303.6.1 Light activation. See Section E35-210.70(A)(2)(c).

R303.7 Required glazed openings. Required glazed openings shall open directly onto a street or public alley, or a yard or court located on the same lot as the building.

R303.7.1 Roofed porches. Required glazed openings may face into a roofed porch where the porch abuts a street, yard or court and the longer side of the porch is at least 65 percent open and unobstructed and the ceiling height is not less than 7 feet (2134 mm).

R303.8 Required heating. Every dwelling unit shall be provided with heating facilities capable of maintaining a minimum room temperature of 68°F (20°C) at a point 3 feet (914 mm) above the floor and 2 feet (610 mm) from exterior walls in all habitable rooms at the design temperature. The installation of one or more portable space heaters shall not be used to achieve compliance with this section.

SECTION R304 MINIMUM ROOM AREAS

R304.1 Minimum area. Every dwelling unit shall have at least one habitable room that shall have not less than 120 square feet (11.2 m²) of gross floor area.

R304.2 Other rooms. Other habitable rooms shall have a floor area of not less than 70 square feet (6.5 m²).

Exception: Kitchens.

R304.3 Minimum dimensions. Habitable rooms shall not be less than 7 feet (2134 mm) in any horizontal dimension.

Exception: Kitchens.

R304.4 Height effect on room area. Portions of a room with a sloping ceiling measuring less than 5 feet (1524 mm) or a furred ceiling measuring less than 7 feet (2134 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required habitable area for that room.

SECTION R305 CEILING HEIGHT

R305.1 Minimum height. Habitable rooms, hallways, corridors, bathrooms, toilet rooms, laundry rooms and basements shall have a ceiling height of not less than 7 feet (2134 mm). The required height shall be measured from the finish floor to the lowest projection from the ceiling.

Exceptions:

1. Beams and girders spaced not less than 4 feet (1219 mm) on center may project not more than 6 inches (152 mm) below the required ceiling height.
2. Ceilings in basements without habitable spaces may project to within 6 feet, 8 inches (2032 mm) of the finished floor; and beams, girders, ducts or other obstructions may project to within 6 feet, 4 inches (1931 mm) of the finished floor.
3. Not more than 50 percent of the required floor area of a room or space is permitted to have a sloped ceiling less than 7 feet (2134 mm) in height with no portion of

the required floor area less than 5 feet (1524 mm) in height.

4. Not more than 75 percent of the floor area of a bathroom or toilet room is permitted to have a sloped ceiling less than 7 feet (2134 mm) in height, provided an area of 21 inches by 24 inches (534 mm by 610 mm) in front of toilets and lavatories has a minimum of 6 feet, 4 inches (1931 mm) in height, measured from the finished floor. An area of 24 inches by 30 inches (610 mm by 762 mm) in front of and inside a tub or shower shall have a minimum of 6 feet, 4 inches (1931 mm) in height, measured from the standing surface of the fixture.

SECTION R306 SANITATION

R306.1 Toilet facilities. Every dwelling unit shall be provided with a water closet, lavatory, and a bathtub or shower.

R306.2 Kitchen. Each dwelling unit shall be provided with a kitchen area and every kitchen area shall be provided with a sink.

R306.3 Sewage disposal. All plumbing fixtures shall be connected to a sanitary sewer or to an approved private sewage disposal system.

R306.4 Water supply to fixtures. All plumbing fixtures shall be connected to an approved water supply. Kitchen sinks, lavatories, bathtubs, showers, bidets, laundry tubs and washing machine outlets shall be provided with hot and cold water.

SECTION R307 TOILET, BATH AND SHOWER SPACES

R307.1 Space required. Fixtures shall be spaced as per Figure R307.2.

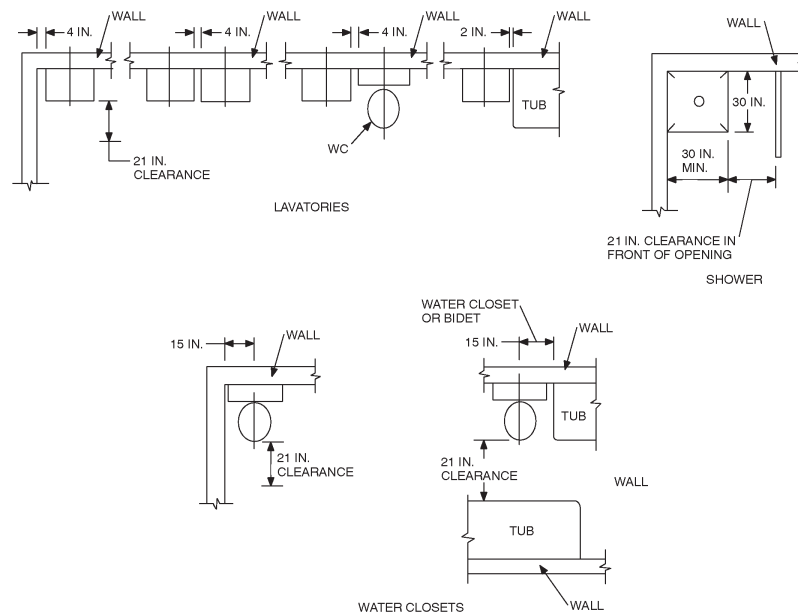
R307.2 Bathtub and shower spaces. Bathtub and shower floors and walls above bathtubs with installed shower heads and in shower compartments shall be finished with a nonabsorbent surface. Such wall surfaces shall extend to a height of not less than 6 feet (1829 mm) above the floor.

SECTION R308 GLAZING

[B] R308.1 Identification. Except as indicated in Section R308.1.1, each pane of glazing installed in hazardous locations as defined in Section R308.4 shall be provided with a manufacturer's or installer's label, designating the type and thickness of glass and the safety glazing standard with which it complies, which is visible in the final installation. The label shall be acid etched, sandblasted, ceramic-fired, embossed mark, or shall be of a type which once applied cannot be removed without being destroyed.

Exceptions:

1. For other than tempered glass, labels may be omitted provided the building official approves the use of a certificate, affidavit or other evidence confirming compliance with this code.
2. Tempered spandrel glass may be identified by the manufacturer with a removable paper label.



For SI: 1 inch = 25.4 mm.

**FIGURE R307.2
 MINIMUM FIXTURE CLEARANCES**

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R308.1.1 Identification of multipane assemblies. Multi-pane assemblies having individual panes not exceeding 1 square foot (0.09 m²) in exposed area shall have at least one pane in the assembly identified in accordance with Section R308.1. All other panes in the assembly shall be labeled "16 CFR 1201."

R308.2 Louvered windows or жалuѕіes. Regular, float, wired or patterned glass in жалuѕіes and louvered windows shall be no thinner than nominal 3/16 inch (4.76 mm) and no longer than 48 inches (1219 mm). Exposed glass edges shall be smooth.

R308.2.1 Wired glass prohibited. Wired glass with wire exposed on longitudinal edges shall not be used in жалuѕіes or louvered windows.

[B] R308.3 Human impact loads. Individual glazed areas including glass mirrors in hazardous locations such as those indicated as defined in Section R308.4 shall pass the test requirements of CPSC 16 CFR, Part 1201. Glazing shall comply with the CPSC 16 CFR, Part 1201 criteria for Category I or Category II as indicated in Table R308.3.

Exceptions:

1. Polished wired glass for use in fire doors and other fire resistant locations shall comply with ANSI Z97.1.
2. Louvered windows and жалuѕіes shall comply with Section R308.2.

[B] R308.4 Hazardous locations. The following shall be considered specific hazardous locations for the purposes of glazing:

1. Glazing in swinging doors except жалuѕіes.
2. Glazing in fixed and sliding panels of sliding door assemblies and panels in sliding and bifold closet door assemblies.
3. Glazing in storm doors.
4. Glazing in all unframed swinging doors.
5. Glazing in doors and enclosures for hot tubs, whirlpools, saunas, steam rooms, bathtubs and showers. Glazing in any part of a building wall enclosing these compartments where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) measured vertically above any standing or walking surface.
6. Glazing, in an individual fixed or operable panel adjacent to a door where the nearest vertical edge is within a 24-inch (610 mm) arc of the door in a closed position

and whose bottom edge is less than 60 inches (1524 mm) above the floor or walking surface.

