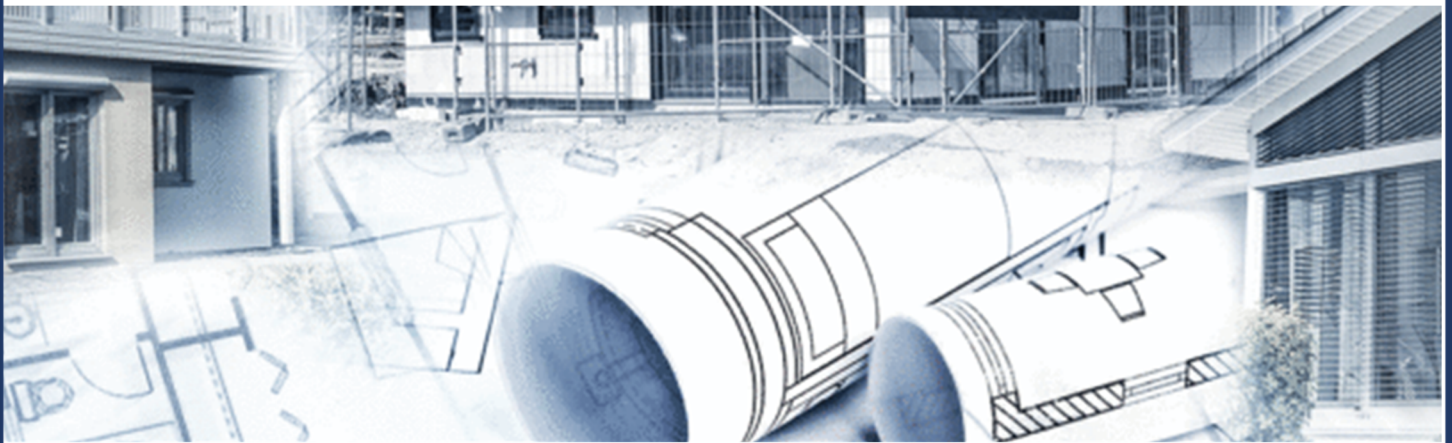




City of
Ozark MISSOURI
Bridging strong traditions with bright futures.



2018 BUILDING CODES



**GUIDELINES & INSPECTION CHECKLIST
FOR RESIDENTIAL CONSTRUCTION**

Based on the 2018 International Residential Code and the 2017
National Electric Code

**THIS IS A GUIDELINE ONLY IF YOU SHOULD HAVE
ANY QUESTIONS PLEASE CALL OUR OFFICE!!**

This informational handout is based on the 2018 IRC one and two family dwelling code, the 2017 National Electric Code and other Ozark City Ordinances.

The purpose of this handout is to better present and clarify code interpretation and enforcement for construction of a one or two family dwelling; however, it by no means attempts to address every code item.

The Building Department's mission is to work with the Contractors and the public so that the consumer may purchase a quality home that meets or exceeds the requirements of the code in the City of Ozark.

Planning & Development Department

205 N 1st St.

Ozark, MO 65721

Phone: 417-581-2407 Fax: 417-581-0575

R101.3 Intent. The purpose of this code is to establish minimum requirements to safeguard the public safety, health and general welfare through affordability, structural strength, means of egress facilities, stability, sanitation, light and ventilation, energy conservation and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations.

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Site planning for One & Two Family Homes

CONTRACTOR/BUILDER RESPONSIBILITIES

- All houses shall have the address and permit number posted on property during construction. Permanent address must be posted before occupancy.
- All construction sites shall have a portable rest room for construction workers.
- The builder is responsible for hooking up the correct water line and meter to the correct building on multifamily residences.
- Builders who need water during construction shall hook up a frost free hydrant on the outside base of the water meter. No kind of apparatus is allowed inside meter box.
- Excess mud, dirt, and rock on the street shall be cleaned up by contractor.
- Builder shall install storm water drainage fences & protection.
- The builder is responsible for making sure landscaper does not cover water meters with dirt or sod during final grade.
- All materials that are used must be approved by U.L. or equal agency.
- The contractor is responsible for the maintenance, repair, and/or replacement of the water meter, water meter pit and lid, electric vaults, and related equipment, at no expense to the City of Ozark.

REQUIRED INSPECTIONS

For on-site construction, the building department inspectors, upon notification from the permit holder or his agent, will make all necessary inspections and will either approve that portion of the construction as completed or disapprove that same portion, state why on an inspection slip and post the inspection slip in a conspicuous place. Inspections consist of but are not limited to the following items:

Footing: Commonly made after areas are excavated, forms erected and required steel is in place prior to the placing of concrete.

Foundation (Stem Wall): Commonly made after footing concrete has been placed, forms erected, and required steel is in place prior to placing of concrete; or during and upon completion of laying concrete block foundation.

Temporary Electric: Usually at footing-foundation stage prior to framing.

In-ground Plumbing: Inspection required before any concealment.

Sheathing: Before house wrap & windows.

Rough Ins: Rough In inspections include the following:

Framing: Required after the roof, all framing, fire stopping, draft stopping and bracing are in place.

Electric: Inspection required before any concealment

Plumbing

Mechanical: Inspection required before any concealment, before fixtures are set

Gas Test

Draft Stop

Sewer Inspection: Before sewer connection.

Electric Ditch:

Sidewalk/Driveway Approach: Before pouring concrete.

Permanent Electric: After all rough-in inspections are approved, usually at drywall stage.

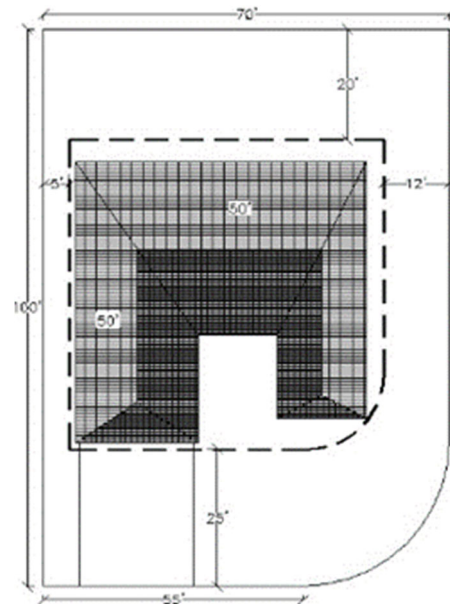
Final Inspection: Commonly made after building is complete and yard and driveway are completed.

OCCUPANCY: No building shall be occupied until a final inspection is approved! If occupancy occurs a fine will be assessed and a ticket will be issued and you will have to appear in front of the City Judge. City Ordinance 103-31; IRC 110.

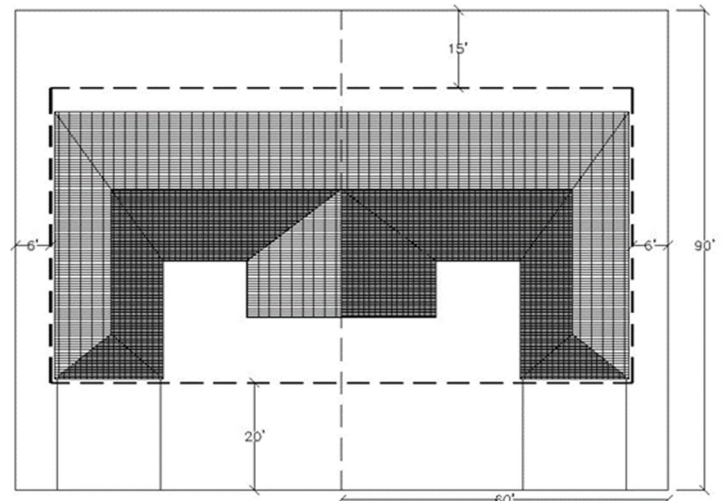
ONE & TWO FAMILY DWELLING SETBACKS

Single family (corner lot)

Each side yard is 5 feet unless corner lot



TWO-FAMILY
(Duplex)



SETBACKS: This term refers to zoning regulations regarding the location of a building on the lot or parcel of land. The setbacks vary with the use of the building and the zoning district. The setback requirements are:

	Front	Side	Back	Street Side
Single Family (R-1)	25 ft.	5 ft.	20 ft.	12 ft.
Duplex & Townhouse (R-4 & R-5)	20 ft.	6 ft.	15 ft.	12 ft.

ZERO LOT LINE DWELLINGS

Townhouse

A single-family dwelling unit constructed in a group of three or more attached units in which each unit extends from foundation to roof and with a yard or public way on at least two sides.

Common Wall

A common 2-hour fire-resistive 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 are limited to electrical wire installed in raceways and electrical outlet boxes. R302.2.2

Continuity

The common wall for townhouses shall be continuous from the foundation to the underside of the roof sheathing, deck or slab and shall extend the full length of the common wall. R302.2.3

Materials

The wall separating the dwelling may be of masonry or wood construction with 2 layers of 5/8" type X fire resistant gypsum board applied on both sides of separating wall. No combustible material may extend through the fire wall. The fire wall must extend out to the back of the fascia board when there is an overhang.

Parapets

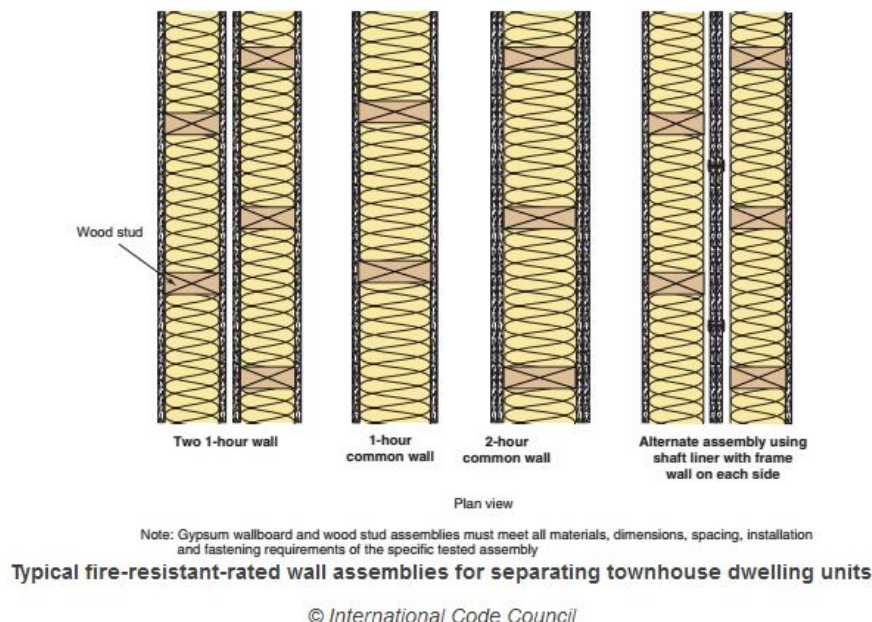
Parapets shall be provided for townhouses when roof surfaces adjacent to the wall are at the same elevation. The parapet shall extend not less than 30" above the roof surfaces. R302.2.4

Exceptions

A parapet is not required when the roof decking is of noncombustible material or approved fire-retardant treated wood for a distance of 4' on each side of the wall.

TWO-FAMILY DWELLINGS

Dwelling units in two-family dwellings are required to be separated from each other by wall and/or floor assemblies of not less than 1-hour fire-resistive rating (2 layers of 5/8" type X sheet rock. Fire-resistive, 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. R302.3



Sound Insulation

Wall and floor assemblies separating dwelling units shall provide airborne and impact sound insulation for floor/ceiling assemblies. These assemblies shall meet a sound transmission class of 45. AK102

Automatic Fire Sprinkler Systems

Fire Sprinkler Requirements Section R313

R313.1 Townhouse automatic fire sprinkler systems. An automatic residential fire sprinkler system shall be installed in *townhouses*.

Exception: An automatic residential fire sprinkler system shall not be required where *additions* or *alterations* are made to existing *townhouses* that do not have an automatic residential fire sprinkler system installed.

R313.1.1 Design and installation. Automatic residential fire sprinkler systems for *townhouses* shall be designed and installed in accordance with Section P2904 or NFPA 13D.

R313.2 One and two family dwellings automatic fire sprinkler systems. An automatic residential fire sprinkler system shall be installed in one and two family *dwellings*.

Exception: An automatic residential fire sprinkler system shall required for *additions* or *alterations* to existing buildings that are not already provided with an automatic residential Sprinkler system.

State of Missouri SB 108— INSTALLATION OF FIRE SPRINKLERS IN CERTAIN DWELLINGS

This substitute specifies that a builder of a one or two family dwelling or a townhouse must offer to any purchaser the option, at the purchaser's cost, to install or equip fire sprinklers in the buildings. Currently, a builder of single-family dwellings or residences or multi-unit dwellings of four or fewer units must offer to install or equip fire sprinklers in the dwelling.

Any political subdivision that adopts the 2018 International Residential code for One and Two Family Dwellings or a subsequent edition of the code without mandated automatic fire sprinkler systems will retain the language in Section R317 of the 2006 International Residential Code for two family dwellings and townhouses.

City of Ozark. Amend Section R313 'Automatic Fire Sprinkler Systems' be deleting sub-section R313 in its entirety and enacting a new sub-section which said new sub-section shall read as follows:

R313 Automatic Fire Sprinkler Systems. A builder of five (5) or more connected units shall comply with the design and installation requirements of the 2018 International Residential Code (IRC) Section P2904. The builder of four (4) or less connected units shall comply with fire suppressant separation as provided in Section R317 of the 2006 IRC. Or Section P2904 of the 2018 IRC at the builder's or purchaser's cost and option.

Footing and Stem walls

Footing Inspection Requirements R401

- Building permit has been posted on-site. R105.7
- The lot and street number has been posted.
- Stamped and Approved Building drawings are on site and available to the inspector
- All property pins have been located.
- The minimum dimensions for footings are based on loading and assumed allowable soil pressure of 2000 pounds per square foot. Footing widths or the depth of footings below natural grade may have to be increased if the supporting soil is of a type not having an allowable bearing pressure of at least 2000 pounds per square foot. R401.4.1

Minimum requirements for footings R401.2

- All loose dirt and debris have been removed from interior of the footing. Footing soil is free of vegetation roots branches. The footing is clear of water.
- **Slope.** The top surface of footing shall be level. The bottom surface of footing shall not have a slope exceeding one vertical in 10 units horizontal (10% slope). 403.1.5
- Concrete encased electrode (upper ground) One or more bare steel re-enforcing rods not less than 1/2 inch in diameter installed in a continuous 20 foot length. E3508.1.2
- The rebar re-enforcing has been installed and sets on steel high chairs (no bricks or stones allowed)
- Concrete can only be placed on frost-free surfaces
- Concrete footing shall be protected from freezing during depositing and for a period of not less than five days thereafter.
- Concrete in footings shall have a compressive strength of not less than 2500 lbs. per square inch in 28 days. R402.2
- **Depth.** Footings are to be poured on a solid bearing surface. All exterior footing shall be placed at least 12 inches below the undisturbed ground surface and minimum of 18 inches below finish grade. R403.1.4
- Footings shall be at least 6 inches in thickness R403.1(1)
- **Width**

TABLE R403.1 MINIMUM WIDTH OF CONCRETE, PRECAST OR MASONRY FOOTINGS (inches) a

TABLE R401.4.1

PRESUMPTIVE LOAD-BEARING VALUES OF FOUNDATION MATERIALS^a

CLASS OF MATERIAL	LOAD-BEARING PRESSURE per square foot (pounds)
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, silty clay, clayey silt, silt and sandy silt clay (CL, ML, MH and CH)	1,500 ^b

For SI: 1 pound per square foot = 0.0479 kPa.

a. Where 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.

TABLE R403.1(1)**MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS FOR LIGHT-FRAME CONSTRUCTION (inches)^{a, b}**

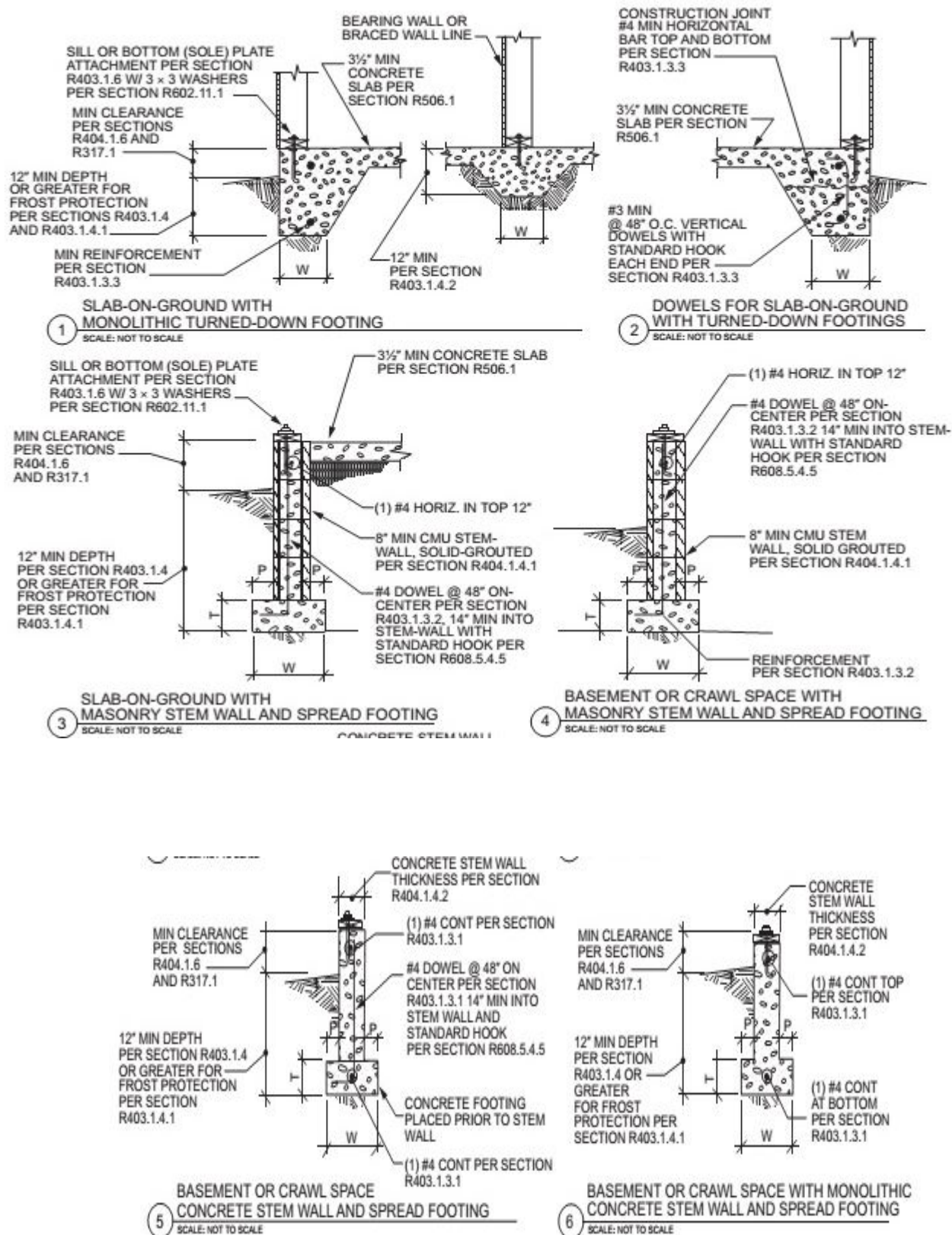
SNOW LOAD OR ROOF LIVE LOAD	STORY AND TYPE OF STRUCTURE WITH LIGHT FRAME	LOAD-BEARING VALUE OF SOIL (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story—slab-on-grade	12 × 6	12 × 6	12 × 6	12 × 6	12 × 6	12 × 6
	1 story—with crawl space	12 × 6	12 × 6	12 × 6	12 × 6	12 × 6	12 × 6
	1 story—plus basement	18 × 6	14 × 6	12 × 6	12 × 6	12 × 6	12 × 6
	2 story—slab-on-grade	12 × 6	12 × 6	12 × 6	12 × 6	12 × 6	12 × 6
	2 story—with crawl space	16 × 6	12 × 6	12 × 6	12 × 6	12 × 6	12 × 6
	2 story—plus basement	22 × 6	16 × 6	13 × 6	12 × 6	12 × 6	12 × 6
	3 story—slab-on-grade	14 × 6	12 × 6	12 × 6	12 × 6	12 × 6	12 × 6
	3 story—with crawl space	19 × 6	14 × 6	12 × 6	12 × 6	12 × 6	12 × 6
	3 story—plus basement	25 × 8	19 × 6	15 × 6	13 × 6	12 × 6	12 × 6

TABLE R403.1(2)**MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS FOR LIGHT-FRAME CONSTRUCTION WITH BRICK VENEER (inches)^{a, b}**

SNOW LOAD OR ROOF LIVE LOAD	STORY AND TYPE OF STRUCTURE WITH BRICK VENEER	LOAD-BEARING VALUE OF SOIL (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story—slab-on-grade	12 × 6	12 × 6	12 × 6	12 × 6	12 × 6	12 × 6
	1 story—with crawl space	15 × 6	12 × 6	12 × 6	12 × 6	12 × 6	12 × 6
	1 story—plus basement	21 × 6	15 × 6	12 × 6	12 × 6	12 × 6	12 × 6
	2 story—slab-on-grade	15 × 6	12 × 6	12 × 6	12 × 6	12 × 6	12 × 6
	2 story—with crawl space	20 × 6	15 × 6	12 × 6	12 × 6	12 × 6	12 × 6
	2 story—plus basement	26 × 8	20 × 6	16 × 6	13 × 6	12 × 6	12 × 6
	3 story—slab-on-grade	20 × 6	15 × 6	12 × 6	12 × 6	12 × 6	12 × 6
	3 story—with crawl space	26 × 8	19 × 6	15 × 6	13 × 6	12 × 6	12 × 6
	3 story—plus basement	32 × 11	24 × 7	19 × 6	16 × 6	14 × 6	12 × 6

TABLE R403.1(3)**MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS WITH CAST-IN-PLACE CONCRETE OR FULLY GROUTED MASONRY WALL CONSTRUCTION (inches)^{a, b}**

SNOW LOAD OR ROOF LIVE LOAD	STORY AND TYPE OF STRUCTURE WITH CMU	LOAD-BEARING VALUE OF SOIL (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story—slab-on-grade	14 × 6	12 × 6	12 × 6	12 × 6	12 × 6	12 × 6
	1 story—with crawl space	19 × 6	14 × 6	12 × 6	12 × 6	12 × 6	12 × 6
	1 story—plus basement	25 × 8	19 × 6	15 × 6	13 × 6	12 × 6	12 × 6
	2 story—slab-on-grade	23 × 7	18 × 6	14 × 6	12 × 6	12 × 6	12 × 6
	2 story—with crawl space	29 × 9	22 × 6	17 × 6	14 × 6	12 × 6	12 × 6
	2 story—plus basement	35 × 12	26 × 8	21 × 6	17 × 6	15 × 6	13 × 6
	3 story—slab-on-grade	32 × 11	24 × 7	19 × 6	16 × 6	14 × 6	12 × 6
	3 story—with crawl space	38 × 14	28 × 9	23 × 6	19 × 6	16 × 6	14 × 6
	3 story—plus basement	43 × 17	33 × 11	26 × 8	22 × 6	19 × 6	16 × 6



W = Width of footing, T = Thickness of footing and P = Projection per [Section R403.1.1](#)

FOUNDATION R404

- Concrete and masonry foundation walls shall extend above the finished grade adjacent to the foundation at all points a minimum of 4 inches where masonry veneer is used and a minimum of 6 inches elsewhere. R404.1.6
- Stem walls are to be a minimum of 6 inches wide for one (1) story. 404.1.5
- Foundations with stem walls shall have installed a minimum of one #4 bar within 12 inches of the top of the wall and one #4 bar located 3 inches to 4 inches from the bottom of the footing. R403.1.3.1
- Stem wall height should be a minimum of one (1) foot above street curb, depending on grade of lot. 403.1.7.3
- Foundation shall have 1/2 inch bolts at six (6) feet on center not more than 12 inches from each corner and seven (7) inches into concrete. 403.1.6
- Portal frame with hold-downs. R602.10.6.2 Method PFH minimum width of narrow wall single-story are minimum of 16 inches and two-story are minimum 24 inches in wide.

Minimum Floor Elevation for Storm water

Finished Floor Elevation Verification Policy

To ensure proper placement of a structure, all lots with a minimum finished floor elevation identified on the recorded Final Plat shall require the submittal of a finished floor elevation certificate upon completion of the basement finished floor and/or garage finished floor and prior to framing of the structure.

A surveyor registered in the State of Missouri shall conduct the elevation certification. Results of the survey shall be submitted, stamped, and sealed to the Development department; verifying compliance with the finished floor elevation for the lot on the City's Certification Form.

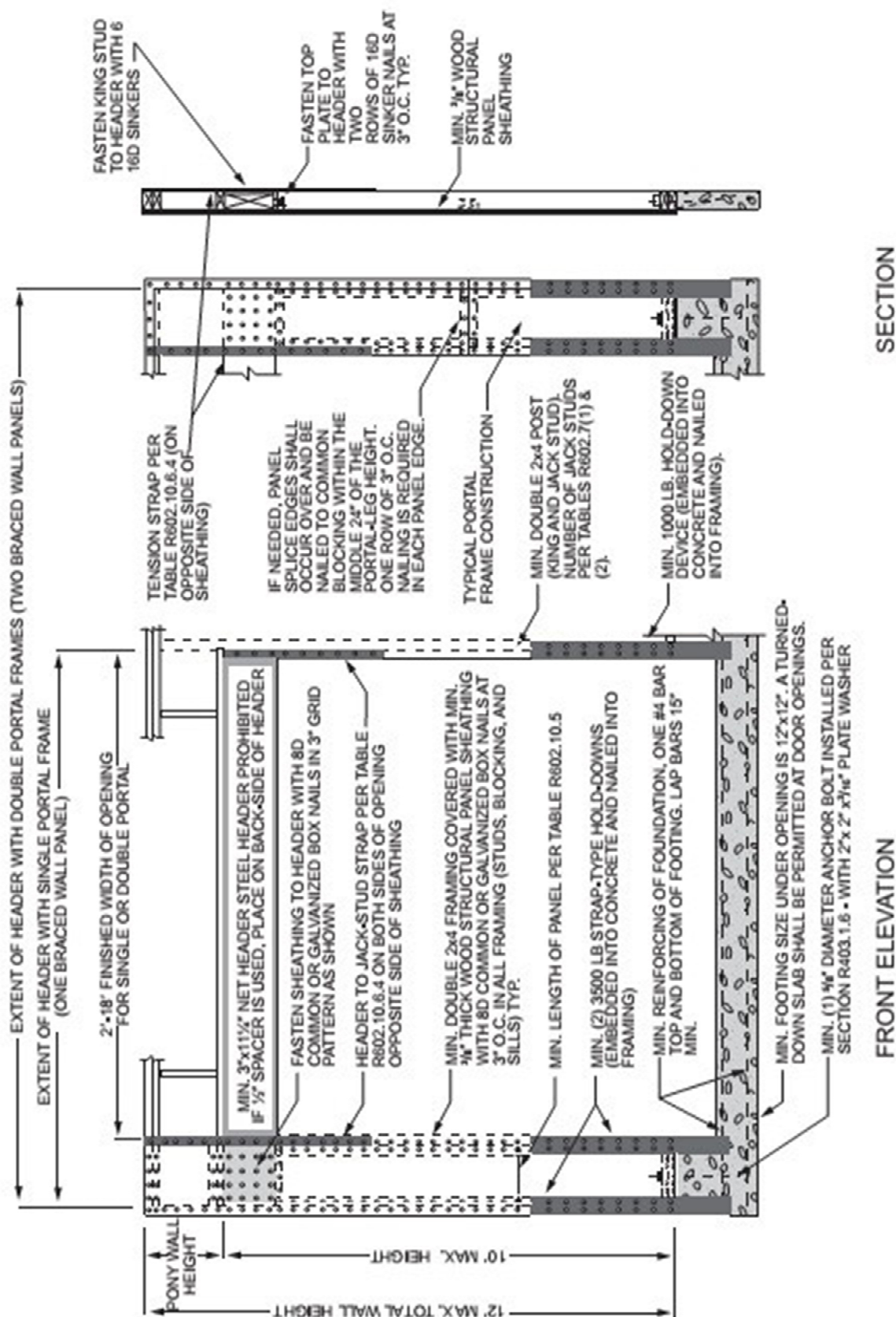


FIGURE R602.10.6.2

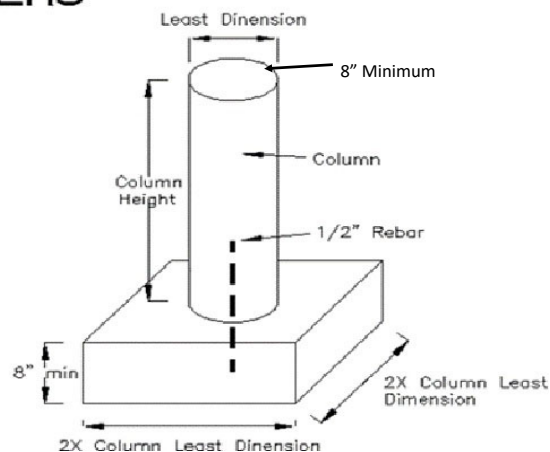
METHOD PFH – PORTAL FRAME WITH HOLD-DOWNS

Piers and Columns

Piers and columns are vertical members usually made of concrete, brick, block, steel, or wood and are used to support the floor system. Piers and columns may be used to support the complete structure or they may be used in conjunction with the foundation wall and provide intermediate support between riders and beams.

- The unsupported height of columns shall not exceed ten (10) times their least dimension. Block or hollow masonry unit columns are required to have the cells filled with concrete when their unsupported height exceeds four times their least dimension. 606.7
- Hollow columns shall be capped with four (4) inches thick solid masonry. 606.7.1
- Pier column to be at least eight (8) inches thick. R404.1.9
- Concrete columns shall be doweled to the pier with 1/2 inch rebar.
- The columns shall be restrained to prevent lateral displacement at the bottom end. Wood columns shall be not less in nominal size than 4 inches by 4 inches. Steel columns shall be not less than 3-inch-diameter. Schedule 40 pipe manufactured in accordance with ASTM A53 Grade B or *approved* equivalent. 407.3

PIERS



Brick Ledge

- Exterior Veneer supported by foundation, wood or cold-formed steel construction 703.7.2
- The brick ledge can be formed in the foundation wall or by concrete masonry units bearing on the footing, head and bed joints are required. R606.3.1
- Plywood under brick is required to be covered with felt or sealed. 703.2
- Surface drainage shall be diverted to a storm sewer conveyance or other approved point of collection that does not create a hazard. Lots shall be graded to drain surface water away from foundation walls. The grade shall fall a minimum of 6 inches within the first 10 feet. R401.3

Foundation Waterproofing and Damp Proofing

R406.1 Concrete and masonry foundation damp proofing. Except where required by Section R406.2 to be waterproofed, foundation walls that retain earth and enclose interior spaces and floors below *grade* shall be damp proofed from the top of the footing to the finished *grade*. Masonry walls shall have not less than 3/8 inch Portland cement parging applied to the exterior of the wall. The parging shall be damp proofed in accordance with one of the following:

1. Bituminous coating
2. Three pounds per square yard of acrylic modified cement.
3. 1/8" coat of surface-bonding cement complying with ASTM C 887.
4. Any material permitted for waterproofing in Section R406.2.
5. Other *approved* methods or materials.
6. A 6-mil-thick (0.15 mm) polyethylene vapor retarder shall be applied over the porous layer with the basement floor constructed over the polyethylene. R405.2.2.

