

State of Montana



Performing Residential Plan Review, 2021 IRC

Friday am - 3/15/2024

INSTRUCTOR:



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Building Contractor - 1984 to present
Building Inspector Technician - 1997 - 2 years
Field Inspector - 1997 - 2020
Residential Plans Examiner - 1997 - to present
Code Development Committee - started 2001
Instructor - 1998 - present
Code Consultant - 2005 to present
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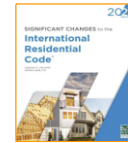
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Chapter 1: JHA Construction Code

Reference and Resources Material

- 2021 International Residential Code® (IRC®)
- Significant Changes to the IRC 2021 Edition



5. Designed - Structural Calculations

- Authority per section R301.1.3.
- Ensure signature, seal and date are affixed.
- Look for...
 - Load determination.
 - Reference to design standard.
 - Design conclusion.
 - Calculations match drawings.



Applicability R102

- Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable.
- Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern.

General Example

TABLE R702.3.1
MINIMUM THICKNESS AND APPLICATION OF GYPSUM BOARD AND GYPSUM PANEL PRODUCTS

THICKNESS OF GYPSUM BOARD OR GYPSUM PANEL PRODUCTS (inches)	APPLICATION	ORIENTATION OF GYPSUM BOARD OR GYPSUM PANEL PRODUCTS TO FRAMING	MAXIMUM SPACING OF FRAMING MEMBERS (inches max.)		SIZE OF NAILS FOR APPLICATION TO WOOD FRAMING*
			Stud ^a	Stitch ^b	
1/2	Ceiling	Other direction	16	7	13 gage, 1 1/4" long, 1 1/2" head, 0.086" diameter
	Wall	Parallel to framing	24	7	1 1/4" long, uncoated, 16d common nail, 0.086" diameter
5/8	Wall	Other direction	24	16	16d common nail, 1 1/4" long, 1 1/2" head, 0.086" diameter
	Wall	Other direction	16	16	16d common nail, 1 1/4" long, 1 1/2" head, 0.086" diameter

Specific

R602.10.4.3 Braced wall panel interior finish material.
Braced wall panels shall have gypsum wall board installed on the side of the wall opposite the bracing material. Gypsum wall board shall be not less than 1/2 inch (12.7 mm) in thickness and be fastened with nails or screws in accordance with Table R602.3(1) for exterior sheathing or Table R702.3.5 for interior gypsum wall board. Spacing of fasteners at panel edges for gypsum wall board opposite Method L39 bracing shall not exceed 8 inches (203 mm). Interior finish material shall not be glued in Seismic Design Categories D_s, D₁, and D₂.

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Referenced Standard Chapter 44

Standard reference	Title	Referenced in code section number
ACI 308-10	American Concrete Institute 3800 Country Club Drive Farmington Hills, MI 48331	
AWC	American Wood Council 200 Catchpole Circle, Suite 201 Leesburg, VA 20175	
AWC ECF-2015	Good Timber for Joists and Rafters	R602.4, R602.5
AWC WFCM-2015	Wood Frame Construction Manual for One- and Two-Family Dwellings	R601.1, R601.1.1, R601.1.1.2, R602.2, Figure R601.3(A), R601.10
ANSI AWC 1025-2015	National Design Specification (NDS) for Wood Construction— with 2005 Supplement	R602.2, R602.2.1, Table R602.2.1, Table R602.2.2, Table R602.2.3, Table R602.2.4, Table R602.2.5, Table R602.2.6, Table R602.2.7, Table R602.2.8, Table R602.2.9, Table R602.2.10, Table R602.2.11, Table R602.2.12, Table R602.2.13, Table R602.2.14, Table R602.2.15, Table R602.2.16, Table R602.2.17, Table R602.2.18, Table R602.2.19, Table R602.2.20, Table R602.2.21, Table R602.2.22, Table R602.2.23, Table R602.2.24, Table R602.2.25, Table R602.2.26, Table R602.2.27, Table R602.2.28, Table R602.2.29, Table R602.2.30, Table R602.2.31, Table R602.2.32, Table R602.2.33, Table R602.2.34, Table R602.2.35, Table R602.2.36, Table R602.2.37, Table R602.2.38, Table R602.2.39, Table R602.2.40, Table R602.2.41, Table R602.2.42, Table R602.2.43, Table R602.2.44, Table R602.2.45, Table R602.2.46, Table R602.2.47, Table R602.2.48, Table R602.2.49, Table R602.2.50, Table R602.2.51, Table R602.2.52, Table R602.2.53, Table R602.2.54, Table R602.2.55, Table R602.2.56, Table R602.2.57, Table R602.2.58, Table R602.2.59, Table R602.2.60, Table R602.2.61, Table R602.2.62, Table R602.2.63, Table R602.2.64, Table R602.2.65, Table R602.2.66, Table R602.2.67, Table R602.2.68, Table R602.2.69, Table R602.2.70, Table R602.2.71, Table R602.2.72, Table R602.2.73, Table R602.2.74, Table R602.2.75, Table R602.2.76, Table R602.2.77, Table R602.2.78, Table R602.2.79, Table R602.2.80, Table R602.2.81, Table R602.2.82, Table R602.2.83, Table R602.2.84, Table R602.2.85, Table R602.2.86, Table R602.2.87, Table R602.2.88, Table R602.2.89, Table R602.2.90, Table R602.2.91, Table R602.2.92, Table R602.2.93, Table R602.2.94, Table R602.2.95, Table R602.2.96, Table R602.2.97, Table R602.2.98, Table R602.2.99, Table R602.2.100
AWC PWF-2015	Permanent Wood Foundation Design Specification	R517.2.2, R611.1, R611.1.1

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Modifications R104.10


Wherever *Where* there are practical difficulties involved in carrying out the provisions of this code, the building official *shall* have the authority to grant modifications for individual cases, provided the building official *shall* first find that special individual reason makes the strict letter of this code impractical *and* the modification is in compliance with the intent *and* purpose of this code *and* that such modification does not lessen health, life *and* fire safety requirements *or* structural. The details of action granting modifications *shall* be recorded *and* entered in the files of the department of building safety.

❖ This section makes no provision for granting variances or modifications for reasons of expense or hardship in complying with code, unless equivalent safety and serviceability are achieved.

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Exemptions with Exception: R105.2

Exemption from permit requirements of this code **shall not** be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this jurisdiction .



Two Interpretations: —

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Plan Review

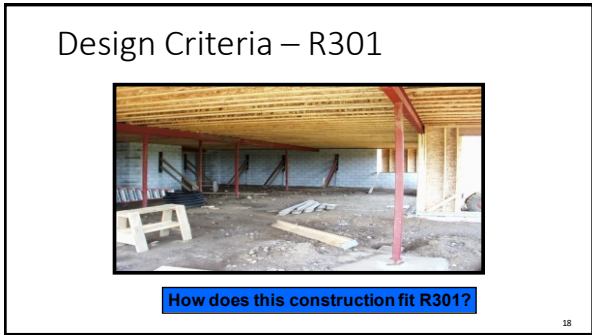
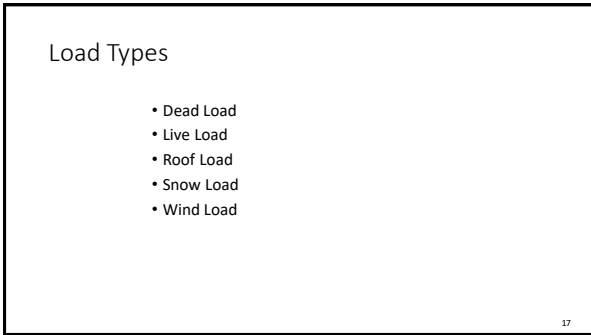
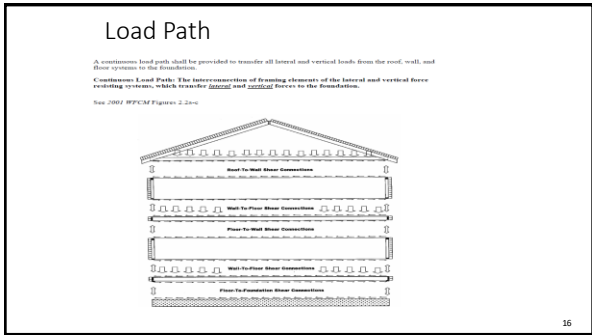
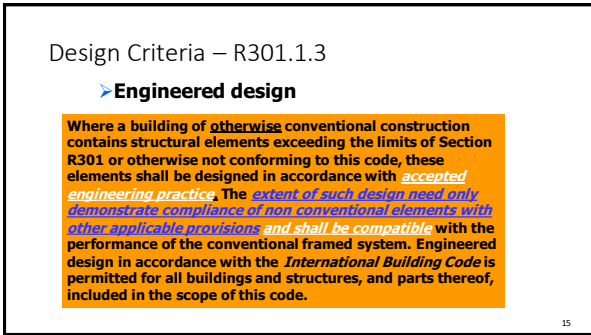
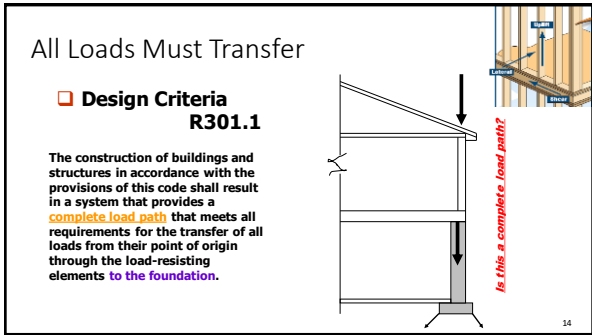
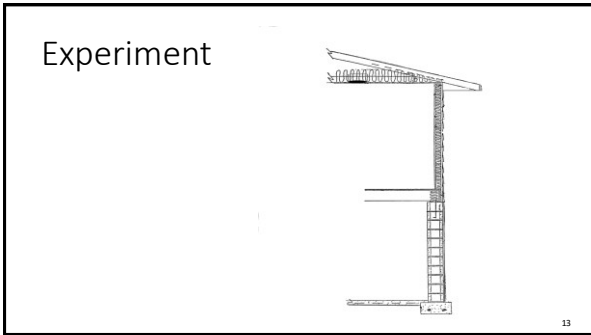
- ❑ Where to start:
 - ❑ Choose the most important component of a plan:
 - 1) Structural
 - 2) Fire
 - 3) Safety
 - 4) Sanitation
 - 5) HVAC
 - 6) ????? Etc...
 - ❑ What takes the longest to get revised if there is a problem?