7. Glazing in an individual fixed or operable panel, other than those locations described in Items 5 and 6 above, that meets all of the following conditions:
 - 7.1. Exposed area of an individual pane greater than 9 square feet (0.836 m²).
 - 7.2. Bottom edge less than 18 inches (457 mm) above the floor.
 - 7.3. Top edge greater than 36 inches (914 mm) above the floor.
 - 7.4. One or more walking surfaces within 36 inches (914 mm) horizontally of the glazing.
8. All glazing in railings regardless of an area or height above a walking surface. Included are structural baluster panels and nonstructural in-fill panels.
9. Glazing in walls and fences enclosing indoor and outdoor swimming pools, hot tubs and spas where the bottom edge of the glazing is less than 60 inches (1524 mm) above a walking surface and within 60 inches (1524 mm) horizontally of the water's edge. This shall apply to single glazing and all panes in multiple glazing.
10. Glazing adjacent to stairways, landings and ramps within 36 inches (914 mm) horizontally of a walking surface when the exposed surface of the glass is less than 60 inches (1524 mm) above the plane of the adjacent walking surface.
11. Glazing adjacent to stairways within 60 inches (1524 mm) horizontally of the bottom tread of a stairway in any direction when the exposed surface of the glass is less than 60 inches (1524 mm) above the nose of the tread.

Exception: The following products, materials and uses are exempt from the above hazardous locations:

1. Openings in doors through which a 3-inch (76 mm) sphere is unable to pass.
2. Decorative glass in Items 1, 6 or 7.
3. Glazing in Section R308.4, Item 6, when there is an intervening wall or other permanent barrier between the door and the glazing.
4. Glazing in Section R308.4, Item 6, in walls perpendicular to the plane of the door in a closed position or where access through the door is to a closet or storage

**TABLE R308.3
MINIMUM CATEGORY CLASSIFICATION OF GLAZING**

EXPOSED SURFACE AREA OF ONE SIDE OF ONE LITE	GLAZING IN STORM OR COMBINATION DOORS (Category Class)	GLAZING IN DOORS (Category Class)	GLAZED PANELS REGULATED BY ITEM 7 OF SECTION R308.4 (Category Class)	GLAZED PANELS REGULATED BY ITEM 6 OF SECTION R308.4 (Category Class)	GLAZING IN DOORS AND ENCLOSURES REGULATED BY ITEM 5 OF SECTION R308.4 (Category Class)	SLIDING GLASS DOORS PATIO TYPE (Category Class)
9 sq. ft. or less	I	I	NR ^a	I	II	II
More than 9 sq. ft	II	II	II	II	II	II

For SI: 1 square foot = 0.0929 m².

a. NR means "No Requirement."

area 3 feet (914 mm) or less in depth. Glazing in these applications shall comply with Section R308.4, Item 7.

5. Glazing in Section R308.4, Items 7 and 10, when a protective bar is installed on the accessible side(s) of the glazing 36 inches \pm 2 inches (914 mm \times 51 mm) above the floor. The bar shall be capable of withstanding a horizontal load of 50 pounds per linear foot (74.5 kg/m) without contacting the glass and be a minimum of 1½ inches (38 mm) in height.
6. Outboard panes in insulating glass units and other multiple glazed panels in Section R308.4, Item 7, when the bottom edge of the glass is 25 feet (7620 mm) or more above grade, a roof, walking surface, or other horizontal [within 45 degrees (0.79 rad) of horizontal] surface adjacent to the glass exterior.
7. Louvered windows and jalousies complying with the requirements of Section R308.2.
8. Mirrors and other glass panels mounted or hung on a surface that provides a continuous backing support.
9. Safety glazing in Section R308.4, Items 10 and 11 is not required where:
 - 9.1. The side of a stairway, landing or ramp has a guardrail or handrail, including balusters or in-fill panels, complying with the provisions of Sections 1012 and 1607.7 of the *International Building Code*; and
 - 9.2. The plane of the glass is greater than 18 inches (457 mm) from the railing.

[B] R308.5 Site built windows. Site built windows shall comply with Section NF1111.6.

[B] R308.6 Skylights and sloped glazing. Skylights and sloped glazing shall comply with the following sections.

R308.6.1 Definitions.

SKYLIGHTS AND SLOPED GLAZING. Glass or other transparent or translucent glazing material installed at a slope of more than 15 degrees (0.26 rad) from vertical. Glazing materials in skylights, including unit skylights, solariums, sunrooms, roofs and sloped walls are included in this definition.

UNIT SKYLIGHT. A factory assembled, glazed fenestration unit, containing one panel of glazing material, that allows for natural daylighting through an opening in the roof assembly while preserving the weather resistant barrier of the roof.

R308.6.2 Permitted materials. The following types of glazing may be used:

1. Laminated glass with a minimum 0.015-inch (0.38 mm) polyvinyl butyral interlayer for glass panes 16 square feet (1.5 m²) or less in area located such that the highest point of the glass is not more than 12 feet (3658 mm) above a walking surface or other accessible area; for higher or larger sizes, the minimum interlayer thickness shall be 0.030 inch (0.76 mm).
2. Fully tempered glass.
3. Heat-strengthened glass.
4. Wired glass.

5. Approved rigid plastics.

R308.6.3 Screens, general. For fully tempered or heat-strengthened glass, a retaining screen meeting the requirements of Section R308.6.7 shall be installed below the glass, except for fully tempered glass that meets either condition listed in Section R308.6.5.

R308.6.4 Screens with multiple glazing. When the inboard pane is fully tempered, heat-strengthened, or wired glass, a retaining screen meeting the requirements of Section R308.6.7 shall be installed below the glass, except for either condition listed in Section R308.6.5. All other panes in the multiple glazing may be of any type listed in Section R308.6.2.

R308.6.5 Screens not required. Screens shall not be required when fully tempered glass is used as single glazing or the inboard pane in multiple glazing and either of the following conditions are met:

1. Glass area 16 square feet (1.49 m²) or less. Highest point of glass not more than 12 feet (3658 mm) above a walking surface or other accessible area, nominal glass thickness not more than 3/16 inch (4.76 mm), and (for multiple glazing only) the other pane or panes fully tempered, laminated or wired glass.
2. Glass area greater than 16 square feet (1.49 m²). Glass sloped 30 degrees (0.52 rad) or less from vertical, and highest point of glass not more than 10 feet (3048 mm) above a walking surface or other accessible area.

R308.6.6 Glass in greenhouses. Any glazing material is permitted to be installed without screening in the sloped areas of greenhouses, provided the greenhouse height at the ridge does not exceed 20 feet (6096 mm) above grade.

R308.6.7 Screen characteristics. The screen and its fastenings shall be capable of supporting twice the weight of the glazing, be firmly and substantially fastened to the framing members, and have a mesh opening of no more than 1 inch by 1 inch (25.4 mm by 25.4 mm).

R308.6.8 Curbs for skylights. All unit skylights installed in a roof with a pitch flatter than three units vertical in 12 units horizontal (25-percent slope) shall be mounted on a curb extending at least 4 inches (102 mm) above the plane of the roof unless otherwise specified in the manufacturer's installation instructions.

R308.6.9 Testing and labeling. Unit skylights shall be labeled in accordance with Section NF1112.

SECTION R309 GARAGES AND CARPORTS

R309.1 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 residence shall be equipped with solid wood doors not less than 1¾ inches (35 mm) in thickness, solid or honeycomb core steel doors not less than 1¾ inches (35 mm) thick, or 20-minute fire-rated doors.

R309.1.1 Duct penetration. Ducts in the garage and ducts penetrating the walls or ceilings separating the dwelling from the garage shall be constructed of a minimum No. 26 gage

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(0.48 mm) sheet steel or other approved material and shall have no openings into the garage. When a vibration isolator is used in the garage duct, it must be installed at least 18 inches (457 mm) from the penetration. Vibration isolators shall be installed in accordance with Section M1601.2.2.

R309.2 Separation required. The garage shall be separated from the residence and its attic area by not less than 1/2-inch (12.7 mm) gypsum board applied to the garage side. Garages beneath habitable rooms shall be separated from all habitable rooms above by not less than 5/8-inch (15.9 mm) Type X gypsum board or equivalent. Where the separation is a floor-ceiling assembly, the structure supporting the separation shall also be protected by not less than 1/2-inch (12.7 mm) gypsum board or equivalent.

R309.3 Floor surface. Garage 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.

R309.4 Carports. Carports shall be open on at least two sides. Carport floor surfaces shall be of approved noncombustible material. Carports not open on at least two sides shall be considered a garage and shall comply with the provisions of this section for garages.