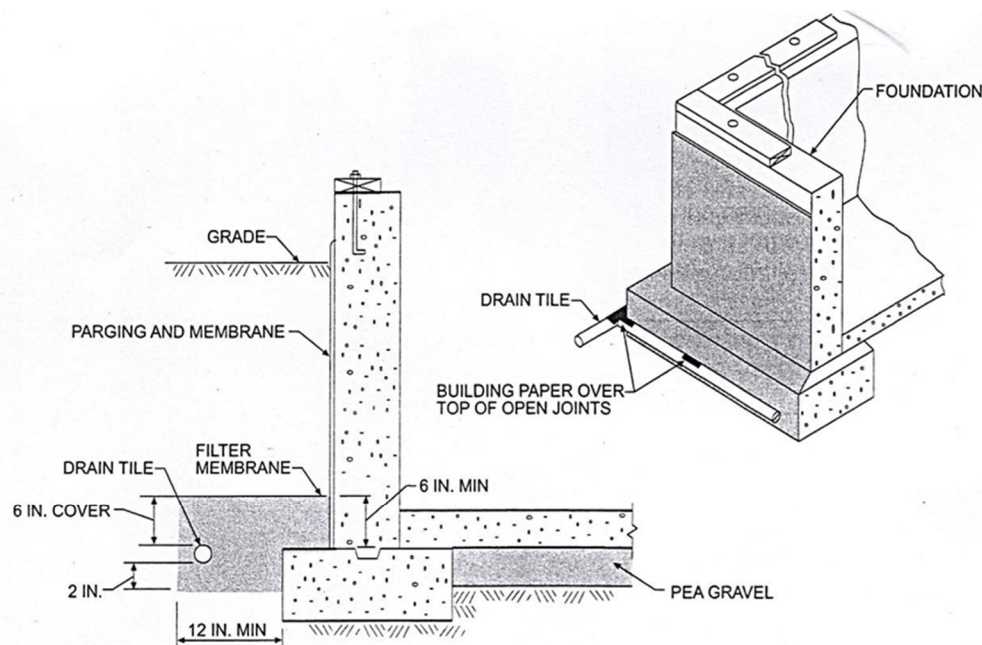
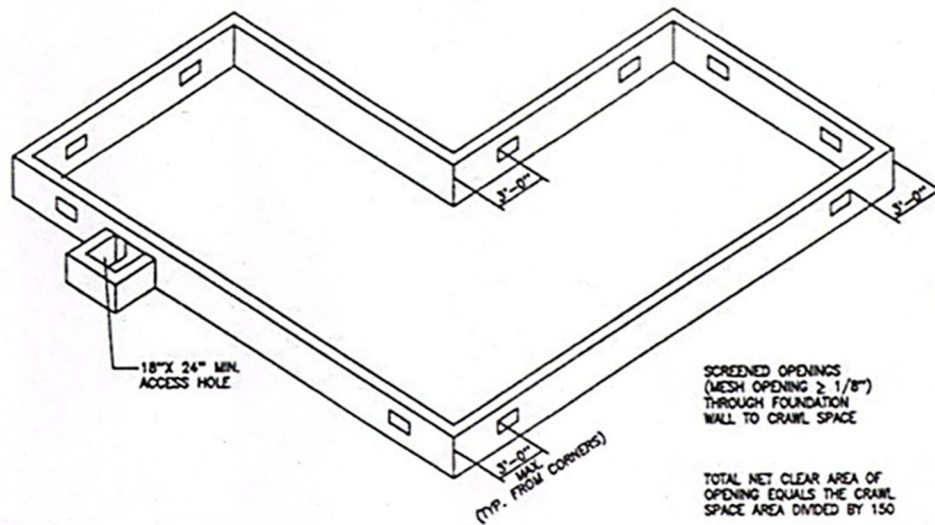


Figure R405.1(1)
FOUNDATION DRAINAGE FOR HABITABLE SPACE BELOW GRADE

Crawl Space

- Ventilation opening is 1 square foot for each 150 square feet of crawl space. 408.1
- Openings shall be within 3 feet of each corner of the building
- Minimum access hole required is 18 inches x 24 inches. 408.4
- Minimum heights of crawl space to bottom of floor joist is 18 inches or wood girders when closer than 12 inches to exposed ground. 317.1



R408.3

Concrete Floor (on ground) R506

GENERAL: Concrete slab-on-ground floors shall be designed and constructed in accordance with the provisions of this section or ACI 332. Floors shall be a minimum 3.5" thick R506.1

- The area within the foundation walls shall have all vegetation, top soil and foreign material removed. R506.2
- Fill material shall be free of vegetation and foreign material. The fill shall be compacted to assure uniform support of the slab and except where approved, the fill depth shall not exceed 24 inches for clean sand or gravel and 8 inches for earth. R506.2.1
- A 6-mil polyethylene or approved vapor retarder with joints lapped not less than 6 inches shall be placed between the concrete floor slab and the base course or the prepared subgrade where no base course exists. R506.2.3

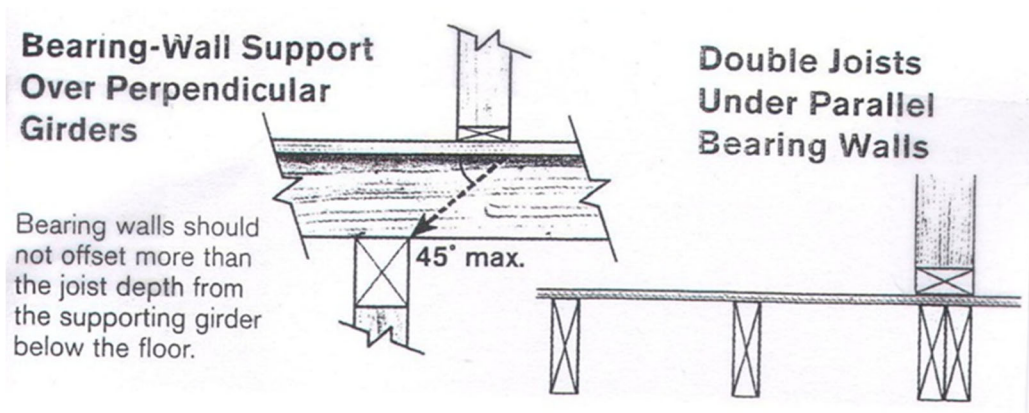
Exception: The vapor retarder may be omitted:

1. From garages, utility buildings, and other unheated accessory structures.
2. For unheated storage rooms, having an area of less than 70 square feet and carports.
3. From driveways, walks, patios and other flatwork not likely to be enclosed and heated at a later date.
4. Where approved by the building official, based on local site conditions.

Framing

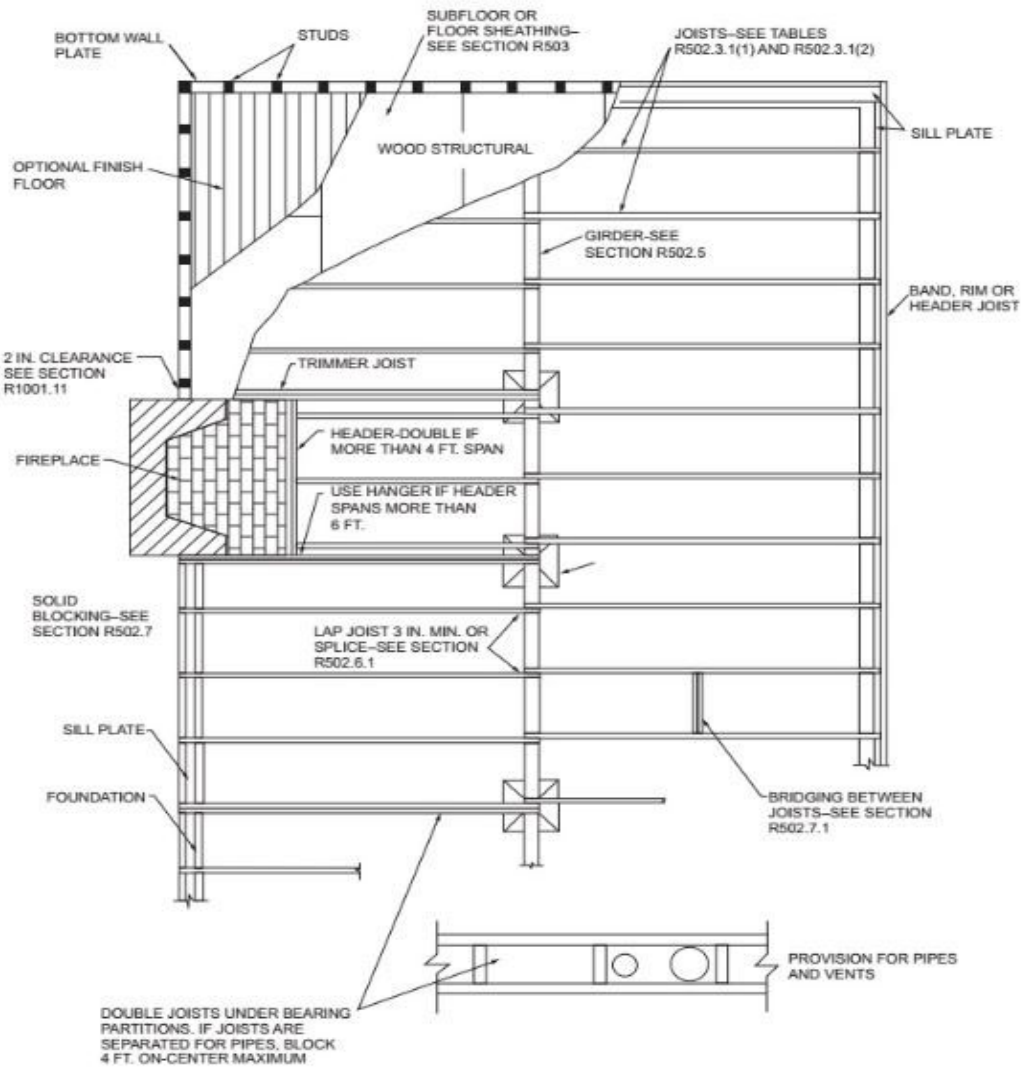
Girders 502.5

- Girders are the main horizontal support members upon which the floor system is laid. They are supported by posts, beam pockets, and piers.
- The arrangement of the girders under the floor system is dependent on the design of the floor system itself and the load it is expected to carry. Some girders are positioned to carry only floor load while others will have to support floors, walls, and roof structures. This can result in girders of various size and spacing. The most common method of laying out girders is to determine the size of the largest girder required and use girders of like size in all locations where they will be needed. This results in a uniform design and makes the job of framing easier.
- For Girder spans see table 502.5(2) (page 25)
- Shims for floor joist or girders shall be of hardwood or steel plates. Shim width shall not be less than girder width.



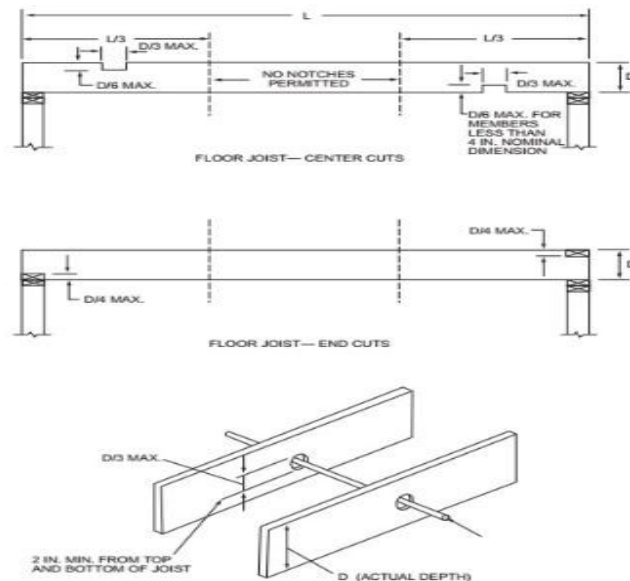
Floors R502

- All lumber for joists, beams, and girders shall be grade marked by an approved agency .
- The ends of each joist, beam, or girder shall have not less than 1 1/2 inches bearing on wood or metal and not less than three (3) inches on concrete or masonry. 502.6
- Joists attached into the sides of a wood girder shall be supported by approved framing anchors. 502.6
- Notches in solid lumber joists, rafters, and beams shall not exceed one-sixth of the depth of the member, shall not be longer than one-third of the depth of the member and shall not be located in the middle one-third of the span. Notches at the ends of the member shall not exceed one-fourth the depth of the member. The tension side of members 4 inches or greater in nominal thickness shall not be notched except at the ends of the members. The diameter of holes bored or cut into members shall not be closer than 2 inches to the top or bottom of the member, or to any other hole located in the member. Where the member is notched, the hole shall not be closer than 2 inches to the notch. **R502.8.1 Sawn lumber**
- Joists under bearing walls shall be doubled. Double joists which are separated to permit installation of piping or vents shall be solid blocked at maximum spacing of 4' on center. 502.4
- The clear span of floor joist shall not exceed the values set forth in IRC Tables. 502.3 Openings over 4' shall be framed with a header and double trimmer joists. 502.10
- Floor trusses shall be designed and installed in accordance with approved engineering practices. Floor trusses shall not be drilled, cut notched, or altered in any manner unless so designed. 502.1.4
- Joists exceeding a nominal 2" by 12" shall be supported laterally by solid blocking, diagonal bridging (wood or metal), or a continuous 1" by 3" strip nailed across the bottom of joists perpendicular to joists at intervals not exceeding 8'. 502.7.1



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

FIGURE R502.2
FLOOR CONSTRUCTION



For SI: 1 inch = 25.4 mm.

FIGURE R502.8
CUTTING, NOTCHING AND DRILLING

Allowable holes in prefabricated I-joist

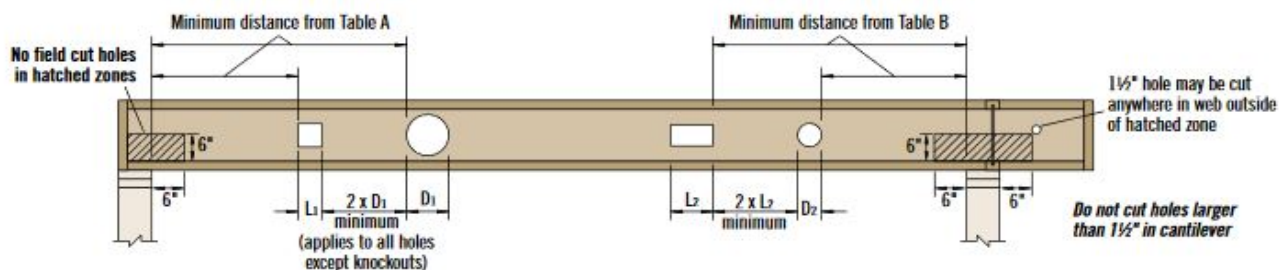


Table A—End Support
Minimum distance from edge of hole to inside face of nearest end support

Depth	TJI®	● Round Hole Size									■ Square or Rectangular Hole Size								
		2"	3"	4"	5"	6½"	7"	8¾"	11"	13"	2"	3"	4"	5"	6½"	7"	8¾"	11"	13"
9½"	110	1'-0"	1'-6"	2'-0"	2'-6"	5'-0"					1'-0"	1'-6"	2'-6"	3'-6"	4'-6"				
	210	1'-0"	1'-6"	2'-0"	3'-0"	5'-0"					1'-0"	2'-0"	2'-6"	4'-0"	5'-0"				
11¼"	110	1'-0"	1'-0"	1'-0"	1'-0"	2'-6"	2'-6"	5'-0"			1'-0"	1'-0"	1'-6"	2'-6"	4'-6"	4'-6"	6'-0"		
	210	1'-0"	1'-0"	1'-0"	1'-6"	2'-6"	3'-0"	5'-6"			1'-0"	1'-0"	2'-0"	3'-0"	5'-0"	5'-6"	6'-6"		
	360	1'-0"	1'-0"	1'-6"	2'-6"	4'-6"	5'-0"	7'-0"			1'-0"	1'-0"	2'-6"	4'-0"	6'-6"	6'-6"	7'-6"		
	560	1'-0"	1'-0"	1'-6"	3'-0"	5'-0"	5'-6"	8'-0"			1'-0"	2'-0"	3'-6"	5'-0"	7'-0"	7'-6"	8'-0"		
14"	110	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	2'-6"	5'-0"		1'-0"	1'-0"	1'-0"	1'-6"	3'-6"	4'-0"	6'-0"	8'-0"	
	210	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-6"	3'-0"	6'-0"		1'-0"	1'-0"	1'-0"	2'-0"	4'-0"	4'-6"	6'-6"	8'-6"	
	360	1'-0"	1'-0"	1'-0"	1'-0"	2'-6"	3'-0"	5'-6"	8'-0"		1'-0"	1'-0"	1'-0"	2'-6"	5'-6"	6'-6"	8'-0"	9'-6"	
	560	1'-0"	1'-0"	1'-0"	1'-0"	2'-6"	3'-0"	6'-0"	9'-0"		1'-0"	1'-0"	1'-6"	3'-6"	6'-6"	7'-0"	9'-0"	10'-0"	
16"	210	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-6"	3'-6"	6'-0"	1'-0"	1'-0"	1'-0"	1'-0"	2'-6"	3'-6"	6'-6"	8'-0"	10'-6"
	360	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	3'-0"	6'-0"	9'-0"	1'-0"	1'-0"	1'-0"	1'-0"	4'-0"	5'-0"	9'-0"	10'-0"	11'-6"
	560	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	3'-0"	6'-6"	10'-0"	1'-0"	1'-0"	1'-0"	1'-6"	5'-0"	6'-0"	10'-0"	11'-0"	12'-6"

Table B—Intermediate or Cantilever Support
Minimum distance from edge of hole to inside face of nearest intermediate or cantilever support

Depth	TJI®	● Round Hole Size									■ Square or Rectangular Hole Size								
		2"	3"	4"	5"	6½"	7"	8¾"	11"	13"	2"	3"	4"	5"	6½"	7"	8¾"	11"	13"
9½"	110	1'-6"	2'-6"	3'-0"	4'-0"	7'-6"					1'-6"	2'-6"	3'-6"	5'-6"	6'-6"				
	210	2'-0"	2'-6"	3'-6"	4'-6"	7'-6"					2'-0"	3'-0"	4'-0"	6'-0"	7'-0"				
11¼"	110	1'-0"	1'-0"	1'-6"	2'-6"	4'-0"	4'-0"	8'-0"			1'-0"	1'-6"	2'-6"	4'-0"	6'-6"	7'-0"	9'-0"		
	210	1'-0"	1'-0"	2'-0"	3'-0"	4'-6"	5'-0"	9'-0"			1'-0"	2'-0"	3'-0"	4'-6"	7'-6"	8'-0"	10'-0"		
	360	2'-0"	3'-0"	4'-0"	5'-6"	7'-0"	7'-6"	11'-0"			2'-0"	3'-6"	5'-0"	7'-0"	9'-6"	9'-6"	11'-0"		
	560	1'-6"	3'-0"	4'-6"	5'-6"	8'-0"	8'-6"	12'-0"			3'-0"	4'-6"	6'-0"	8'-0"	10'-6"	11'-0"	12'-0"		
14"	110	1'-0"	1'-0"	1'-0"	1'-0"	2'-0"	2'-6"	4'-6"	8'-0"		1'-0"	1'-0"	1'-0"	2'-6"	5'-0"	6'-0"	9'-0"	12'-0"	
	210	1'-0"	1'-0"	1'-0"	1'-0"	2'-6"	3'-0"	5'-0"	9'-0"		1'-0"	1'-0"	2'-0"	3'-6"	6'-0"	7'-0"	10'-0"	12'-6"	
	360	1'-0"	1'-0"	2'-0"	3'-6"	5'-6"	6'-0"	8'-6"	12'-6"		1'-0"	2'-0"	4'-0"	5'-6"	9'-0"	10'-0"	12'-0"	14'-0"	
	560	1'-0"	1'-0"	1'-6"	3'-6"	5'-6"	6'-6"	9'-6"	13'-6"		1'-0"	3'-0"	5'-0"	7'-0"	10'-0"	11'-0"	13'-6"	15'-0"	
16"	210	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	3'-0"	5'-6"	9'-6"	1'-0"	1'-0"	1'-0"	2'-0"	4'-6"	5'-6"	9'-6"	12'-6"	15'-6"
	360	1'-0"	1'-0"	1'-0"	1'-0"	3'-0"	4'-0"	6'-6"	10'-0"	13'-6"	1'-0"	1'-0"	2'-0"	4'-0"	7'-6"	8'-6"	13'-0"	14'-6"	17'-0"
	560	1'-0"	1'-0"	1'-0"	1'-0"	2'-6"	3'-6"	7'-0"	11'-0"	15'-0"	1'-0"	1'-0"	3'-6"	5'-6"	9'-0"	10'-0"	14'-6"	16'-0"	18'-0"

■ Rectangular holes based on measurement of longest side.

Walls

- Load-bearing dimension lumber for studs and plates and headers shall be grade-marked by an approved agency. 602.1
- Studs are to be a minimum grade 3#. 602.2
- The size, height, and spacing of studs shall be in accordance with Table R602.3(6)A stud cannot be cut or notched more than 25% of its width. 602.6
- Drilling and notching. Where top plates are cut, drilled, or notched due to piping or duct work more than 50% of its width, the plates shall be reinforced with 24 gauge steel angle or equivalent support. 602.6.1
- Fire stopping shall be provided to cut off all concealed draft openings both horizontal and vertical. In concealed spaces of stud walls and partitions including furred spaces at the ceiling and floor level. At all soffits, drop ceilings, cove ceilings, in concealed spaces between stair stringers at the top of bottom of the run. Draft stop at openings around vents, pipes, ducts, chimneys, and fireplaces at ceiling and floor level. 602.8
- Cripple walls shall be framed of studs not less in size with studding above, with a minimum length of 14" or shall be framed of solid blocking. When exceeding 4', studs will be sized for an additional story. 602.9

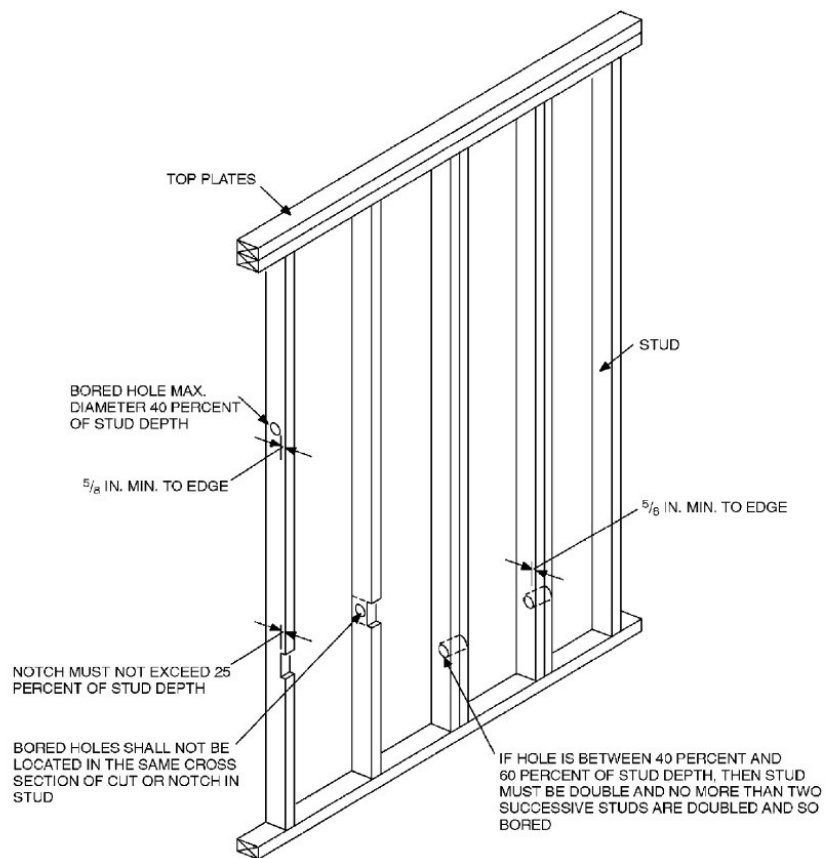


FIGURE R602.6(1)

NOTCHING AND BORED HOLE LIMITATIONS FOR EXTERIOR WALLS AND BEARING WALLS

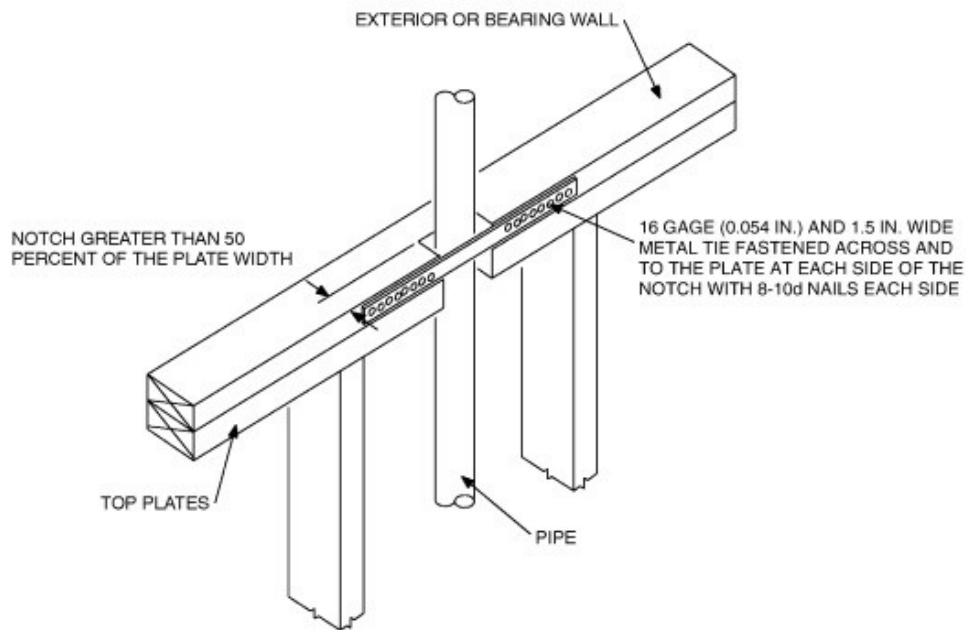


FIGURE R602.6.1

TOP PLATE FRAMING TO ACCOMMODATE PIPING

Wall Sheathing

R602.10.6.2 Method PFG: Portal frame at garage door openings in Seismic Design Categories A, B, and C. Where supporting a roof or one story and a roof, a Method PFG *braced wall panel* constructed in accordance with Figure R602.10.6.3 shall be permitted on either side of garage door openings.

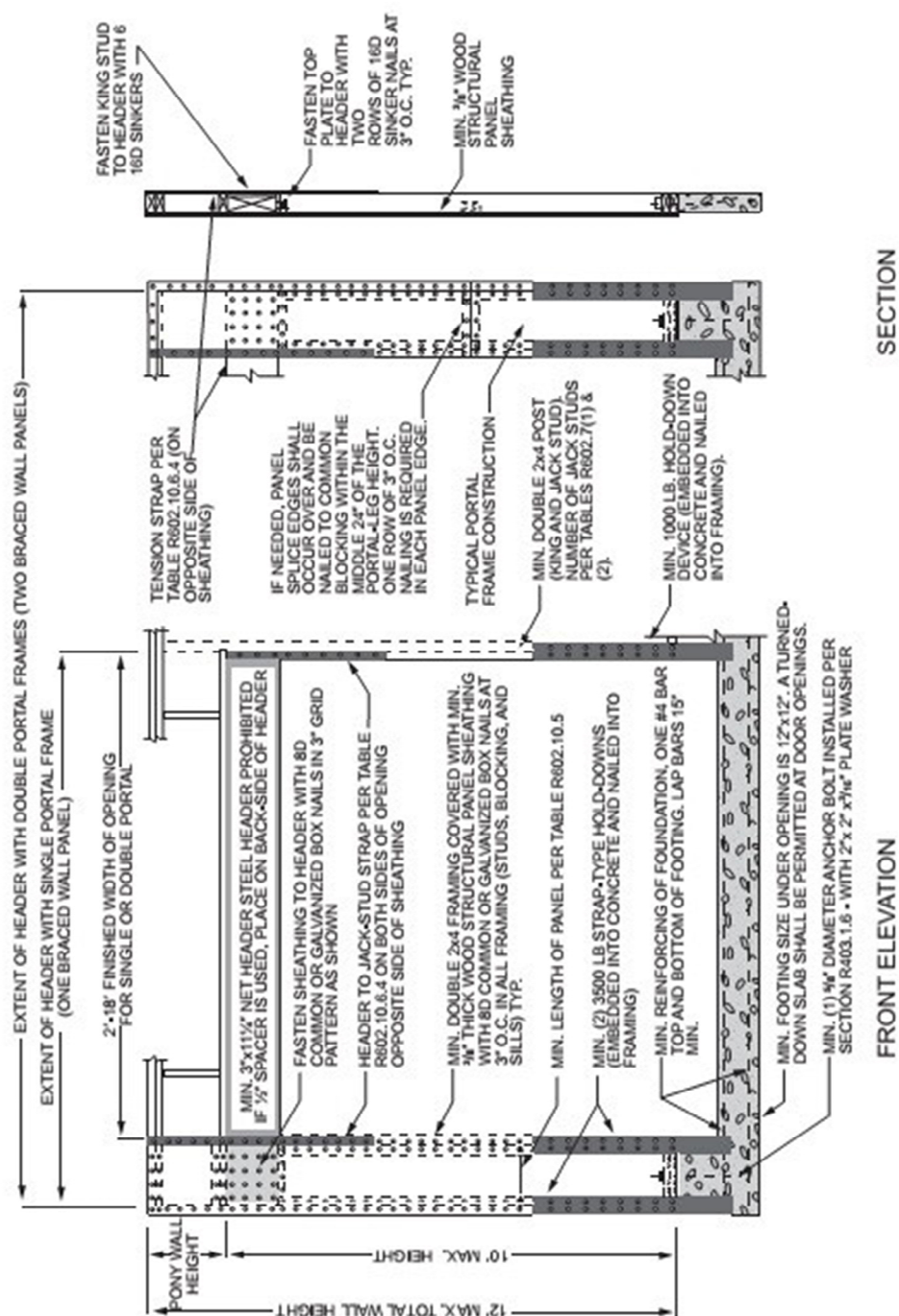


FIGURE R602.10.6.2

METHOD PFH—PORTAL FRAME WITH HOLD-DOWNS

Brace wall panels R602.10.2.3

- A *braced wall panel* shall begin within 10' from each end of a *braced wall line* as determined in Section R602.10.1.1 The distance between adjacent edges of *braced wall panels* along a *braced wall line* shall be no greater than 20' as shown in Figure R602.10.2.4
- *Braced wall lines* with a length of 16' or less shall have a minimum of two *braced wall panels* of any length or one *braced wall panel* equal to 48" or more. *Braced wall lines* greater than 16' shall have a minimum of two *braced wall panels*.