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Before Review

- ❑ Who should have reviewed this plan before it reached you?
 - ❑ Engineering
 - ❑ Water Management (erosion)
 - ❑ Zoning
 - ❑ Utilities
 - ❑ ????

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Design Criteria – R301.1

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Snow Load

- To calculate Roof Snow Load per Residential Building Code: $0.7 \times \text{pg}$ (ground snow load) = pf (roof snow load)
- The ground snow load, Pg. $50 \times .7 \text{pg} = 35 \text{psf}$
- The ground snow Load, Pg. $20 \times .7 \text{pg} = 14 \text{psf}$

R802.10.2 Truss Design

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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.

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Dead Load

Carpet/Pad	1.0 PSF
3/4 T & G Plywood	2.3 PSF
TJI	3.0 PSF
5/8\" Gyp. BD	2.8 PSF
Misc.	1.5 PSF
Dead Load	10.6 PSF < 10 Fails

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NewTable

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

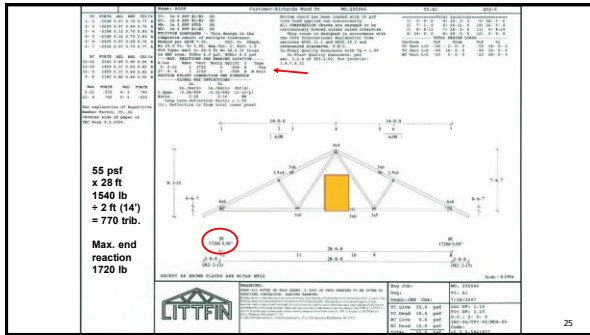
USE	UNIFORM LOAD (psf)	CONCENTRATED LOAD (lb)
Uninhabitable attics without storage ^a	10	—
Uninhabitable attics with limited storage ^b	20	—
Inhabitable attics and attics served with fixed stairs	30	—
Balconies (interior) and decks ^c	40	—
Fire escapes	40	—
Garage	—	300 ^d
Garage-in component ^e	—	50 ^f
Hangar ^g	20 ^h	—
Passenger vehicle garages ^g	50 ⁱ	2,000 ^j
Areas other than sleeping areas	40	—
Sleeping areas	30	—
Stairs	40 ^k	300 ^l

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Table R301.5 Footnotes

- Element (garage floor) shall be capable of supporting the uniformly distributed live load or a 2,000-lb concentrated load applied in an area of 4' x 4' inches, whichever produces the greater stress.
- Uninhabitable attics without storage are those where the clear height between joists and rafters is not more than 42 inches, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width or greater, within the planes of the trusses. The load need not be assumed to act concurrently with any other live load requirements.
- Individual stud heads and/or supports of supporting the uniformly distributed live load or a 2,000-lb concentrated load application or a load of 1,000 lb by 2' x 2' inches, whichever produces the greater stress.
- A single concentrated load applied in any direction at any point along the top. For a guard not required to serve as a handrail, the load need not be applied in the top edge of the guard in a direction parallel to such element.
- See Section 2007.2 for details attached to exterior walls.
- Guard-in components (all those except the handrail), balusters and panel fills 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.
- Uninhabitable attics with limited storage are those where the clear height between joists and rafters is 42 inches or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width or greater, within the planes of the trusses. The live load need not be applied to those portions of the joists or truss bottom chords where all of the following conditions are met:
 - The attic area is accessed from an opening not less than 22 inches in width by 24 inches in height that is located where the clear height of the attic is not less than 30 inches.
 - The depth of insulation in truss bottom chords are not greater than 24 inches vertical 12-inch horizontal.
 - Required insulation depth is less than the joist or truss bottom chord member depth.
 The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed concurrent live load of not less than 10 pounds per square foot.
- Roofing used in hangar assemblies and garages shall be designed with a load adjustment factor of 4. The load adjustment factor shall be applied to each of the concentrated loads applied to the top of the rail, and to the load on the in-fill components. These loads shall be determined independent of one another and shall be assumed to occur with any other live load.
- When the top of a guard is not required to serve as a handrail, the single concentrated load shall be applied at any point along the top. In the vertical downward direction and in the horizontal direction away from the walling surface. Where the top of a guard is used serving as a handrail, a single concentrated load shall be applied in any direction at any point along the top. Concentrated loads shall not be applied concurrently.

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Is a design professional required?

Table 301.5 footnote a

Structural

- ❑ Top down
 - ❑ Trusses
 - ❑ Walls & Headers
 - ❑ Size of Trimmers and Columns
 - ❑ Floor system
 - ❑ Foundation walls
 - ❑ Footing size
 - ❑ Supporting soil – Dirt

When is Engineering required?

- ❑ Point loads over # lb's
- ❑ Tall walls
- ❑ Height of foundation wall
- ❑ Brace wall lines
- ❑ Trusses?? Beams?? Headers??

BCSI – Best Practices for Handling, Installing, Restraining & Bracing

For more info on:

- Truss repairs
- Girders
- Fall protection
- Jobsite storage
- Truss handling
- Toe-nailing for uplift
- Temporary bracing
- Construction loading

www.sbcindustry.com

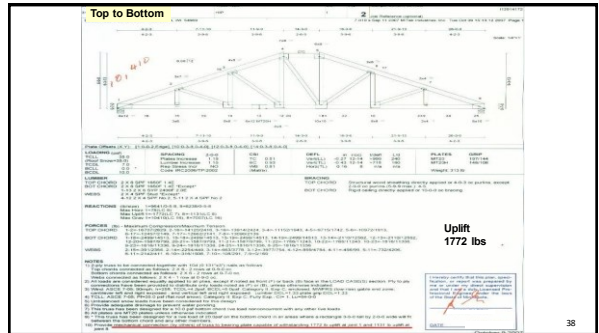
Gable Ends

Bottom-framed gable end wall

Bulkhead gable end wall with scissors Gable End Frame

Frequently Use Load Duration Factors (Increases)

- 0.9 = Permanent Dead Load
- 1.0 = Ten years Occupancy Live Load
- 1.15 = 2 Months Snow Load
- 1.25 = 7 Days Construction Load
- 1.33 = 1 Day
- 1.6 = Ten Minutes Wind / Earthquake Load
- 2.0 = Impact



Uplift

R802.11 Roof tie uplift resistance. Roof assemblies shall have uplift resistance in accordance with Sections R802.11.1 and R802.11.2.

- Exceptions: Rafter or trusses shall be permitted to be attached to their supporting wall assemblies in accordance with Table R602.3.11 where either of the following occur:
 - Where the uplift force per rafter or truss does not exceed 200 lbs as determined by Table R802.11.
 - Where the basic wind speed does not exceed 115 miles per hour, the wind exposure category is B, the roof pitch is 5 units vertical in 12 units horizontal (42-percent slope) or greater, the roof span is 32' or less, and rafters and trusses are spaced not more than 24" on center.

R802.11.1 Truss uplift resistance.

- Trusses shall be attached to supporting wall assemblies by connections capable of resisting uplift forces as specified on the truss design drawings for the ultimate design wind speed as determined by Figure R301.2.12 and listed in Table R301.2 or as shown on the construction documents. Uplift forces shall be permitted to be determined as specified by Table R802.11, if applicable, or as determined by accepted engineering practice.

R802.11.2 Rafter uplift resistance.

- Individual rafters shall be attached to supporting wall assemblies by connections capable of resisting uplift forces as determined by Table R802.11 or as determined by accepted engineering practice. Connections for beams used in a roof system shall be designed in accordance with accepted engineering practice.