Exception: Asphalt surfaces shall be permitted at ground level in carports.

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.

R309.5 Flood hazard areas. For buildings located in flood hazard areas as established by the local jurisdiction, garage floors shall be:

1. Elevated to or above the design flood elevation as determined in Section R327.
2. Located below the design flood elevation provided they are at or above grade on all sides, are used solely for parking, building access, or storage, meet the requirements of Section R327, and are otherwise constructed in accordance with this code.

R309.6 Automatic garage door openers. Automatic garage door openers, if provided, shall be listed in accordance with UL 325.

SECTION R310

EMERGENCY ESCAPE AND RESCUE OPENINGS

R310.1 Emergency escape and rescue required. Basements with habitable space and every sleeping room shall have at least one openable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, emergency egress and rescue openings shall be required in each sleeping room, but shall not be required in adjoining areas of the basement. Where emergency escape and rescue openings are provided they shall have a sill height of not more than 44 inches (1118 mm) above the floor. Where a door opening having a threshold below the adjacent ground elevation serves as an emergency escape and rescue opening and is provided with a

bulkhead enclosure, the bulkhead enclosure shall comply with Section 310.3. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. Emergency escape and rescue openings with a finished sill height below the adjacent ground elevation shall be provided with a window well in accordance with Section R310.2.

R310.1.1 Minimum opening area. All emergency escape and rescue openings shall have a minimum net clear opening of 5.7 square feet (0.530 m²).

Exception: Grade floor openings shall have a minimum net clear opening of 5 square feet (0.465 m²).

R310.1.2 Minimum opening height. The minimum net clear opening height shall be 22 inches (559 mm).

R310.1.3 Minimum opening width. The minimum net clear opening width shall be 20 inches (508 mm).

R310.1.4 Operational constraints. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys or tools.

R310.2 Window wells. The minimum horizontal area of the window well shall be 9 square feet (0.84 m²), with a minimum horizontal projection and width of 36 inches (914 mm). The area of the window well shall allow the emergency escape and rescue opening to be fully opened.

Exception: The ladder or steps required by Section R310.2.1 shall be permitted to encroach a maximum of 6 inches (152 mm) into the required dimensions of the window well.

R310.2.1 Ladder and steps. Window wells with a vertical depth greater than 44 inches (1118 mm) shall be equipped with a permanently affixed ladder or steps usable with the window in the fully open position. Ladders or steps required by this section shall not be required to comply with Sections R311.5 and R311.6. Ladders or rungs shall have an inside width of at least 12 inches (305 mm), shall project at least 3 inches (76 mm) from the wall and shall be spaced not more than 18 inches (457 mm) on center vertically for the full height of the window well.

R310.3 Bulkhead enclosures. Bulkhead enclosures shall provide direct access to the basement. The bulkhead enclosure with the door panels in the fully open position shall provide the minimum net clear opening required by Section R310.1.1. Bulkhead enclosures shall also comply with Section R311.5.8.2.

R310.4 Bars, grills, covers and screens. Bars, grills, covers, screens or similar devices are permitted to be placed over emergency escape and rescue openings, bulkhead enclosures, or window wells that serve such openings, provided the minimum net clear opening size complies with Sections R310.1.1 to R310.1.3, and such devices shall be releasable or removable from the inside without the use of a key, tool or force greater than that which is required for normal operation of the escape and rescue opening.

SECTION R311 MEANS OF EGRESS

R311.1 General. Stairways, ramps, exterior exit balconies, hallways and doors shall comply with this section.

R311.2 Construction.

R311.2.1 Attachment. Required exterior exit balconies, stairs and similar exit facilities shall be positively anchored to the primary structure to resist both vertical and lateral forces. Such attachment shall not be accomplished by use of toenails or nails subject to withdrawal.

R311.2.2 Under stair protection. Enclosed accessible space under stairs shall have walls, under stair surface and any soffits protected on the enclosed side with $\frac{1}{2}$ -inch (12.7 mm) gypsum board.

R311.3 Hallways. The minimum width of a hallway shall be not less than 3 feet (914 mm).

R311.4 Doors.

R311.4.1 Exit door required. Not less than one exit door conforming to this section shall be provided for each dwelling unit. The required exit door shall provide for direct access from the habitable portions of the dwelling to the exterior without requiring travel through a garage or carport. Access to habitable levels not having an exit in accordance with this section shall be by a ramp in accordance with Section R311.6 or a stairway in accordance with Section R311.5.

R311.4.2 Door type and size. The required exit door shall be a side-hinged door not less than 3 feet (914 mm) in width and 6 feet 8 inches (2032 mm) in height. Other doors shall not be required to comply with these minimum dimensions.

R311.4.3 Landings at doors. There shall be a floor or landing on the interior side of each exterior door. There shall be a floor or landing on the exterior side of the required exit door described in Section R311.1.

The interior floor or landing at a door shall not be more than 1.5 inches (38 mm) lower than the top of the threshold. The exterior landing at the required exit doors shall not be more than 8 inches (203 mm) below the top of the threshold, provided the door does not swing over the landing.

Exception: Exterior storm or screen doors.

The width of each landing shall not be less than the door served. Every landing shall have a minimum dimension of 36 inches (914 mm) measured in the direction of travel.

R311.4.4 Type of lock or latch. All egress doors shall be readily openable from the side from which egress is to be made without the use of a key or special knowledge or effort.

R311.5 Stairways.

R311.5.1 Width. Stairways shall not be less than 36 inches (914 mm) in clear width at all points above the permitted handrail height and below the required headroom height. Handrails shall not project more than 4.5 inches (114 mm) on either side of the stairway and the minimum clear width of the stairway at and below the handrail height, including treads and landings, shall not be less than 31.5 inches (787

mm) where a handrail is installed on one side and 27 inches (698 mm) where handrails are provided on both sides.

Exceptions:

1. The width of spiral stairways shall be in accordance with Section R311.5.8.
2. Where a floor is served by more than one stairway, stairways other than the first stairway may have a clear width of not less than 30 inches (762 mm). Any handrail may encroach a maximum of 4.5 inches (102 mm) into the clear width.

R311.5.2 Headroom. The minimum headroom in all parts of the stairway shall not be less than 6 feet 8 inches (2036 mm) measured vertically from the sloped plane adjoining the tread nosing or from the floor surface of the landing or platform.

R311.5.3 Stair treads and risers.

R311.5.3.1 Riser height. The maximum riser height shall be 8 inches (203 mm). The riser height shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than $\frac{3}{8}$ inch (9.5 mm). The greatest tread depth within any flight of stairs shall not exceed the smallest by more than $\frac{3}{8}$ inch (9.5 mm).

R311.5.3.2 Tread depth. The minimum tread depth shall be 9 inches (229 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than $\frac{3}{8}$ inch (9.5 mm). Winder treads shall have a minimum tread depth of 9 inches (229 mm) measured as above at a point 12 inches (305 mm) from the side where the treads are narrower. Winder treads shall have a minimum tread depth of 6 inches (152 mm) at any point. Within any flight of stairs, the greatest winder tread depth at the 12 inch (305 mm) walk line shall not exceed the smallest by more than $\frac{3}{8}$ inch (9.5 mm).

R311.5.3.3 Profile. The radius of curvature at the leading edge of the tread shall be no greater than $\frac{9}{16}$ inch (14.3 mm). A nosing not less than $\frac{3}{4}$ inch (19 mm) but not more than $1\frac{1}{4}$ inch (32 mm) shall be provided on stairways with solid risers. The greatest nosing projection shall not exceed the smallest nosing projection by more than $\frac{3}{8}$ inch (9.5 mm) between two stories, including the nosing at the level of floors and landings. Beveling of nosing shall not exceed $\frac{1}{2}$ inch (12.7 mm). Risers shall be vertical or sloped from the underside of the leading edge of the tread above at an angle not more than 30 (0.51 rad) degrees from the vertical. Open risers are permitted, provided that the opening between treads does not permit the passage of a 4-inch diameter (102 mm) sphere.

Exceptions:

1. A nosing is not required where the tread depth is a minimum of 10 inches (254 mm).

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2. The opening between adjacent treads is not limited on stairs with a total rise of 30 inches (762 mm) or less.

R311.5.3.4 Steps. The rise of a step or steps exclusive of a threshold shall not be less than 4 inches (102 mm) or greater than 8 inches (203 mm).