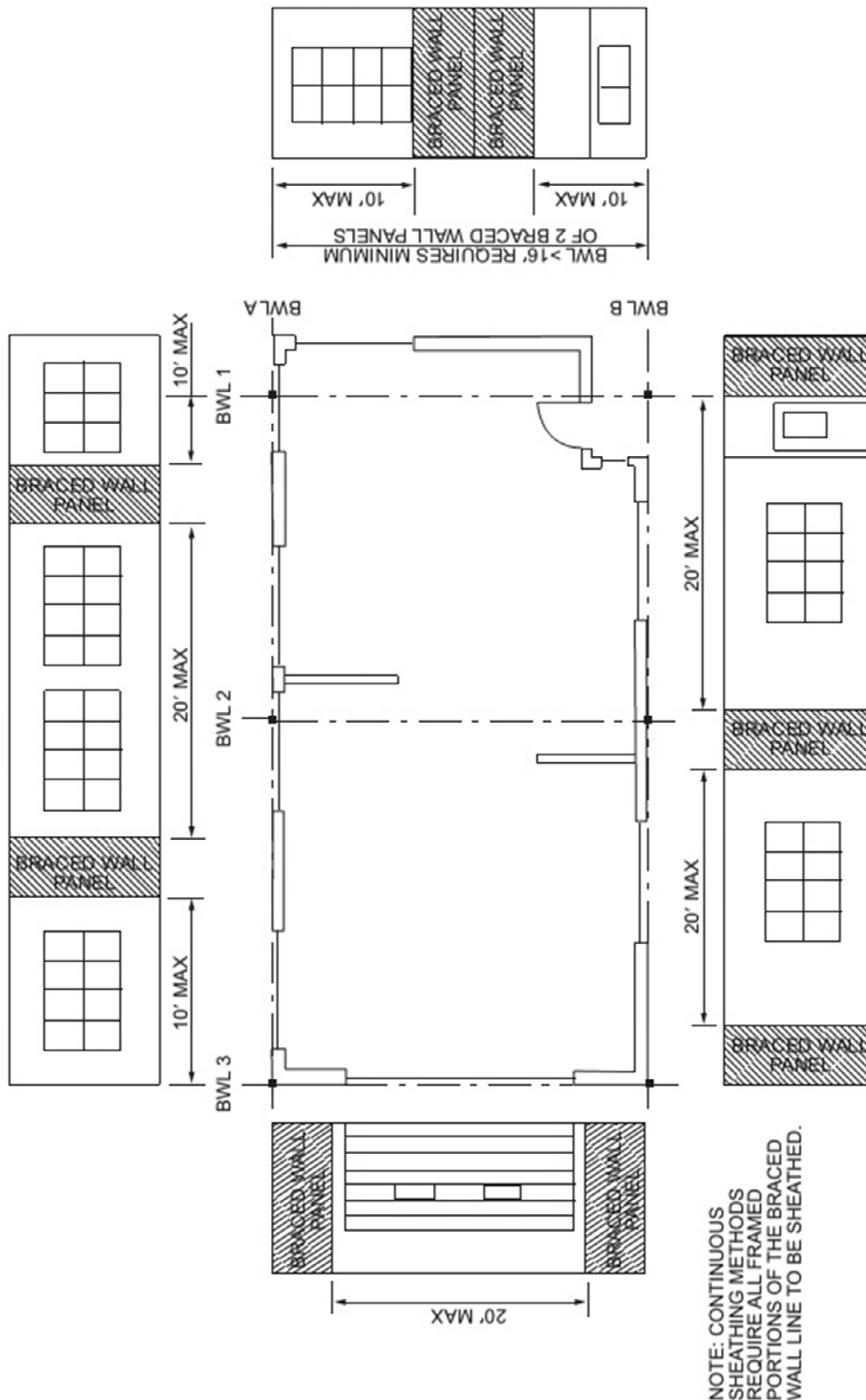


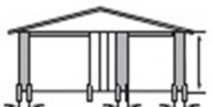
FIGURE R602.10.2.2

LOCATION OF BRACED WALL PANELS

TABLE R602.10.4
BRACING METHODS

METHODS, MATERIAL		MINIMUM THICKNESS	FIGURE	CONNECTION CRITERIA ^a	
				Fasteners	Spacing
Intermittent Bracing Methods	LIB Let-in-bracing	1 × 4 wood or approved metal strap sat 45° to 60° angles for maximum 16" stud spacing		Wood: 2-8d common nails or 3-8d (21/2" long × 0.113" dia.) nails Metal strap: per manufacturer	Wood: per stud and top and bottom plates Metal: per manufacturer
	DWB Diagonal wood boards	3/4"(1" nominal) for maximum 24" stud spacing		2-8d (21/2" long × 0.113" dia.) nails or 2 - 13/4" long staples	Per stud
	WSP Wood structural panel (See Section R604)	3/8"		Exterior sheathing per Table R602.3(3)	6" edges 12" field
				Interior sheathing per Table 602.3(1) or R602.3(2)	Varies by fastener
	BV-WSP Wood structural panels with stone or masonry veneer (See Section R602.10.6.5)	7/16"	See Figure R602.10.6.5	8d common (21/2" × 0.131) nails	4" at panel edges 12" at intermediate supports 4" at braced wall panel end posts
	SFB Structural fiberboard sheathing	1/2" or 25/32" for maximum 16" stud spacing		11/2" long × 0.12" dia. (for 1/2" thick sheathing) 13/4" long × 0.12" dia. (for 25/32" thick sheathing) galvanized roofing nails	3" edges 6" field
	GB Gypsum board	1/2"		Nails or screws per Table R602.3(1) for exterior locations	For all braced wall panel locations: 7" edges (including top and bottom plates) 7" field
				Nails or screws per Table R702.3.5 for interior locations	
	PBS Particle board sheathing (See Section R605)	3/8" or 1/2" for maximum 16" stud spacing		For 3/8", 6d common (2" long × 0.113" dia.) nails For 1/2", 8d common (21/2" long × 0.131" dia.) nails	3" edges 6" field
	PCP Portland cement plaster	See Section R703.6 for maximum 16" stud spacing		11/2" long, 11 gage, 7/16" dia. head nails or 7/8" long, 16 gage staples	6" o.c. on all framing members
	HPS Hardboard panel siding	7/16" for maximum 16" stud spacing		0.092" dia., 0.225" dia. head nails with length to accommodate 11/2" penetration into studs	4" edges 8" field
	ABW Alternate braced wall	3/8"		See Section R602.10.6.1	See Section R602.10.6.1

TABLE R602.10.4 continued
BRACING METHODS

METHODS, MATERIAL		MINIMUM THICKNESS	FIGURE	CONNECTION CRITERIA ^a	
				Fasteners	Spacing
Intermittent Bracing Methods	PFH Portal frame with hold-downs	3/8"		See Section R602.10.6.2	See Section R602.10.6.2
	PFG Portal frame at garage	7/16"		See Section R602.10.6.3	See Section R602.10.6.3
Continuous Sheathing Methods	CS-WSP Continuously sheathed wood structural panel	3/8"		Exterior sheathing per Table R602.3(3)	6" edges 12" field
				Interior sheathing per Table R602.3(1) or R602.3(2)	Varies by fastener
	CS-G^{b,c} Continuously sheathed wood structural panel adjacent to garage openings	3/8"		See Method CS-WSP	See Method CS-WSP
	CS-PF Continuously sheathed portal frame	7/16"		See Section R602.10.6.4	See Section R602.10.6.4
	CS-SFB^d Continuously sheathed structural fiberboard	1/2" or 25/32" for maximum 16" stud spacing		11/2" long x 0.12" dia. (for 1/2" thick sheathing) 13/4" long x 0.12" dia. (for 25/32" thick sheathing) galvanized roofing nails	3" edges 6" field

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.0175 rad, 1 pound per square foot = 47.8 N/m², 1 mile per hour = 0.447 m/s.

- a. Adhesive attachment of wall sheathing, including Method GB, shall not be permitted in Seismic Design Categories C, D0, D1 and D2.
- b. Applies to panels next to garage door opening where supporting gable end wall or roof load only. Shall only be used on one wall of the garage. In Seismic Design Categories D0, D1 and D2, roof covering dead load shall not exceed 3 psf.
- c. Garage openings adjacent to a Method CS-G panel shall be provided with a header in accordance with Table R602.7(1). A full-height clear opening shall not be permitted adjacent to a Method CS-G panel.
- d. Method CS-SFB does not apply in Seismic Design Categories D0, D1 and D2.
- e. Method applies to detached one- and two-family dwellings in Seismic Design Categories D0 through D2 only.

Roof and Ceiling: R801

- New concepts in ceiling design have brought about new configurations in framing methods and introduced assemblies such as stiff backs, A-frames and trusses to enable the new concepts in ceiling design to be accomplished. Some of these designs are so complex that it is necessary to consult with an engineer to insure structural integrity.

- The roof and ceiling assembly shall provide continuous ties across the structure to prevent roof thrust from being applied to the supporting walls. The assembly shall be designed and constructed in accordance with the provisions of this chapter and Figures R606.11(1), R606.11(2), and R606.11(3) or in accordance with AWC NDS. R802.2
- Bearing: The ends of each rafter or joist shall not have less than 1 1/2" bearing on wood or metal and 3" on concrete. 802.6
- Cutting and notching: Notching at the ends of the rafters or ceiling joists shall not exceed 1/4 the depth. Notches in the top or bottom of the joists shall not exceed 1/6 of the depth and shall not be located in the middle 1/3 of the span. 802.7
- Bored Holes: Holes bored in rafter and ceiling joists shall not be within 2" of the top and bottom. Their diameter shall not exceed 1/3 the depth of the member.
- Ridge boards shall be at least 1" nominal thickness and depth shall not be less than the cut at end of the rafter. 802.3
- Hip and valley rafters shall be not less than 2 inches nominal in thickness and not less in depth than the cut end of the rafter. Hip and valley rafters shall be supported at the ridge by a brace to a bearing partition or be designed to carry and distribute the specific load at that point. R802.4.3
- Rafters and ceiling joists having a depth to thickness ratio exceeding 6 to 1 based on nominal dimensions shall be supported laterally by solid blocking, diagonal bridging (wood or metal) or a continuous 1" by 3" wood strip nailed across the rafters or ceiling joists at intervals not exceeding 8'. R802.8.1
- Roof Tie-Down. Uplift resistance, by adding the following: All rafters and trusses spaced not more than 24 inches on center shall be attached to their supporting wall assemblies by mechanical fasteners. R802.11

Attic Ventilation

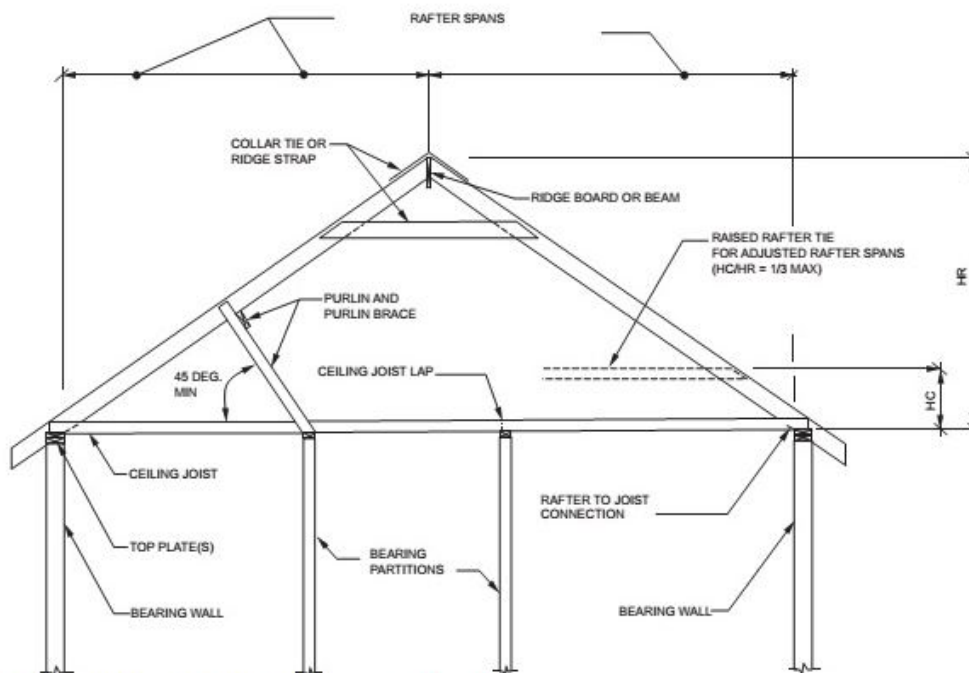
- Enclosed attics and rafter spaces where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space. 806.1
- The net free ventilating area shall not be less than 1 to 150 of the area of the space ventilated except that the area may be 1 to 300, provided at least 50% of the required ventilating area has ventilators located in the upper portion of the space to be ventilated, at least 3' above eave or cornice vents. 806.2

Attic Access

- A readily accessible attic access framed opening, not less than 22" by 30", shall be provided to any attic area having a clear height of over 30". 807.1

Purlins

- Installation of purlins to reduce the span of rafters is permitted as shown in Figure R802.4.5. Purlins shall be sized not less than the required size of the rafters that they support. Purlins shall be continuous and shall be supported by 2-inch by 4-inch braces installed to bearing walls at a slope not less than 45 degrees from the horizontal. The braces shall be spaced not more than 4 feet on center and unbraced length of braces shall not exceed 8 feet.



For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 degree = 0.018 rad.

H_C = Height of ceiling joists or rafter ties measured vertically above the top of rafter support walls.

H_R = Height of roof ridge measured vertically above the top of the rafter support walls.

FIGURE R802.4.5
BRACED RAFTER CONSTRUCTION

Wood Trusses

Truss design drawings prepared in conformance to Section R802.10.1 shall be provided to the *building official* and *approved* prior to installation. Truss design drawings shall be provided with the shipment of trusses delivered to the jobsite.

Applicability limits. The provisions of this section shall control the design of truss roof framing where snow controls for buildings that are not greater than 60 feet in length perpendicular to the joist, rafter or truss span, not greater than 36 feet in width parallel to the joist, rafter or truss span, not more than three stories above grade plane in height, and have roof slopes not smaller than 3:12 or greater than 12:12. Truss roof framing constructed in accordance with the provision of this section shall be limited to sites subjected to a maximum design wind speed of 140 miles per hour, Exposure B or C, and a maximum ground snow load of 70 psf. For consistent loading of all truss types, roof snow load is to be computed as: 0.7 p. R802.10.2.1

Bracing

Trusses shall be braced to prevent rotation and provide lateral stability in accordance with the requirements specified in the *construction documents* for the building and on the individual truss design drawings. R802.10.3

Alterations to Trusses

Truss members shall not be cut, notched, drilled, spliced or otherwise altered in any way without the approval of a registered design professional. Alterations resulting in the addition of load (e.g., HVAC equipment, water heater) that exceeds the design load for the truss shall not be permitted without verification that the truss is capable of supporting such additional loading. R802.10.4

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. R802.11.1.1

Ceiling Height 305

Minimum Height. *Habitable space*, hallways, bathrooms, toilet rooms, laundry rooms and portions of basements containing these spaces shall have a ceiling height of not less than 7'. 305.1

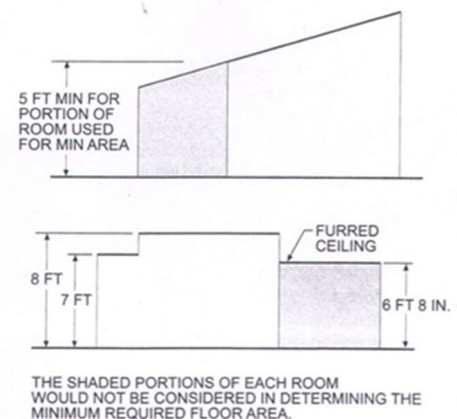
Exceptions:

- For rooms with sloped ceilings, at least 50% of the required floor area of the room must have a ceiling height of at least 7' and not portion of the required floor area may have a ceiling height of less than 5'.
- Bathrooms shall have a minimum ceiling height of 6' 8" at the center of the front clearance area for fixtures shall be such that the fixture is capable of being used for its intended purpose. A shower or tub equipped with a showerhead shall have a minimum ceiling height of 6 feet 8 inches above a minimum area 30 inches by 30 inches at the showerhead.

Basements. Portions of *basements* that do not contain *habitable space*, hallways, bathrooms, toilet rooms, and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches. R305.1.1

Exception:

Beams, girders, ducts, or other obstructions may project to within 6 feet 4 inches of the finished floor



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

Figure R304.4
HEIGHT EFFECT ON ROOM AREA

Fire blocking R302.11

Fire blocking: In combustible construction, fire blocking shall be provided to cut off all concealed draft openings (both vertical and horizontal) and to form an effective fire barrier between stories, and between a top *story* and the roof space.

Fire blocking shall be provided in wood-frame construction in the following locations:

1. In concealed spaces of stud walls and partitions, including furred spaces and parallel rows of studs or staggered studs, as follows:
 - 1.1. Vertically at the ceiling and floor levels.
 - 1.2. Horizontally at intervals not exceeding 10 feet.
2. At all interconnections between concealed vertical and horizontal spaces such as occur at soffits, drop ceilings and cove ceilings.
3. In concealed spaces between stair stringers at the top and bottom of the run. Enclosed spaces under stairs shall comply with Section R302.7.
4. At openings around vents, pipes, ducts, cables and wires at ceiling and floor level, with an *approved* material to resist the free passage of flame and products of combustion. The material filling this annular space shall not be required to meet the ASTM E 136 requirements.
5. For the fire blocking of chimneys and fireplaces, see Section R1003.19.
6. Fire blocking of cornices of a two-family *dwelling* is required at the line of *dwelling unit* separation.

Fire blocking R302.11.1

Fire blocking materials: Except as provided in Section R302.11, Item 4, fire blocking shall consist of the following materials.

1. Two-inch nominal lumber.
2. Two thicknesses of 1-inch nominal lumber with broken lap joints.
3. One thickness of 23/32-inch wood structural panels with joints backed by 23/32-inch wood structural panels.
4. One thickness of 3/4-inch particleboard with joints backed by 3/4-inch particleboard.
5. One-half-inch gypsum board.
6. One-quarter-inch cement-based millboard.
7. Batts or blankets of mineral wool or glass fiber or other approved materials installed in such a manner as to be securely retained in place.
8. Cellulose insulation installed as tested for the specific application.

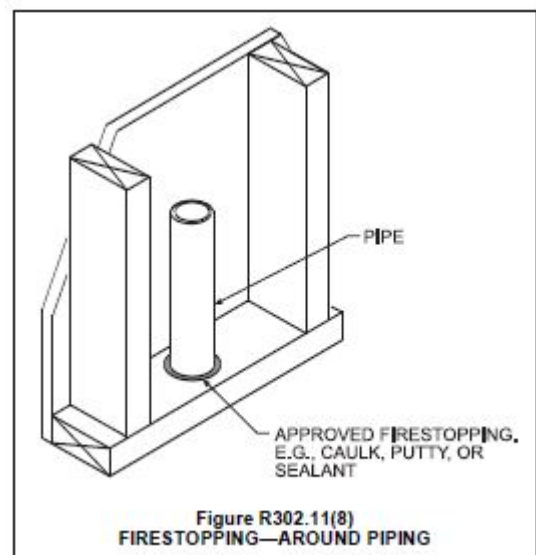
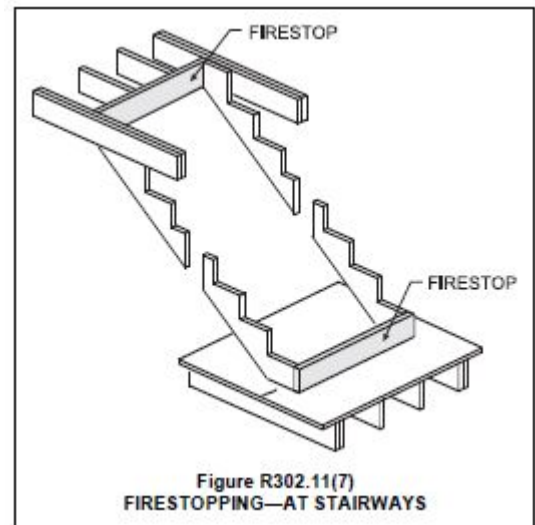
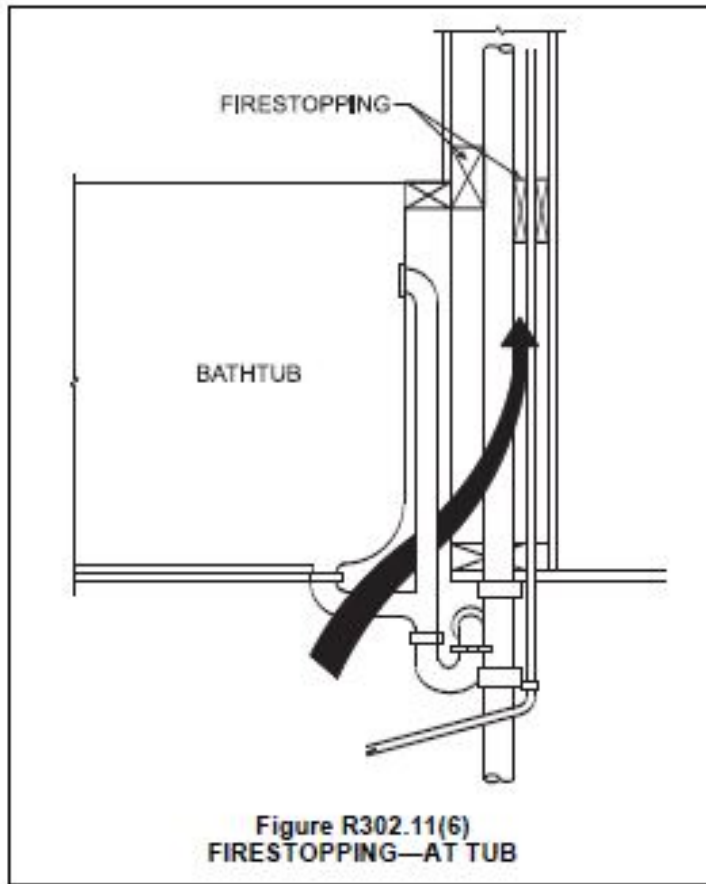
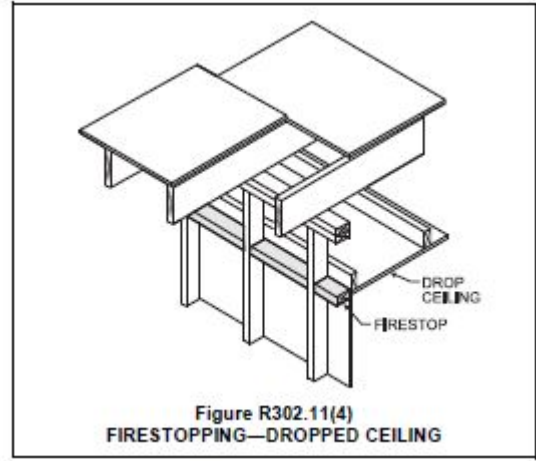
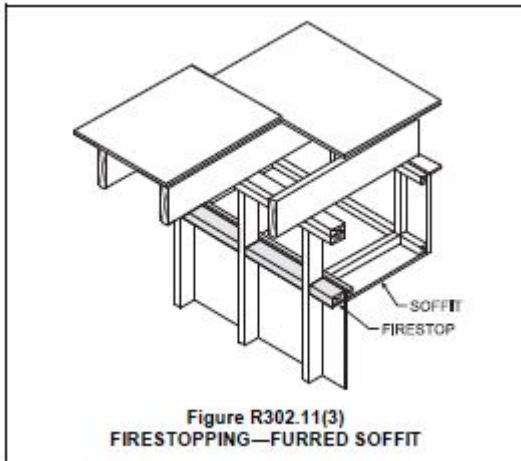
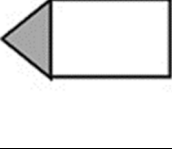
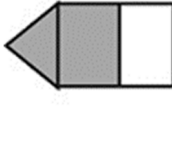
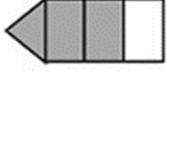
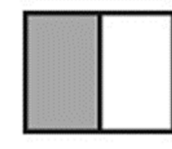


TABLE R602.3(5)
SIZE, HEIGHT AND SPACING OF WOOD STUDS^a

STUD SIZE (inches)	BEARING WALLS					NONBEARING WALLS	
	Laterally unsupported stud height ^a (feet)	Maximum spacing where supporting a roof-ceiling assembly or a habitable attic assembly, only (inches)	Maximum spacing where supporting one floor, plus a roof- ceiling assembly or a habitable attic assem- bly (inches)	Maximum spacing where supporting two floors, plus a roof- ceiling assembly or a habitable attic assembly (inches)	Maximum spacing where supporting one floor height ^a (inches)	Laterally unsupported stud height ^a (feet)	Maximum spacing (inches)
							
2 x 3 _b	—	—	—	—	—	10	16
2 x 4	10	24 _c	16 _c	—	24	14	24
3 x 4	10	24	24	16	24	14	24
2 x 5	10	24	24	—	24	16	24
2 x 6	10	24	24	16	24	20	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.

TABLE R602.7(2)

GIRDER SPANS^a AND HEADER SPANS^a FOR INTERIOR BEARING WALLS (Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine- and required number of jack studs)

HEADERS AND GIRDERS SUPPORTING	SIZE	BUILDING (feet)					
		12		24		36	
One floor only	2-2 × 4	4-1	1	2-10	1	2-4	1
	2-2 × 6	6-1	1	4-4	1	3-6	1
	2-2 × 8	7-9	1	5-5	1	4-5	2
	2-2 × 10	9-2	1	6-6	2	5-3	2
	2-2 × 12	10-9	1	7-7	2	6-3	2
	3-2 × 8	9-8	1	6-10	1	5-7	1
	3-2 × 10	11-5	1	8-1	1	6-7	2
	3-2 × 12	13-6	1	9-6	2	7-9	2
	4-2 × 8	11-2	1	7-11	1	6-5	1
	4-2 × 10	13-3	1	9-4	1	7-8	1
	4-2 × 12	15-7	1	11-0	1	9-0	2
Two floors	2-2 × 4	2-7	1	1-11	1	1-7	1
	2-2 × 6	3-11	1	2-11	2	2-5	2
	2-2 × 8	5-0	1	3-8	2	3-1	2
	2-2 × 10	5-11	2	4-4	2	3-7	2
	2-2 × 12	6-11	2	5-2	2	4-3	3
	3-2 × 8	6-3	1	4-7	2	3-10	2
	3-2 × 10	7-5	1	5-6	2	4-6	2
	3-2 × 12	8-8	2	6-5	2	5-4	2
	4-2 × 8	7-2	1	5-4	1	4-5	2
	4-2 × 10	8-6	1	6-4	2	5-3	2
	4-2 × 12	10-1	1	7-5	2	6-2	2

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Spans are given in feet and inches.

b. Spans are based on minimum design properties for No. 2 grade lumber of Douglas fir-larch, hem-fir, Southern pine, and spruce-pine-fir.

c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

d. NJ = Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

e. Spans are calculated assuming the top of the header or girder is laterally braced by perpendicular framing. Where the top of the header or girder is not laterally braced (for example, cripple studs bearing on the header), tabulated spans for headers consisting of 2 × 8, 2 × 10, or 2 × 12 sizes shall be multiplied by 0.70 or the header or girder shall be designed.

TABLE R602.3(6)

ALTERNATE WOOD BEARING WALL STUD SIZE, HEIGHT AND SPACING

STUD HEIGHT	SUPPORTING	STUD SPACING ^a	ULTIMATE DESIGN WIND SPEED					
			115 mph		130 mph ^b		140 mph ^b	
			Maximum roof/floor span ^c		Maximum roof/floor span ^c		Maximum roof/floor span ^c	
11 ft.	Roof Only	12 in.	12 ft.	24 ft.	12 ft.	24 ft.	12 ft.	24 ft.
		16 in.	2 × 4	2 × 4	2 × 4	2 × 4	2 × 4	2 × 4
		24 in.	2 × 4	2 × 4	2 × 4	2 × 6	2 × 4	2 × 6
		12 in.	2 × 6	2 × 6	2 × 6	2 × 6	2 × 6	2 × 6
	Roof and One Floor	16 in.	2 × 4	2 × 6	2 × 4	2 × 6	2 × 4	2 × 6
		24 in.	2 × 6	2 × 6	2 × 6	2 × 6	2 × 6	2 × 6
		12 in.	2 × 4	2 × 4	2 × 4	2 × 6	2 × 4	2 × 6
		16 in.	2 × 6	2 × 6	2 × 6	2 × 6	2 × 6	2 × 6
12 ft.	Roof Only	12 in.	2 × 6	2 × 6	2 × 6	2 × 6	2 × 6	2 × 6
		16 in.	2 × 4	2 × 4	2 × 4	2 × 6	2 × 4	2 × 6
		24 in.	2 × 4	2 × 6	2 × 6	2 × 6	2 × 6	2 × 6
		12 in.	2 × 6	2 × 6	2 × 6	2 × 6	2 × 6	2 × 6
	Roof and One Floor	16 in.	2 × 4	2 × 6	2 × 4	2 × 6	2 × 6	2 × 6
		24 in.	2 × 6	2 × 6	2 × 6	2 × 6	2 × 6	2 × 6
		12 in.	2 × 4	2 × 4	2 × 4	2 × 6	2 × 6	2 × 6
		16 in.	2 × 6	2 × 6	2 × 6	2 × 6	2 × 6	2 × 6

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mph = 0.447 m/s, 1 pound = 4.448 N.

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.

TABLE R602.7(1)

GIRDER SPANS^a AND HEADER SPANS^a FOR EXTERIOR BEARING WALLS (Maximum spans for Douglas fir-larch, hem-fir, Southern pine and spruce-pine-fir^b and required number of jack studs)

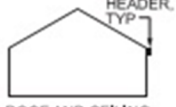
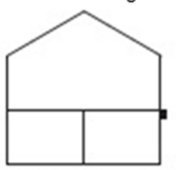
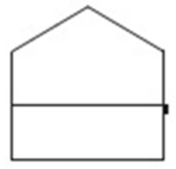
GIRDERS AND HEADERS SUPPORTING	SIZE	GROUND SNOW LOAD (psf) ^c																	
		30						50						70					
		Building width ^c (feet)																	
		12		24		36		12		24		36		12		24		36	
		Span'	NJ ^d	Span'	NJ ^d	Span'	NJ ^d	Span'	NJ ^d	Span'	NJ ^d	Span'	NJ ^d	Span'	NJ ^d	Span'	NJ ^d	Span'	NJ ^d
Roof and ceiling 	1-2 × 6	4-0	1	3-1	2	2-7	2	3-5	1	2-8	2	2-3	2	3-0	2	2-4	2	2-0	2
	1-2 × 8	5-1	2	3-11	2	3-3	2	4-4	2	3-4	2	2-10	2	3-10	2	3-0	2	2-6	3
	1-2 × 10	6-0	2	4-8	2	3-11	2	5-2	2	4-0	2	3-4	3	4-7	2	3-6	3	3-0	3
	1-2 × 12	7-1	2	5-5	2	4-7	3	6-1	2	4-8	3	3-11	3	5-5	2	4-2	3	3-6	3
	2-2 × 4	4-0	1	3-1	1	2-7	1	3-5	1	23-7	1	2-2	1	3-0	1	2-4	1	2-0	1
	2-2 × 6	6-0	1	4-7	1	3-10	1	5-1	1	3-11	1	3-3	2	4-6	1	3-6	2	2-11	2
	2-2 × 8	7-7	1	5-9	1	4-10	2	6-5	1	5-0	2	4-2	2	5-9	1	4-5	2	3-9	2
	2-2 × 10	9-0	1	6-10	2	5-9	2	7-8	2	5-11	2	4-11	2	6-9	2	5-3	2	4-5	2
	2-2 × 12	10-7	2	8-1	2	6-10	2	9-0	2	6-11	2	5-10	2	8-0	2	6-2	2	5-2	3
	3-2 × 8	9-5	1	7-3	1	6-1	1	8-1	1	6-3	1	5-3	2	7-2	1	5-6	2	4-8	2
	3-2 × 10	11-3	1	8-7	1	7-3	2	9-7	1	7-4	2	6-2	2	8-6	1	6-7	2	5-6	2
	3-2 × 12	13-2	1	10-1	2	8-6	2	11-3	2	8-8	2	7-4	2	10-0	2	7-9	2	6-6	2
	4-2 × 8	10-11	1	8-4	1	7-0	1	9-4	1	7-2	1	6-0	1	8-3	1	6-4	1	5-4	2
4-2 × 10	12-11	1	9-11	1	8-4	1	11-1	1	8-6	1	7-2	2	9-10	1	7-7	2	6-4	2	
4-2 × 12	15-3	1	11-8	1	9-10	2	13-0	1	10-0	2	8-5	2	11-7	1	8-11	2	7-6	2	
Roof, ceiling and one center-bearing floor 	1-2 × 6	3-3	1	2-7	2	2-2	2	3-0	2	2-4	2	2-0	2	2-9	2	2-2	2	1-10	2
	1-2 × 8	4-1	2	3-3	2	2-9	2	3-9	2	3-0	2	2-6	3	3-6	2	2-9	2	2-4	3
	1-2 × 10	4-11	2	3-10	2	3-3	3	4-6	2	3-6	3	3-0	3	4-1	2	3-3	3	2-9	3
	1-2 × 12	5-9	2	4-6	3	3-10	3	5-3	2	4-2	3	3-6	3	4-10	3	3-10	3	3-3	4
	2-2 × 4	3-3	1	2-6	1	2-2	1	3-0	1	2-4	1	2-0	1	2-8	1	2-2	1	1-10	1
	2-2 × 6	4-10	1	3-9	1	3-3	2	4-5	1	3-6	2	3-0	2	4-1	1	3-3	2	2-9	2
	2-2 × 8	6-1	1	4-10	2	4-1	2	5-7	2	4-5	2	3-9	2	5-2	2	4-1	2	3-6	2
	2-2 × 10	7-3	2	5-8	2	4-10	2	6-8	2	5-3	2	4-5	2	6-1	2	4-10	2	4-1	2
	2-2 × 12	8-6	2	6-8	2	5-8	2	7-10	2	6-2	2	5-3	3	7-2	2	5-8	2	4-10	3
	3-2 × 8	7-8	1	6-0	1	5-1	2	7-0	1	5-6	2	4-8	2	6-5	1	5-1	2	4-4	2
	3-2 × 10	9-1	1	7-2	2	6-1	2	8-4	1	6-7	2	5-7	2	7-8	2	6-1	2	5-2	2
	3-2 × 12	10-8	2	8-5	2	7-2	2	9-10	2	7-8	2	6-7	2	9-0	2	7-1	2	6-1	2
	4-2 × 8	8-10	1	6-11	1	5-11	1	8-1	1	6-4	1	5-5	2	7-5	1	5-11	1	5-0	2
4-2 × 10	10-6	1	8-3	2	7-0	2	9-8	1	7-7	2	6-5	2	8-10	1	7-0	2	6-0	2	
4-2 × 12	12-4	1	9-8	2	8-3	2	11-4	2	8-11	2	7-7	2	10-4	2	8-3	2	7-0	2	
Roof, ceiling and one clear-span floor 	1-2 × 6	2-11	2	2-3	2	1-11	2	2-9	2	2-1	2	1-9	2	2-7	2	2-0	2	1-8	2
	1-2 × 8	3-9	2	2-10	2	2-5	3	3-6	2	2-8	2	2-3	3	3-3	2	2-6	3	2-2	3
	1-2 × 10	4-5	2	3-5	3	2-10	3	4-2	2	3-2	3	2-8	3	3-11	2	3-0	3	2-6	3
	1-2 × 12	5-2	3	4-0	3	3-4	4	4-10	3	3-9	3	3-2	4	4-7	3	3-6	3	3-0	4
	2-2 × 4	2-11	1	2-3	1	1-10	1	2-9	1	2-1	1	1-9	1	2-7	1	2-0	1	1-8	1
	2-2 × 6	4-4	1	3-4	2	2-10	2	4-1	1	3-2	2	2-8	2	3-10	1	3-0	2	2-6	2
	2-2 × 8	5-6	2	4-3	2	3-7	2	5-2	2	4-0	2	3-4	2	4-10	2	3-9	2	3-2	2
	2-2 × 10	6-7	2	5-0	2	4-2	2	6-1	2	4-9	2	4-0	3	5-9	2	4-5	2	3-9	3
	2-2 × 12	7-9	2	5-11	2	4-11	3	7-2	2	5-7	3	4-8	3	6-9	2	5-3	3	4-5	3
	3-2 × 8	6-11	1	5-3	2	4-5	2	6-5	1	5-0	2	4-2	2	6-1	2	4-8	2	4-0	2
	3-2 × 10	8-3	2	6-3	2	5-3	2	7-8	2	5-11	2	5-0	2	7-3	2	5-7	2	4-8	2
	3-2 × 12	9-8	2	7-5	2	6-2	2	9-0	2	7-0	2	5-10	3	8-6	2	6-7	2	5-6	3
	4-2 × 8	8-0	1	6-1	1	5-1	2	7-5	1	5-9	2	4-10	2	7-0	1	5-5	2	4-7	2
4-2 × 10	9-6	1	7-3	2	6-1	2	8-10	2	6-10	2	5-9	2	8-4	2	6-5	2	5-5	2	
4-2 × 12	11-2	2	8-6	2	7-2	2	10-5	2	8-0	2	6-9	2	9-10	2	7-7	2	6-5	2	