Uplift

TABLE R802.11 RAFTER OR TRUSS UPLIFT CONNECTION FORCES FROM WIND (ASD) (POUNDS PER CONNECTION)

RAFTER OR TRUSS SPACING	ROOF SPAN (feet)	EXPOSURE C							
		Ultimate Design Wind Speed V _{ult} (mph)							
		115		120		130		140	
		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch	
		< 5:12	≥ 5:12	< 5:12	≥ 5:12	< 5:12	≥ 5:12	< 5:12	≥ 5:12
	12	96	88	118	106	140	128	190	176
	18	118	104	148	132	178	162	244	224
	24	142	124	178	158	218	196	288	274
	30	158	138	198	176	242	218	334	306
	36	188	164	240	212	292	264	406	372
	42	212	184	270	240	332	298	460	422
	48	236	204	302	268	370	332	516	472

Roof Type & Slope	Span (feet)	Wind Speed (mph)	Uplift Force (lbs)	Notes
115	12	115	96	
115	18	115	118	
115	24	115	142	
115	30	115	158	
115	36	115	188	
115	42	115	212	
115	48	115	236	
120	12	120	106	
120	18	120	132	
120	24	120	158	
120	30	120	176	
120	36	120	212	
120	42	120	240	
120	48	120	268	
130	12	130	128	
130	18	130	162	
130	24	130	196	
130	30	130	218	
130	36	130	264	
130	42	130	298	
130	48	130	332	
140	12	140	176	
140	18	140	224	
140	24	140	274	
140	30	140	306	
140	36	140	406	
140	42	140	422	
140	48	140	472	

RAFTER OR TRUSS SPACING	ROOF SPAN (feet)	EXPOSURE C							
		Ultimate Design Wind Speed V _{ult} (mph)							
		115		120		130		140	
		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch	
		< 5:12	≥ 5:12	< 5:12	≥ 5:12	< 5:12	≥ 5:12	< 5:12	≥ 5:12
	12	96	88	118	106	140	128	190	176
	18	118	104	148	132	178	162	244	224
	24	142	124	178	158	218	196	288	274
	30	158	138	198	176	242	218	334	306
	36	188	164	240	212	292	264	406	372
	42	212	184	270	240	332	298	460	422
	48	236	204	302	268	370	332	516	472

Top to Bottom

R802.11 Roof Tie-down

APPROVED RAFTER TIE

04/08/2008

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CHAPTER 8: Roof-Ceiling Construction

R802.7 Cutting, drilling and notching
R802.7.1.1 Cantilevered portions of rafters.

- Notches on cantilevered rafters are permitted
- Rafter is $< 3 \frac{1}{2}''$ and the length of the cantilever does not exceed 24" in Figure R802.7.1.1.

Bird mouth notch

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CHAPTER 8: Roof-Ceiling Construction

R802.7 Cutting, drilling and notching

Max. D/4

Ceiling joist

Rafter

R802.7.1.2 Ceiling joist taper cut

- Taper cuts at the ends of the ceiling joist *shall not* exceed **one-fourth** the depth of the member in accordance with Figure R802.7.1.2.

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Cap Trusses

Continuous Lateral Restraint required only if Bracing Frame or Structural Sheathing is installed intermittently

Bracing Frame or Structural Sheathing

Supporting Trusses

BCSI BUILDING CONSTRUCTION SAFETY INSTITUTE

IBCA

FIGURE B3-45

R802.10.3 Bracing

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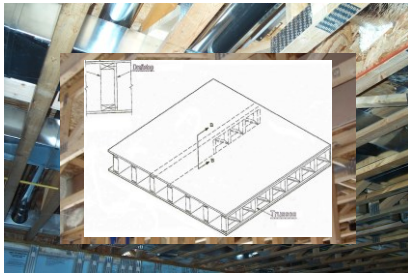


Table R602.7(3) Porch Header

**TABLE R602.7(3)
GIRDER AND HEADER SPANS^a FOR OPEN PORCHES**
(Maximum span for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir^b)

SIZE	SUPPORTING ROOF GROUND SHOW LOAD (psf)				SUPPORTING FLOOR			
	20		75		20		75	
	DEPTH OF PORCH ^c (feet)							
2 x 4	8	10	8	10	8	10	8	10
2 x 6	10	12	10	12	10	12	10	12
2 x 8	12	14	12	14	12	14	12	14
2 x 10	14	16	14	16	14	16	14	16
2 x 12	16	18	16	18	16	18	16	18

^a For 20 psf, 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.
^b Values for other species in Table R602.7(3).
^c Tabulated values assume 2x6 joists, wet service and section for refractory species. Use 30 psf ground snow load for depths between ground snow loads in this table. Use the roof live load in Table R602.7(1) in the same column.
^d Porch depth is measured horizontally from building face to centerline of the header. For depths between those shown, spans are permitted to be interpolated.



R302.12Draftstopping

Structural

- Foundation walls
- Footing sizes
- Soils



Foundations

Class of Material	Load-Bearing Pressure (Pounds per Square Foot)
Crystalline bedrock	12,000
Sedimentary and foliated rock	4,000
Sandy gravel and/or gravel (GW and GP)	3,000
Sand, silty sand, clayey sand, silty gravel and clayey gravel (SW, SP, SM, SC, GM, and GC)	2,000
Clay, sandy clay, silty clay, clayey silt, silt and sandy silt (CL, ML, MH, and CH)	1,500 ^{b,c}

- a. When soil tests are required by Section R401.4, the allowable bearing capacities of the soil shall be part of the recommendations.
- b. Where the building official determines that in-place soils with an allowable bearing capacity of less than 1,500 psf are likely to be present at the site, the allowable bearing capacity shall be determined by a soils investigation.
- c. 2,000 psf presumptive load-bearing value shall be used for Boone, Campbell and Kenton counties for CL and CH soils only.

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Footings – Table R403

DESIGNED FROM LOAD OR RISKY LOAD LOAD	STORY AND TYPE OF STRUCTURE WITH LIGHT FRAME	LOAD-BEARING VALUE OF SOIL (psf)				
		1,500	2,000	2,500	3,000	3,500
1st story	1-story light-frame	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12
2nd story	1-story light-frame	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12
	1-story light-frame w/grade beam	12x12	12x12	12x12	12x12	12x12

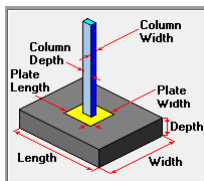


- a. Interpolation allowed. Extrapolation is not allowed.
- b. Based on 32-foot wide house with load bearing center wall that carries half of the tributary attic, and floor framing. For every 2 feet of adjustment to the width of the house, add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).

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Isolated Square Footing

- How to check footing size:
 - Q = soil bearing pressure, psf.
 - P = column load, lbs.
 - L = footing length, ft.
 - W = footing width, ft.
- If $Q <$ presumptive bear pressure, footing is OK!



$$Q = \frac{P}{L \times W}$$

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2021 Wall Bracing

Braced wall methodology – 2 options



“Classic”
Wall Bracing
(Braced Wall Lines)
R602.10

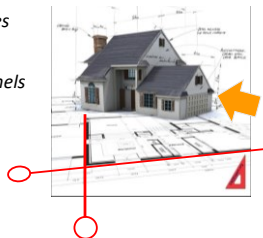


Simplified
Wall Bracing
(Circumscribed Rectangle)
R602.12

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Classic Wall Bracing R602.10

- Braced wall lines (BWLS)
- Braced wall panels (BWPs)



65

Framing Walls

STUD SIZE (nominal)	BEARING WALLS				NONBEARING WALLS	
	Laterally unsupported where supporting one floor plus attic assembly, or a habitable attic assembly, only	Maximum spacing where supporting one floor plus attic assembly, or a habitable attic assembly (inches)	Maximum spacing where supporting one floor plus attic assembly, or a habitable attic assembly (inches)	Maximum spacing where supporting one floor plus attic assembly, or a habitable attic assembly (inches)	Laterally unsupported where supporting one floor plus attic assembly, or a habitable attic assembly, only	Maximum spacing (inches)
2 x 4 ^b	—	—	—	—	10	16
2 x 6	10	24 ^c	48 ^c	—	24	14
2 x 8	10	24	24	16	24	14
2 x 10	10	24	24	—	24	16
2 x 12	10	24	24	16	24	24

- For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.
- a. Listed heights are distances between points of lateral support placed perpendicular to the plane of the wall. Bearing walls shall be sheathed on not less than one side or bridging shall be installed not greater than 4 feet apart measured vertically from either end of the stud. Increases in unsupported height are permitted where in compliance with Exception 2 of Section R602.3.1 or designed in accordance with accepted engineering practice.
- b. Shall not be used in exterior walls.
- c. A habitable attic assembly supported by 2 x 4 studs is limited to a roof span of 32 feet. Where the roof span exceeds 32 feet, the wall studs shall be increased to 2 x 6 or the studs shall be designed in accordance with accepted engineering practice.