R311.5.3.5 Slope. Where the top or bottom riser adjoins a sloping walk, garage floor or driveway, the top or bottom riser may be reduced to less than 4 inches (102 mm) in height with the variation height of the riser not to exceed 3 inches (76 mm) in every 3 feet (904 mm) of walk or stairway width.

R311.5.4 Landings for stairways. There shall be a floor or landing at the top and bottom of each stairway.

Exception: A floor or landing is not required at the top of an interior flight of stairs, provided a door does not swing over the stairs.

A flight of stairs shall not have a vertical rise greater than 12 feet (3658 mm) between floor levels or landings.

The width of each landing shall not be less than the stairway served. Every landing shall have a minimum dimension of 36 inches (914 mm) measured in the direction of travel.

R311.5.5 Stairway walking surface. The walking surface of treads and landings of stairways shall be sloped no steeper than one unit vertical in 48 inches horizontal (2-percent slope).

R311.5.6 Handrails. Handrails shall be provided on at least one side of each continuous run of treads or flight with four or more risers. The continuous handrail required for winders shall be located on the side where the tread is narrower.

R311.5.6.1 Height. Handrail height, measured vertically from the sloped plane adjoining the tread nosing, or finish surface of ramp slope, shall be not less than 30 inches (762 mm) and not more than 38 inches (965 mm).

R311.5.6.2 Continuity. Handrails for stairways shall be continuous for the full length of the flight, from a point directly above the top riser of the flight to a point directly above lowest riser of the flight. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than 1½ inch (38 mm) between the wall and the handrails.

Exceptions:

1. Handrails shall be permitted to be interrupted by a newel post at the turn.
2. The use of a volute, turnout, starting easing or starting newel shall be allowed over the lowest tread.

R311.5.6.3 Handrail grip size. All required handrails shall be of one of the following types or provide equivalent graspability.

1. Type I. Handrails with a circular cross section shall have an outside diameter of at least 1¼ inches (32 mm) and not greater than 2 inches (51 mm). If the handrail is not circular it shall have a perimeter di-

mension of at least 4 inches (102 mm) and not greater than 6¼ inches (160 mm) with a maximum cross section of dimension of 2¼ inches (57 mm).

2. Type II. Handrails with a perimeter greater than 6¼ inches (160 mm) shall provide a graspable finger recess area on both sides of the profile. The finger recess shall begin within a distance of ¾ inch (19 mm) measured vertically from the tallest portion of the profile and achieve a depth of at least ⅝ inch (8 mm) within ⅞ inch (22 mm) below the widest portion of the profile. This required depth shall continue for at least ⅜ inch (10 mm) to a level that is not less than 1¼ inches (45 mm) below the tallest portion of the profile. The minimum width of the handrail above the recess shall be 1¼ inches (32 mm) to a maximum of 2¼ inches (70 mm). Edges shall have a minimum radius of 0.01 inches (0.25 mm).

R311.5.7 Illumination. All stairs shall be provided with illumination in accordance with Section R303.6.

R311.5.8 Special stairways. Circular stairways, spiral stairways, winders and bulkhead enclosure stairways shall comply with all requirements of Section R311.5 except as specified below.

R311.5.8.1 Spiral stairways. Spiral stairways are permitted, provided the minimum width shall be 26 inches (660 mm) with each tread having a 7½-inch (190 mm) minimum tread depth at 12 inches from the narrower edge. All treads shall be identical, and the rise shall be no more than 9½ inches (241 mm). A minimum headroom of 6 feet 6 inches (1982 mm) shall be provided.

R311.5.8.2 Bulkhead enclosure stairways. Stairways serving bulkhead enclosures, not part of the required building egress, providing access from the outside grade level to the basement shall be exempt from the requirements of Sections R311.4.3 and R311.5 where the maximum height from the basement finished floor level to grade adjacent to the stairway does not exceed 8 feet (2438 mm), and the grade level opening to the stairway is covered by a bulkhead enclosure with hinged doors or other approved means.

R311.6 Ramps.

R311.6.1 Maximum slope. Ramps shall have a maximum slope of one unit vertical in eight units horizontal (12.5-percent slope).

R311.6.2 Landings required. A minimum 3-foot-by-3-foot (914 mm by 914 mm) landing shall be provided:

1. At the top and bottom of ramps,
2. Where doors open onto ramps,
3. Where ramps change direction.

R311.6.3 Handrails required. Handrails shall be provided on at least one side of all ramps exceeding a slope of one unit vertical in 12 units horizontal (8.33-percent slope).

R311.6.3.1 Height. Handrail height, measured above the finished surface of the ramp slope, shall be not less than 30 inches (762 mm) and not more than 38 inches (965 mm).

R311.6.3.2 Handrail grip size. Handrails on ramps shall comply with Section R311.5.6.3.

R311.6.3.3 Continuity. Handrails where required on ramps shall be continuous for the full length of the ramp. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than 1.5 inches (38 mm) between the wall and the handrails.

SECTION R312 GUARDS

R312.1 Guards required. Porches, balconies or raised floor surfaces located more than 30 inches (762 mm) above the floor or grade below shall have guards not less than 36 inches (914 mm) in height. Open sides of stairs with a total rise of more than 30 inches (762 mm) above the floor or grade below shall have guards not less than 34 inches (864 mm) in height measured vertically from the nosing of the treads.

Porches and decks which are enclosed with insect screening shall be provided with guards where the walking surface is located more than 30 inches (762 mm) above the floor or grade below.

R312.2 Guard opening limitations. Required guards on open sides of stairways, raised floor areas, balconies and porches shall have intermediate rails or ornamental closures that do not allow passage of a sphere 4 inches (102mm) or more in diameter.

Exceptions:

1. The triangular openings formed by the riser, tread and bottom rail of a guard at the open side of a stairway are permitted to be of such a size that a sphere 6 inches (152 mm) cannot pass through.
2. Openings for required guards on open sides of stair shall not allow passage of a sphere 5 inches (127 mm) or more in diameter to pass through. Opening limitations for required guardrails on open sides of stairways are applicable above the second riser of the stair.

SECTION R313 SMOKE ALARMS

R313.1 Single- and multiple-station smoke alarms. Single- and multiple-station smoke alarms shall be installed in the following locations:

1. In each sleeping room.
2. Outside each separate sleeping area in the immediate vicinity of the bedrooms.
3. On each additional story of the dwelling, including basements and cellars but not including crawl spaces and uninhabitable attics. In dwellings or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

When more than one smoke alarm is required to be installed within an individual dwelling unit the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual unit. All smoke alarms shall be listed and installed in accordance with the provisions of this code.

Required smoke alarms shall not be located within kitchens or garages, or in other spaces where temperatures can fall below 40°F (38°C). Ionization smoke alarms shall not be located closer than 3 feet (914 mm) horizontally from the following:

1. The door to a kitchen;
2. The door to a bathroom containing a tub or shower;
3. The supply registers of a forced air heating or cooling system, outside the airflow from those registers.

A smoke alarm installed within 20 feet (6096 mm) (direct linear path) of a cooking appliance shall be a photoelectric-type smoke alarm or the alarm shall have an approved alarm silencing means.

R313.1.1 Alterations, repairs and additions. When interior alterations, repairs or additions requiring a structural permit occur, or when one or more sleeping rooms are added or created in existing dwellings, the individual unit shall be provided with smoke alarms located as required for new dwellings; the smoke alarms shall be interconnected and hard wired.

Exceptions:

1. Smoke alarms in existing areas shall not be required to be interconnected and hard wired where the alterations or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure.
2. Repairs to the exterior surfaces of dwellings are exempt from the requirements of this section.

R313.2 Power source. In new construction, the required smoke alarms shall receive their primary power from the building wiring when such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection. Smoke alarms shall be permitted to be battery operated when installed in buildings without commercial power or in buildings that undergo alterations, repairs or additions regulated by Section R313.1.1.

SECTION R314 PLASTICS

R314.1 Foam plastics general. The provisions of this section shall govern the requirements and uses of foam plastics.

R314.1.1 Surface burning characteristics. Except where otherwise noted in Section R314.2, all foam plastic or foam plastic cores in manufactured assemblies used in building construction shall have a flame-spread rating of not more than 75 and shall have a smoke-developed rating of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E 84.