TABLE R602.7(1) continued

GIRDER SPANS^a AND HEADER SPANS^a FOR EXTERIOR BEARING WALLS (Maximum spans for Douglas fir-larch, hem-fir, Southern pine and spruce-pine-fir^b and required number of jack studs)

GIRDERS AND HEADERS SUP- PORTING	SIZE	GROUND SNOW LOAD (psf) ^e																	
		30						50						70					
		Building width ^c (feet)																	
		20		24		36		20		24		36		20		24		36	
Span'	NJ ^a	Span'	NJ ^a	Span'	NJ ^a	Span'	NJ ^a	Span'	NJ ^a	Span'	NJ ^a	Span'	NJ ^a	Span'	NJ ^a	Span'	NJ ^a	Span'	NJ ^a
Roof, ceiling and two center-bearing floors  ROOF, CEILING AND TWO FLOORS (CENTER BEARING)	1-2 × 6	2-8	2	2-1	2	1-10	2	2-7	2	2-0	2	1-9	2	2-5	2	1-44	2	1-8	2
	1-2 × 8	3-5	2	2-8	2	2-4	3	3-3	2	2-7	2	2-2	3	3-1	2	2-5	3	2-1	3
	1-2 × 10	4-0	2	3-2	3	2-9	3	3-10	2	3-1	3	2-7	3	3-8	2	2-11	3	2-5	3
	1-2 × 12	4-9	3	3-9	3	3-2	4	4-6	3	3-7	3	3-1	4	4-3	3	3-5	3	2-11	4
	2-2 × 4	2-8	1	2-1	1	1-9	1	2-6	1	2-0	1	1-8	1	2-5	1	1-11	1	1-7	1
	2-2 × 6	4-0	1	3-2	2	2-8	2	3-9	1	3-0	2	2-7	2	3-7	1	2-10	2	2-5	2
	2-2 × 8	5-0	2	4-0	2	3-5	2	4-10	2	3-10	2	3-3	2	4-7	2	3-7	2	3-1	2
	2-2 × 10	6-0	2	4-9	2	4-0	2	5-8	2	4-6	2	3-10	3	5-5	2	4-3	2	3-8	3
	2-2 × 12	7-0	2	5-7	2	4-9	3	6-8	2	5-4	3	4-6	3	6-4	2	5-0	3	4-3	3
	3-2 × 8	6-4	1	5-0	2	4-3	2	6-0	1	4-9	2	4-1	2	5-8	2	4-6	2	3-10	2
	3-2 × 10	7-6	2	5-11	2	5-1	2	7-1	2	5-8	2	4-10	2	6-9	2	5-4	2	4-7	2
	3-2 × 12	8-10	2	7-0	2	5-11	2	8-5	2	6-8	2	5-8	3	8-0	2	6-4	2	5-4	3
	4-2 × 8	7-3	1	5-9	1	4-11	2	6-11	1	5-6	2	4-8	2	6-7	1	5-2	2	4-5	2
	4-2 × 10	8-8	1	6-10	2	5-10	2	8-3	2	6-6	2	5-7	2	7-10	2	6-2	2	5-3	2
	4-2 × 12	10-2	2	8-1	2	6-10	2	9-8	2	7-8	2	6-7	2	9-2	2	7-3	2	6-2	2
Roof, ceiling, and two clear-span floors  ROOF, CEILING AND TWO FLOORS (CLEAR SPAN)	1-2 × 6	2-3	2	1-9	2	1-5	2	2-3	2	1-9	2	1-5	3	2-2	2	1-8	2	1-5	3
	1-2 × 8	2-10	2	2-2	3	1-10	3	2-10	2	2-2	3	1-10	3	2-9	2	2-1	3	1-10	3
	1-2 × 10	3-4	2	2-7	3	2-2	3	3-4	3	2-7	3	2-2	4	3-3	3	2-6	3	2-2	4
	1-2 × 12	4-0	3	3-0	3	2-7	4	4-0	3	3-0	4	2-7	4	3-10	3	3-0	4	2-6	4
	2-2 × 4	2-3	1	1-8	1	1-4	1	2-3	1	1-8	1	1-4	1	2-2	1	1-8	1	1-4	2
	2-2 × 6	3-4	1	2-6	2	2-2	2	3-4	2	2-6	2	2-2	2	3-3	2	2-6	2	2-1	2
	2-2 × 8	4-3	2	3-3	2	2-8	2	4-3	2	3-3	2	2-8	2	4-1	2	3-2	2	2-8	3
	2-2 × 10	5-0	2	3-10	2	3-2	3	5-0	2	3-10	2	3-2	3	4-10	2	3-9	3	3-2	3
	2-2 × 12	5-11	2	4-6	3	3-9	3	5-11	2	4-6	3	3-9	3	5-8	2	4-5	3	3-9	3
	3-2 × 8	5-3	1	4-0	2	3-5	2	5-3	2	4-0	2	3-5	2	5-1	2	3-11	2	3-4	2
	3-2 × 10	6-3	2	4-9	2	4-0	2	6-3	2	4-9	2	4-0	2	6-1	2	4-8	2	4-0	3
	3-2 × 12	4-5	2	5-8	2	4-9	3	7-5	2	5-8	2	4-9	3	7-2	2	5-6	3	4-8	3
	4-2 × 8	6-1	1	4-8	2	3-11	2	6-1	1	4-8	2	3-11	2	5-11	1	4-7	2	3-10	2
	4-2 × 10	7-3	2	5-5	2	4-8	2	7-3	2	5-6	2	4-8	2	7-0	2	5-5	2	4-7	2
	4-2 × 12	8-6	2	6-6	2	5-6	2	8-6	2	6-6	2	5-6	2	8-3	2	6-4	2	5-4	3

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.

b. Spans are based on minimum design properties for No. 2 grade lumber of Douglas fir-larch, hem-fir, Southern pine, and spruce-pine-fir.

c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

d. NJ = Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

e. Use 30 psf ground snow load for cases in which ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.

f. Spans are calculated assuming the top of the header or girder is laterally braced by perpendicular framing. Where the top of the header or girder is not laterally braced (for example, cripple studs bearing on the header), tabulated spans for headers consisting of 2 × 8, 2 × 10, or 2 × 12 sizes shall be multiplied by 0.70 or the header or girder shall be designed.

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-)

SIZE	SUPPORTING ROOF						SUPPORTING FLOOR	
	GROUND SNOW LOAD (psf)							
	30		50		70			
	DEPTH OF PORCH ^c (feet)							
	8	14	8	14	8	14	8	14
2-2 × 6	7-6	5-8	6-2	4-8	5-4	4-0	6-4	4-9
2-2 × 8	10-1	7-7	8-3	6-2	7-1	5-4	8-5	6-4
2-2 × 10	12-4	9-4	10-1	7-7	8-9	6-7	10-4	7-9
2-2 × 12	14-4	10-10	11-8	8-10	10-1	7-8	11-11	9-0

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.

b. Tabulated values assume No. 2 grade lumber, wet service and incising for refractory species. Use 30 psf ground snow load for cases in which ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.

c. Porch depth is measured horizontally from building face to centerline of the header. For depths between those shown, spans are permitted to be interpolated.

TABLE R502.3.3(1)

CANTILEVER SPANS FOR FLOOR JOISTS SUPPORTING LIGHT-FRAME EXTERIOR BEARING WALL AND ROOF ONLY a, b, c, f, g, h (Floor Live Load ≤ 40 psf, Roof Live Load ≤ 20 psf)

MEMBER & SPACING	MAXIMUM CANTILEVER SPAN (uplift force at backspan support in lbs.) ^{d, e}											
	Ground Snow Load											
	≤ 20 psf			30 psf			50 psf			70 psf		
	Roof Width			Roof Width			Roof Width			Roof Width		
	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft
2 × 8 @ 12"	20"(177)	15"(227)	—	18"(209)	—	—	—	—	—	—	—	—
2 × 10 @ 16"	29"(228)	21"(297)	16"(364)	26"(271)	18"(354)	—	20"(375)	—	—	—	—	—
2 × 10 @ 12"	36"(166)	26"(219)	20"(270)	34"(198)	22"(263)	16"(324)	26"(277)	—	—	19"(356)	—	—
2 × 12 @ 16"	—	32"(287)	25"(356)	36"(263)	29"(345)	21"(428)	29"(367)	20"(484)	—	23"(471)	—	—
2 × 12 @ 12"	—	42"(209)	31"(263)	—	37"(253)	27"(317)	36"(271)	27"(358)	17"(447)	31"(348)	19"(462)	—
2 × 12 @ 8"	—	48"(136)	45"(169)	—	48"(164)	38"(206)	—	40"(233)	26"(294)	36"(230)	29"(304)	18"(379)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Tabulated values are for clear-span roof supported solely by exterior bearing walls.

b. Spans are based on No. 2 Grade lumber of Douglas fir-larch, hem-fir, and spruce-pine-fir for repetitive (three or more) members. No.1 or better shall be used for Southern pine.

c. Ratio of backspan to cantilever span shall be not less than 3:1.

d. Connections capable of resisting the indicated uplift force shall be provided at the backspan support.

e. Uplift force is for a backspan to cantilever span ratio of 3:1. Tabulated uplift values are permitted to be reduced by multiplying by a factor equal to 3 divided by the actual backspan ratio provided (3/backspan ratio).

f. See Section R301.2.2.6, Item 1, for additional limitations on cantilevered floor joists for detached one- and two-family dwellings in Seismic Design Category D0, D1, or D2 and townhouses in Seismic Design Category C, D0, D1 or D2.

g. A full-depth rim joist shall be provided at the unsupported end of the cantilever joists. Solid blocking shall be provided at the supported end. Where the cantilever length is 24 inches or less and the building is assigned to Seismic Design Category A, B or C, solid blocking at the support for the cantilever shall not be required.

interpolation shall be permitted for building widths and ground snow loads other than shown.

TABLE R502.3.1(2)

FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES (Residential living areas, live load = 40 psf, L/Δ = 360)b

JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf				DEAD LOAD = 20 psf			
			2 × 6	2 × 8	2 × 10	2 × 12	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum floor joist spans							
			(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)
12	Douglas fir-larch	SS	11-4	15-0	19-1	23-3	11-4	15-0	19-1	23-3
	Douglas fir-larch	#1	10-11	14-5	18-5	22-0	10-11	14-2	17-4	20-1
	Douglas fir-larch	#2	10-9	14-2	18-0	20-11	10-8	13-6	16-5	19-1
	Douglas fir-larch	#3	8-11	11-3	13-9	16-0	8-1	10-3	12-7	14-7
	Hem-fir	SS	10-9	14-2	18-0	21-11	10-9	14-2	18-0	21-11
	Hem-fir	#1	10-6	13-10	17-8	21-6	10-6	13-10	17-1	19-10
	Hem-fir	#2	10-0	13-2	16-10	20-4	10-0	13-1	16-0	18-6
	Hem-fir	#3	8-8	11-0	13-5	15-7	7-11	10-0	12-3	14-3
	Southern pine	SS	11-2	14-8	18-9	22-10	11-2	14-8	18-9	22-10
	Southern pine	#1	10-9	14-2	18-0	21-11	10-9	14-2	16-11	20-1
	Southern pine	#2	10-3	13-6	16-2	19-1	9-10	12-6	14-9	17-5
	Southern pine	#3	8-2	10-3	12-6	14-9	7-5	9-5	11-5	13-6
	Spruce-pine-fir	SS	10-6	13-10	17-8	21-6	10-6	13-10	17-8	21-6
	Spruce-pine-fir	#1	10-3	13-6	17-3	20-7	10-3	13-3	16-3	18-10
	Spruce-pine-fir	#2	10-3	13-6	17-3	20-7	10-3	13-3	16-3	18-10
	Spruce-pine-fir	#3	8-8	11-0	13-5	15-7	7-11	10-0	12-3	14-3
16	Douglas fir-larch	SS	10-4	13-7	17-4	21-1	10-4	13-7	17-4	21-1
	Douglas fir-larch	#1	9-11	13-1	16-5	19-1	9-8	12-4	15-0	17-5
	Douglas fir-larch	#2	9-9	12-9	15-7	18-1	9-3	11-8	14-3	16-6
	Douglas fir-larch	#3	7-8	9-9	13-15	13-10	7-0	8-11	10-11	12-7
	Hem-fir	SS	9-9	12-10	16-5	19-11	9-9	12-10	16-5	19-11
	Hem-fir	#1	9-6	12-7	16-0	18-10	9-6	12-2	14-10	17-2
	Hem-fir	#2	9-1	12-0	15-2	17-7	8-11	11-4	13-10	16-1
	Hem-fir	#3	7-6	9-6	11-8	13-6	6-10	8-8	10-7	12-4
	Southern pine	SS	10-2	13-4	17-0	20-9	10-2	13-4	17-0	20-9
	Southern pine	#1	9-9	12-10	16-1	19-1	9-9	12-7	14-8	17-5
	Southern pine	#2	9-4	11-10	14-0	16-6	8-6	10-10	12-10	15-1
	Southern pine	#3	7-1	8-11	10-10	12-10	6-5	8-2	9-10	11-8
	Spruce-pine-fir	SS	9-6	12-7	16-0	19-6	9-6	12-7	16-0	19-6
	Spruce-pine-fir	#1	9-4	12-3	15-5	17-10	9-1	11-6	14-1	16-3
	Spruce-pine-fir	#2	9-4	12-3	15-5	17-10	9-1	11-6	14-1	16-3
	Spruce-pine-fir	#3	7-6	9-6	11-8	13-6	6-10	8-8	10-7	12-4

TABLE R502.3.1(2)continued

FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES (Residential living areas, live load = 40 psf, L/Δ = 360)b

JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf				DEAD LOAD = 20 psf			
			2 × 6	2 × 8	2 × 10	2 × 12	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum floor joist spans							
			(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)
19.2	Douglas fir-larch	SS	9-8	12-10	16-4	19-10	9-8	12-10	16-4	19-6
	Douglas fir-larch	#1	9-4	12-4	15-0	17-5	8-10	11-3	13-8	15-11
	Douglas fir-larch	#2	9-2	11-8	14-3	16-6	8-5	10-8	13-0	15-1
	Douglas fir-larch	#3	7-0	8-11	10-11	12-7	6-5	8-2	9-11	11-6
	Hem-fir	SS	9-2	12-1	15-5	18-9	9-2	12-1	15-5	18-9
	Hem-fir	#1	9-0	11-10	14-10	17-2	8-9	11-1	13-6	15-8
	Hem-fir	#2	8-7	11-3	13-10	16-1	8-2	10-4	12-8	14-8
	Hem-fir	#3	6-10	8-8	10-7	12-4	6-3	7-11	9-8	11-3
	Southern pine	SS	9-6	12-7	16-0	19-6	9-6	12-7	16-0	19-6
	Southern pine	#1	9-2	12-1	14-8	17-5	9-0	11-5	13-5	15-11
	Southern pine	#2	8-6	10-10	12-10	15-1	7-9	9-10	11-8	13-9
	Southern pine	#3	6-5	8-2	9-10	11-18	5-11	7-5	9-0	10-8
	Spruce-pine-fir	SS	9-0	11-10	15-1	18-4	9-0	11-10	15-1	17-9
	Spruce-pine-fir	#1	8-9	11-6	14-1	16-3	8-3	10-6	12-10	14-10
	Spruce-pine-fir	#2	8-9	11-6	14-1	16-3	8-3	10-6	12-10	14-10
	Spruce-pine-fir	#3	6-10	8-8	10-7	12-4	6-3	7-11	9-8	11-3
24	Douglas fir-larch	SS	9-0	11-11	15-2	18-5	9-0	11-11	15-0	17-5
	Douglas fir-larch	#1	8-8	11-0	13-5	15-7	7-11	10-0	12-3	14-3
	Douglas fir-larch	#2	8-3	10-5	12-9	14-9	7-6	9-6	11-8	13-6
	Douglas fir-larch	#3	6-3	8-0	9-9	11-3	5-9	7-3	8-11	10-4
	Hem-fir	SS	8-6	11-3	14-4	17-5	8-6	11-3	14-4	16-10 ^a
	Hem-fir	#1	8-4	10-10	13-3	15-5	7-10	9-11	12-1	14-0
	Hem-fir	#2	7-11	10-2	12-5	14-4	7-4	9-3	11-4	13-1
	Hem-fir	#3	6-2	7-9	9-6	11-0	5+7	7-1	8-8	10-1
	Southern pine	SS	8-10	11-8	14-11	18-1	8-10	11-8	14-11	18-0
	Southern pine	#1	8-6	11-3	13-1	15-7	8-1	10-3	12-0	14-3
	Southern pine	#2	7-7	9-8	11-5	13-6	7-0	8-10	10-5	12-4
	Southern pine	#3	5-9	7-3	8-10	10-5	5-3	6-8	8-1	9-6
	Spruce-pine-fir	SS	8-4	11-10	14-0	17-0	8-4	11-0	13-8	15-11
	Spruce-pine-fir	#1	8-1	10-3	12-7	14-7	7-5	9-5	11-6	13-4
	Spruce-pine-fir	#2	8-1	10-3	12-7	14-7	7-5	9-5	11-6	13-4
	Spruce-pine-fir	#3	6-2	7-9	9-6	11-0	5-7	7-1	8-8	10-1

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

Note: Check sources for availability of lumber in lengths greater than 20 feet.

A End bearing length shall be increased to 2 inches.

b. Dead load limits for townhouses in Seismic Design Category C and all structures in Seismic Design Categories D0, D1, and D2 shall be determined in accordance with Section R301.2.2.2.

TABLE R802.5.1(1)

CEILING JOIST SPANS FOR COMMON LUMBER SPECIES (Uninhabitable attics without storage, live load = 10 psf, L/Δ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 5 psf			
			2 × 4	2 × 6	2 × 8	2 × 10
			Maximum ceiling joist spans			
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Douglas fir-larch	SS	13-2	20-8	Note a	Note a
	Douglas fir-larch	#1	12-8	19-11	Note a	Note a
	Douglas fir-larch	#2	12-5	19-6	25-8	Note a
	Douglas fir-larch	#3	11-1	16-3	20-7	25-2
	Hem-fir	SS	12-5	19-6	25-8	Note a
	Hem-fir	#1	12-2	19-1	25-2	Note a
	Hem-fir	#2	11-7	18-2	24-0	Note a
	Hem-fir	#3	10-10	15-10	20-1	24-6
	Southern pine	SS	12-11	20-3	Note a	Note a
	Southern pine	#1	12-5	19-6	25-8	Note a
	Southern pine	#2	11-10	18-8	24-7	Note a
	Southern pine	#3	10-1	14-11	18-9	22-9
	Spruce-pine-fir	SS	12-2	19-1	25-2	Note a
	Spruce-pine-fir	#1	11-10	18-8	24-7	Note a
	Spruce-pine-fir	#2	11-10	18-8	24-7	Note a
	Spruce-pine-fir	#3	10-10	15-10	20-1	24-6
16	Douglas fir-larch	SS	11-11	18-9	24-8	Note a
	Douglas fir-larch	#1	11-6	18-1	23-10	Note a
	Douglas fir-larch	#2	11-3	17-8	23-4	Note a
	Douglas fir-larch	#3	9-7	14-1	17-10	21-9
	Hem-fir	SS	11-3	17-8	23-4	Note a
	Hem-fir	#1	11-0	17-4	22-10	Note a
	Hem-fir	#2	10-6	16-6	21-9	Note a
	Hem-fir	#3	9-5	13-9	17-5	21-3
	Southern pine	SS	11-9	18-5	24-3	Note a
	Southern pine	#1	11-3	17-8	23-10	Note a
	Southern pine	#2	10-9	16-11	21-7	25-7
	Southern pine	#3	8-9	12-11	16-3	19-9
	Spruce-pine-fir	SS	11-0	17-4	22-10	Note a
	Spruce-pine-fir	#1	10-9	16-11	22-4	Note a
	Spruce-pine-fir	#2	10-9	16-11	22-4	Note a
	Spruce-pine-fir	#3	9-5	13-9	17-5	21-3

(Continued)

TABLE R802.5.1(1)continued

CEILING JOIST SPANS FOR COMMON LUMBER SPECIES (Uninhabitable attics without storage, live load = 10 psf, L/Δ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 5 psf			
			2 × 4	2 × 6	2 × 8	2 × 10
			Maximum ceiling joist spans			
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
19.2	Douglas fir-larch	SS	11-3	17-8	23-3	Note a
	Douglas fir-larch	#1	10-10	17-0	22-5	Note a
	Douglas fir-larch	#2	10-7	16-8	21-4	26-0
	Douglas fir-larch	#3	8-9	12-10	16-3	19-10
	Hem-fir	SS	10-7	16-8	21-11	Note a
	Hem-fir	#1	10-4	16-4	21-6	Note a
	Hem-fir	#2	9-11	15-7	20-6	25-3
	Hem-fir	#3	8-7	12-6	15-10	19-5
	Southern -pine	SS	11-0	17-4	22-10	Note a
	Southern pine	#1	10-7	16-8	22-0	Note a
	Southern pine	#2	10-2	15-7	19-8	23-5
	Southern pine	#3	8-0	11-9	14-10	18-0
	Spruce-pine-fir	SS	10-4	16-4	21-6	Note a
	Spruce-pine-fir	#1	10-2	15-11	21-0	25-8
	Spruce-pine-fir	#2	10-2	15-11	21-0	25-8
	Spruce-pine-fir	#3	8-7	12-6	15-10	19-5
24	Douglas fir-larch	SS	10-5	16-4	21-7	Note a
	Douglas fir-larch	#1	10-0	15-9	20-1	24-6
	Douglas fir-larch	#2	9-10	15-0	19-1	23-3
	Douglas fir-larch	#3	7-10	11-6	14-7	17-9
	Hem-fir	SS	9-10	15-6	20-5	Note a
	Hem-fir	#1	9-8	15-2	19-10	24-3
	Hem-fir	#2	9-2	14-5	18-6	22-7
	Hem-fir	#3	7-8	11-2	14-2	17-4
	Southern pine	SS	10-3	16-1	21-2	Note a
	Southern pine	#1	9-10	15-6	20-5	24-0
	Southern pine	#2	9-3	13-11	17-7	20-11
	Southern pine	#3	7-2	10-6	13-3	16-1
	Spruce-pine-fir	SS	9-8	15-2	19-11	25-5
	Spruce-pine-fir	#1	9-5	14-9	18-9	22-11
	Spruce-pine-fir	#2	9-5	14-9	18-9	22-11
	Spruce-pine-fir	#3	7-8	11-2	14-2	17-4

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Span exceeds 26 feet in length.

TABLE R802.5.1(2)

CEILING JOIST SPANS FOR COMMON LUMBER SPECIES (Uninhabitable attics with limited storage, live load = 20 psf, L/Δ = 240)

CEILING JOIST SPAC- ING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf			
			2 × 4	2 × 6	2 × 8	2 × 10
			Maximum ceiling joist spans			
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Douglas fir-larch	SS	10-5	16-4	21-7	Note a
	Douglas fir-larch	#1	10-0	15-9	20-1	24-6
	Douglas fir-larch	#2	9-10	15-0	19-1	23-3
	Douglas fir-larch	#3	7-10	11-6	14-7	17-9
	Hem-fir	SS	9-10	15-6	20-5	Note a
	Hem-fir	#1	9-8	15-2	19-10	24-3
	Hem-fir	#2	9-2	14-5	18-6	22-7
	Hem-fir	#3	7-8	11-2	14-2	17-4
	Southern pine	SS	10-3	16-1	21-2	Note a
	Southern pine	#1	9-10	15-6	20-5	24-0
	Southern pine	#2	9-3	13-11	17-7	20-11
	Southern pine	#3	7-2	10-6	13-3	16-1
	Spruce-pine-fir	SS	9-8	15-2	19-11	25-5
	Spruce-pine-fir	#1	9-5	14-9	18-9	22-11
	Spruce-pine-fir	#2	9-5	14-9	18-9	22-11
	Spruce-pine-fir	#3	7-8	11-2	14-2	17-4
16	Douglas fir-larch	SS	9-6	14-11	19-7	25-0
	Douglas fir-larch	#1	9-1	13-9	17-5	21-3
	Douglas fir-larch	#2	8-11	13-0	16-6	20-2
	Douglas fir-larch	#3	6-10	9-11	12-7	15-5
	Hem-fir	SS	8-11	14-1	18-6	23-8
	Hem-fir	#1	8-9	13-7	17-2	21-0
	Hem-fir	#2	8-4	12-8	16-0	19-7
	Hem-fir	#3	6-8	9-8	12-4	15-0
	Southern pine	SS	9-4	14-7	19-3	24-7
	Southern pine	#1	8-11	14-0	17-9	20-9
	Southern pine	#2	8-0	12-0	15-3	18-1
	Southern pine	#3	6-2	9-2	11-6	14-0
	Spruce-pine-fir	SS	8-9	13-9	18-1	23-1
	Spruce-pine-fir	#1	8-7	12-10	16-3	19-10
	Spruce-pine-fir	#2	8-7	12-10	16-3	19-10
	Spruce-pine-fir	#3	6-8	9-8	12-4	15-0

(Continued)

TABLE R802.5.1(2)continued

CEILING JOIST SPANS FOR COMMON LUMBER SPECIES (Uninhabitable attics with limited storage, live load = 20 psf, L/Δ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf			
			2 × 4	2 × 6	2 × 8	2 × 10
			Maximum ceiling joist spans			
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
19.2	Douglas fir-larch	SS	8-11	14-0	18-5	23-7
	Douglas fir-larch	#1	8-7	12-6	15-10	19-5
	Douglas fir-larch	#2	8-2	11-11	15-1	18-5
	Douglas fir-larch	#3	6-2	9-1	11-6	14-1
	Hem-fir	SS	8-5	13-3	17-5	22-3
	Hem-fir	#1	8-3	12-4	15-8	19-2
	Hem-fir	#2	7-10	11-7	14-8	17-10
	Hem-fir	#3	6-1	8-10	11-3	13-8
	Southern pine	SS	8-9	13-9	18-2	23-1
	Southern pine	#1	8-5	12-9	16-2	18-11
	Southern pine	#2	7-4	11-0	13-11	16-6
	Southern pine	#3	5-8	8-4	10-6	12-9
	Spruce-pine-fir	SS	8-3	12-11	17-1	21-8
	Spruce-pine-fir	#1	8-0	11-9	14-10	18-2
	Spruce-pine-fir	#2	8-0	11-9	14-10	18-2
	Spruce-pine-fir	#3	6-1	8-10	11-3	13-8
24	Douglas fir-larch	SS	8-3	13-0	17-2	21-3
	Douglas fir-larch	#1	7-8	11-2	14-2	17-4
	Douglas fir-larch	#2	7-3	10-8	13-6	16-5
	Douglas fir-larch	#3	5-7	8-1	10-3	12-7
	Hem-fir	SS	7-10	12-3	16-2	20-6
	Hem-fir	#1	7-7	11-1	14-0	17-1
	Hem-fir	#2	7-1	10-4	13-1	16-0
	Hem-fir	#3	5-5	7-11	10-0	12-3
	Southern pine	SS	8-1	12-9	16-10	21-6
	Southern pine	#1	7-8	11-5	14-6	16-11
	Southern pine	#2	6-7	9-10	12-6	14-9
	Southern pine	#3	5-1	7-5	9-5	11-5
	Spruce-pine-fir	SS	7-8	12-0	15-10	19-5
	Spruce-pine-fir	#1	7-2	10-6	13-3	16-3
	Spruce-pine-fir	#2	7-2	10-6	13-3	16-3
	Spruce-pine-fir	#3	5-5	7-11	10-0	12-3

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Span exceeds 26 feet in length.

R802.5.2Ceiling joist and rafter connections.

Where ceiling joists run parallel to rafters, they shall be connected to rafters at the top wall plate in accordance with [Table R802.5.2](#). Where ceiling joists are not connected to the rafters at the top wall plate, they shall be installed in the bottom third of the rafter height in accordance with [Figure R802.4.5](#) and [Table R802.5.2](#). Where the ceiling joists are installed above the bottom third of the rafter height, the ridge shall be designed as a beam. Where ceiling joists do not run parallel to rafters, the ceiling joists shall be connected to top plates in accordance with [Table R602.3\(1\)](#). Each rafter shall be tied across the structure with a rafter tie or a 2-inch by 4-inch (51 mm × 102 mm) kicker connected to the ceiling diaphragm with nails equivalent in capacity to [Table R802.5.2](#).