66

Tall Wall

TABLE R602.3(6) ALTERNATE WOOD BEARING WALL STUD SIZE, HEIGHT AND SPACING

16' MAXIMUM DESIGN WIND SPEED

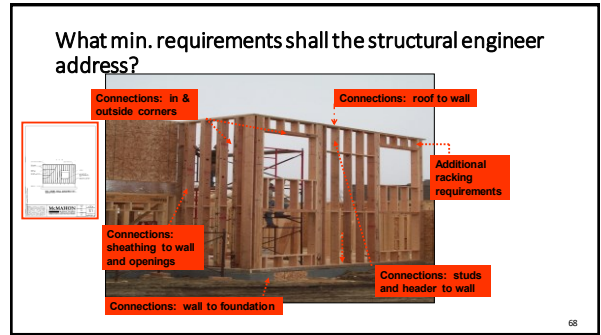
STUD HEIGHT	SUPPORTING	STUD SPACING ¹	16' MAXIMUM DESIGN WIND SPEED					
			115 mph		130 mph ²		140 mph ³	
			Maximum roof/floor span ⁴	24 ft.	Maximum roof/floor span ⁴	24 ft.	Maximum roof/floor span ⁴	24 ft.
11 ft.	Roof Only	12 in.	2 x 4	2 x 6	2 x 8	2 x 4	2 x 6	2 x 8
		16 in.	2 x 6	2 x 4	2 x 4	2 x 6	2 x 4	2 x 6
		24 in.	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6
	Roof and One Floor	12 in.	2 x 4	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6
		16 in.	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6
		24 in.	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6
12 ft.	Roof Only	12 in.	2 x 4	2 x 4	2 x 4	2 x 4	2 x 4	2 x 4
		16 in.	2 x 4	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6
		24 in.	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6
	Roof and One Floor	12 in.	2 x 4	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6
		16 in.	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6
		24 in.	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6	2 x 6

DR = Design Required.

a. Wall studs not exceeding 16 inches on center shall be sheathed with minimum 1/2-inch gypsum board on the interior and 3/8-inch wood structural panel sheathing on the exterior. Wood structural panel sheathing shall be attached with 8d (2.5" x 0.131") nails not greater than 6 inches on center along panel edges and 12 inches on center at intermediate supports, and all panel joints shall occur over studs or blocking.

b. Where the ultimate design wind speed exceeds 115 mph, studs shall be attached to top and bottom plates with connectors having a minimum 300-pound lateral capacity.

c. The maximum span is applicable to both single- and multiple-span roof and floor conditions. The roof assembly shall not contain a habitable attic.



- ### Summary
- Design criteria
 - Review of roof and floor trusses
 - Point loads identifications
 - Proper support for point loads
 - Identifying crushing of top & bottom plates
 - Review of uplift requirements
 - Headers and beams
 - Foundation and footing loads
 - Wall bracing & tall walls

Elevation

- Survey.
- Location on lot
- Setbacks (zoning code).
- Elevations of structure (footings, top of foundation, garage floor).
- Grade drainage.

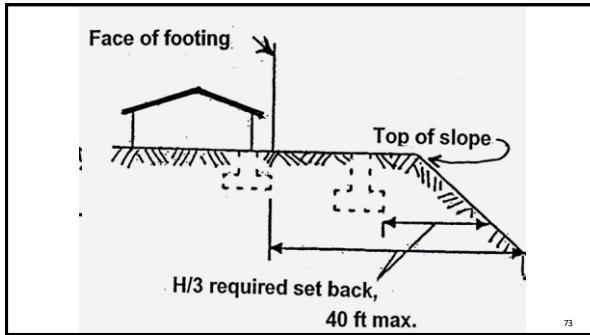
R401.3 Drainage

- Surface drainage shall be diverted to an approved point of collection with a minimum fall of 6 inches within the first 10 feet.
- Exceptions:
 - 5% when 10 feet not available, swales sloped minimum of 2%.
 - Impervious surfaces within 10 feet of the foundation shall slope minimum of 2% away from building.

Hailey's Elevation Comments

Russell, I am responding to items #4, #5, and #6 on your n been notified to respond to the remainder of the

Item #4 - While it was not indicated on the plans



No elevation plan has been submitted & none required.



How does the plans examiner know how to review this dwelling?

Deformed Bar Identification

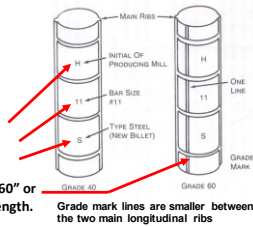
Steel reinforcement.

Is steel required?

What grade of steel?

Grade marks:
 (1st) Producing mill.
 (2nd) Bar size number.
 (3rd) Type S for Billet.

Grade 60 must also show "60" or One Line for 60,000 psi strength.

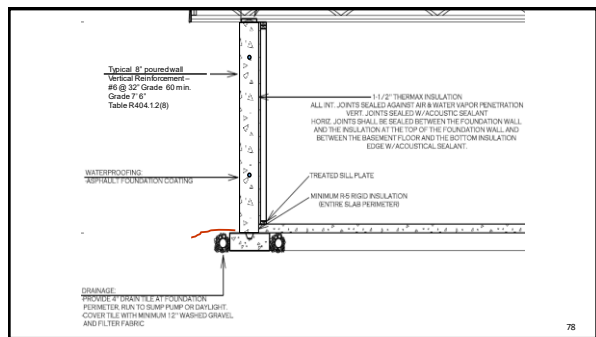


Grade mark lines are smaller between the two main longitudinal ribs

Foundation Walls Section R404

- Masonry foundation walls shall comply with appropriate tables for:
 - Plain masonry foundation wall [Table R404.1.1(1)]
 - 8-inch reinforced masonry foundation wall [Table R404.1.1(2)]
 - 10-inch reinforced masonry foundation wall [Table R404.1.1(3)]
 - 12-inch reinforced masonry foundation wall [Table R404.1.1(4)]
- The minimum thickness of masonry bearing walls more than one story high shall be 8".
- Solid masonry walls of one-story dwellings and garages shall not be less than 6" in thickness when not greater than 9' in height, provided that when gable construction is used, an additional 6' is permitted to the peak of the gable.
- Masonry walls shall be laterally supported in either the horizontal or vertical direction at intervals as required by Section R606.9.

MAXIMUM WALL HEIGHT (ft/0)	MAXIMUM UNGRADED BACKFILL HEIGHT (ft/0)	MINIMUM VERTICAL REINFORCEMENT BAR SIZE AND SPACING (INCHES)											
		MINIMUM VERTICAL REINFORCEMENT BAR SIZE AND SPACING (INCHES)						BC, UC, CL and Morgan CL					
		MINIMUM VERTICAL REINFORCEMENT BAR SIZE AND SPACING (INCHES)											
		MINIMUM VERTICAL REINFORCEMENT BAR SIZE AND SPACING (INCHES)											
5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9	9	9
10	10	10	10	10	10	10	10	10	10	10	10	10	10



Concrete foundations walls

New table for horizontal reinforcing of concrete foundation walls:

- ≤ 8' tall wall:
 - #4 within 12" top
 - #4 near mid height
- >8' tall wall:
 - #4 within 12" top
 - #4 at the 1/3 points.



Table R404.1.2(1)

79

Foundation Anchorage

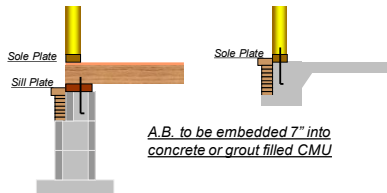
- ❑ Sill plates and walls supported directly on continuous foundation shall be anchored to the foundation in accordance with this section.
- ❑ Wood sole plates: at all exterior walls on monolithic slabs, wood sole plates of *braced wall panels* at building interiors on monolithic slabs and all wood sill plates shall anchored to the foundation with anchor bolts spaced a maximum of 6 feet on center.

R403.1.6

80

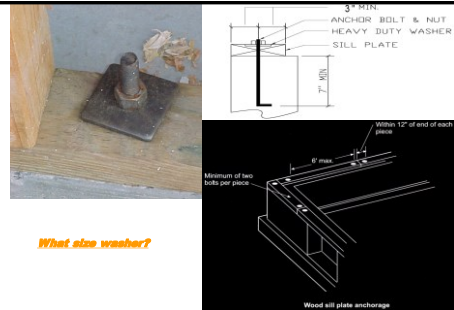
Foundation Anchorage

Definitions: sill plate, sole plate

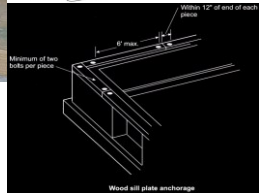


R403.1.6

81

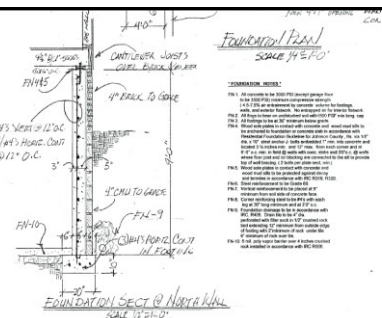


What size washer?