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R314.1.2 Thermal barrier. Foam plastic, except where otherwise noted, shall be separated from the interior of a building by minimum 1/2-inch (12.7 mm) gypsum board or an approved finish material equivalent to a thermal barrier to limit the average temperature rise of the unexposed surface to no more than 250°F (121°C) after 15 minutes of fire exposure to the ASTM E 119 standard time temperature curve. The gypsum board shall be installed using a mechanical fastening system in accordance with Section R702.3.5. Reliance on adhesives to ensure that the gypsum board will remain in place when exposed to fire shall be prohibited.

R314.1.3 Specific requirements. The following requirements shall apply to all uses of foam plastic unless specifically approved in accordance with Section R314.1.4 or by other sections of the code.

R314.1.3.1 Masonry or concrete construction. Foam plastics may be used without the thermal barrier described in Section R314.1.2 when the foam plastic is protected by a minimum 1-inch (25.4 mm) thickness of masonry or concrete.

R314.1.3.2 Roofing. Foam plastic may be used in a roof-covering assembly without the thermal barrier when the foam is separated from the interior of the building by wood structural panel sheathing in accordance with Section R803, not less than 15/32 inch (11.9 mm) in thickness bonded with exterior glue and identified as Exposure 1, with edge supported by blocking or tongue-and-groove joints. The smoke-developed rating shall not be limited.

R314.1.3.3 Attics and crawlspaces. Within attics and crawlspaces where entry is made only for service of utilities, foam plastics shall be protected against ignition by 1 1/2-inch-thick (38 mm) mineral fiber insulation, 1/4-inch-thick (6.4 mm) wood structural panels, 3/8-inch (9.5 mm) particleboard, 1/4-inch (6.4 mm) hardboard, 3/8-inch (9.5 mm) gypsum board, or corrosion-resistant steel having a base metal thickness of 0.016 inch (0.406 mm).

R314.1.3.4 Foam-filled doors. Foam-filled doors are exempt from the requirements of Section R314.2.1 and R314.1.2.

R314.1.3.5 Siding backer board. Foam plastic board of not more than 1/2-inch (12.7 mm) thickness may be used as siding backer board when separated from interior spaces by not less than 2 inches (51 mm) of mineral fiber insulation or 1/2-inch (12.7 mm) gypsum wallboard or installed over existing exterior wall finish in conjunction with re-siding, providing the plastic board does not have a potential heat of more than 2,000 Btu per square foot (22 720 kJ/m²) when tested in accordance with NFPA 259.

R314.1.3.6 Interior trim. Foam plastic trim defined as picture molds, chair rails, baseboards, handrails, ceiling beams, door trim and window trim may be installed, provided:

1. The minimum density is 20 pounds per cubic foot (3.14 kg/m³).

2. The maximum thickness of the trim is 0.5 inch (12.7 mm) and the maximum width is 4 inches (102 mm).
3. The trim constitutes no more than 10 percent of the area of any wall or ceiling.
4. The flame-spread rating does not exceed 75 when tested per ASTM E 84. The smoke-developed rating is not limited.

R314.1.3.7 Sill plates and headers. Foam plastic shall be permitted to be spray applied to a sill plate and header without thermal barrier subject to all of the following:

1. The maximum thickness of the foam plastic shall be 3 1/4 inches (82.6 mm).
2. The density of the foam plastic shall be in the range of 1.5 to 2.0 pcf (24 to 32 kg/m³).
3. The foam plastic shall have a flame spread index of 25 or less and an accompanying smoke developed index of 450 or less when tested in accordance with ASTM E84.

R314.1.4 Specific approval. Plastic foam not meeting the requirements of Sections R314.1.1, R314.1.2 and R314.1.3 may be specifically approved on the basis of one of the following approved tests: ASTM E 84, FM 4880, UL 1040, NFPA 286, ASTM E 152, or UL 1715, or fire tests related to actual end-use configurations. The specific approval may be based on the end use, quantity, location and similar considerations where such tests would not be applicable or practical.

R314.1.5 Interior finish. Foam plastics that are used as interior finish shall also meet the flame-spread requirements for interior finish.

R314.1.6 Termite damage. The use of foam plastics in areas of "very heavy" termite infestation probability shall be in accordance with Section R320.4.

R314.2 Plastic panels and panel systems general. The provisions of this section shall be limited to detached one- and two-family dwellings and shall govern the quality, methods and expanded use of plastic panels and panel systems classified as CC-1 plastics in accordance with ASTM D635-03 and this section. Plastic panels and panel systems installed in detached one- and two-family dwellings and meeting the requirements of this section may be of unlimited area.

R314.2.1 Approval for use. The building official shall require that sufficient technical data be submitted to substantiate that the proposed plastic material is satisfactory for the intended use.

R314.2.1.1 Identification. Each unit or package of plastic panels and panel systems shall be identified with a mark or decal satisfactory to the building official, which includes identification as to the material classification.

R314.2.1.2 Standards of quality. The standards listed below are listed in Chapter 43 of this code.

1. UL Standard 790.
2. ASTM D2843-99.
3. ASTM D1929-96.

4. ASTM D635-03.
5. NFPA 285.
6. Factory Mutual Research Corporation (FMRC) Approval Standard 4470, Section 5.5 for Foot Traffic.
7. Factory Mutual Research Corporation (FMRC) Approval Standard 4471 for the Test Method for Wind Uplift.
8. Factory Mutual Research Corporation (FMRC) Approval Standard 4880, Section 5.4, 25-foot and 50-foot High Corner Tests.

R314.2.2 Definitions.

PLASTIC PANELS. As used in this section, are classified as CC-1 in accordance with ASTM D 635.

PLASTIC PANEL SYSTEM. Construction in whole or in part of plastic panels and component structural parts that create a wall or roof panel capable of supporting the appropriate design loads for the building element.

WALL PANELS. As used in this section, are approved plastic materials that are not classified as plastic glazing and are used as an element of wall construction.

R314.2.3 Design and installation structural requirements. Plastic materials and their assembly shall be of adequate strength and durability to withstand the design loads as prescribed elsewhere in this code. Technical data shall be submitted to establish stresses, maximum unsupported spans and such other information for the various thicknesses and forms used as may be deemed necessary by the building official.

R314.2.3.1 Fastening. Fastening shall be adequate to withstand design loads as prescribed elsewhere in this code. Proper allowance shall be made for expansion and contraction of plastic materials to protect the structural integrity of the installation in accordance with accepted data on coefficient of expansion of the material and other material in conjunction with which it is employed. Listed assemblies shall be installed according to manufacturers' specifications. Corrosion-resistant or other approved fastening systems shall be used.

R314.2.3.2 Water resistance. Plastic panels and panel systems shall resist water penetration and provide weather protection for the building.

R314.2.4 Wall panels and panel systems. Approved plastic panels and panel systems may be installed in exterior walls provided the walls are not required to have a fire-resistive rating.

Exception: Plastic panels approved as fire-resistive construction or as a fire assembly.

For fire-resistive protection of exterior walls and openings, as determined by location on property, see Section R302.

R314.2.5 Roof panels and panel systems. Approved plastic roof panels and panel systems may be installed in roofs of buildings not required to have a fire-resistive rating. Roof panels or units shall not be installed within that portion of a roof located within a distance to property line or public way where openings in exterior walls are prohibited or required to be protected.

Exception: Plastic panels approved as fire-resistive construction or as a fire assembly.

Plastic roof panels and panel systems shall slope at least 2 units vertical in 12 units horizontal. When used as roof covering, the panels or panel systems shall have at least a Class C rating.

R314.2.6 Energy conservation. Alternative building systems and equipment design may be approved by the building official for detached one- and two-family dwellings. Applicants shall demonstrate that the whole building annual energy consumption will not exceed that used by a similar building using similar forms of energy designed in accordance with the prescriptive requirements of this chapter. Compliance under this section allows trade-offs between the performance requirements in all sections of Chapter 11.

R314.2.6.1 Documentation. The applicant shall submit documents showing compliance with the requirements of this chapter. This documentation shall be in a manner approved by the administrator of the Building Codes Division.

SECTION R315 FLAME SPREAD AND SMOKE DENSITY

R315.1 Wall and ceiling. Wall and ceiling finishes shall have a flame-spread classification of not greater than 200.

Exception: Flame-spread requirements for finishes shall not apply to trim defined as picture molds, chair rails, baseboards and handrails; to doors and windows or their frames; or to materials that are less than $\frac{1}{28}$ inch (0.907 mm) in thickness cemented to the surface of walls or ceilings if these materials have a flame-spread characteristic no greater than paper of this thickness cemented to a noncombustible backing.

R315.2 Smoke-developed index. Wall and ceiling finishes shall have a smoke-developed index of not greater than 450.