TABLE R802.4.1(1)

RAFTER SPANS FOR COMMON LUMBER SPECIES (Roof live load = 20 psf, ceiling not attached to rafters, $L/\Delta = 180$)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
		Maximum rafter spans ^a									
		(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Douglas fir-larch SS	11-6	18-0	23-9	Note b	Note b	11-6	18-0	23-9	Note b	Note b
	Douglas fir-larch #1	11-1	17-4	22-5	Note b	Note b	10-6	15-4	19-5	23-9	Note b
	Douglas fir-larch #2	10-10	16-10	21-4	26-0	Note b	10-0	14-7	18-5	22-6	26-0
	Douglas fir-larch #3	8-9	12-10	16-3	19-10	23-0	7-7	11-1	14-1	17-2	19-11
	Hem-fir SS	10-10	17-0	22-5	Note b	Note b	10-10	17-0	22-5	Note b	Note b
	Hem-fir #1	10-7	16-8	22-0	Note b	Note b	10-4	15-2	19-2	23-5	Note b
	Hem-fir #2	10-1	15-11	20-8	25-3	Note b	9-8	14-2	17-11	21-11	25-5
	Hem-fir #3	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
	Southern pine SS	11-3	17-8	23-4	Note b	Note b	11-3	17-8	23-4	Note b	Note b
	Southern pine #1	10-10	17-0	22-5	Note b	Note b	10-6	15-8	19-10	23-2	Note b
	Southern pine #2	10-4	15-7	19-8	23-5	Note b	9-0	13-6	17-1	20-3	23-10
	Southern pine #3	8-0	11-9	14-10	18-0	21-4	6-11	10-2	12-10	15-7	18-6
	Spruce-pine-fir SS	10-7	16-8	21-11	Note b	Note b	10-7	16-8	21-9	Note b	Note b
	Spruce-pine-fir #1	10-4	16-3	21-0	25-8	Note b	9-10	14-4	18-2	22-3	25-9
	Spruce-pine-fir #2	10-4	16-3	21-0	25-8	Note b	9-10	14-4	18-2	22-3	25-9
	Spruce-pine-fir #3	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
16	Douglas fir-larch SS	10-5	16-4	21-7	Note b	Note b	10-5	16-3	20-7	25-2	Note b
	Douglas fir-larch #1	10-0	15-4	19-5	23-9	Note b	9-1	13-3	16-10	20-7	23-10
	Douglas fir-larch #2	9-10	14-7	18-5	22-6	26-0	8-7	12-7	16-0	19-6	22-7
	Douglas fir-larch #3	7-7	11-1	14-1	17-2	19-11	6-7	9-8	12-12	14-11	17-3
	Hem-fir SS	9-10	15-6	20-5	Note b	Note b	9-10	15-6	19-11	24-4	Note b
	Hem-fir #1	9-8	15-2	19-2	23-5	Note b	9-0	13-1	16-7	20-4	23-7
	Hem-fir #2	9-2	14-2	17-11	21-11	25-5	8-5	12-3	15-6	18-11	22-0
	Hem-fir #3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10
	Southern pine SS	10-3	16-1	21-2	Note b	Note b	10-3	16-1	21-2	25-7	Note b
	Southern pine #1	9-10	15-6	19-10	23-2	Note b	9-1	13-7	17-2	20-1	23-10
	Southern pine #2	9-0	13-6	17-1	20-3	23-10	7-9	11-8	14-9	17-6	20-8
	Southern pine #3	6-11	10-2	12-10	15-7	18-6	6-0	8-10	11-2	13-6	16-0
	Spruce-pine-fir SS	9-8	15-2	19-11	25-5	Note b	9-8	14-10	18-10	23-0	Note b
	Spruce-pine-fir #1	9-5	14-4	18-2	22-3	25-9	8-6	12-5	15-9	19-3	22-4
	Spruce-pine-fir #2	9-5	14-4	18-2	22-3	25-9	8-6	12-5	15-9	19-3	22-4
	Spruce-pine-fir #3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10
19.2	Douglas fir-larch SS	9-10	15-5	20-4	25-11	Note b	9-10	14-10	18-10	23-0	Note b
	Douglas fir-larch #1	9-5	14-0	17-9	21-8	25-2	8-4	12-2	15-4	18-9	21-9
	Douglas fir-larch #2	9-1	13-3	16-10	20-7	23-10	7-10	11-6	14-7	17-10	20-8
	Douglas fir-larch #3	6-11	10-2	12-10	15-8	18-3	6-0	8-9	11-2	12-7	15-9
	Hem-fir SS	9-3	14-7	19-2	24-6	Note b	9-3	14-4	18-2	22-3	25-9
	Hem-fir #1	9-1	13-10	17-6	21-5	24-10	8-2	12-0	15-2	18-6	21-6
	Hem-fir #2	8-8	12-11	16-4	20-0	23-2	7-8	11-2	14-2	17-4	20-1
	Hem-fir #3	6-9	9-11	12-7	15-4	17-9	5-10	8-7	10-10	13-3	15-5
	Southern pine SS	9-8	15-2	19-11	25-5	Note b	9-8	15-2	19-7	23-4	Note b
	Southern pine #1	9-3	14-3	18-1	21-2	25-2	8-4	12-4	15-8	18-4	21-9
	Southern pine #2	8-2	12-3	15-7	18-6	21-9	7-1	10-8	13-6	16-0	18-10
	Southern pine #3	6-4	9-4	11-19	14-3	16-10	5-6	8-1	10-2	12-4	14-7
	Spruce-pine-fir SS	9-1	14-3	18-9	23-11	Note b	9-1	13-7	17-2	21-0	24-4
	Spruce-pine-fir #1	8-10	13-1	16-7	20-3	23-6	7-9	11-4	14-4	17-7	20-4
	Spruce-pine-fir #2	8-10	13-1	16-7	20-3	23-6	7-9	11-4	14-4	17-7	20-4
	Spruce-pine-fir #3	6-9	9-11	12-7	15-4	17-9	5-10	8-7	10-10	13-3	15-5

TABLE R802.4.1(1) - CONTINUED

RAFTER SPANS FOR COMMON LUMBER SPECIES (Roof live load = 20 psf, ceiling not attached to rafters, $L/\Delta = 180$)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
		Maximum rafter spans									
		(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
24	Douglas fir-larch S	9-1	14-4	18-10	23-9	Note b	9-1	13-3	16-10	20-7	23-10
	Douglas fir-larch #1	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
	Douglas fir-larch #2	8-2	11-11	15-1	18-5	21-4	7-0	10-4	13-0	15-11	18-6
	Douglas fir-larch #3	6-2	9-1	11-6	14-1	16-3	5-4	7-10	10-0	12-2	14-1
	Hem-fir S	8-7	13-6	17-10	22-9	Note b	8-7	12-10	16-3	19-10	23-0
	Hem-fir #1	8-5	12-4	15-8	19-2	22-2	7-4	10-9	13-7	16-7	19-3
	Hem-fir #2	7-11	11-7	14-8	17-10	20-9	6-10	10-0	12-8	15-6	17-11
	Hem-fir #3	6-1	8-10	11-3	13-8	15-11	5-3	7-8	9-9	11-10	13-9
	Southern pine S	8-11	14-1	18-6	23-8	Note b	8-11	13-10	17-6	20-10	24-8
	Southern pine #1	8-7	12-9	16-2	18-11	22-6	7-5	11-1	14-0	16-5	19-6
	Southern pine #2	7-4	11-0	13-11	16-6	19-6	6-4	9-6	12-1	14-4	16-10
	Southern pine #3	5-8	8-4	10-6	12-9	15-1	4-11	7-3	9-1	11-0	13-1
	Spruce-pine-fir S	8-5	13-3	17-5	21-8	25-2	8-4	12-2	15-4	18-9	21-9
	Spruce-pine-fir #1	8-0	11-9	14-10	18-2	21-0	6-11	10-2	12-10	15-8	18-3
	Spruce-pine-fir #2	8-0	11-9	14-10	18-2	21-0	6-11	10-2	12-10	15-8	18-3
	Spruce-pine-fir #3	6-1	8-10	11-3	13-8	15-11	5-3	7-8	9-9	11-10	13-9

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the following factors:

H_c/H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.9
1/7.5 or less	1.00

where:

H_c = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.

H_R = Height of roof ridge measured vertically above the top of the rafter support walls.

b. Span exceeds 26 feet in length.

802.11 ROOF TIE-DOWN

Amend Section R802 roof, framing, subsection R802.11.1 uplift resistance, by adding the following: All rafters and trusses spaced not more than 24-inches on center shall be attached to their supporting wall assemblies by mechanical fasteners.

TABLE R802.4.1(2)

RAFTER SPANS FOR COMMON LUMBER SPECIES (Roof live load = 20 psf, ceiling attached to rafters, $L/\Delta = 240$)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans									
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Douglas fir-	S	10-5	16-4	21-7	Note b	Note b	10-5	16-4	21-7	Note b	Note b
	Douglas fir-larch	#1	10-0	15-9	20-10	Note b	Note b	10-0	15-4	19-5	23-9	Note b
	Douglas fir-larch	#2	9-10	15-6	20-5	26-0	Note b	9-10	14-7	18-5	22-6	26-0
	Douglas fir-larch	#3	8-9	12-10	16-3	19-10	23-0	7-7	11-1	14-1	17-2	19-11
	Hem-fir	S	9-10	15-6	20-5	Note b	Note b	9-10	15-6	20-5	Note b	Note b
	Hem-fir	#1	9-8	15-2	19-11	25-5	Note b	9-8	15-2	19-2	23-5	Note b
	Hem-fir	#2	9-2	14-5	19-0	24-3	Note b	9-2	14-2	17-11	21-11	25-5
	Hem-fir	#3	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
	Southern pine	S	10-3	16-1	21-2	Note b	Note b	10-3	16-1	21-2	Note b	Note b
	Southern pine	#1	9-10	15-6	20-5	Note b	Note b	9-10	15-6	19-10	23-2	Note b
	Southern pine	#2	9-5	14-9	19-6	23-5	Note b	9-0	13-6	17-1	20-3	23-10
	Southern pine	#3	8-0	11-9	14-10	18-0	21-4	6-11	10-2	12-10	15-7	18-6
	Spruce-pine-fir	S	9-8	15-2	19-11	25-5	Note b	9-8	15-2	19-11	25-5	Note b
	Spruce-pine-fir	#1	9-5	14-9	19-6	24-10	Note b	9-5	14-4	18-2	22-3	25-9
	Spruce-pine-fir	#2	9-5	14-9	19-6	24-10	Note b	9-5	14-4	18-2	22-3	25-9
	Spruce-pine-fir	#3	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
16	Douglas fir-	S	9-6	14-11	19-7	25-0	Note b	9-6	14-11	19-7	25-0	Note b
	Douglas fir-larch	#1	9-1	14-4	18-11	23-9	Note b	9-1	13-3	16-10	20-7	23-10
	Douglas fir-larch	#2	8-11	14-1	18-5	22-6	26-0	8-7	12-7	16-0	19-6	22-7
	Douglas fir-larch	#3	7-7	11-1	14-1	17-2	19-11	6-7	9-8	12-2	14-11	17-3
	Hem-fir	S	8-11	14-1	18-6	23-8	Note b	8-11	14-1	18-6	23-8	Note b
	Hem-fir	#1	8-9	13-9	18-1	23-1	Note b	8-9	13-1	16-7	20-4	23-7
	Hem-fir	#2	8-4	13-1	17-3	21-11	25-5	8-4	12-3	15-6	18-11	22-0
	Hem-fir	#3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10
	Southern pine	S	9-4	14-7	19-3	24-7	Note b	9-4	14-7	19-3	24-7	Note b
	Southern pine	#1	8-11	14-1	18-6	23-2	Note b	8-11	13-7	17-2	20-1	23-10
	Southern pine	#2	8-7	13-5	17-1	20-3	23-10	7-9	11-8	14-9	17-6	20-8
	Southern pine	#3	6-11	10-2	12-10	15-7	18-6	6-0	8-10	11-2	13-6	16-0
	Spruce-pine-fir	S	8-9	13-9	18-1	23-1	Note b	8-9	13-9	18-1	23-0	Note b
	Spruce-pine-fir	#1	8-7	13-5	17-9	22-3	25-9	8-6	12-5	15-9	19-3	22-4
	Spruce-pine-fir	#2	8-7	13-5	17-9	22-3	25-9	8-6	12-5	15-9	19-3	22-4
	Spruce-pine-fir	#3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10

(Continued)

TABLE R802.4.1(2) CONTINUED

RAFTER SPANS FOR COMMON LUMBER SPECIES (Roof live load = 20 psf, ceiling attached to rafters, $L/\Delta = 240$)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
		Maximum rafter spans									
		(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
19.2	Douglas fir-larch SS	8-11	14-0	18-5	23-7	Note b	8-11	14-0	18-5	23-0	Note b
	Douglas fir-larch #1	8-7	13-6	17-9	21-8	25-2	8-4	12-2	15-4	18-9	21-9
	Douglas fir-larch #2	8-5	13-3	16-10	20-7	23-10	7-10	11-6	14-7	17-10	20-8
	Douglas fir-larch #3	6-11	10-2	12-10	15-8	18-3	6-0	8-9	11-2	13-7	15-9
	Hem-fir SS	8-5	13-3	17-5	22-3	Note b	8-5	13-3	17-5	22-3	25-9
	Hem-fir #1	8-3	12-11	17-1	21-5	24-10	8-2	12-0	15-2	18-6	21-6
	Hem-fir #2	7-10	12-4	16-3	20-0	23-2	7-8	11-2	14-2	17-4	20-1
	Hem-fir #3	6-9	9-11	12-7	15-4	17-9	5-10	8-7	10-10	13-3	15-5
	Southern pine SS	8-9	13-9	18-2	23-1	Note b	8-9	13-9	18-2	23-1	Note b
	Southern pine #1	8-5	13-3	17-5	21-2	25-2	8-4	12-4	15-8	18-4	21-9
	Southern pine #2	8-1	12-3	15-7	18-6	21-9	7-1	10-8	13-6	16-0	18-10
	Southern pine #3	6-4	9-4	11-9	14-3	16-10	5-6	8-1	10-2	12-4	14-7
	Spruce-pine-fir SS	8-3	12-11	17-1	21-9	Note b	8-3	12-11	17-1	21-0	24-4
	Spruce-pine-fir #1	8-1	12-8	16-7	20-3	23-6	7-9	11-4	14-4	17-7	20-4
	Spruce-pine-fir #2	8-1	12-8	16-7	20-3	23-6	7-9	11-4	14-4	17-7	20-4
	Spruce-pine-fir #3	6-9	9-11	12-7	15-4	17-9	5-10	8-7	10-10	13-3	15-5
24	Douglas fir-larch SS	8-3	13-0	17-2	21-10	Note b	8-3	13-0	16-10	20-7	23-10
	Douglas fir-larch #1	8-0	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
	Douglas fir-larch #2	7-10	11-11	15-1	18-5	21-4	7-0	10-4	13-0	15-11	18-6
	Douglas fir-larch #3	6-2	9-1	11-6	14-1	16-3	5-4	7-10	10-0	12-2	14-1
	Hem-fir SS	7-10	12-3	16-2	20-8	25-1	7-10	12-3	16-2	19-10	23-0
	Hem-fir #1	7-8	12-0	15-8	19-2	22-2	7-4	10-9	13-7	16-7	19-3
	Hem-fir #2	7-3	11-5	14-8	17-10	20-9	6-10	10-0	12-8	15-6	17-11
	Hem-fir #3	6-1	8-10	11-3	13-8	15-11	5-3	7-8	9-9	11-10	13-9
	Southern pine SS	8-1	12-9	16-10	21-6	Note b	8-1	12-9	16-10	20-10	24-8
	Southern pine #1	7-10	12-3	16-2	18-11	22-6	7-5	11-1	14-0	16-5	19-6
	Southern pine #2	7-4	11-0	13-11	16-6	19-6	6-4	9-6	12-1	14-4	16-10
	Southern pine #3	5-8	8-4	10-6	12-9	15-1	4-11	7-3	9-1	11-0	13-1
	Spruce-pine-fir SS	7-8	12-0	15-10	20-2	24-7	7-8	12-0	15-4	18-9	21-9
	Spruce-pine-fir #1	7-6	11-9	14-10	18-2	21-0	6-11	10-2	12-10	15-8	18-3
	Spruce-pine-fir #2	7-6	11-9	14-10	18-2	21-0	6-11	10-2	12-10	15-8	18-3
	Spruce-pine-fir #3	6-1	8-10	11-3	13-8	15-11	5-3	7-8	9-9	11-10	13-9

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the following factors:

H_c/H_R	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.9
1/7.5 or less	1.00

where:

 H_c = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls. H_R = Height of roof ridge measured vertically above the top of the rafter support walls.

b. Span exceeds 26 feet in length.

Glazing R308

Identification. Permanent labels and identification marks for glazing installed in hazardous locations is always required. Each unit of tempered glass shall be sandblasted, laser etched embossed or of a type that once applied cannot be removed without being destroyed and be visible when the unit is glazed. R308.1

Hazardous locations. The following are specific hazardous locations where safety glazing is required R308.4:

Glazing adjacent doors. Glazing in an individual fixed or operable panel adjacent to a door where the nearest vertical edge of the glazing is within a 24 inch arc of either vertical edge of the door in a closed position and where the bottom exposed edge of the glazing is less than 60 inches above the floor or walking surface shall be considered a hazardous location. R308.4.2

Glazing and wet surfaces. Glazing in walls, enclosures or fences containing or facing hot tubs, spas, whirlpools, saunas, steam rooms, bathtubs, showers and indoor or outdoor swimming pools where the bottom exposed edge of the glazing is less than 60 inches measured vertically above any standing or walking surface shall be considered a hazardous location. This shall apply to single glazing and all panes in multiple glazing. R308.4.5

Glazing in windows. Glazing in an individual fixed or operable panel that meets all of the following conditions shall be considered a hazardous location: R308.4.3

1. The exposed area of an individual pane is larger than 9 square feet;
2. The bottom edge of the glazing is less than 18 inches above the floor;
3. The top edge of the glazing is more than 36 inches above the floor;
4. One or more walking surfaces are within 36 inches, measured horizontally and in a straight line, of the glazing.

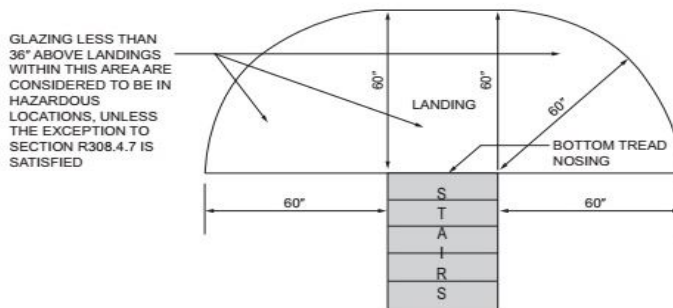
Glazing adjacent to stairs and ramps. Glazing where the bottom exposed edge of the glazing is less than 36 inches above the plane of the adjacent walking surface of stairways, landings between flights of stairs and ramps shall be considered to a hazardous location. R308.4.6

Exceptions:

1. Where glazing is adjacent to a walking surface and a horizontal rail is installed at 34 to 38 inches above the walking surface. The rail shall be capable of withstanding horizontal load of 50 pounds per linear foot without contacting the glass and have a cross-sectional height of not less than 1 1/2 inches.
2. Glazing 36 inches or more measured horizontally from the walking surface.

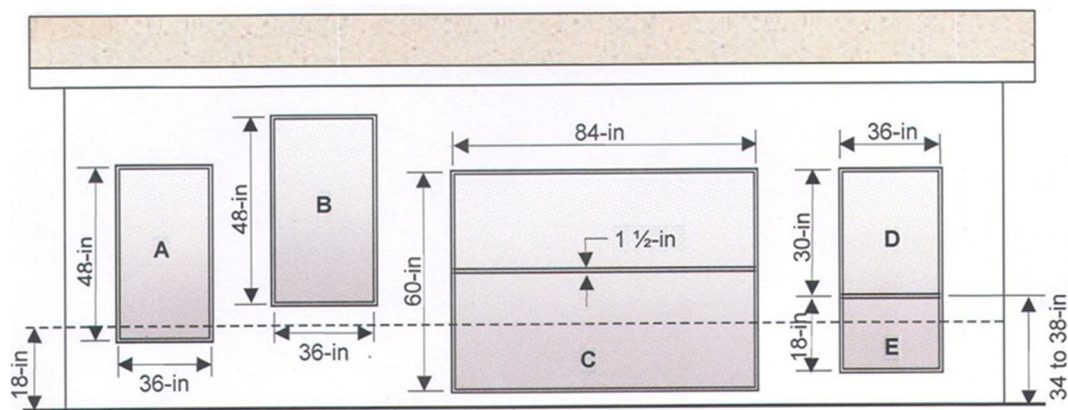
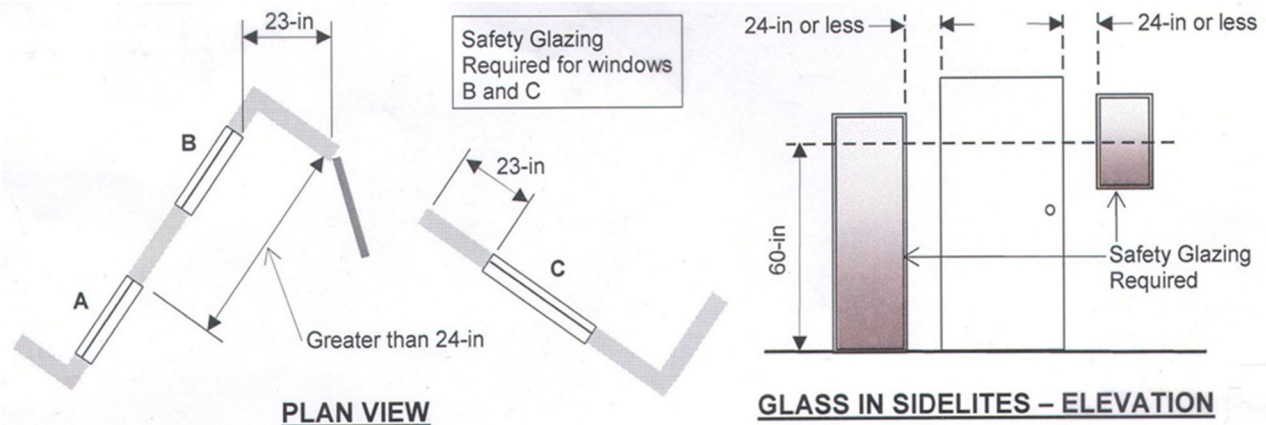
Glazing adjacent to the bottom stair landing. Glazing adjacent to the landing at the bottom of a stair way where the glazing is less than 36 inches above the landing and within a 60-inch horizontal arc less than 180 degrees from the bottom tread nosing shall be considered to be a hazardous location. (see Figure R308.4.7.)

Exception: Where the glazing is protected by a *guard* complying with Section R312 and the plane of the glass is more than 18 inches from the *guard*.



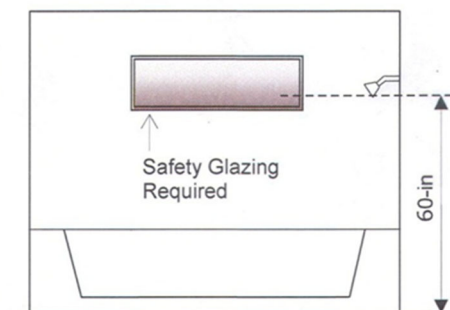
For SI: 1 inch = 25.4 mm.

FIGURE R308.4.7
HAZARDOUS GLAZING LOCATIONS AT BOTTOM STAIR LANDINGS



GLASS PANELS ADJACENT TO A WALKING SURFACE - ELEVATION

Table 1 - Glass panels adjacent to a walking surface		
Glass Panel(s)	Safety Glazing Required?	Remarks
A	Yes	Panel A is more than 9 sq. ft. in area and its lowest edge extends to within 18-in of the walking surface.
B & D	No	The lowest edge of the panel is more than 18-in above the walking surface.
E	No	Panel E is less than 9 sq. ft. in area.
C	See remarks	Panel C, being one piece of glass more than 9 sq. ft. in area and within 18-in of the walking surface, is required to be of safety glazing materials unless a horizontal member not less than 1 1/2-in in width is located between 34 and 38-in above the walking surface.



GLASS WITHIN SHOWER WALLS

Emergency Escape and Rescue Openings R310

Emergency escape and rescue required. *Basements*, habitable attics and every sleeping room shall have at least one operable 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. Where emergency escape and rescue openings are provided they shall have a sill height of not more than 44 inches measured from the finished floor to the bottom of the clear opening. 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 R310.3. 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. Emergency escape and rescue openings shall open directly into a public way, or to a *yard* or court that opens to a public way. R310.1

Exception: *Basements* used only to house mechanical *equipment* and not exceeding total floor area of 200 square feet.

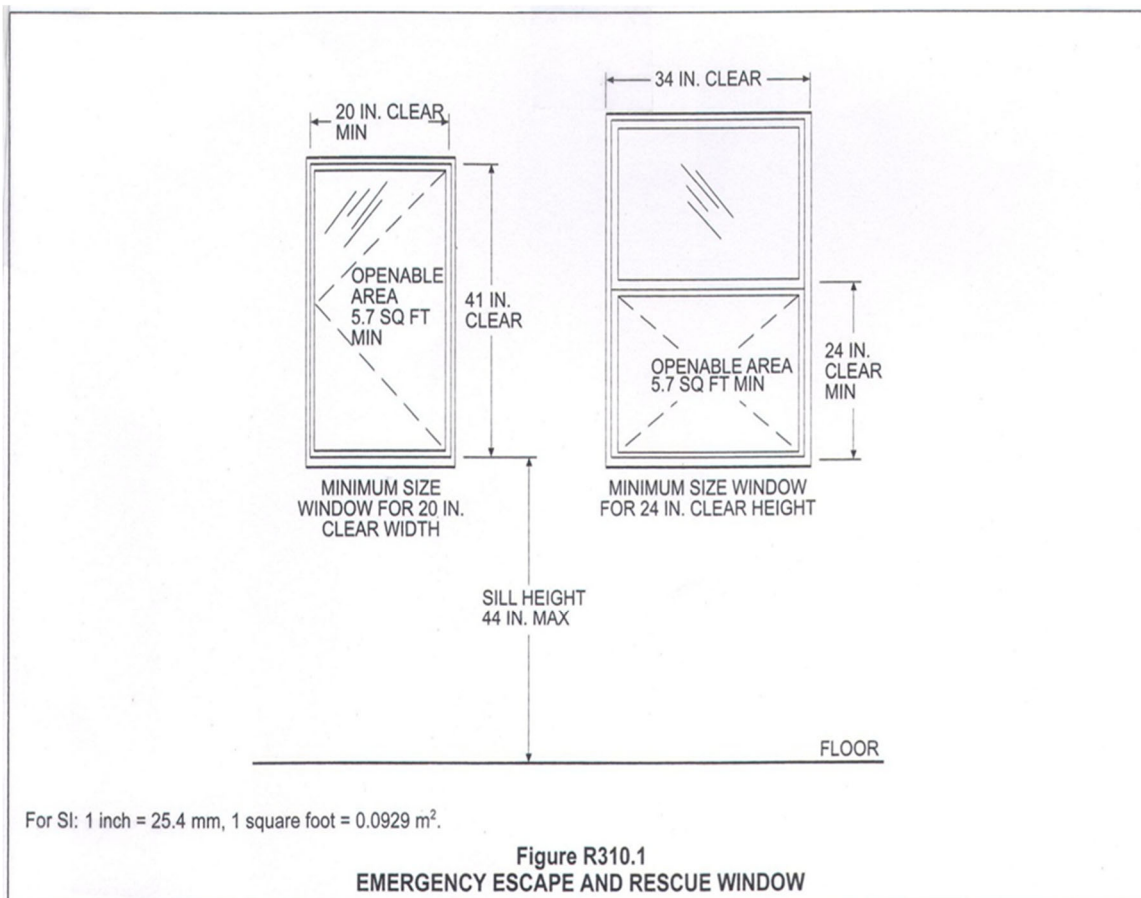
Operational constraints. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge. R310.1.1

Emergency escape and rescue openings. Emergency escape and rescue openings shall have a minimum dimensions as specified in this section. R310.2

Minimum opening area. Emergency and escape rescue openings shall have a net clear opening of not less than 5.7 square feet. 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. The net clear height of the opening shall be not less than 24 inches and the net clear width shall be not less than 20 inches. R310.2.1

Exception: *Grade floor openings* or *below-grade openings* shall have a net clear opening area of not less than 5 square feet.

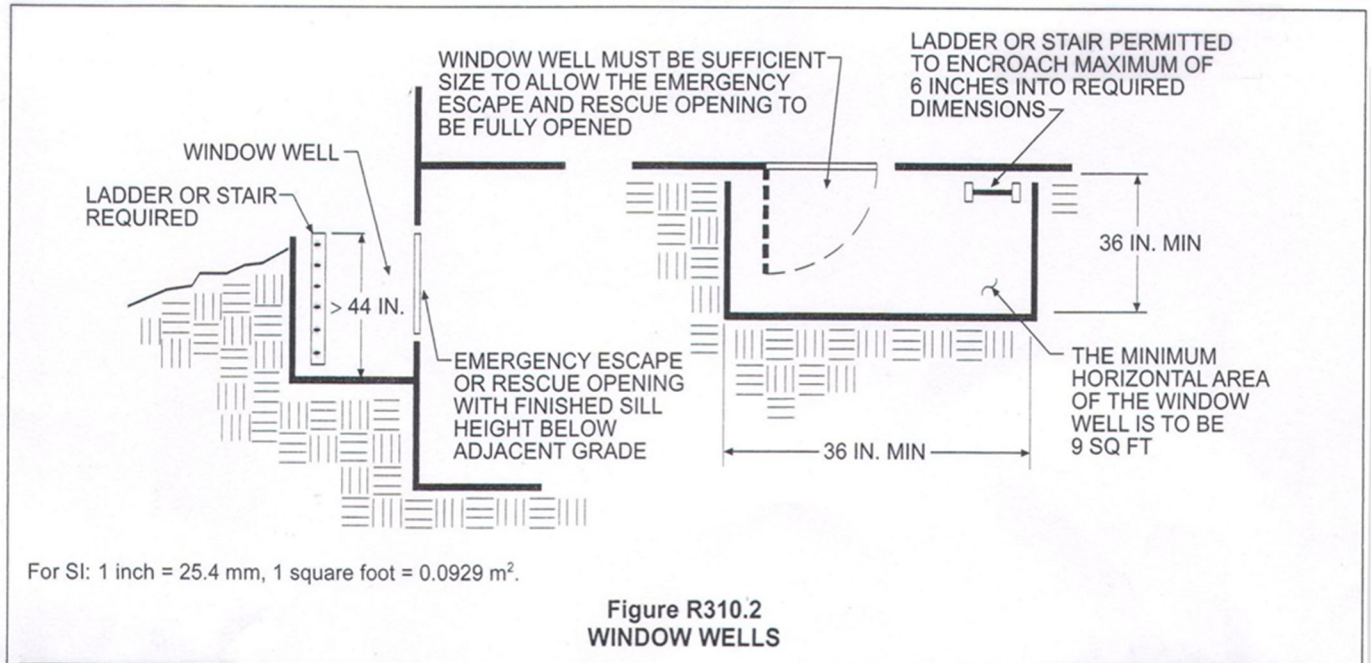
Window sill height. Where a window is provided as the emergency escape and rescue opening, it shall have a sill height of not more than 44 inches above the floor; where the sill height is below *grade*, it shall be provided with a window well in accordance with Section R310.2.3



Area Wells. Area wells shall have a width of not less than 36 inches. The area well shall be sized to allow the emergency escape and rescue door to be fully opened. R310.3.2

Ladder and steps. Area wells with a vertical depth greater than 44 inches shall be equipped with a permanently affixed ladder or steps usable with the door in the fully open position. Ladders or steps required by this section shall not be required to comply with Section R311.7. Ladders or rungs shall have an inside width of not less than 12 inches, shall project not less than 3 inches from the wall and shall be spaced not more than 18 inches on center vertically for the full height of the exterior stairwell. R310.3.2.1.

Drainage. Area wells shall be designed for property drainage by connecting to the building's foundation drainage system required by Section R405.1 or by an *approved* alternative method.



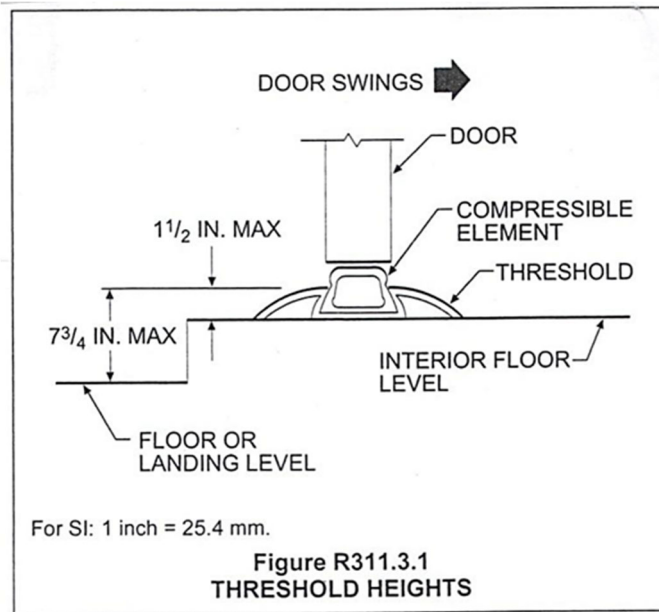
Means of Egress R311

Egress Door. At least one egress door shall be provided for each *dwelling* unit. The egress door shall be side hinged, and shall provide a minimum clear width of 32 inches when measured between the face of the door and the stop, with the door open 90 degrees. The minimum clear height of the door opening shall not be less than 78 inches in height measured from the top of the threshold to the bottom of the stop. Other doors shall not be required to comply with these minimum dimensions. Egress doors shall be readily openable from inside the *dwelling* without the use of a key or special knowledge or effort. R311.2

Floors and landings at exterior doors. There shall be a landing or floor on each side of each exterior door. The width of each landing shall not be less than the door served. Every landing shall have a minimum dimension of 36 inches measured in the direction of travel. Exterior landings shall be permitted to have a slope not to exceed 1/4 unit vertical in 12 units horizontal. R311.3

Floor elevations at the required egress doors. Landings or finished floors at the required egress door shall not be more than 1 1/2 inches lower than the top of the threshold.