Wood sill plate anchorage

82



FOUNDATION SECT @ MORRIS WALL SCALE 1/8\"/>

83

Concrete foundations walls

R404.1.3.2 Reinforcement for foundation walls.
Concrete foundation walls shall be laterally supported at the top and bottom.

R606.6.4 Lateral support.
Masonry walls shall be laterally supported in either the horizontal or the vertical direction.

84

Some Type of Blocking



85

Failures w/o Lateral Bracing



86

Other Important Items

- ❑ Stoops
- ❑ Slopes
- ❑ Unbalanced exterior grade
- ❑ Footing steps
- ❑ Brick ledges

Quote by structural engineer

87

Issues With Stoops

- ❑ Grade higher than the wall
- ❑ Extreme load increase
- ❑ Flashing/wood protection
- ❑ Voids under slab
- ❑ Compaction
- ❑ Structural Slab
- ❑ May require dowel support

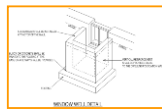


Quote by structural engineer

88

R404.5 Retaining walls

- ❑ Retaining walls not laterally supported at the top, retaining more than 24 inches of unbalanced fill shall be designed to ensure stability against overturning, sliding, excessive foundation pressure and water uplift. Safety factor of 1.5 against lateral sliding and overturning required.



89



90

Foundation Drainage Section R405.1

- ❑ Unless soils are classified as Group I, drains are required around all concrete or masonry foundations that enclose usable space below grade with approved filter membran
- ❑ Drain construction may include:
 - ❑ drainage tiles,
 - ❑ gravel or crushed stone,
 - ❑ perforated pipe, or
 - ❑ other approved systems or materials
- ❑ Drains to discharge by gravity or by mechanical means to an approved drainage system
- ❑ Specific installation requirements are provided for gravel or crushed stone drains, as well as for drain tiles

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Foundation Waterproofing and Dampproofing

- ❑ Dampproofing of foundation walls is required where retaining earth and enclosing habitable or usable spaces below grade
- ❑ Masonry walls to be parged with at least 3/8 inch Portland cement
 - ❑ Parging to be dampproofed by bituminous coating, acrylic modified cement, surface-bonding mortar, or one of listed methods for waterproofing
- ❑ Concrete walls to be dampproofed by any listed dampproofing or waterproofing materials



R406

92

R406.2 Concrete and masonry foundation waterproofing

- Walls shall be water proofed in accordance with one of the following:
 1. 2 ply hot mopped felts
 2. 55 pound roll roofing
 3. 6-mil polyvinyl chloride
 4. 6-mil polyethylene
 5. 40-mil polymer-modified asphalt
 6. 60-mil flexible polymer cement
 7. 1/8 inch cement-based, fiber-reinforced, waterproof coating
 8. 60-mil solvent-free liquid-applied synthetic rubber Exception applies to ICF walls

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Foundation Waterproofing - R406.2



- Requires dampproofing or waterproofing for all concrete and masonry foundations that retain earth and enclose interior spaces and floors below grade.

94

Columns

Structural Requirements New minimums:

... **Wood Column shall not be less than 4 x4**

... **Steel column ... Schedule 40 and not less than 3" dia. ASTM A 53 Grade B or approved equivalent**

Instructors opinion: column size should be determined by all loading factors and reactions and the es report of steel column



R407.3

95

Invented Crawl Space

- ❑ Ventilation openings in under-floor spaces specified in Sections R408.1 and R408.3 shall not be required where:
 - For **unvented** under-floor spaces, the following items shall be provided:
 1. Exposed earth shall be covered with a continuous Class I vapor retarder. Joints of the vapor retarder shall overlap by 6" and shall be sealed or taped. The edges of the vapor retarder shall extend at least 6" up the stem wall and shall be attached and sealed to the stem wall.
 2. **One** of the following shall be provided for the under-floor space:
 - 2.1. Continuously operated mechanical exhaust ventilation at a rate equal to 1 cubic foot per minute for each 50 square feet of crawl space floor area, including an air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with Section N1102.2.11.
 - 2.2. Conditioned air supply sized to deliver at a rate equal to 1 cubic foot per minute for each 50 sq. ft. of under-floor area, including a return air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with Section N1102.2.11.
 - 2.3. Plenum in existing structures complying with Section M1601.5, if under-floor space is used as a plenum.
 - 2.4. Dehumidification sized in accordance with manufacturer's specifications.

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Structural Glue Laminated Timbers



R502.1.5

- Glued laminated timbers shall be manufactured and identified as required in ANSI/AITC A190.1 and ASTM D 3737.
- ANSI/AITC A190.1-2007 American National Standard, Structural Glued Laminated Timber (2002 version available also.)
No Download Available. \$40.00
- The primary reference standard for manufacturing and quality control requirements for glued laminated timber. Topics addressed are lumber, adhesives, grading, end jointing, face laminating, finishing, marking, qualification of manufacturers and process quality control. Recommended for all manufacturers of glued laminated timber. 2007. 20 pages. (2002 version available also.)

Chapter 5 – Composite ASTM D7032



- This specification presents the standard procedures for establishing the performance rating of wood-plastic composite (WPC) deck boards and guardrail systems (guards or handrails). The purpose of this specification is to establish the basis for code recognition of these products or systems in exterior applications where combustible construction is allowed. The general requirements for these products shall be dictated by their performance in the following test methods:
- flexural tests;
 - ultraviolet resistance test;
 - biodegradation tests; and
 - temperature and moisture effects;
 - freeze-thaw resistance test;
 - fire performance tests.
- Deck boards are additionally examined by:
- creep-recovery test;
 - mechanical fastener holding tests;
 - determination of unadjusted allowable load;
 - and slip resistance tests.
- In the same manner, guards and handrails are additionally analyzed through concentrated load tests, and one- and two-family dwelling requirements.

Positively Anchored

Where supported by attachment to an exterior wall, decks shall be **positively anchored** to the primary structure and designed for both vertical and lateral loads as applicable. Such attachment **shall not** be accomplished by the use of toenails or nails subject to withdrawal.



Positively Anchored

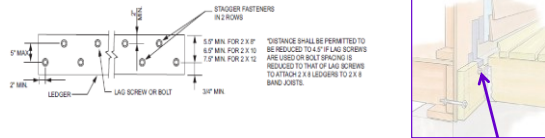
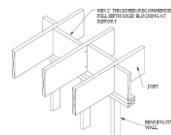


Table 9.1.3 - b. Ledgers shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joist.

R703.4 Flashing
... The flashing shall extend to the surface of the exterior wall finish. ...

- Vinyl = 1/2" min
- Cedar lap = 2" min
- Cedar shingle = 1/2" min
- Fiber cement = 1" to 2" min (by manufacturer)
- Composite wood siding = 1" min (by manufacturer)

Lateral Restraint at Supports. R502.7



The load on any structure must be transferred to the foundation. Joists provide that transfer, as long as they remain upright to receive the loads.

- Joists shall be supported laterally:
- ends by full-depth solid blocking
- not less than 2 inches nominal in thickness;
- by attachment to a full-depth header,
- band or rim joist,
- to an adjoining stud
- shall be otherwise provided with lateral support to prevent rotation.



Lateral Restraint at Supports & Bridging



R502.7 except. 2. In Seismic Design Categories D0, D1 and D2, lateral restraint shall be provided at each intermediate support.

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Blocking Between Floor Joists (Per Manufactures Instructions R502.7 except. 1) Blocking For Sub-floor Nailing At Edges Section R503 Manufactures



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Allowable Floor Joist Spans - R502.3

- Floor joist spans regulated by Tables [R502.3.1\(1\)](#) and [R502.3.1\(2\)](#)
- [Table 502.3.1\(1\)](#) based on 30 psf for maximum design load and applicable to:
 - Sleeping areas
 - Attics accessed by fixed stairway

105

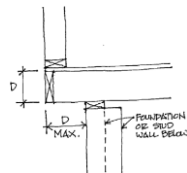
Allowable Floor Joist Spans - R502.3

- Allowable spans for ceiling joists supporting limited or no attic storage addressed in [R802.4](#)
- [Table 502.3.1\(2\)](#) based on 40 psf for maximum design load and applicable to all other areas of building.
- [footnote b](#). Dead load limits for townhouses in Seismic Design Category C and all structures in Seismic Design Categories D0, D1, and D2 shall be determined in accordance with Section [R301.2.2.2.1](#).
- Design dead load limited to 10 psf

106

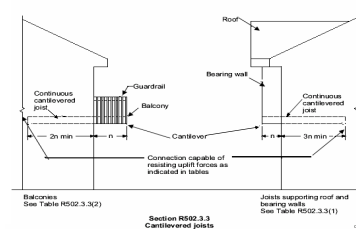
Floor Cantilevers – R502.3.3

- Floor cantilever spans shall not exceed the nominal depth of the wood floor joist. Floor cantilevers constructed in accordance with [Table R502.3.3\(1\)](#) shall be permitted where supporting a light-frame bearing wall and roof only. Floor cantilevers supporting an exterior balcony are permitted to be constructed in accordance with [Table R502.3.3\(2\)](#).