R315.3 Testing. Tests shall be made in accordance with ASTM E 84.

R315.4 Alternate test method. As an alternate to having a flame-spread classification of not greater than 200 and a smoke developed index of not greater than 450 when tested in accordance with ASTM E 84, wall and ceiling finishes, other than textiles, shall be permitted to be tested in accordance with NFPA 286. Materials tested in accordance with NFPA 286 shall meet the following criteria:

During the 40 kW exposure, the interior finish shall comply with Item 1. During the 160 kW exposure, the interior finish

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shall comply with Item 2. During the entire test, the interior finish shall comply with Item 3.

1. During the 40 kW exposure, flames shall not spread to the ceiling.
2. During the 160 kW exposure, the interior finish shall comply with the following:
 - 2.1. Flame shall not spread to the outer extremity of the sample on any wall or ceiling.
 - 2.2. Flashover, as defined in NFPA 286, shall not occur.
3. The total smoke released throughout the NFPA 286 test shall not exceed 1,000 m².

SECTION R316 INSULATION

R316.1 Insulation. Insulation materials, including facings, such as vapor retarders or vapor permeable membranes installed within floor-ceiling assemblies, roof-ceiling assemblies, wall assemblies, crawl spaces and attics shall have a flame-spread index not to exceed 25 with an accompanying smoke-developed index not to exceed 450 when tested in accordance with ASTM E 84.

Exceptions:

1. When such materials are installed in concealed spaces, the flame-spread and smoke-developed limitations do not apply to the facings, provided that the facing is installed in substantial contact with the unexposed surface of the ceiling, floor or wall finish.
2. Cellulose loose-fill insulation, which is not spray applied, complying with the requirements of Section R316.3, shall only be required to meet the smoke-developed index of not more than 450.

R316.2 Loose-fill insulation. Loose-fill insulation materials that cannot be mounted in the ASTM E 84 apparatus without a screen or artificial supports shall have a flame-spread rating not to exceed 25 with an accompanying smoke-developed factor not to exceed 450 when tested in accordance with CAN/ULC-S102.2.

Exception: Cellulose loose-fill insulation shall not be required to comply with this test method provided that such insulation complies with the requirements of Section R316.3.

R316.3 Cellulose loose-fill insulation. Cellulose loose-fill insulation shall comply with CPSC 16 CFR, Parts 1209 and 1404. Each package of such insulating material shall be clearly labeled in accordance with CPSC 16 CFR, Parts 1209 and 1404.

R316.4 Exposed attic insulation. All exposed insulation materials installed on attic floors shall have a critical radiant flux not less than 0.12 watt per square centimeter.

R316.5 Testing. Tests for critical radiant flux shall be made in accordance with ASTM E 970.

SECTION R317 DWELLING UNIT SEPARATION

R317.1 Two-family dwellings. Dwelling units in two-family dwellings shall be separated from each other by wall and/or floor assemblies having not less than 1-hour fire-resistance rating when tested in accordance with ASTM E 119. Fire-resistance-rated floor-ceiling and wall assemblies shall extend to and be tight against the exterior wall, and wall assemblies shall extend to the underside of the roof sheathing.

Exception: A fire resistance rating of 1/2 hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13D.

R317.1.1 Supporting construction. When floor assemblies are required to be fire-resistance-rated by Section R317.1, the supporting construction of such assemblies shall have an equal or greater fire-resistive rating.

R317.2 Townhouses. Each townhouse shall be considered a separate building and shall be separated by fire-resistance-rated wall assemblies meeting the requirements of Section R302 for exterior walls.

Exception: A common 2-hour fire-resistance-rated wall is permitted for townhouses if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. Electrical installations shall be installed in accordance with Chapters 33 through 42. Penetrations of electrical outlet boxes shall be in accordance with Section R317.3.

R317.2.1 Continuity. The common wall for townhouses shall have a continuous fire separation from the foundation to the underside of the floor sheathing, roof sheathing, deck or slab and shall extend the full length of the common wall including walls extending through and separating attached accessory structures.

R317.2.2 Parapets. Parapets constructed in accordance with Section R317.2.3 shall be provided for townhouses as an extension of exterior walls or common walls in accordance with the following:

1. Where roof surfaces adjacent to the wall or walls are at the same elevation, the parapet shall extend not less than 30 inches (762 mm) above the roof surfaces.
2. Where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is not more than 30 inches (762 mm) above the lower roof, the parapet shall extend not less than 30 inches (762 mm) above the lower roof surface.

Exception: A parapet is not required in the two cases above when:

- a. The roof decking or sheathing is of noncombustible materials or fire-retardant-treated plywood conforming to Section R803.2.1.2 for a distance of 4 feet (1219 mm) on each side of the wall; or
- b. One layer of 5/8-inch (15.9 mm) Type X gypsum board is installed on the roof framing directly beneath the roof decking or sheathing for a distance of 4 feet (1219 mm) on each side of the wall; and

- c. The roof is covered with a minimum Class C roof covering; and
 - d. Openings in the roof are not located within 4 feet (1219 mm) one each side of the fire wall.
3. A parapet is not required where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is more than 30 inches (762 mm) above the lower roof. The common wall construction from the lower roof to the underside of the higher roof deck shall not have less than a 1-hour fire-resistive rating. The wall shall be rated for exposure from both sides.

R317.2.3 Parapet construction. Parapets shall have the same fire-resistance rating as that required for the supporting wall or walls. On any side adjacent to a roof surface, the parapet shall have noncombustible faces for the uppermost 18 inches (457 mm), to include counterflashing and coping materials. Where the roof slopes toward a parapet at slopes greater than two units vertical in 12 units horizontal (16.7-percent slope), the parapet shall extend to the same height as any portion of the roof within a distance of 3 feet (914 mm), but in no case shall the height be less than 30 inches (762 mm).

R317.2.4 Structural independence. Each individual townhouse shall be structurally independent.

Exceptions:

1. Foundations supporting exterior walls or common walls.
2. Structural roof and wall sheathing from each unit may fasten to the common wall framing.
3. Nonstructural wall coverings.
4. Flashing at termination of roof covering over common wall.
5. Townhouses separated by a common 2-hour fire-resistance-rated wall as provided in Section R317.2.

R317.2.5 Rowhouse construction. Townhouse units separated by property lines (rowhouse units) shall meet the additional requirements contained in Appendix O.

R317.3 Rated penetrations. Penetrations of wall or floor/ceiling assemblies required to be fire-resistance-rated in accordance with Section R317.1 or R317.2 shall be protected in accordance with this section.

R317.3.1 Through penetrations. Through penetrations of fire-resistance-rated wall or floor assemblies shall comply with Section R317.3.1.1 or R317.3.1.2.

Exception: Where the penetrating items are steel, ferrous or copper pipes or steel conduits, the annular space shall be permitted to be protected as follows:

1. In concrete or masonry wall or floor assemblies where the penetrating item is a maximum 6 inches (152 mm) nominal diameter and the opening is a maximum 144 square inches (92 900 mm²), concrete, grout or mortar shall be permitted where installed to the full thickness of the wall or floor

assembly or the thickness required to maintain the fire-resistance rating.

2. The material used to fill the annular space shall prevent the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E 119 time temperature fire conditions under a minimum positive pressure differential of 0.01 inch of water (3 Pa) at the location of the penetration for the time period equivalent to the fire-resistance rating of the construction penetrated.

R317.3.1.1 Fire-resistance-rated assembly. Penetrations shall be installed as tested in the approved fire-resistance-rated assembly.

R317.3.1.2 Penetration firestop system. Penetrations shall be protected by an approved penetration firestop system installed as tested in accordance with ASTM E 814 or UL 1479, with a minimum positive pressure differential of 0.01 inch of water (3 Pa) and shall have an F rating of not less than the required fire-resistance rating of the wall or floor/ceiling assembly penetrated.

R317.3.2 Membrane penetrations. Membrane penetrations shall comply with Section R317.3.1. Where walls are required to have a minimum 1-hour fire resistance rating, recessed luminaire shall be so installed such that the required fire resistance will not be reduced.