Exception. The landing or floor on the exterior side shall not be more than 7 3/4 inches below the top of the threshold provided the door does not swing over the landing or floor. R311.3.1



Floor elevations for other exterior doors. Doors other than the required egress door shall be provided with landings or floors not more than 7 ³/₄ inches below the top of the threshold.

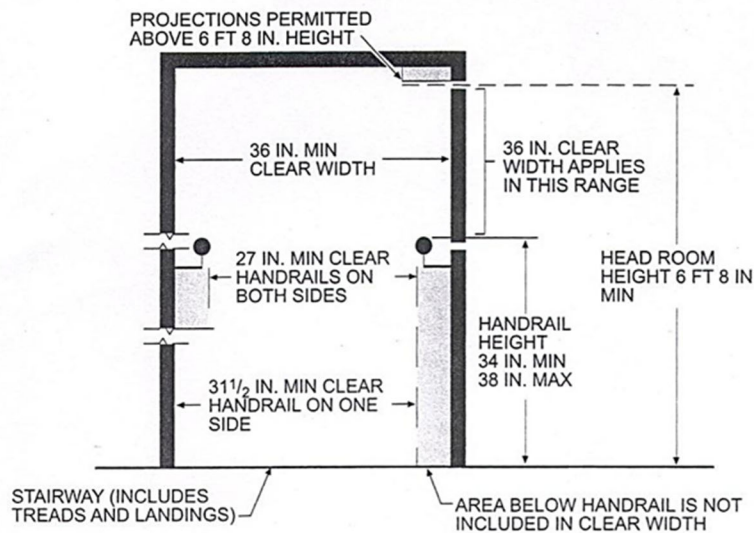
Exception: A landing is not required where a stairway of two or fewer risers is located on the exterior side of the door, provided the door does not swing over the stairway. R311.3.2

Stairways R311.7

Width. Stairways shall not be less than 36 inches 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 on either side of the stairway at and below the handrail heights, including treads and landings, shall not be less than 31 ¹/₂ inches where a handrail is installed on one side and 27 inches where handrails are provided on both sides. R311.7.1

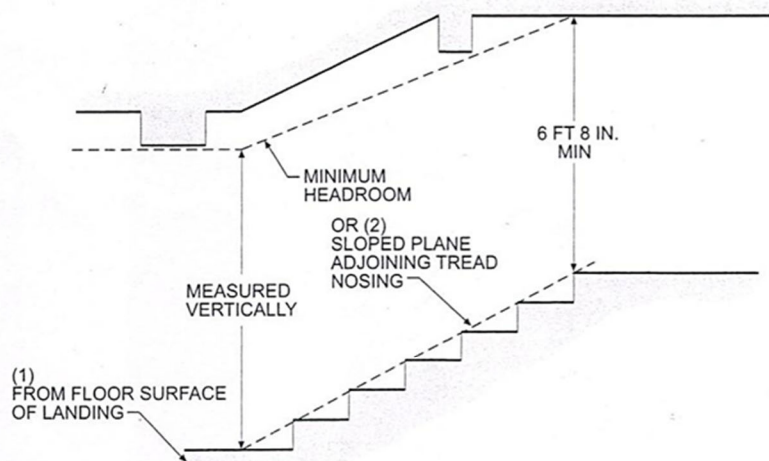
Headroom. The minimum headroom in all parts of the stairway shall not be less than 6 feet 8 inches measured vertically from the sloped line adjoining the tread nosing or from the floor surface of the landing or platform on that portion of the stairway. R311.7.2

Vertical Rise. A flight of stairs shall not have a vertical rise larger than 12 feet between floor levels or landings. R311.7.3



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

Figure R311.7.1
STAIRWAY CLEARANCES



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

Figure R311.7.2(1)
MINIMUM HEADROOM

Walkline. The walkline across winder treads shall be concentric to the curved direction of travel through the turn and located 12 inches from the side where the winders are narrower. The 12 inch dimension shall be measured from the widest point of the clear stair width at the walking surface of the winder. If winders are adjacent within the flight, the point of the widest clear stair width of the adjacent winders shall be used. R311.7.4

Stair treads and risers. Stair treads and risers shall meet the requirements of this section. For the purposes of this section all dimensions and dimensioned surfaces shall be exclusive of carpets, rugs, or runners. R311.7.5

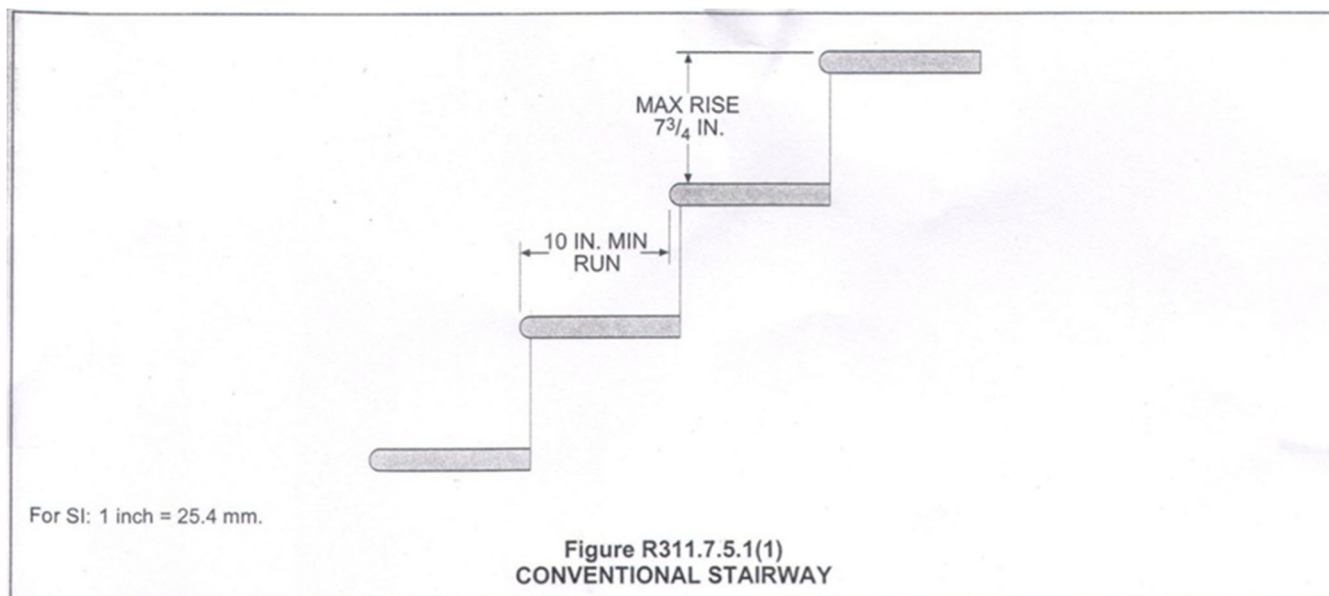
Risers. The maximum riser height shall be $7\frac{3}{4}$ inches. The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser heights within any flight of stairs shall not exceed the smallest by more than $\frac{3}{8}$ inch. Risers shall be vertical or sloped from the underside of the nosing of the tread above at an angle not more than 30 degree from the vertical. Open risers are permitted provided that the opening between treads does not permit the passage of a 4 inch diameter sphere. R311.7.5.1

Winder treads. Winder treads shall have a minimum tread depth of 10 inches measured between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline. Winder treads shall have a minimum tread depth of 6 inches at any point within the clear width of the stair. Within any flight of stairs, the largest winder tread depth at the walkline shall not exceed the smallest winder tread by more than $\frac{3}{8}$ inch. Consistently shaped winders at the walkline shall be allowed within the same flight of stairs as rectangular treads and do not have to be within $\frac{3}{8}$ inch of the rectangular tread depth. R311.7.5.2.1

Treads. The minimum tread depth shall be 10 inches. 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. R311.7.5.2

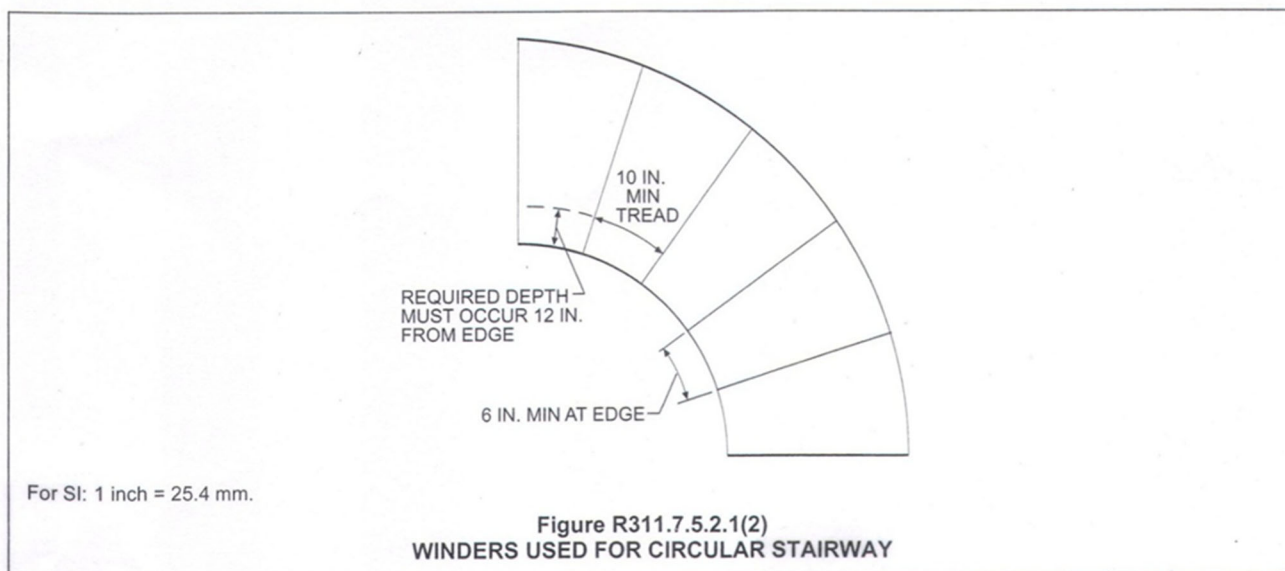
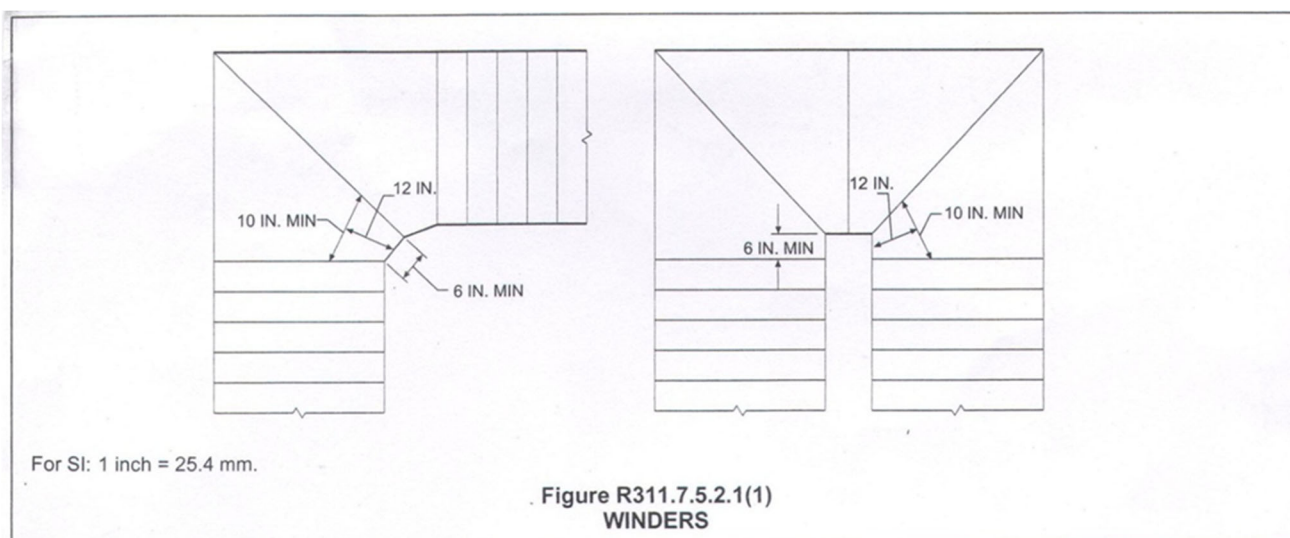
Nosings. The radius of curvature at the nosing shall be no greater than $\frac{9}{16}$ inch. A nosing not less than $\frac{3}{4}$ inch but not more than $1\frac{1}{4}$ inches shall be provided on stairways with solid risers. The greatest nosing projection shall not exceed the smallest nosing projection by more than $\frac{3}{8}$ inch between two stories, including the nosing at the level of floors and landings. Beveling of nosings shall not exceed $\frac{1}{2}$ inch. R311.7.5.3

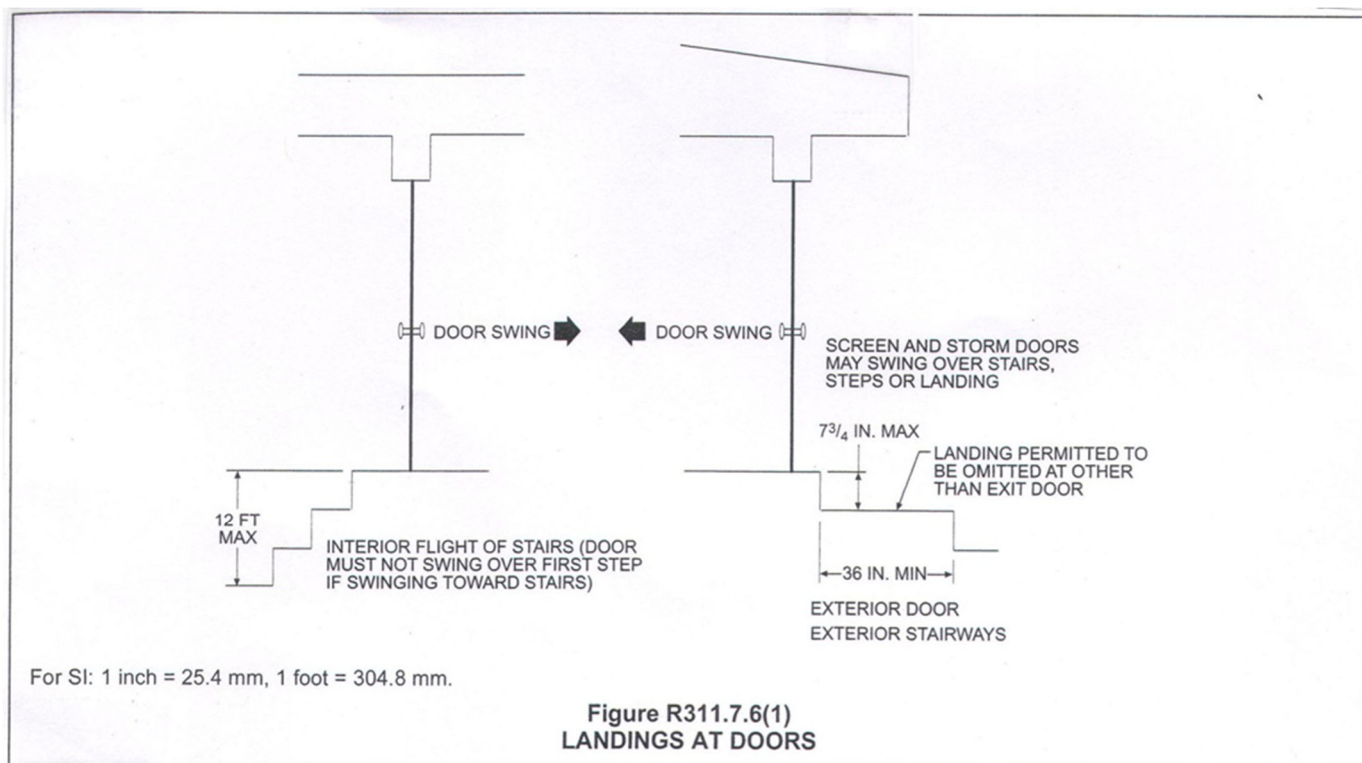
Exception: A nosing is not required where the tread depth is a minimum of 11 inches.



Landings for stairways. There shall be a floor or landing at the top and bottom of each stairway. The minimum width perpendicular to the direction of travel shall be no less than the width of the flight served. Landings of shapes other than square or rectangular shall be permitted provided the depth at the walk line and the total area is not less than that of a quarter circle with a radius equal to the required landing width. Where the stairway has a straight run, the minimum depth in the direction of travel shall be not less than 36 inches. R311.7.6

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





Handrails. Handrails shall be provided on not less than one side of each flight of stairs with four or more risers. R311.7.8

Height. Handrail height, measured vertically from the sloped plane adjoining the tread nosing, or finish surface of ramp slope, shall be not less than 34 inches and not more than 38 inches. R311.7.8.1

Continuity. Handrails 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 the lowest riser of the flight. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. R311.7.8.4

Exceptions:

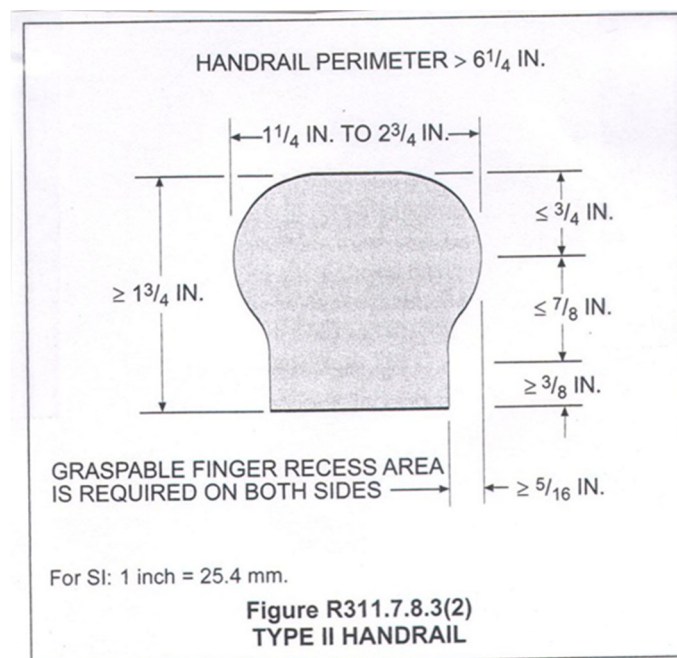
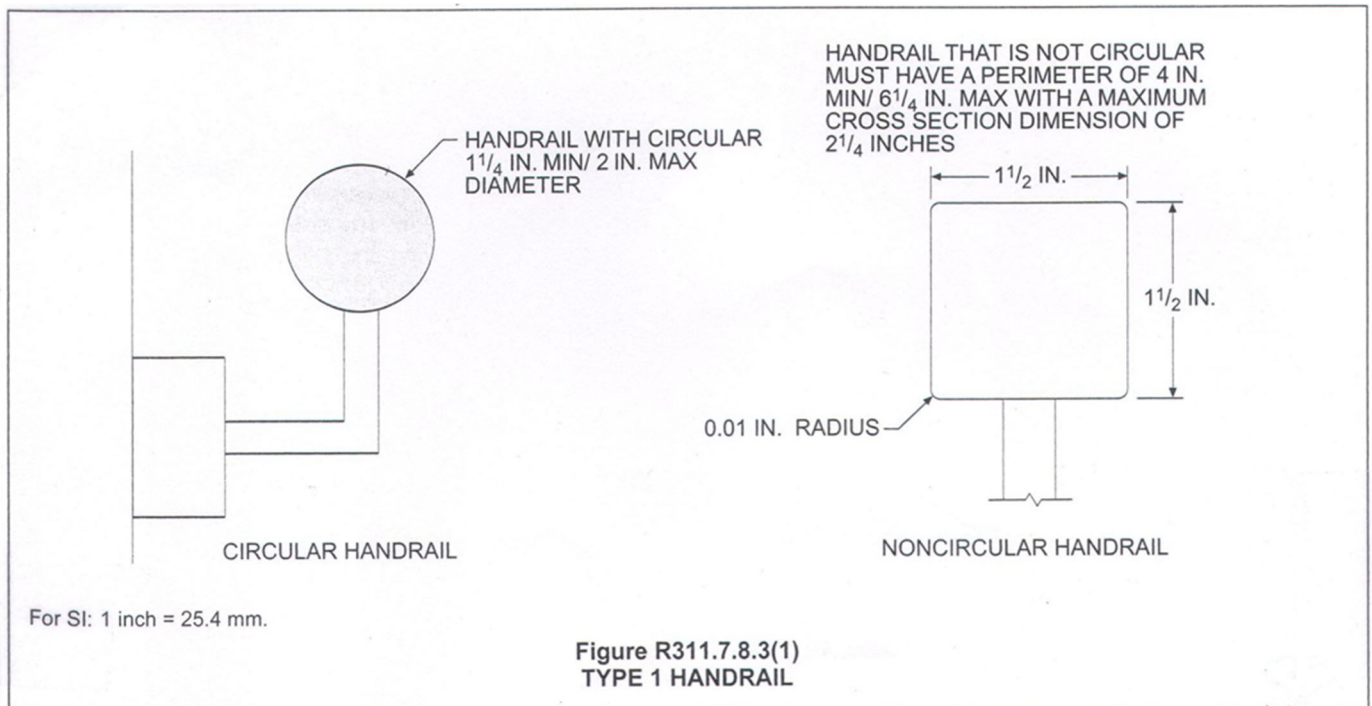
1. Handrail continuity shall be permitted to be interrupted by a newel post at a turn in a flight with winders, at a landing, or over the lowest tread.
2. A volute, turnout or starting easing shall be allowed to terminate over the lowest tread.

Grip-size. All required handrails shall be of one of the following types or provide equivalent graspability. R311.7.8.5

Type I. Handrails with a circular cross section shall have an outside diameter of at least 1 1/4 inches and not greater than 2 inches. If the handrail is not circular, it shall have a perimeter dimension of at least 4 inches and not greater than 6 1/4 inches with a maximum cross section of dimension of 2 1/4 inches. Edges shall have a minimum radius of 0.01 inch.

Type II. Handrails with a perimeter greater than 6 1/4 inches shall have a graspable finger recess area on both sides of the profile. The finger recess shall begin within a distance of 3/4 inch measured vertically from the tallest portion of the profile and achieve a depth of at least 5/16 inch within 7/8 inch below the widest portion of the profile. This required depth shall continue for at least 3/8 inch to a level that is not less than 1 3/4 inches below the tallest portion of the profile.

The minimum width of the handrail above the recess shall be 1 ¼ inches to a maximum of 2 ¾ inches. Edges shall have a minimum radius of 0.01 inch.



Guards. Guards shall be provided in accordance with Sections R312.1.1 Through R312.1.4

R312.1.1 Where Required. *Guards* shall be provided for those portions of open-sided walking surfaces, including stairs, ramps, and landings, that are located more than 30 inches measured vertically to the floor or *grade* below at any point within 39 inches horizontally to the edge of the open side. Insect screening shall not be considered as a *guard*.

Height. Required *guards* at open-sided walking surfaces, including stairs, porches, balconies or landings, shall be not less than 36 inches in height as measured vertically above the adjacent walking surface or the line connecting the *nosings*. R312.1.2

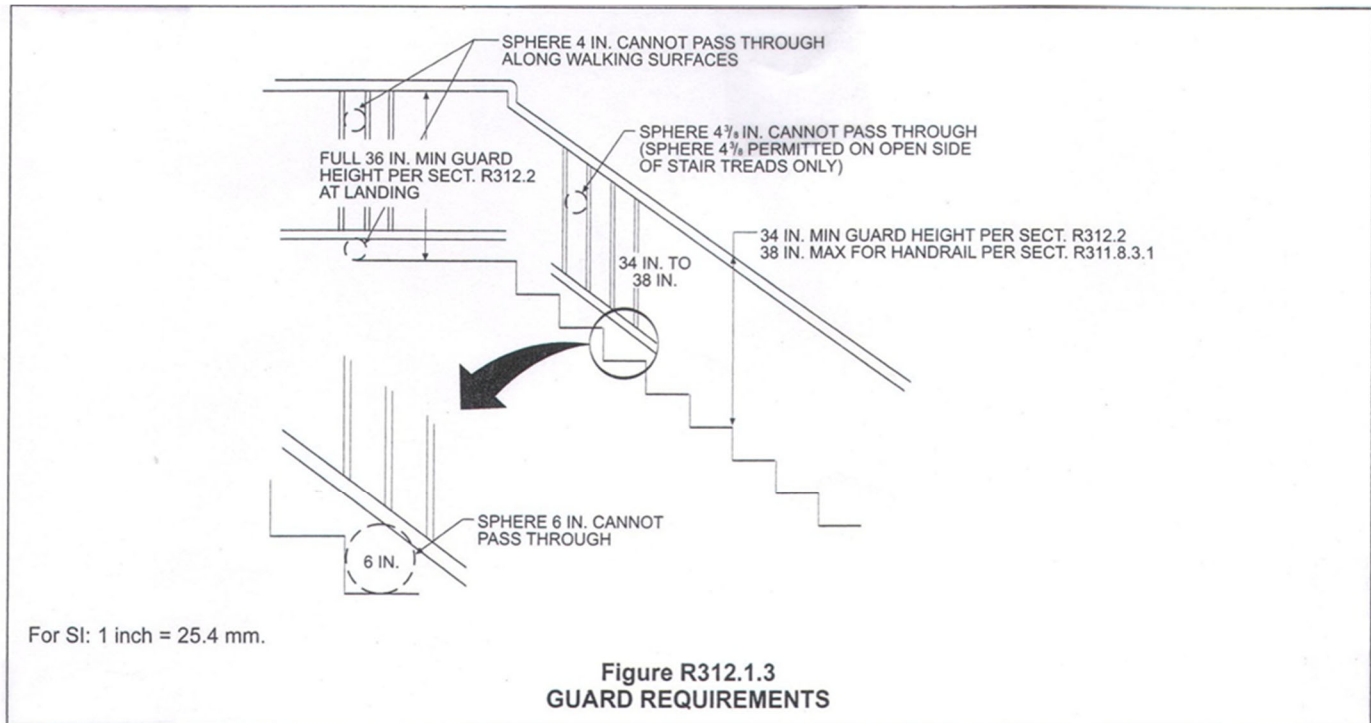
Exceptions:

1. *Guards* on the open sides of stairs shall have a height of not less than 34 inches measured vertically from a line connecting the *nosings*.
2. Where the top of the *guard* serves as a handrail on the open sides of stairs, the top of the *guard* shall be not less than 34 inches and not more than 38 inches as measured vertically from a line connecting the *nosings*.

Opening limitations. Required *guards* shall not have openings from the walking surface to the required *guard* height which allow passage of a sphere 4 inches in diameter. R312.1.3

Exceptions:

1. The triangular openings at the open side of stair, formed by the riser, tread and bottom rail of a guard, shall not allow passage of a sphere 6 inches in diameter.
2. *Guards* on the open side of stairs shall not have openings which allow passage of a sphere 4 3/8 inches in diameter.

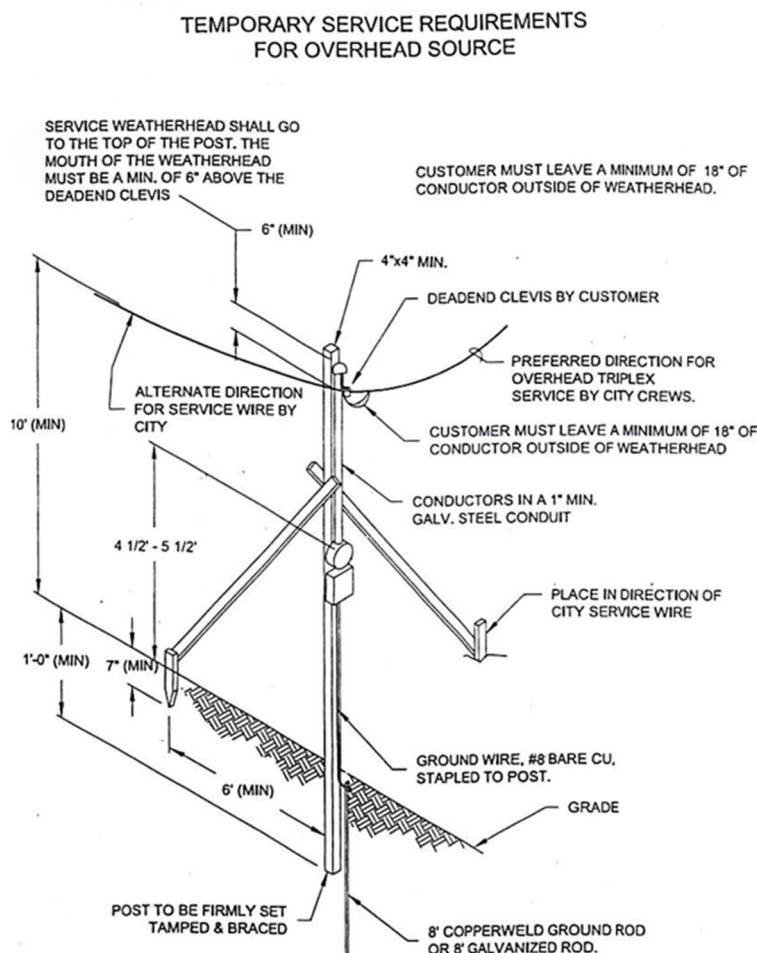


Electric

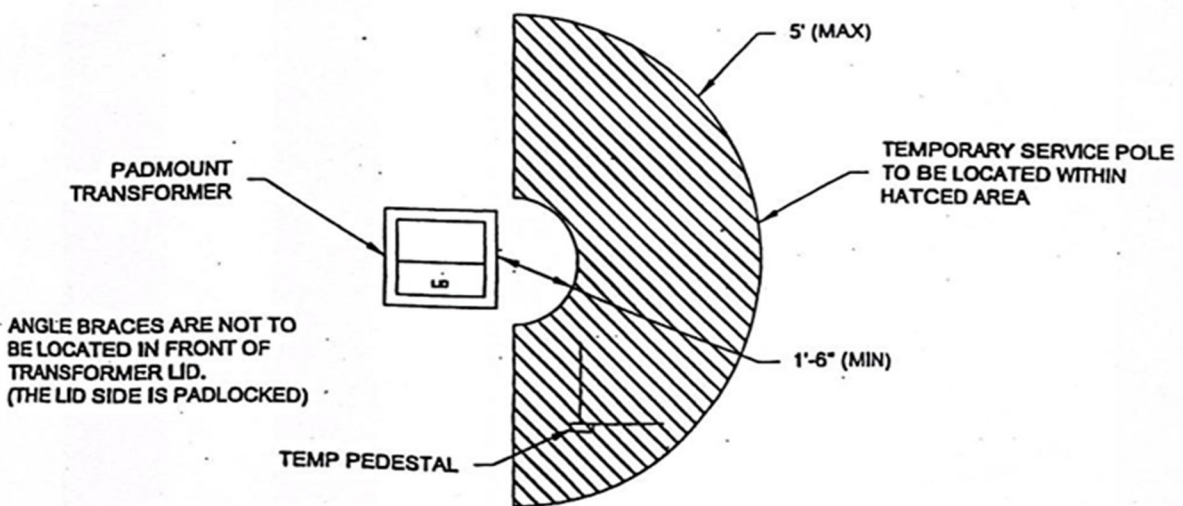
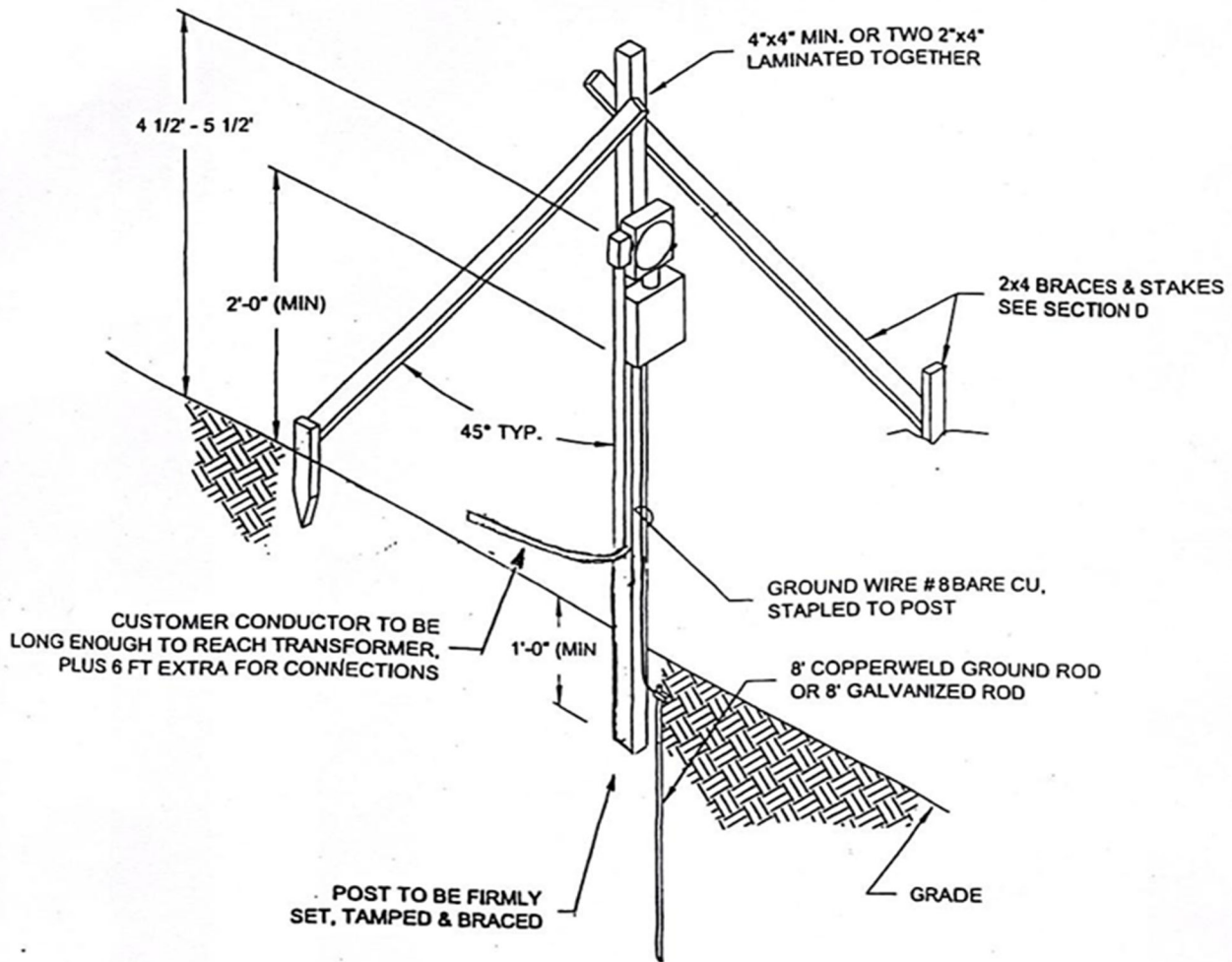
Temporary Power Requirements

General Specification applying to overhead and underground service.