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Floor Cantilevers – R502.3.3



Balconies: See Table R502.3.3(2)

Section R502.3.3 Cantilevered joists

Joists supporting roof and bearing walls: See Table R502.3.3(1)

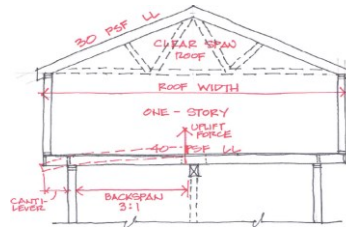
108

Floor Cantilevers – R502.3.3

TABLE R502.3.3(1)
CANTILEVER SPANS FOR FLOOR JOISTS SUPPORTING LIGHT-FRAME EXTERIOR BEARING WALL AND ROOF ONLY^{1,2,3,4,5,6}
(Floor Live Load = 40 psf; Roof Live Load = 20 psf)
Maximum Cantilever Span (200% Floor or Backspan Support in Lbs./ft.)⁷

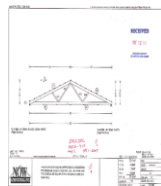
Member & Spacing	Ground Snow Load											
	≤ 20 psf				30 psf				50 psf			
	Roof Width			24 ft.	Roof Width			24 ft.	Roof Width			24 ft.
2 x 8 @ 12"	24 ft.	20 ft.	18 ft.	24 ft.	20 ft.	18 ft.	24 ft.	20 ft.	18 ft.	24 ft.	20 ft.	18 ft.
2 x 10 @ 16"	29"	21"	18"	29"	21"	18"	29"	21"	18"	29"	21"	18"
2 x 10 @ 12"	36"	30"	24"	36"	30"	24"	36"	30"	24"	36"	30"	24"
2 x 12 @ 16"	—	32"	25"	32"	25"	20"	32"	25"	20"	32"	25"	20"
2 x 12 @ 12"	—	42"	34"	37"	27"	36"	27"	17"	34"	34"	34"	—
2 x 12 @ 9"	—	48"	45"	—	41"	38"	—	40"	36"	36"	29"	19"

Floor Cantilevers – R502.3.3

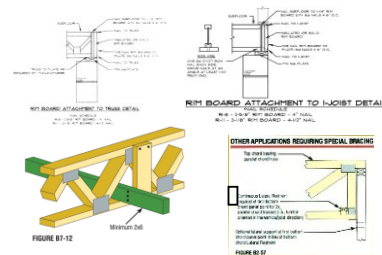


Wood Trusses - R502.11

- Truss design drawings, prepared in compliance with Section R502.11.1, shall be submitted to the building official and approved prior to installation.
- Truss design drawings to be provided with truss shipment to job site and contain 12 specific items of information.



Lateral Support and Rim Connection



Chapter 6 – Fastening

R602.3 and Table R602.3(3) Wood Structural Panel Wall Sheathing Used to Resist Wind Pressures

- Component and cladding wind load requirements of Section R301.2.1 and Table R301.2(2)
- Wood structural panels used as exterior wall sheathing must comply with the new Table R602.3(3)
 - Fastening
 - panel thickness
 - span ratings
 - stud spacing
- Based on design wind speed and wind exposure category

Fastener Schedule for Structural Members

R602.3 Design and construction.

- Structural wall sheathing shall be fastened directly to structural framing members. Exterior wall coverings shall be capable of resisting the wind pressures listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3). Wood structural panel sheathing used for exterior walls shall conform to the requirements of Table R602.3(3).

TABLE R602.3(3)
REQUIREMENTS FOR WOOD STRUCTURAL PANEL WALL SHEATHING USED TO RESIST WIND PRESSURES^{1,2}

MEMBER SIZE	MINIMUM WIND SPEED (mph)	MINIMUM WIND EXPOSURE CATEGORY	MINIMUM PANEL THICKNESS (inches)	MINIMUM FASTENER TYPE AND SPACING (inches)	WIND SPEED (mph)	
					15	20
2x4	15	A, B, C, D, E	1/2	16 @ 12"	15	20
2x6	15	A, B, C, D, E	3/4	16 @ 12"	15	20
2x8	15	A, B, C, D, E	1	16 @ 12"	15	20
2x10	15	A, B, C, D, E	1 1/4	16 @ 12"	15	20
2x12	15	A, B, C, D, E	1 1/2	16 @ 12"	15	20

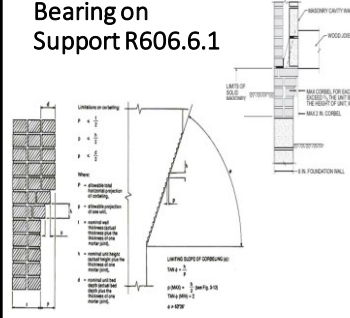
¹ For 15 mph wind speed, use 16d nails spaced at 12 inches on end and 16 inches on center. For 20 mph wind speed, use 16d nails spaced at 12 inches on end and 16 inches on center. For 20 mph wind speed, use 16d nails spaced at 12 inches on end and 16 inches on center. For 20 mph wind speed, use 16d nails spaced at 12 inches on end and 16 inches on center.

Headers Section R602.7

R502.5 Allowable girder and header spans found in Tables R602.7(1), R602.7(2) and R602.7(3).



Bearing on Support R606.6.1



- Addresses masonry wythe construction
- Requires the wythe to be supported by at least 2/3 of its thickness.
- Allows masonry veneer walls to be built on 8" block wall using corbelling.

Chapter 6—Wall Construction: Revised



R610 – Exterior concrete wall construction

This section was revised IRC 2009 and updated the prescriptive requirements to be consistent with PCA 100-07. It addresses both removable and **stay-in-place (ICF) forms**.

Exterior windows and glass doors R609

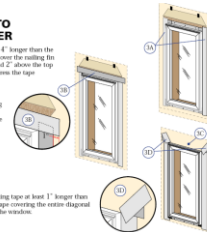
3 INTEGRATING THE WINDOW TO THE WATER RESISTIVE BARRIER

- Apply side flashing tape. Cut two pieces of flashing tape L longer than the frame height of the window. Apply one piece to each side over the railing fin and onto the water resistive barrier. The tape should extend L' above the top of the window and L'' below the bottom of the window. From the tape finish.

Note: DO NOT tape or seal the bottom railing fin.
- Apply top flashing tape. Cut a piece of flashing tape long enough to go across the top of the window and extend at least $1'$ past the side flashing tape on both sides. Apply the tape over the top railing fin as shown.

Note: Be sure to overlap the top covers (D).
- Fold down top flap of water resistive barrier (B).
- Apply flashing tape to diagonal cuts. Cut pieces of flashing tape at least $1'$ longer than the diagonal cut in the water resistive barrier. Apply the tape covering the entire diagonal cut in the water resistive barrier at both upper corners of the window.

Note: Be sure to overlap the top covers (D).



Vehicular Garage Doors

R609.4 - Garage doors shall be tested in accordance with either ASTM E330 or [ANSI/DASMA 108](#), and shall meet the pass/fail criteria of [ANSI/DASMA 108](#).

R609.4.1 Garage door labeling.

Garage doors shall be labeled with a permanent label provided by the garage door manufacturer. The label shall identify the garage door manufacturer, the garage door model/series number, the positive and negative design wind pressure rating, the installation instruction drawing reference number, and the applicable test standard.

COMPONENT AND CLADDING LOADS FOR A BUILDING WITH A MEAN ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B (psf) Table R301.2(2)

COMPONENT AND CLADDING PRESSURE ZONES FIGURE R301.1(7)

Chapter 7 Wall Covering

Chapter 7—Wall Construction:

R702.7 – Vapor retarders review slides in Chapter 4 section 408 for Class I - III

NEW: This section, originally in Chapter 11, was extensively revised and moved to Chapter 7.

R702.7 Vapor retarders.

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Chapter 7 – Vapor Retarder

R702.7

- Class I or II vapor retarders are required on the interior side of frame walls in Zones 5, 6, 7, 8 and Marine 4.
 - Exceptions:
 1. Basement walls
 2. Below grade portion of any wall
 3. Construction where moisture or its freezing will not damage the materials

R702.7.1 Class III vapor retarders.

- Class III vapor retarders shall be permitted where any one of the conditions in Table R601.3.1 is met

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Vapor Retarder

So what, actually is a "vapor retarder"? The current 2006 IRC describes a vapor retarder as a material that has a permeance rating of 1.0 perms or less ([Section R202 Vapor retarder](#)). This seems simple enough, but there is in reality a large variation in performance between a product with a 1.0 perm rating and a product with a 0.1 perm rating. To address this, the International Code Council (ICC) added a new definition to Chapter 2 of the 2007 Supplement to the IRC for Vapor retarder class.