Exceptions:

1. Steel electrical boxes that do not exceed 16 square inches (0.0103m²) in area provided the total area of such openings does not exceed 100 square inches (0.0645 m² for any 100 square feet (9.29 m²) of wall area. Outlet boxes on opposite sides of the wall shall be separated as follows:
 - 1.1. By a horizontal distance of not less than 24 inches (610 mm);
 - 1.2. By a horizontal distance of not less than the depth of the wall cavity when the wall cavity is filled with cellulose loose-fill, rockwool or slag mineral wool insulation;
 - 1.3. By solid fire blocking in accordance with Section R602.8.1;
 - 1.4. By protecting both outlet boxes by listed putty pads; or
 - 1.5. By other listed materials and methods.
2. Membrane penetrations for listed electrical outlet boxes of any materials are permitted provided such boxes have been tested for use in fire resistance-rated assemblies and are installed in accordance with the instructions included in the listing. Outlet boxes on opposite sides of the wall shall be separated as follows:
 - 2.1. By a horizontal distance of not less than 24 inches (610 mm);
 - 2.2. By solid fire-blocking in accordance with Section R602.8;
 - 2.3. By protecting both outlet boxes by listed putty pads; or

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- 2.4. By other listed materials and methods.
3. The annular space created by the penetration of a fire sprinkler provided it is covered by a metal esutcheon plate.

R317.4 Sound transmission. Wall and floor-ceiling assemblies separating dwelling units shall be provided with sound transmission insulation in accordance with Appendix K.

R317.5 Apartment requirements. Requirements for structures containing more than three attached units which are not constructed as townhouse or rowhouse units, see Appendix N.

SECTION R318 MOISTURE VAPOR RETARDERS

R318.1 Moisture control. In all framed walls, floors and roof/ceilings comprising elements of the building thermal envelope, a vapor retarder shall be installed on the warm-in-winter side of the insulation.

Exceptions:

1. In construction where moisture or freezing will not damage the materials.
2. Where the framed cavity or space is ventilated to allow moisture to escape.

SECTION R319 PROTECTION AGAINST DECAY

R319.1 Location required. In areas subject to decay damage as established by Table R301.2(1), the following locations shall require the use of an approved species and grade of lumber, pressure treated in accordance with AWPAC1, C2, C3, C4, C9, C15, C18, C22, C23, C24, C28, C31, C33, P1, P2 and P3, or decay-resistant heartwood of redwood, black locust, or cedars.

1. Wood joists or the bottom of a wood structural floor when closer than 18 inches (457 mm) or wood girders when closer than 12 inches (305 mm) to the exposed ground in crawl spaces or unexcavated area located within the periphery of the building foundation.
2. All wood framing members that rest 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 0.5 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.
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.

R319.1.1 Ground contact. All wood in contact with the ground and that supports permanent structures intended for human occupancy shall be approved pressure preservative treated wood suitable for ground contact use, except untreated wood may be used where entirely below groundwater level or continuously submerged in fresh water.

R319.1.2 Geographical areas. In geographical areas where experience has demonstrated a specific need, approved naturally durable or pressure preservative treated wood shall be used for those portions of wood members that form the structural supports of buildings, balconies, porches or similar permanent building appurtenances when such members are exposed to the weather without adequate protection from a roof, eave, overhang or other covering that would prevent moisture or water accumulation on the surface or at joints between members. Depending on local experience, such members may include:

1. Horizontal members such as girders, joists and decking.
2. Vertical members such as posts, poles and columns.
3. Both horizontal and vertical members.

R319.1.3 Posts, poles and columns. Posts, poles and columns supporting permanent structures that are embedded in concrete in direct contact with the ground or embedded in concrete exposed to the weather shall be approved pressure preservative treated wood suitable for ground contact use.

R319.1.4 Wood columns. Wood columns shall be approved wood of natural decay resistance or approved pressure preservative treated wood.

Exceptions:

1. Posts or columns which are either exposed to the weather or located in basements or cellars, supported by piers or metal pedestals projecting 1 inch (25.4 mm) above the floor or finished grade and 6 inches (152 mm) above exposed earth, and are separated there from by an approved impervious moisture barrier.
2. Posts or columns in enclosed crawl spaces or unexcavated areas located within the periphery of the building, supported by a concrete pier or metal pedestal at a height greater than 8 inches (203mm) from exposed ground, and are separated there from by an impervious moisture barrier.

R319.2 Quality mark. Lumber and plywood required to be pressure preservative treated in accordance with Section R319.1 shall bear the quality mark of an approved inspection agency that maintains continuing supervision, testing and inspection over the quality of the product and that has been approved by an accreditation body that complies with the requirements of the American Lumber Standard Committee treated wood program.

R319.2.1 Required information. The required quality mark on each piece of pressure preservative treated lumber or plywood shall contain the following information:

1. Identification of the treating plant.
2. Type of preservative.
3. The minimum preservative retention.
4. End use for which the product was treated.
5. Standard to which the product was treated.
6. Identity of the approved inspection agency.
7. The designation "Dry," if applicable.

Exception: Quality marks on lumber less than 1 inch (25.4 mm) nominal thickness, or lumber less than nominal 1 inch by 5 inches (25.4 mm by 127 mm) or 2 inches by 4 inches (51 mm by 102 mm) or lumber 36 inches (914 mm) or less in length shall be applied by stamping the faces of exterior pieces or by end labeling not less than 25 percent of the pieces of a bundled unit.

R319.3 Fasteners. Fasteners for pressure preservative and fire-retardant-treated wood shall be of hot-dipped galvanized steel, stainless steel, silicon bronze or copper.

Exception: One-half-inch (12.7 mm) diameter or greater steel bolts.

**SECTION R320
PROTECTION AGAINST TERMITES
Not adopted by the State of Oregon**

**[F] SECTION R321
SITE ADDRESS**

R321.1 Premises identification. Approved numbers or addresses shall be provided for all new buildings in such a position as to be plainly visible and legible from the street or road fronting the property.

**SECTION R322
ACCESSIBILITY**

R322.1 Scope. Dwelling units required to be accessible by ORS 447.231 shall comply with Chapter 11 of the *Oregon Structural Specialty Code* as applicable.

**SECTION R323
FLOOD-RESISTANT CONSTRUCTION**

R323.1 General. Buildings and structures constructed in flood hazard areas (including A or V Zones) as identified by the local jurisdiction shall be designed and constructed in accordance with the provisions contained in this section. For the purposes of Section R323, the required elevation of construction elements shall be a minimum of 1 foot (305 mm) above the design flood elevation unless increased by the local municipality under the authority of National Flood Insurance Program (NFIP) incorporated in 423 U.S.C. 40001-4128.

Exception: All buildings and structures in identified floodways as established identified by the local jurisdiction shall be designed and constructed as stipulated in *Oregon Structural Specialty Code* or equivalent design methods based on nationally recognized standards.

R323.1.1 Structural systems. The structural systems of all buildings and structures shall be designed, connected and anchored to resist flotation, collapse or permanent lateral movement resulting from hydrodynamic and hydrostatic loads and stresses, including the effects of buoyancy.

R323.1.2 Flood-resistant construction. All buildings and structures erected in areas prone to flooding shall be constructed by methods and practices that minimize flood damage.

R323.1.3 Establishing the design flood elevation. The design flood elevation shall be used to define areas prone to flooding, and shall describe, at a minimum, the base flood elevation at the depth of peak elevation of flooding (including wave height) which has a 1 percent (100-year flood) or greater chance of being equaled or exceeded in any given year.

R323.1.4 Lowest floor. The lowest floor shall be the floor of the lowest enclosed area, including basement, but excluding any unfinished flood-resistant enclosure that is useable solely for vehicle parking, building access or limited storage provided that such enclosure is not built so as to render the building or structure in violation of this section.

R323.1.5 Protection of mechanical and electrical systems. Electrical systems, equipment and components, and heating, ventilating, air conditioning and plumbing appliances, plumbing fixtures, duct systems, and other service equipment shall be located above the design flood elevation. If replaced as part of a substantial improvement, electrical systems, equipment and components, and heating, ventilating, air conditioning, and plumbing appliances, plumbing fixtures, duct systems, and other service equipment shall meet the requirements of this section. Systems, fixtures, and equipment and components shall not be mounted on or penetrate through walls intended to break away under flood loads.

Exception: Electrical systems, equipment and components, and heating, ventilating, air conditioning and plumbing appliances, plumbing fixtures, duct systems, and other service equipment are permitted to be located below the 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 design flood elevation in compliance with the flood-resistant construction requirements of the *Oregon Structural Specialty Code*. Electrical wiring systems are permitted to be located below the design flood elevation provided they conform to the provisions of the electrical part of this code for wet locations.