- Temporary service requiring the city to extend overhead or underground facilities or install transformers will require additional costs. Check with the electrical superintendent for an estimate of charges and other requirements.
- Meter base will be mounted on a 4x4 post 4 1/2' – 5 1/2'.
- Meter post braces should be a minimum of 2x4 lumber with stakes solidly driven into the ground.
- Do not mount temporary service pole in a location that will conflict with the trenching required for the permanent service conduit.
- Provide sufficient service conductor to reach the transformer, plus 6' for making connections.
- Minimum #8 copper ground from meter base to grounding rod.
- All conductors from the city power source to the meter base and all conductors from the meter base to the panel are to be marked as follows: Neutral legs are to be marked with white tape 200.6 NEC.
- GFI protected receptacles.
- Weather proof enclosure.
- Service drip clearance requirements are as follows 10' minimum at lowest point of the drip loop, 12' over residential property and driveways, 18' over public streets and parking areas subject to truck traffic.



TEMPORARY SERVICE REQUIRMENTS FOR UNDERGROUND SOURCE BOTTOM ENTRY



Permanent Power

- Address must be posted before the electric service will be hooked up.
- Electrical meter base shall be installed on the side of the building toward the front.
- Contractor is to supply meter base. It must be 200 AMP.
- A 100amp minimum capacity panel is required to all residential dwellings.
- Contractor is to supply service entrance conductors and conduit.
- Meter base height from ground level must be between 5 and 5 1/2'.
- Any building with more than one meter shall have address permanently marked on meter base before permanent electric will be hooked up. NEC 230.72
- Roof must be completed.
- No building will be approved with wet wiring. E3404.5

Electric Ditch Requirements

- Conduit from meter base to ditch shall be schedule 40 listed for above ground use, exposed to sunlight and weather. Conduit subject to physical drainage shall be schedule 80.
- Ditch 30" deep to top of conduit
- Conduit in ditch must be glued.
- All conductors from city power source to the meter base and all conductors from meter base to panel are to be marked as follows: Neutral legs are to be marked with white tape. 200.6 NEC
- Concrete encased electrode consisting of at least 20' of steel reinforcing bars or rods not less than 1/2" in diameter E3608.1.2
- Cover shield over panel board.
- Replacing an existing service all work done will need to meet current codes.
- Where an upper ground connection is not accessible 2 ground rods may be used. NEC250.50

Residential Service Upgrades

- All structures for residential purposes, requiring a service upgrade or modification, shall mandate the following electrical system improvements;
 - 200 AMP meter base
 - 2 Ground rods 6 feet apart with 1 continuous ground wire.
 - Overhead service requires a 2" rigid conduit
 - GFI receptacles in the kitchen(s) and bathroom(s) shall be installed if outlets are in existence at the time of the service upgrade.
 - Approved hard-wired, dual-powered, interconnected smoke detectors shall be installed and located as per the adopted building code.
 - Carbon Monoxide alarms shall be installed outside each separate sleeping area.
 - Arc-Fault circuit– interrupter protection shall be required for bedrooms.
 - All apparent hazards shall be corrected.
- If a fire occurs, or other similar incident that damages any part of the electrical system within a residential structure, in addition to all the damaged systems being repaired, it is mandated that all apparent hazards within the structure be corrected. Hard-wired, dual-powered, interconnected smoke detectors shall be installed and located as per the adopted building codes. If the service portion of the electrical system is damaged or upgraded as a result of a fire or other incident, it shall require that all items listed in paragraph E(1) of this section shall be provided.
- A total a partial upgrade of the electrical system may be required, if in the opinion of the Code Official, or his designee, the condition of the existing electrical system constitutes a potential threat to the safety and welfare of current or future occupants.

Service Size and Rating E3602

Ampacity of ungrounded conductors. Ungrounded service conductors shall have an ampacity of not less than the load served. For one-family dwellings, the ampacity of the ungrounded conductors shall be not less than 100 amperes, 3 wire. For all other installations, the ampacity of the ungrounded conductors shall be not less than 60 amperes. E3602.1

SCHEDULE 40 PVC CONDUIT FILL TABLE										
 Conductor Size	Wire Size (THHN, THWN) Conductor Size AWG/kcmil									
	Wire Size									
	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	3-1/2"	4"
14	11	21	34	60	82	135	193	299	401	517
12	8	15	25	43	59	99	141	218	293	377
10	5	9	15	27	37	62	89	137	184	238
8	3	5	9	16	21	36	51	79	106	137
6	1	4	6	11	15	26	37	57	77	99
4	1	2	4	7	9	16	22	35	47	61
3	1	1	3	6	8	13	19	30	40	51
2	1	1	3	5	7	11	16	25	33	43
1	1	1	1	3	5	8	12	18	25	32
1/0	1	1	1	3	4	7	10	15	21	27
2/0	0	1	1	2	6	3	8	13	17	22
3/0	0	1	1	1	3	5	7	11	14	18
4/0	0	1	1	1	2	4	6	9	12	15
250	0	0	1	1	1	3	4	7	10	12
300	0	0	1	1	1	3	4	6	8	11
350	0	0	1	1	1	2	3	5	7	9
400	0	0	0	1	1	1	3	5	6	8
500	0	0	0	1	1	1	2	4	5	7
600	0	0	0	1	1	1	1	3	4	5
700	0	0	0	0	1	1	1	3	4	5
750	0	0	0	0	1	1	1	2	3	4

TABLE E3908.12 (Table 250.122)
EQUIPMENT GROUNDING CONDUCTOR SIZING

RATING OR SETTING OF AUTOMATIC OVERCURRENT DEVICE IN CIRCUIT AHEAD OF EQUIPMENT, CONDUIT, ETC., NOT EXCEEDING THE FOLLOWING RATINGS (amperes)	MINIMUM SIZE	
	Copper wire No. (AWG)	Aluminum or copper-clad aluminum wire No. (AWG)
15	14	12
20	12	10
60	10	8
100	8	6
200	6	4
300	4	2
400	3	1

Fuse or Breaker	Branch Circuits or Feeders Wire Size ^a		Service Conductors Wire Size ^b	
	Copper	Aluminum	Copper	Aluminum
15	14	12		
20	12	10		
25	10	10		
30	10	8		
35	8	6		
40	8	6		
45	6	4		
50	6	4		
60	6	3		
70	4	2		
80	3	1		
90	2	1/0		
100	2	1/0	4	2
110	1	1/0	3	1
125	1/0	1/0	2	1/0
150	1/0	2/0	1	2/0
175	2/0	3/0	1/0	3/0
200	3/0	4/0	2/0	4/0
225	4/0	250kcmil	3/0	250kcmil
250	4/0	300kcmil	4/0	300kcmil
300	300kcmil	400kcmil	250kcmil	350kcmil
350	400kcmil	600kcmil	350kcmil	500kcmil
400	500kcmil	700kcmil	400kcmil	600kcmil

a. Branch circuit and feeder wire sizes are based on table 310.16 of the NEC. The 60°C column is used for sizes #1 or smaller, and the 75°C column is used for larger sizes.

b. Service conductor sizes are based on the wire types in NEC table 310.15(B)(6).

DISTRIBUTION SPECIFICATIONS

SINGLE PHASE, 3 WIRE, 200 AMP UNDERGROUND SERVICE

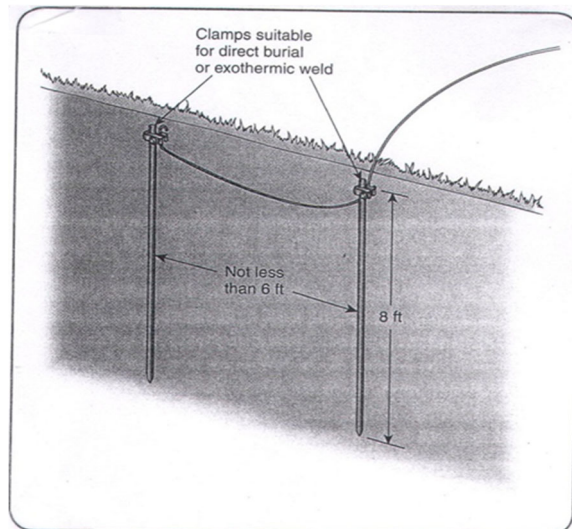
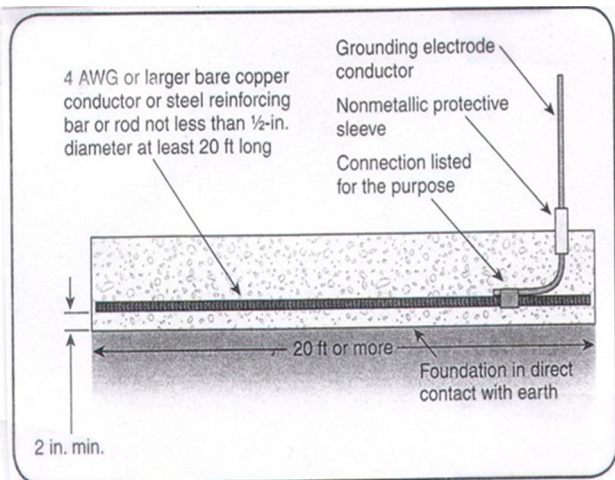
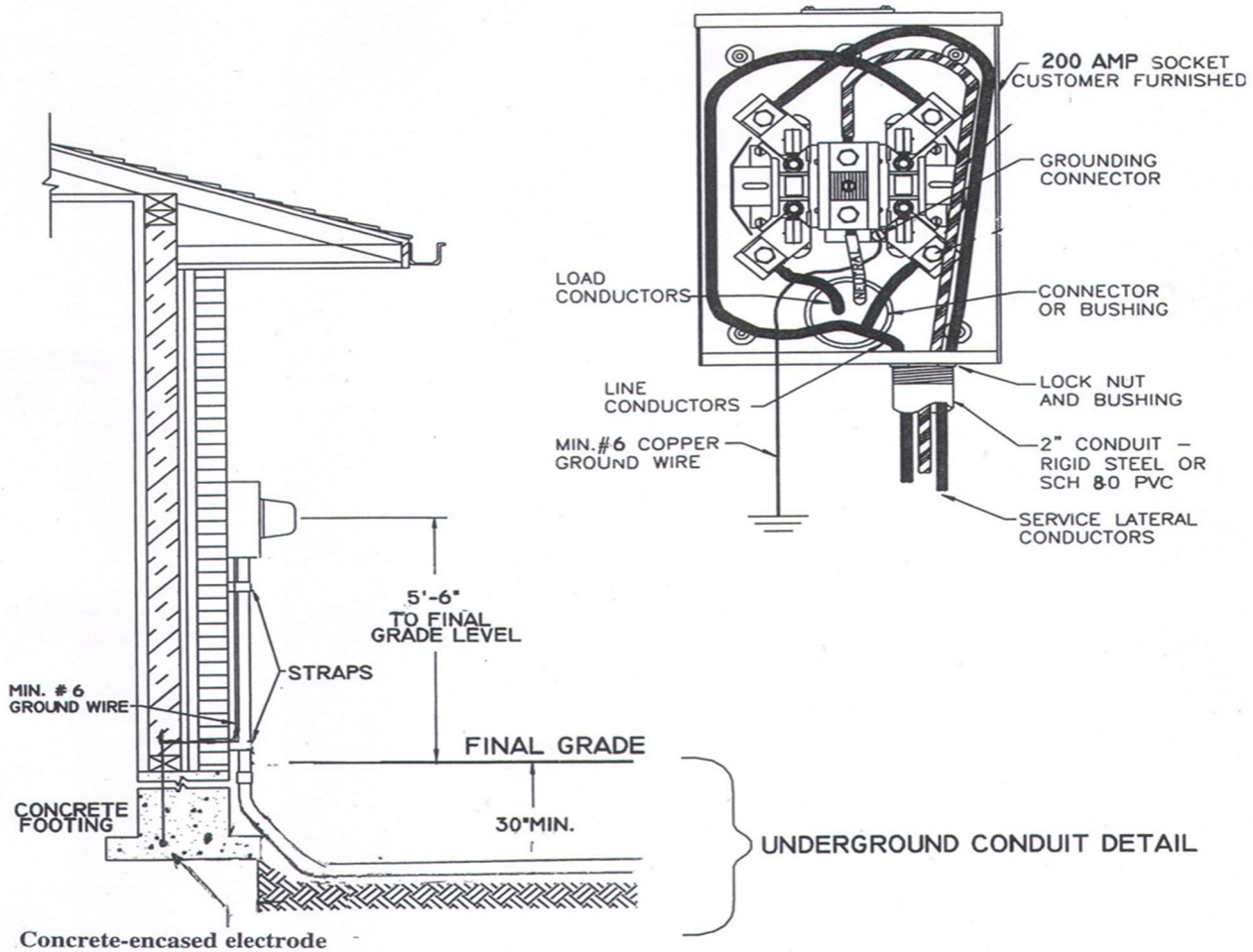
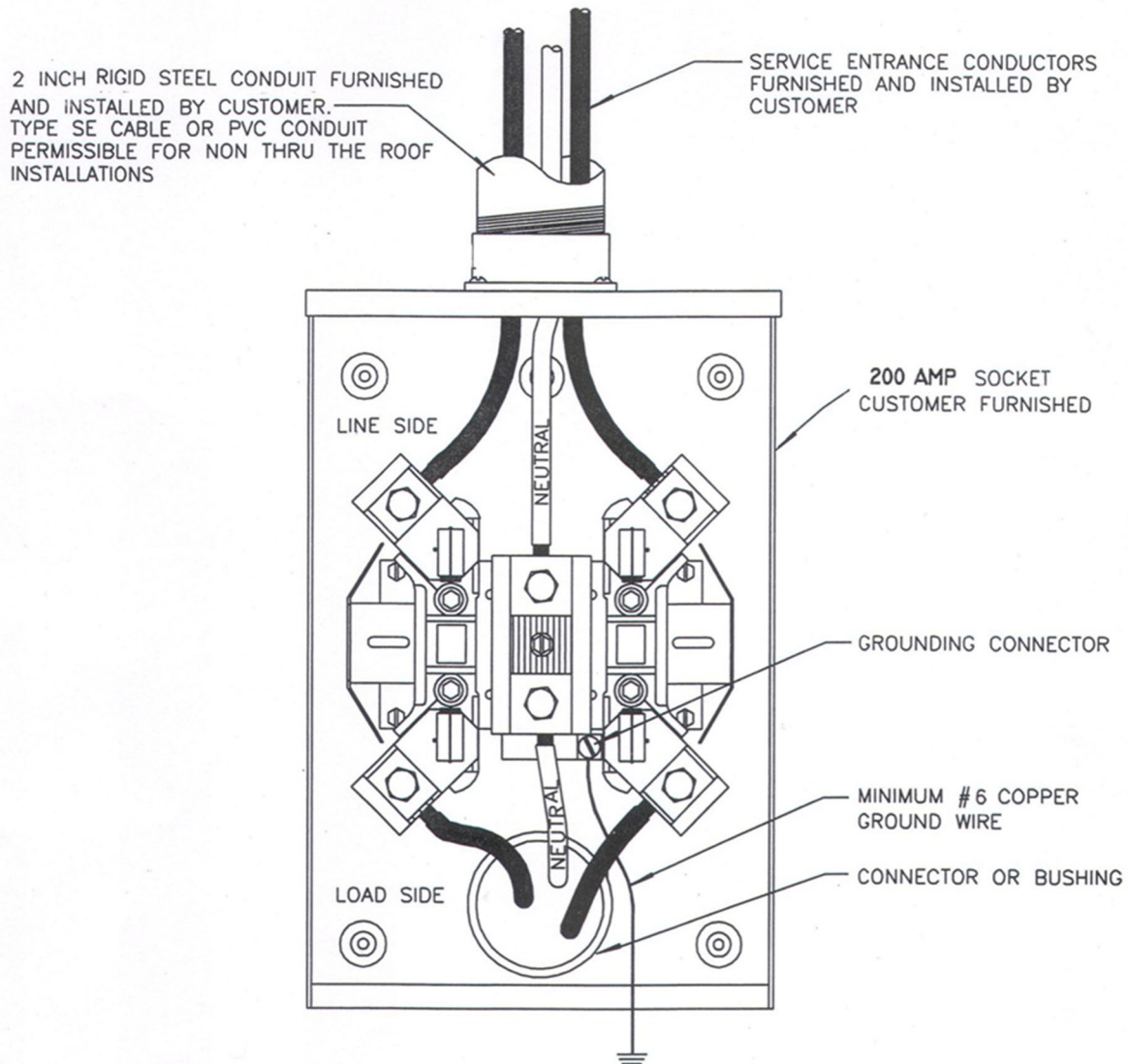


EXHIBIT 250.24 The 6 ft spacing between electrodes required

SINGLE PHASE, 3 WIRE OVERHEAD SERVICE

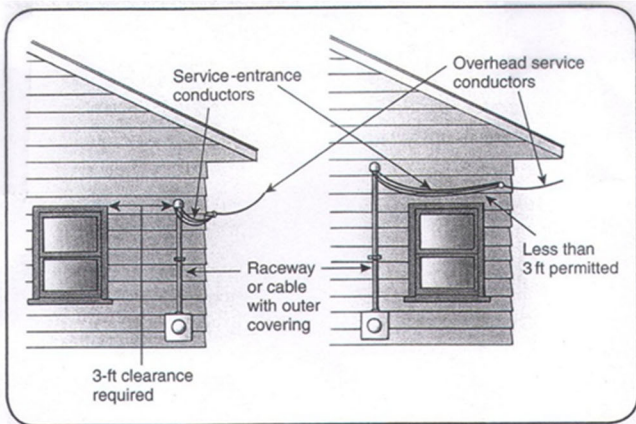


EXHIBIT 230.17 Required dimensions for service conductors located alongside a window (left) and overhead service conductors above the top level of a window designed to be opened (right).

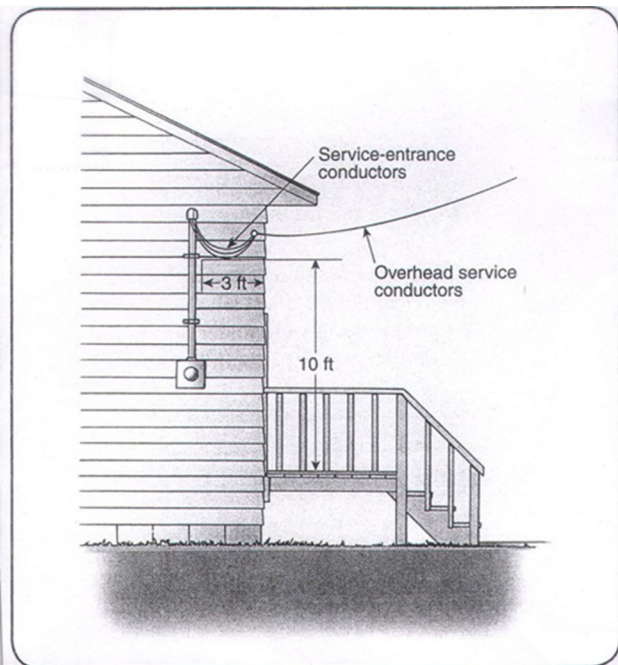


EXHIBIT 230.18 Required dimensions for service conductors located above a stair landing, according to 230.9(B) and 230.24(B).

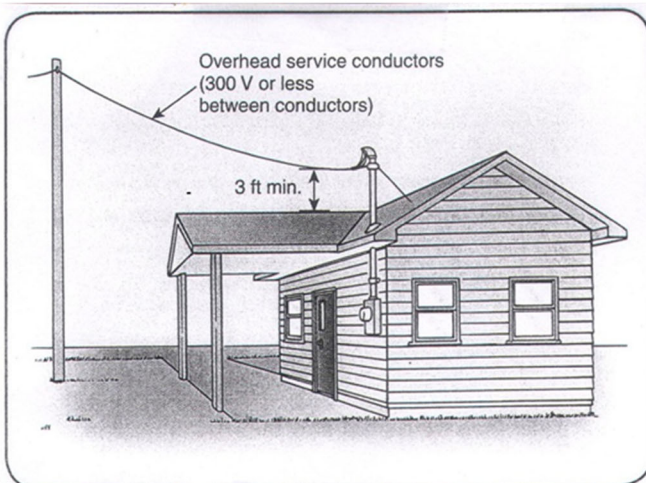


EXHIBIT 230.20 Reduction in clearance above a roof as permitted by 230.24(A), Exception No. 2.

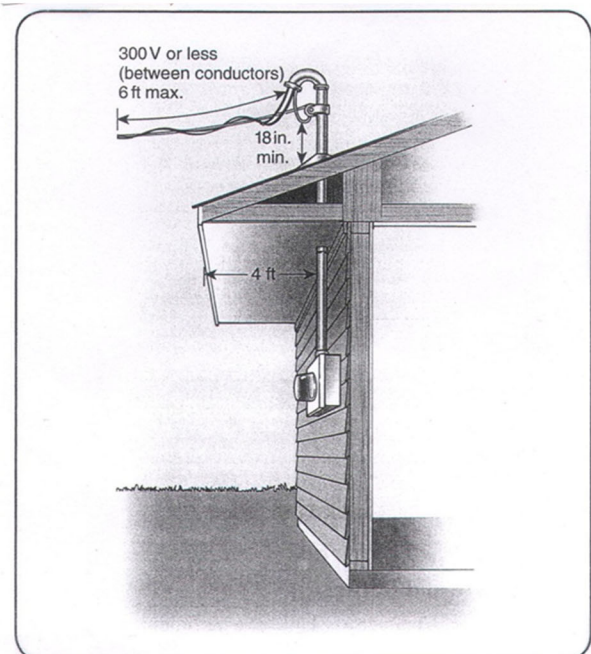


EXHIBIT 230.21 Reduction in clearance above a roof as permitted by 230.24(A), Exception No. 3.

Exhibit 230.23 illustrates the 10-ft, 12-ft, 15-ft, and 18-ft vertical clearances from ground for overhead service con-

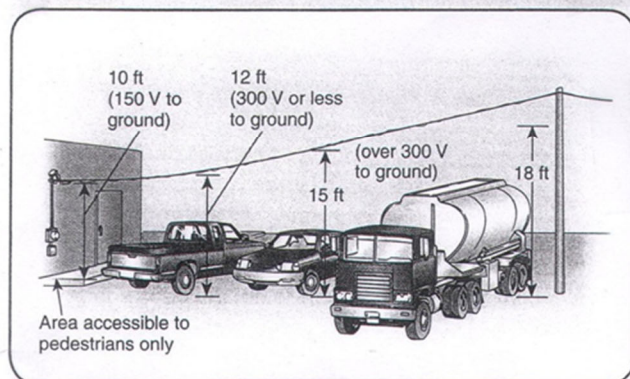


EXHIBIT 230.23 Clearances in accordance with 230.24(B).

Panel Boards E3706

Panel Board rating. All panel boards shall have a rating not less than that of the minimum service or feeder capacity required for the calculated load. E3706.1

Location of overcurrent devices in or on premises. Overcurrent devices shall:

1. Be readily accessible.
2. Not be located where they will be exposed to physical damage.
3. Not be located where they will be in the vicinity of easily ignitable material such as in clothes closets.
4. Not be located in bathrooms.
5. Not be located over steps of a stairway.
6. Be installed so that the center of the grip of the operating handle of the switch or circuit breaker, when in its highest position, is not more than 6' 7" above the floor or working platform. E3705.7

Damp and wet locations. In damp or wet locations, cabinets and panel boards of the surface type shall be placed or equipped so as to prevent moisture or water from entering and accumulating within the cabinet. NEC 312.2

Panel board circuit identification. All circuits and circuit modifications shall be legibly identified as to their clear, evident, and specific purpose or use. E3706.2

Branch Circuits E3701

Branch-circuit ampere rating. Branch circuits shall be rated in accordance with the maximum allowable ampere rating or setting of the overcurrent protection device. The rating for other than individual branch circuits shall be 15, 20, 30, 40, and 50 amperes. Where conductors of higher ampacity are used, the ampere rating or setting of the specified over-current device shall determine the circuit rating. E3702.2

15 (fifteen) and 20 (twenty) ampere branch circuits. A 15 or 20 ampere branch circuit shall be permitted to supply lighting units, or other utilization equipment, or a combination of both. E3702.3

Branch circuits serving multiple loads or outlets. General-purpose branch circuits shall supply lighting outlets, appliances, equipment, or receptacle outlets, and combinations of such. Multi-outlet branch circuits serving lighting or receptacles shall be limited to a maximum branch-circuit rating of 20 amperes. E3702.5

Kitchen and dining area receptacles. A minimum of two 20 ampere rated branch circuits shall be provided to serve all wall and floor receptacle outlets located in the kitchen, pantry, breakfast area, dining area or similar area of a dwelling. The kitchen countertop receptacles shall be served by a minimum of two 20 ampere rated branch circuits, either or both of which shall also be permitted to supply other receptacle outlets in the same kitchen, pantry, breakfast, and dining area including receptacle outlets for refrigeration appliances. E3703.2

Island countertop spaces. At least one receptacle outlet shall be installed at each island countertop space with a long dimension of 24 inches or greater and a short dimension of 12 inches or greater. E3901.4.2

Peninsular countertop space. Not less than one receptacle outlet shall be installed at each peninsular countertop long dimension space having a long dimension of 24 inches or greater and a short dimension of 12 inches or greater. A peninsular countertop is measured from the connected perpendicular wall. E3901.4.3

TABLE E3702.14 BRANCH-CIRCUIT REQUIREMENTS-SUMMARY a, b

TABLE E3702.14 (Table 210.24)
BRANCH-CIRCUIT REQUIREMENTS-SUMMARY^{a, b}

	CIRCUIT RATING		
	15 amp	20 amp	30 amp
Conductors: Minimum size (AWG) circuit conductors	14	12	10
Maximum overcurrent- protection device rating Ampere rating	15	20	30
Outlet devices: Lampholders permitted Receptacle rating (amperes)	Any type 15 maximum	Any type 15 or 20	N/A 30
Maximum load (amperes)	15	20	30

a. These gages are for copper conductors.
b. N/A = Not Allowed.

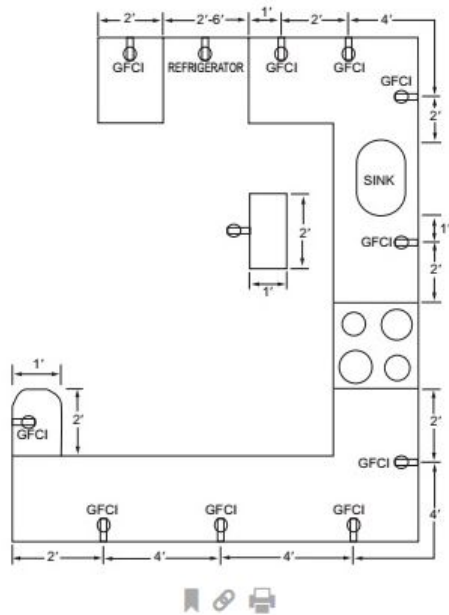
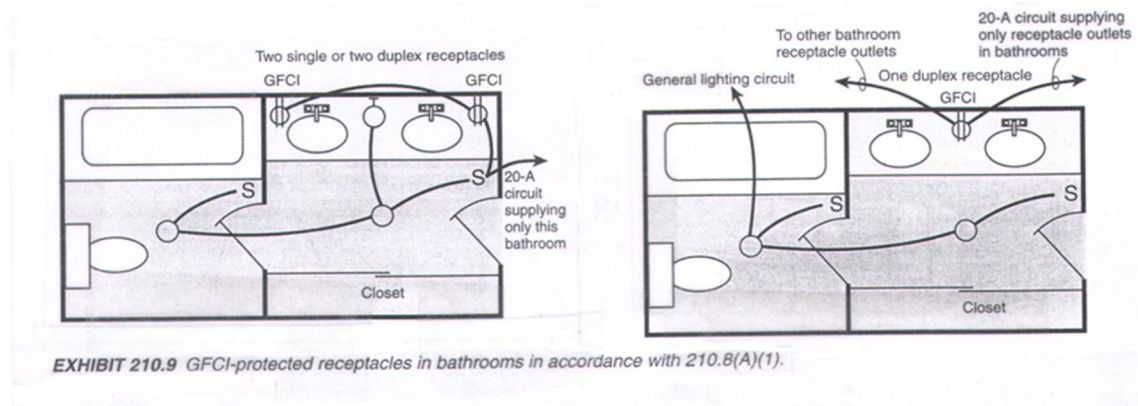


FIGURE E3901.4
COUNTERTOP RECEPTACLES

Laundry Circuits: A minimum of one 20 ampere rated branch circuit shall be provided for receptacles located in the laundry area and shall serve only receptacle outlets located in the laundry area. E3703.3

Bathroom branch circuits: A minimum of one 20 ampere branch circuit shall be provided to supply bathroom receptacle outlet(s). Such circuits shall have no other outlets. E3703.4

Exception: Where the 20 ampere circuit supplies a single bathroom, outlets for other equipment within the same bathroom shall be permitted to be supplied.