The 2007 Supplement to the IRC currently defines vapor retarders under three classes:

Class I: 0.1 perm or less (Sheet polyethylene, non-perforated aluminium foil)

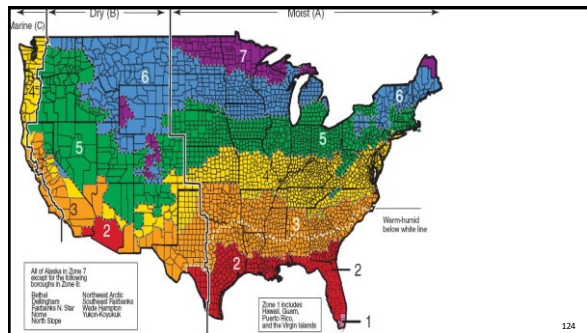
Class II: 0.1 perm <= 1.0 perm (Kraft faced fiberglass batts)

Class III: 1.0 perm <= 10 perm (Latex or enamel paint)

With the new definition for vapor retarder classes, new code language concerning the use for the new classes was also included. Class I and Class II vapor are needed to be installed on the warm in winter side of the insulation in Climate Zones 5, 6, 7, 8 and Marine 4 ([Section N1102.5 Vapor retarders](#)); however, Class III vapor retarders can now be used instead of Class I or II vapor retarders if the conditions of [Table N1102.5.1 Class III vapor retarders](#) (as listed below) are met.

Courtesy of Building Science Corp.

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Chapter 7 – Minimum Clear Air Spaces & Vented Openings

R702.7.3 Minimum clear air spaces and vented openings for vented cladding.

- For the purposes of this section, vented cladding shall include the following minimum clear air spaces. Other openings with the equivalent vent area shall be permitted.

1. Vinyl lap or horizontal aluminum siding applied over a weather resistive barrier as specified in Table R703.4.
2. Brick veneer with a clear airspace as specified in Section R703.7.4.2.
3. Other approved vented claddings.

125

Lintels - R703.8.3

- Masonry veneer shall not support any vertical load other than the dead load of the veneer above.
- Veneer above openings shall be supported on lintels of noncombustible materials.
- The lintels shall have a length of bearing not less than 4 inches.
- Steel lintels shall be shop coated with a rust-inhibitive paint, except for lintels made of corrosion-resistant steel or steel treated with coatings to provide corrosion resistance.

126

Stone & Masonry Veneer - R703.8

- Maximum height- 30 feet (38 feet on gables)
- Maximum weight- 50 psf
- Maximum thickness- 5 inches
- For adhered masonry, the manufacturer's instructions shall be submitted with the permit application????



127

Masonry Veneer Anchorage

- R703.8.4
- Masonry veneer shall be anchored to the supporting wall with corrosion-resistant metal ties embedded in mortar or grout and extending into the veneer a minimum of 1 1/2", with not less than 5/8" mortar or grout cover to outside face.



128

Flashing

The flashing shall extend to the surface of the exterior wall finish.

1. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistant barrier for subsequent drainage.



R703.4 Flashing

129

Flashing

Approved corrosion-resistant flashing shall be installed at wall and roof intersections



R703.4 Item 6

130

Roof Assemblies

New Step Flashing requirements:
 > 4"x4" minimum dimension

- > At the end of the vertical sidewall the step flashing shall be turned out in a manner that directs water away from the wall and onto the roof and/or gutter



R905.2.4.3 Sidewall Flashing

131

Chapter 3 Life Safety

132

Exterior Walls

EXTERIOR WALL ELEMENT	FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE	
Walls	(Fire-resistance rated)	1 hour tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	< 5 feet
	(Not fire-resistance rated)	0 hours	≥ 5 feet
Projectors	(Fire-resistance rated)	1 hour on the underside ^{b,c}	≥ 2 feet to 5 feet
	(Not fire-resistance rated)	0 hours	5 feet
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R107.3	< 5 feet
		None required	5 feet

Fire-Resistive Construction

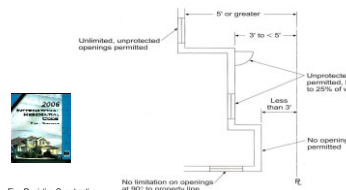
Table R102.1

133

Exterior Wall Location R302

Code Text: ... openings ... of exterior walls of dwellings and accessory buildings shall comply with Table R302.1. See exception for foundation walls.

Discussion and Commentary: Unprotected openings, typically doors and windows, in exterior walls of adjacent buildings provide greater opportunity for the spread of fire and heat from one structure to another than do the exterior walls. For that reason, there cannot be openings, including those in accessory structures, in exterior walls with a fire separation distance of less than 3 feet. Where less of a potential hazard exists, such as where the fire separation distance is between 3 feet and 5 feet, unprotected openings are permitted, but only in a limited amount. Once a distance of 5 feet or greater is provided, an unlimited amount of unprotected openings is allowed.

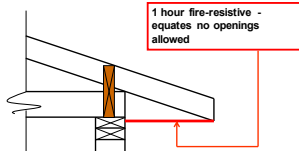


Fire-Resistive Construction

134

Exterior Wall Location

Projectors	Not allowed	N/A	≥ 2 feet
	Fire-resistance rated	1 hour on the underside ^{a,b}	≥ 2 feet to < 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet



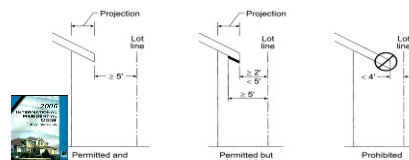
- Roof eave fire-resistance ratings shall be permitted to be reduced to 0 hours on the underside of the eave if fireblocking is provided from the wall top plate to the underside of the roof sheathing.
- Roof eave fire-resistance ratings shall be permitted to be reduced to 0 hours on the underside of the eave provided that gable vent openings are not installed.

Table R302.1 Fire-Resistive Construction

135

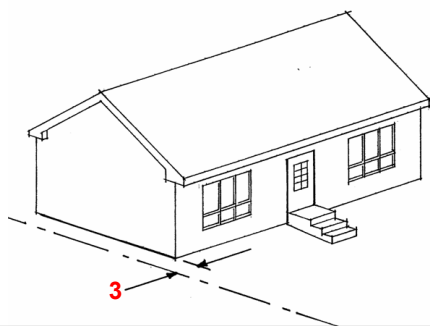
Code Text: ... projections ... of exterior walls of dwellings and accessory buildings shall comply with Table R302.1. Projections beyond the exterior wall shall not extend more than 12 inches (305 mm) into the areas where openings are prohibited. See exceptions for 1) small detached tool shed, storage shed, playhouse and similar structures, and 2) detached garages.

Discussion and Commentary: Projections, particularly those that are combustible, pose a fire hazard when located in close proximity to a lot line. Therefore, a minimum distance must be maintained between any projection and a neighboring lot. In addition, permitted projections located within 5 feet of an interior lot line must be protected with 1-hour construction on the projection's underside. The code provides for exceptions to the setback requirements for garages and small accessory structures.



Fire-Resistive Construction

136



137

Garages and Carports

Separation required.

Garages located less than 3 feet from a dwelling unit on the same lot shall be protected with not less than ½ inch gypsum board applied to the interior side of exterior walls that are within this area.

(continued on next page)

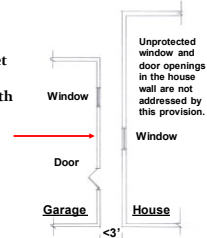


Table R302.6

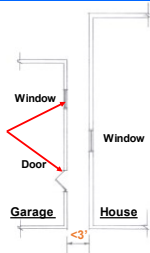
138

Garages and Carports

Separation required.

Openings in these walls shall be regulated by R309.1 (solid wood doors not less than 1 3/8 inches in thickness, solid or honeycomb core steel door not less than 1 3/8 inch thick, or 20 minute fire-rated doors and equipped with a self-closing device).

(continued on next page)



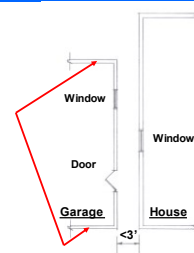
R302.5.1

139

Garages and Carports

Separation required.

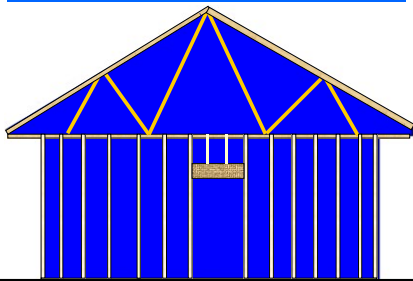
This provision (for separation) does not apply to garage walls that are perpendicular to the adjacent dwelling unit wall.



R302.6

140

House/Garage Separation



141

Separation required

House/garage separation. "Type X gypsum board for garage ceilings beneath habitable rooms shall be installed perpendicular to the ceiling framing and shall be fastened at a maximum 6 inches on center by minimum 1 7/8 inch 6d coated nails or equivalent drywall screws."

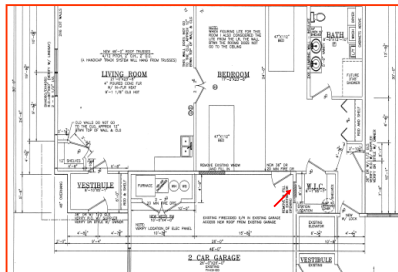


Table R702.3.5, footnote (e).