R323.1.6 Protection of water supply and sanitary sewage systems. New and replacement water supply systems shall minimize or eliminate infiltration of flood waters into

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the systems in accordance with the plumbing provisions of this code. New and replacement sanitary sewage systems shall minimize or eliminate infiltration of floodwaters into systems and discharges from systems into floodwaters in accordance with the plumbing provisions of this code.

R323.1.7 Flood-resistant materials. Building materials used below the design flood elevation shall comply with the following:

1. All wood, including floor sheathing, shall be pressure preservatively treated in accordance with AWWPA C1, C2, C3, C4, C9, C15, C18, C22, C23, C24, C28, P1, P2 and P3 or decay-resistant heartwood or redwood, black locust, or cedars.
2. Materials and installation methods used for flooring and interior and exterior walls and wall coverings shall conform to the provisions of FEMA/FIA-TB-2.

R323.1.8 Manufactured housing. New or replacement manufactured housing shall be elevated in accordance with Section R323.2 and the anchor and tie-down requirements of Sections AE604 and AE605 of Appendix E shall apply. The foundation and anchorage of manufactured housing to be located in identified flood ways as established in Table R301.2(1) shall be designed and constructed in accordance with the applicable provisions in the *International Building Code*.

R323.1.9 As-built elevation documentation. A registered design professional shall prepare and seal documentation of the elevations specified in Section R323.2 or R323.3.

R323.2 Flood hazard areas (including A Zones). All areas that have been determined to be prone to flooding but not subject to high velocity wave action shall be designated as flood hazard areas. All buildings and structures erected in flood hazard areas shall be designed and constructed in accordance with Sections R323.2.1 through R323.2.3.

R323.2.1 Elevation requirements.

1. Buildings and structures shall have the lowest floors elevated above the design flood elevation.
2. In areas of shallow flooding (AO Zones), buildings and structures shall have the lowest floor (including basement) elevated at least as high above the highest adjacent grade as the depth number specified in feet (mm) on the FIRM, or at least 2 feet (610 mm) if a depth number is not specified.
3. Basement floors that are below grade on all sides shall be elevated above the design flood elevation.

Exception: Enclosed areas below the design flood elevation, including basements whose floors are not below grade on all sides, shall meet the requirements of Section R323.2.2.

R323.2.2 Enclosed area below design flood elevation. Enclosed areas, including crawl spaces, that are below the design flood elevation shall:

1. Be used solely for parking of vehicles, building access or storage.
2. Be provided with flood openings which shall meet the following criteria:

- 2.1. There shall be a minimum of two openings on different sides of each enclosed area; if a building has more than one enclosed area below the design flood elevation, each area shall have openings on exterior walls.
- 2.2. The total net area of all openings shall be at least 1 square inch for each square foot (275 mm for each square meter) of enclosed area.
- 2.3. The bottom of each opening shall be 1 foot (305 mm) or less above the adjacent ground-level.
- 2.4. Openings shall be at least 3 inches (76 mm) in diameter.
- 2.5. Any louvers, screens or other opening covers shall allow the automatic flow of floodwaters into and out of the enclosed area.
- 2.6. Openings installed in doors and windows, that meet requirements 2.1 through 2.5, are acceptable; however, doors and windows without installed openings do not meet the requirements of this section.

R323.2.3 Foundation design and construction. Foundation walls for all buildings and structures erected in flood hazard areas shall meet the requirements of Chapter 4.

Exception: Unless designed in accordance with Section 404:

1. The unsupported height of 6 inches (152 mm) plain masonry walls shall be no greater than 3 feet (914 mm).
2. The unsupported height of 8 inches (203 mm) plain masonry walls shall be no greater than 4 feet (1219 mm).
3. The unsupported height of 8 inches (203 mm) reinforced masonry walls shall be no greater than 8 feet (2438 mm).

For the purpose of this exception, unsupported height is the distance from the finished grade of the under-floor space and the top of the wall.

R323.3 Coastal high-hazard areas (including V Zones). 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. All buildings and structures erected in coastal high-hazard areas shall be designed and constructed in accordance with Sections R323.3.1 through R323.3.6.

R323.3.1 Location and site preparation.

1. Buildings and structures shall be located landward of the reach of mean high tide.
2. For any alteration of sand dunes and mangrove stands the building official shall require submission of an engineering analysis which demonstrates that the proposed alteration will not increase the potential for flood damage.

R323.3.2 Elevation requirements.

1. All buildings and structures erected within coastal high hazard areas shall be elevated so that the lowest portion of all structural members supporting the lowest floor, with the exception of mat or raft foundations, piling, pile caps, columns, grade beams and bracing, is located above the design flood elevation.
2. Basement floors that are below grade on all sides are prohibited.
3. The use of fill for structural support is prohibited.
4. The placement of fill beneath buildings and structures is prohibited.

Exception: Walls and partitions enclosing areas below the design flood elevation shall meet the requirements of Sections R323.3.4 and R323.3.5.

R323.3.3 Foundations. All buildings and structures erected in coastal high hazard areas shall be supported on pilings or columns and shall be adequately anchored to such pilings or columns. Piling shall have adequate soil penetrations to resist the combined wave and wind loads (lateral and uplift). Water loading values used shall be those associated with the design flood. Wind loading values shall be those required by this code. Pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling. Pile systems design and installation shall be certified in accordance with Section R323.3.6. Mat, raft or other foundations that support columns shall not be permitted where soil investigations that are required in accordance with Section R401.4 indicate that soil material under the mat, raft or other foundation is subject to scour or erosion from wave-velocity flow conditions.

R323.3.4 Walls below design flood elevation. Walls and partitions are permitted below the elevated floor, provided that such walls and partitions are not part of the structural support of the building or structure and:

1. Electrical, mechanical, and plumbing system components are not to be mounted on or penetrate through walls that are designed to break away under flood loads, and
2. Are constructed with insect screening or open lattice, or;
3. Are designed to break away or collapse without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system. Such walls, framing and connections shall have a design safe loading resistance of not less than 10 (0.48 kN/m²) and no more than 20 pounds per square foot (0.96 kN/m²); or
4. Where wind loading values of this code exceed 20 pounds per square foot (0.96 kN/m²), the construction documents shall include documentation prepared and sealed by a registered design professional that:
 - 4.1. The walls and partitions below the design flood elevation have been designed to collapse

from a water load less than that which would occur during the design flood.

- 4.2. The elevated portion of the building and supporting foundation system have been designed to withstand the effects of wind and flood loads acting simultaneously on all building components (structural and nonstructural). Water loading values used shall be those associated with the design flood. Wind loading values shall be those required by this code.

R323.3.5 Enclosed areas below design flood elevation.

Enclosed areas below 1 foot (305 mm) above the design flood elevation shall be used solely for parking of vehicles, building access or storage.

SECTION R324 WILDFIRE HAZARD MITIGATION

R324.1 Purpose. The purpose of this section is to provide minimum standards for dwellings and their accessory structures located in or adjacent to vegetated areas subject to wildfires to reduce or eliminate hazards presented by such fires.

R324.2 Scope. The provisions of this section shall apply to dwellings required to be protected against wildfire by a jurisdiction which has adopted wildfire zoning regulations.

R324.3 Wildfire hazard zone. A wildfire hazard zone is an area legally determined by a jurisdiction to have special hazards caused by a combination of combustible natural fuels, topography and climatic conditions that result in a significant hazard of catastrophic fire over relatively long periods each year. Wildfire hazard zones shall be determined using criteria established by the Oregon Department of Forestry.

R324.3.1 Wildfire hazard zone requirements. Dwellings and their accessory structures shall be protected against wildfire by the following requirement in addition to other requirements of this code.

R324.3.1.1 Roofing. Roofing shall be asphalt shingles in accordance with Section R905.2, slate shingles in accordance with Section R905.6, metal roofing in accordance with Section R905.4, tile, clay or concrete shingles in accordance with Section R905.3 and other approved roofing which is deemed to be equivalent to a minimum Class C-rated roof covering. Untreated wood shingle and shake roofs are not permitted when the construction site is in a wildfire hazard zone as determined by Section R324.3.

R324.3.1.2 Reroofing or repair of roofing of existing buildings. When 50 percent or more of the roof covering of any building is repaired or replaced within one year, the roof covering shall be made to comply with this section and attic ventilation shall be made to comply with this code. Ventilation openings shall be protected with corrosion-resistant wire mesh, not greater than 1/2-inch (12.7 mm) or less than 1/8-inch (3.2 mm) in any dimension.