R302.6

142

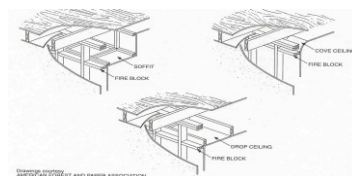
Openings from a private garage directly into a room used for sleeping purposes shall not be permitted.



R302.5

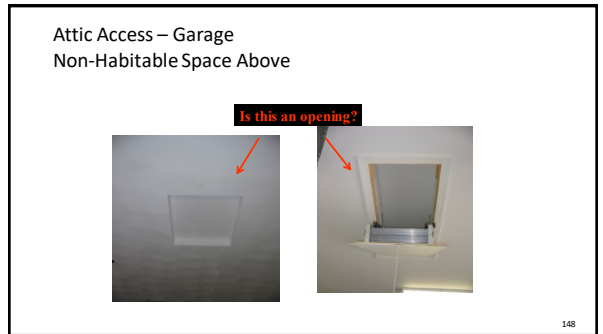
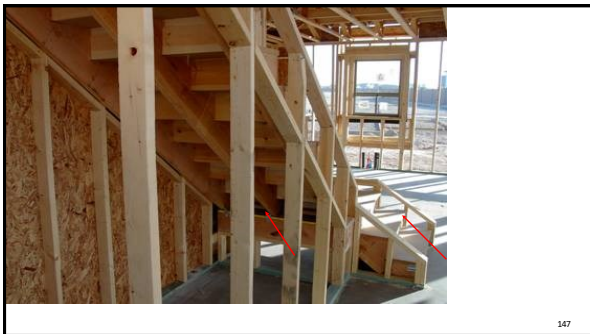
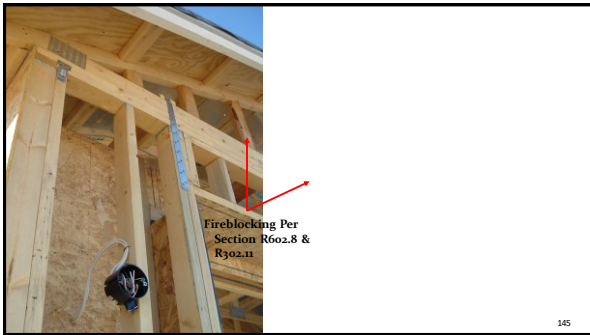
143

Fireblocking R302



Fireblocking shall be provided in accordance with Section R302.11.

144



Garages and carports

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 sheet steel or other approved material and shall have **no openings into the garage.**

149

Private Garages/Carport

Other penetrations.

Penetrations through the separation required in Section R302.6 shall be protected by filling the opening around the penetrating item with approved material to **resist** the free passage of flame and products of combustion.

R302.11, Item 4

150

R308 Glazing Review Steps


1. Check for safety glazing labeling requirements.
2. Check hazardous locations for safety glazing.
3. Remember to check interior and exterior locations

What is the difference between tempered and safety glazing?

Hazardous Location 151

Human Impact Loads

Where glazing occurs in fire doors and fire windows, it must now comply with the test requirements of CPSC 16 CFR, Part 1201, Cat. I or II for human impact loads




Hazardous Location 152

Habitable Attic

R310.1 Emergency Escape and Rescue Opening (EERO)

Every *habitable attic* shall have an EERO of at least 5.7 sq. feet



R314.3 Smoke Alarms

Every *habitable attic* shall have a smoke detector hardwired into system.

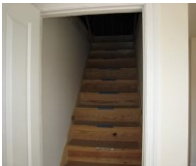
Smoke detector(s) is not typically required for "attic"

153

Habitable Attic

Every *habitable level* shall be accessed by a code compliant stairway (or ramp):

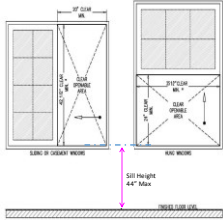
- Minimum 36" wide stairway
- 7 3/4" max. riser and 10" min. tread
- Min. 6'-8" headroom
- Handrail on at least one side
- Landing at the bottom
- Light



R311.4 Vertical Egress 154


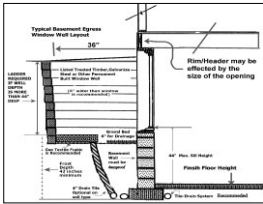
Egress Window

- 5.7 sq. ft minimum net clear openings (measured in the open position) (820 sq. inches)
- 24" minimum net clear opening height x a width to equal 5.7 sq. ft. (820 sq. inches)
- 20" minimum net clear opening width x a height to equal 5.7 sq. ft. (820 sq. inches)
- Maximum height from above the floor not greater than 44 inches of the clear opening



R310.2.1 - R310.2.3 155

Window Well

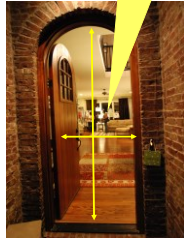
What is the wall called?

R310.2.3 Emergency Escape & Rescue 156

Required Exit Door

Egress door requirements:

- Every residence must have at least one "egress" door,
- Door must be side-hinged,
- **NET** clear door opening to be **32"** from the stop to the face of the door when opened at a 90 degree angle. **AND**
- The height is **78"** from the threshold to the stop.



Do not confuse: "Egress door" with "Exterior door"

R311.2 Egress door

157

Landings at Exterior Doors



Landings at exterior doors:

- Landings are required on both sides of all exterior doors
- 36" wide - measured in the direction of travel
- Screen doors and storm doors may swing over the landing.

R311.3 Floors and Landings at Exterior Doors

158

Landings at Exterior Doors



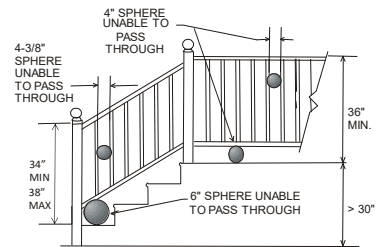
Landings at exterior doors and adjacent to stairs:

- Landings are required at top and bottom of exterior stairs
- 36" wide - measured in the direction of travel
- Closed risers
- Screen doors and storm doors may swing over the landing.

R311.3 Floors and Landings at Exterior Doors

159

R311.7.7, R312 Handrails and Guards



Means of Egress

160

Continuous Handrail?



Means of Egress

161

R312.2 Window Fall Protection.

Window fall protection shall be provided in accordance with Sections R312.2.1 and R312.2.2.



R312.2.1 Window opening height.

In dwelling units, where the bottom of the clear opening of an operable window opening is located less than 24" above the finished floor and greater than 72" above the finished grade or other surface below on the exterior of the building, the operable window shall comply with one of the following:

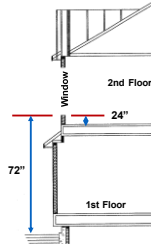
1. Operable window openings will not allow a 4-inch-diameter sphere to pass through where the openings are in their largest opened position.
2. Operable windows are provided with window opening control devices or fall prevention devices that comply with ASTM F2090.

162

Window Fall Protection

R310.1.1 Operational constraints and opening control devices.

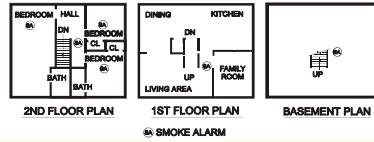
Window opening control devices and fall prevention devices complying with ASTM F2090 shall be permitted for use on windows serving as a required emergency escape and rescue opening and shall be not more than 70" above the finished floor.



163

Smoke Alarm Review

Placement of Smoke Alarms Within Dwelling



Smoke detection and notification:

All smoke alarms shall be listed in accordance with UL 217 and installed in accordance with the provisions of this code and the household fire warning equipment provisions of NFPA 72 and Manufacturer's installation instructions.

Smoke Alarms R314

164

Smoke Alarm Review

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
 - habitable attics,
 - 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.

*Smoke Alarms shall be installed in accordance to manufactures instructions, NFPA 72, and the IRC 2015 - R302.14"

Smoke Alarms R314

165

Carbon Monoxide Alarm

When required:

- New house has fuel-fired appliances,
- New house has an attached garage.

Where required:

- Located outside each sleeping area
- In the immediate vicinity of the bedrooms



R315.1 Carbon Monoxide Alarms

166

Foam Plastic

Labeling and Identification.

Surface burning (flame spread less than 75 and smoke developed less than 450... ASTM E84).

Thermal barrier (1/2 inch gypsum board or equal to 15 minutes...ASTM E119).



R316

167

Foam Plastic

Sill plates and headers.

Thermal barrier not required ... provided all the following are met:

Maximum thickness 3 1/2 inches.

Density 1.5 to 2.0 pcf

Flame spread index of 25 or less, and smoke developed index of 450 or less...



R316

168

Sill plate and Headers

Foam plastic shall be permitted to be **spray-applied** to a sill plate and header (rim joist) without thermal barrier subject to all of the following:



Not code compliant

R316

169

Premise Identification - R319



Where are the address numbers?

170

Summary

- Verify all code requirements.
- Call upon one another for uniformity of code enforcement.
- ...And remember: "Life is good." (Brent Snyder 2006)



171