Lamp holders in wet or damp locations. Lamp holders installed in wet locations shall be listed for use in wet locations. Lamp holders installed in damp locations shall be listed for damp locations or shall be listed for wet locations. E4003.10

Bathtub and shower areas. Cord connected luminaires, chain, cable, or cord suspended luminaires, lighting track, pendants, and ceiling suspended (paddle) fans shall not have any parts located within a zone measured 3 feet horizontally and 8 feet vertically from the top of a bathtub rim or shower stall threshold. E4003.11

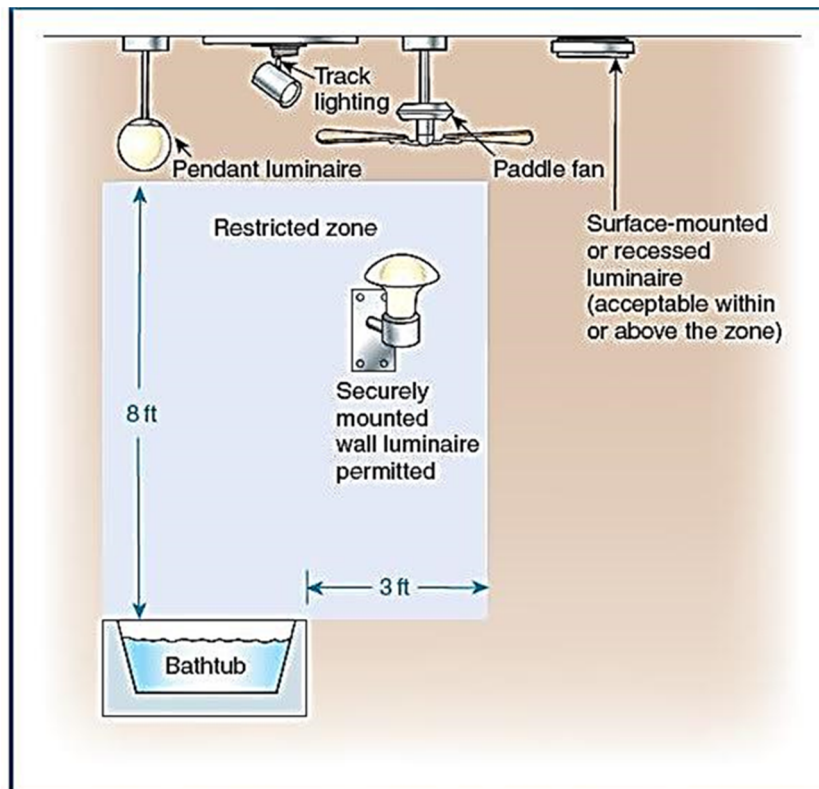


Exhibit 410.1 Luminaires, lighting track, and suspended (paddle) fan located near a bathtub.

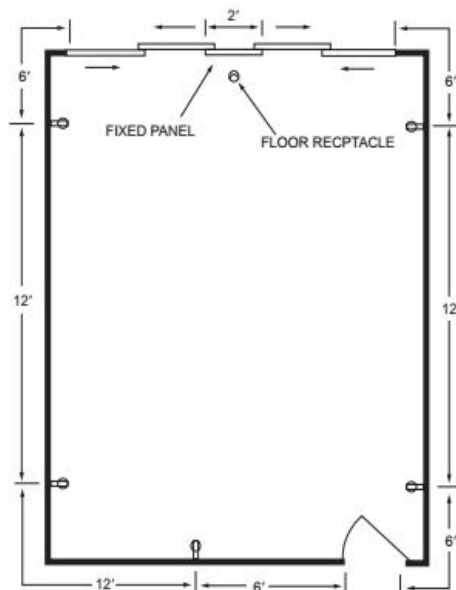
Receptacle Outlets E3901

Spacing. Receptacles shall be installed so that no point measured horizontally along the floor line of any wall space is more than 6' from a receptacle outlet. E.3901.2.1

Floor receptacles. Receptacle outlets in floors shall not be counted as part of the required number of receptacle outlets except where located within 18 inches of the wall. E3901.2.3

Basements, garages, and accessory buildings. Not less than one receptacle outlet, in addition to any provided for specific equipment, shall be installed in each separate unfinished portion of a basement; in each vehicle bay not more than 5.5 feet above the floor in attached garages; in each vehicle bay not more than 5.5 feet above the floor in detached garages that are provided with electric power and in accessory buildings that are provided with electric power. E3901.9

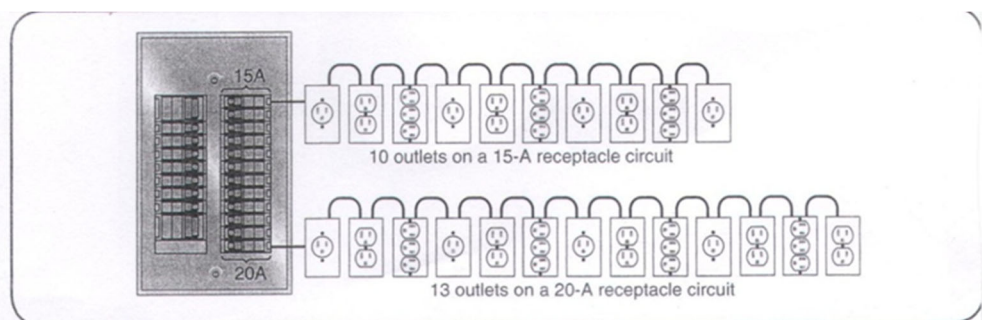
Hallways. Hallways of 10 feet or more in length shall have at least one receptacle outlet. E3901.10



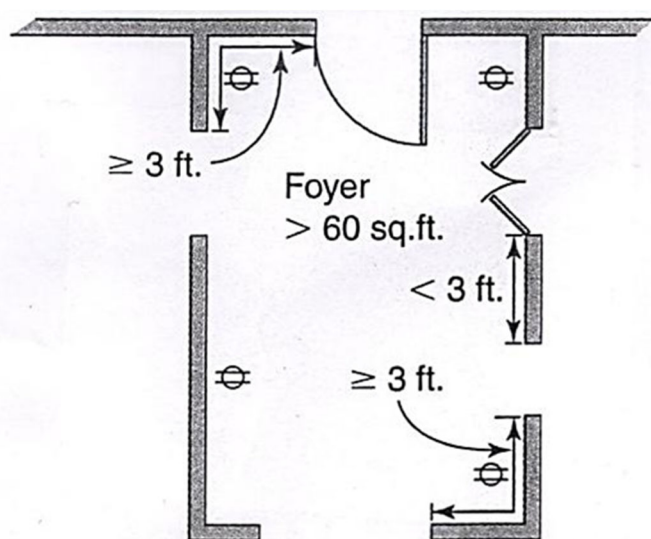
For SI: 1 foot = 304.8 mm.

FIGURE E3901.2
GENERAL USE RECEPTACLE DISTRIBUTION

EXHIBIT 220.4 Maximum number of outlets permitted on 15- and 20-ampere branch circuits.



Foyers. Foyers that are not part of a hallway and that have an area that is greater than 60 ‘ shall have a receptacle(s) located in each wall space that is 3 feet or more in width and unbroken by doorways, floor to ceiling windows, and similar openings. E3901.11



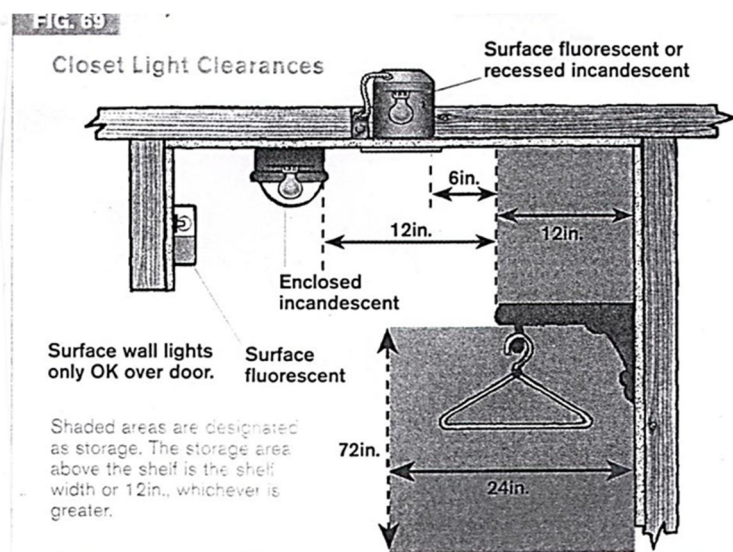
Receptacle outlets in foyers.

Outdoor outlets. Not less than one receptacle outlet that is readily accessible from grade level and located not more than 6 feet, 6 inches above grade, shall be installed outdoors at the front and back of each dwelling unit having direct access to grade level. Balconies, decks, and porches that are accessible from inside of the dwelling unit shall have at least one receptacle outlet installed within the perimeter of the balcony, deck, or porch. The receptacle shall be located not more than 6 feet, 6 inches above the balcony, deck, or porch surface. R3901.7

HVAC outlet. A 125 volt, single phase, 15 or 20 ampere rated receptacle outlet shall be installed at an accessible location for the servicing of heating, air-conditioning, and refrigeration equipment. The receptacle shall be located on the same level and within 25'. E3901.12

Storage or equipment spaces. In attics, under floor spaces, utility rooms, and basements, at least one lighting outlet shall be installed where these spaces are used for storage or contain equipment requiring servicing. E3903.4

Luminaires in clothes closets. E4003.12



Smoke & Carbon Monoxide Alarms

Location. Smoke alarms shall be installed in the following locations: E314.3

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 but not including crawl spaces and uninhabitable *attics*.

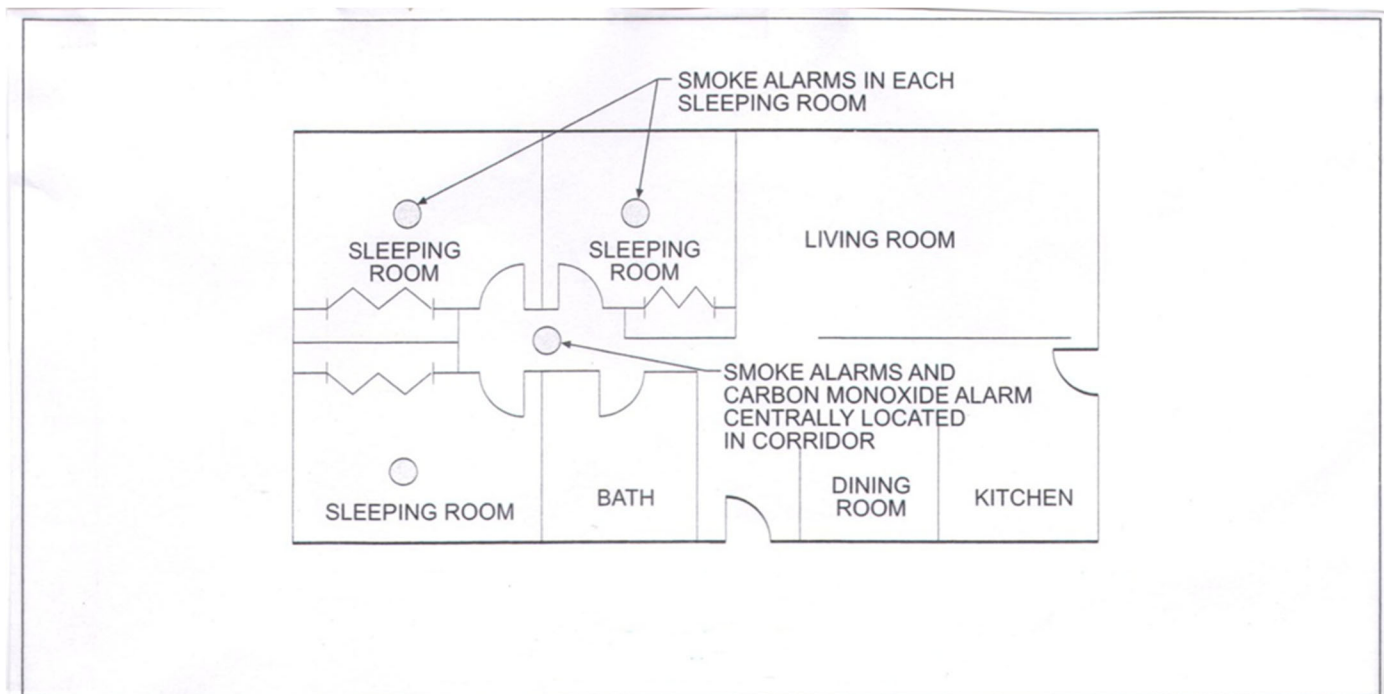
Alterations, repairs and additions. Where *alterations, repairs or additions* requiring a permit occur, the individual *dwelling unit* shall be equipped with smoke alarms located as required for *dwellings*.

Exception:

1. Work involving the exterior surfaces of *dwellings*, such as the replacement of roofing or siding, the *addition* or replacement of windows or doors, or the addition of a porch or deck.
2. Installation, alteration or repairs of plumbing or mechanical systems.

Power source. 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. R314.4

Carbon monoxide alarms. For new construction, an approved carbon monoxide alarm shall be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms *dwelling units* within which fuel-fired *appliances* are installed and in dwelling units that have attached garages.



GFIC & AFCI Protection

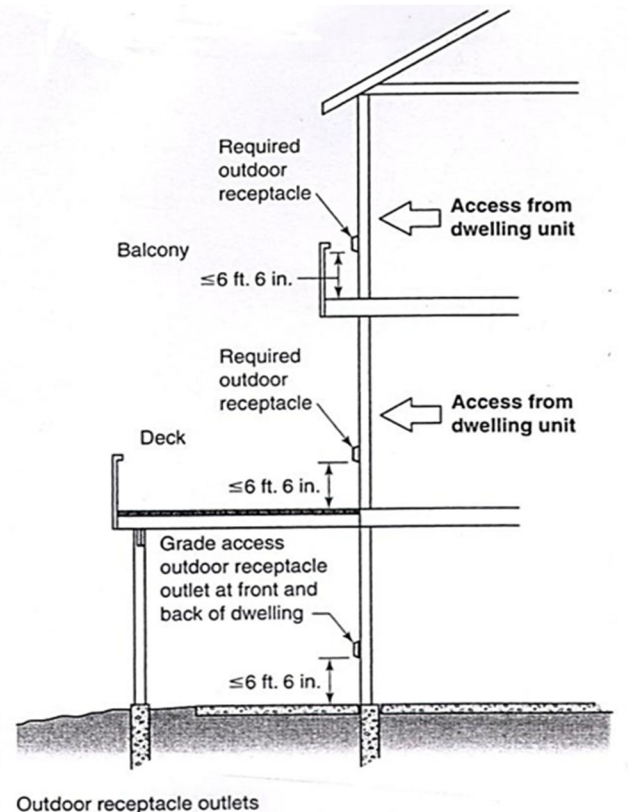
Bathroom receptacles. 125-volt, single-phase, 15- and 20-ampere receptacles installed in bathrooms shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(1)] E3902.1

Garage and accessory building receptacles. 125-volt single-phase, 15-, 20-ampere receptacles installed in garages and grade-level portions of unfinished accessory buildings used for storage or work areas shall have ground fault circuit-interrupter protection for personnel. [210.8(A)(2)] E3902.2

Outdoor receptacles. 125-volt, single phase, 15- and 20-ampere receptacles installed outdoors shall have round-fault circuit-interrupter protection for personnel. E3902.3

Damp or wet locations. In damp or wet locations, boxes, conduit bodies and fittings shall be placed or equipped so as to prevent moisture from entering or accumulating within the box, conduit body or fitting. E3905.11

Crawl space receptacles and lighting outlets. Where a crawl space is at or below grade level, 125-volt, single-phase, 15- and 20- ampere receptacles installed in such spaces shall have ground-fault circuit-interrupter protection for personnel. Lighting outlets not exceeding 120 volts shall have ground-fault circuit-interrupter protection. [210.8(A)(4) 2018E] E3902.4



Unfinished basement receptacles. 125-volt, single-phase, 15- and 20-ampere receptacles installed in unfinished basements shall have ground-fault circuit-interrupter protection for personnel. For purposes of this section, unfinished basements are defined as portions or areas of the basement not intended as habitable rooms. [210.8(A)(5)] E3902.5

Kitchen receptacles. 125-volt, single-phase, 15- and 20-ampere receptacles that serve countertop surfaces shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(6)] E3902.6

Sink receptacles. 125-volt, single-phase, 15- and 20-ampere receptacles that are located within 6 feet of the top inside edge of the bowl of the sink shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(7)] E3902.7

Bathtub or shower stall receptacles. 125-volt, single phase, 15_ and 20-ampere receptacles that are located within 6 feet of the outside edge of a bathtub or shower stall shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(8)] E3902.8

Laundry areas. 125-volt, single-phase, 15- and 20-ampere receptacle installed in laundry areas shall have ground-fault circuit-interrupter protection for personnel. [210.8(A)(9)] E3902.9

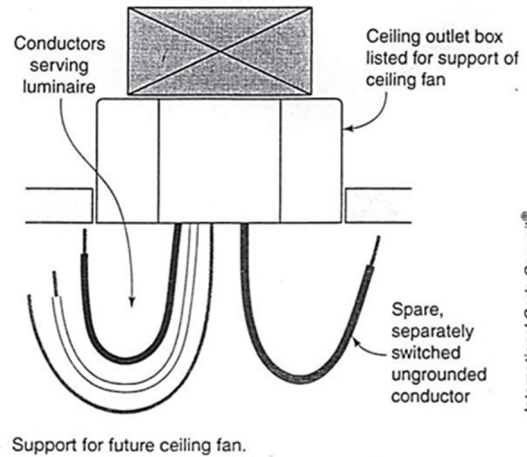
Kitchen dishwasher branch circuit. Ground-fault circuit-interrupter protection shall be provided for outlets that supply dishwasher in dwelling unit locations. [210.8(D)] E3902.10

Arc fault circuit interrupter protection. All branch circuits that supply 120 volt, single phase, 15 and 20 ampere outlets installed in bedrooms areas shall be protected by a combination type arc fault circuit interrupter installed to provide protection of the branch circuit. E3902.16

Ceiling outlets. At every outlet used exclusively for lighting, the box shall be designed or installed so that a luminaire or lamp holder can be attached. Such boxes shall be capable of supporting a luminaire weighing up to 50 pounds. A luminaire that weighs more than 50 pounds shall be supported independently of the outlet box, unless the outlet box is listed and marked for the maximum weight to be supported. E3905.6.2

Boxes at fan outlets. Outlet boxes and outlet box systems used as the sole support of ceiling suspended fans (paddle) shall be marked by their manufacturer as suitable for this purpose and shall not support ceiling suspended fans (paddle) that weigh more than 70 pounds. For outlet boxes and outlet box systems designed to support ceiling suspended fans (paddle) that weigh more than 35 pounds, the required marking shall include the maximum weight to be supported.

Where spare, separately switched, ungrounded conductors are provided to a ceiling mounted outlet box and such box is in a location acceptable for a ceiling suspended (paddle) fan, the outlet box or outlet box system shall be listed for sole support of a ceiling suspended (paddle) fan. E3905.8



Surface mounting. An enclosure mounted on a building or other surface shall be rigidly and securely fastened in place. If the surface does not provide rigid and secure support, additional support in accordance with other provisions of Section E3906.8 shall be provided. E3906.8.1

Structural mounting. An enclosure supported from a structural member of a building or from grade shall be rigidly supported either directly, or by using a metal, polymeric or wood brace. E3906.8.2

Miscellaneous.

- Supports 4 1/2 apart or within 12" of the box
- Protection from physical damage. Where subject to physical damage, cables shall be protected by conduit. E3802.3.2
- All electrical wiring must have nail protection (steel plates) across all studs, top and bottom plates where wires pass within one and one quarter inch of the edge.
- Disconnect in sight of HVAC
- Water heater disconnect in sight or lockable breaker.

Branch circuits for air-conditioning and heat pump equipment. The ampacity of the conductors supplying multi-motor and combination load equipment shall be not less than the minimum circuit ampacity marked on the equipment the branch circuit overcurrent device rating shall be the size and type marked on the appliance. E3702.11

Box Fill

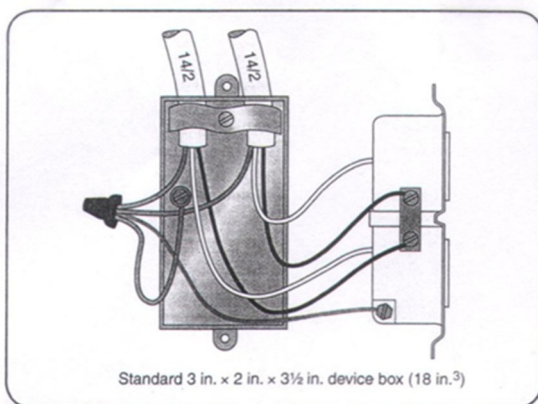


EXHIBIT 314.2 Example 2: A standard-sized device box containing a device and conductors requiring deductions in accordance with 314.16.

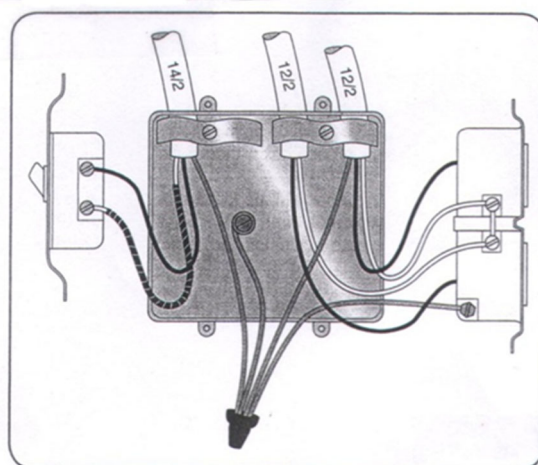


EXHIBIT 314.3 Example 3:

Commentary Table 314.2 Total box fill for example 2

Items contained within Box	Volume Allowance	Unit Volume Based on Table 314.16(B) (in. ³)	Total Box Fill (in. ³)
4 Conductors	4 volume allowances for 14 AWG conductors	2.00	8.00
1 clamp	1 volume allowance (based on 14 AWG conductors)	2.00	2.00
1 device	2 volume allowances (based on 14 AWG conductors)	2.00	4.00
Equipment grounding conductors (all)	1 volume allowance (based on 14 AWG conductors)	2.00	2.00
Total			16.00

Commentary Table 314.3 Total box fill for example 3

Items contained within Box	Volume Allowance	Unit Volume Based on Table 314.16(B) (in. ³)	Total Box Fill (in. ³)
6 Conductors	2 volume allowances for 14 AWG conductors	2.00	4.00
	4 volume allowances for 12 AWG conductors	2.25	9.00
2 clamps	1 volume allowance (based on 12 AWG conductors)	2.25	2.25
2 devices	2 volume allowances (based on 14 AWG conductors)	2.00	4.00
	2 volume allowances (based on 12 AWG conductors)	2.25	4.50
Equipment grounding conductors (all)	1 volume allowance (based on 12 AWG conductors)	2.25	2.25
Total			26.00

Commentary Table 314.1 Summary of Items Contributing to Box Fill

Items Contained within Box	Volume Allowance	Based on (See Table 314.16(B))
Conductors that originate outside box	One for each conductor	Actual conductor size
Conductors that pass through box without splice or connection (less than 12 in. in total length)	One for each conductor	Actual conductor size
Conductors 12 in. or greater that are looped (or coiled) and unbroken (see 300.14 for exact measurement)	Two for a single (entire) unbroken conductor	Actual conductor size
Conductors that originate within box and do not leave box	None (these conductors not counted)	n.a.
Fixture wires [per 314.16(B)(1), Exception]	None (these conductors not counted)	n.a.
Internal cable clamps (one or more)	One only	Largest sized conductor present
Support fittings (such as luminaire studs or hickey)	One for each type of support fitting	Largest sized conductor present
Devices (such as receptacles, switches) or utilization equipment (such as timers, dimmers, AFCI receptacles, GFCI receptacles, TVSS receptacles)	Two for each yoke or mounting strap	Largest sized conductor connected to device or utilization equipment
Equipment grounding conductor (one or more)	One only	Largest isolated and insulated equipment grounding conductor present
Isolated equipment grounding conductor (one or more) [see 250.146(D)]	One only	

TABLE E3905.12.2.1 [Table 314.16(B)]
VOLUME ALLOWANCE REQUIRED PER CONDUCTOR

SIZE OF CONDUCTOR	FREE SPACE WITHIN BOX FOR EACH CONDUCTOR (cubic inches)
18 AWG	1.50
16 AWG	1.75
14 AWG	2.00
12 AWG	2.25
10 AWG	2.50
8 AWG	3.00
6 AWG	5.00

For Slt: 1 cubic inch = 16.4 cm³.

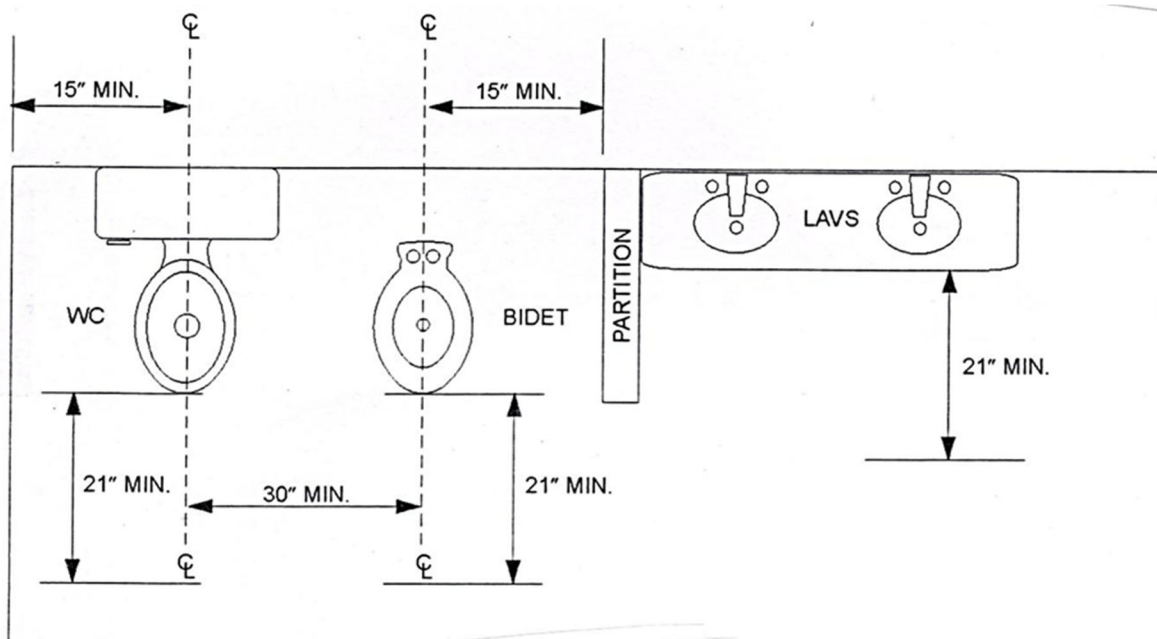
Plumbing P2601

Water Supply

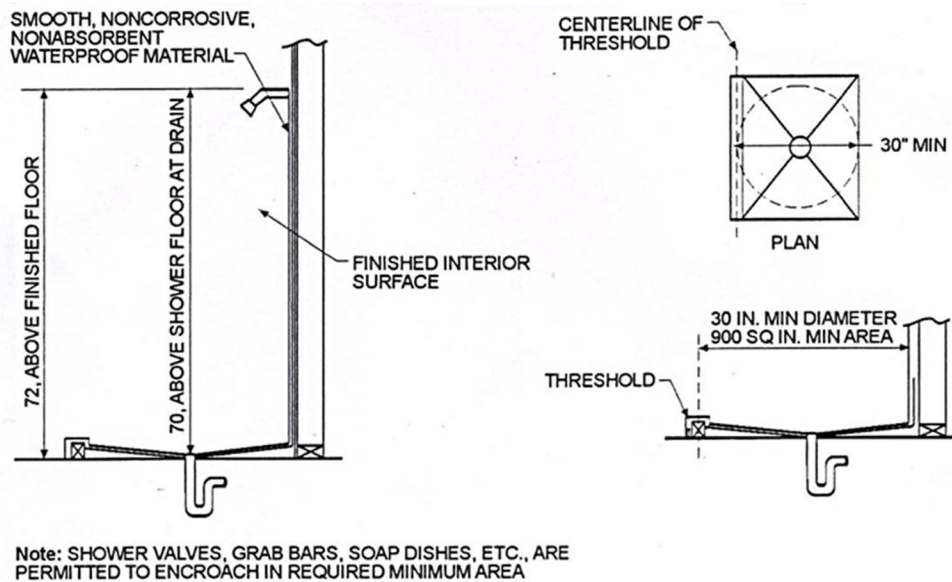
- Water service main, branch main and risers pipe shall not be less than 3/4" diameter. P2903.7
- Water supply system testing. An air test of not less than 50 psi this pressure shall be held for not less than 15 minutes. P2503.7
- Water service minimum depth shall be installed a minimum of 24 inches deep. P2603.5
- The static water pressure shall be not greater than 80 psi. When main pressure exceeds 80 psi, an approved pressure reducing valve shall be installed. P2903.3.1
- Backflow prevention for the protection from fire sprinkler, irrigation systems, or other connections. P2902.3

Fixtures

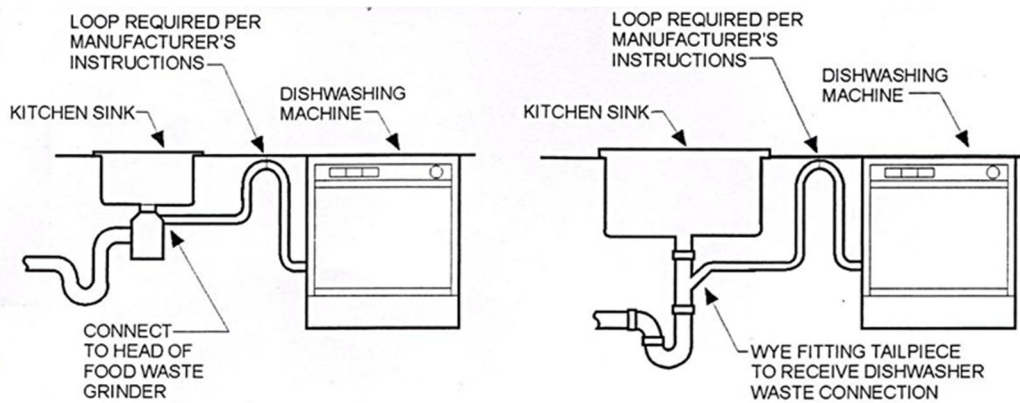
- An individual shutoff valve shall be required on the fixture supply pipe to each plumbing fixture other than bathtubs and showers. P2903.9.3
- Whirlpool tubs. An opening of not less than 12" by 12" shall be installed for access to the circulation pump. Where pumps are located more than 2' from the access opening, an opening of not less than 18" by 18" shall be installed. P2720.1
- Water closet shall not be set closer than 15" from its center to any side wall and not less than 21" in front to any wall fixture or door. P2705.1



- Shower compartments shall have not less than 30" in minimum dimension measured from the finished interior dimension of the shower compartment. P2708.1



- The combined discharge from a sink, dishwasher, and waste grinder is permitted to discharge through a single 1 1/2" trap. P2716.1



- Standpipes shall extend not less than 18" but not greater than 42. P2706.1.2

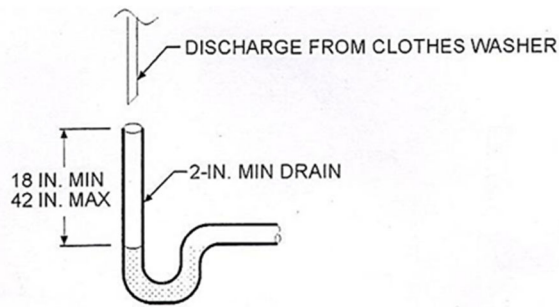


Figure P2706.2
STANDPIPES

Drainage and Vent Systems

- Vent and branch vent pipes shall be graded, connected, and supported to allow moisture and condensate to drain back to the soil or waste pipe by gravity. P31042.2
- Within each plumbing system, not less than one stack vent or a vent stack shall extend outdoors to the open air. P3114.7
- **Location of vent terminal.** An open vent terminal from a drainage system shall not be located less than 4 feet directly beneath any door, openable window, or other air intake opening of the building or of an adjacent building, nor shall any such vent terminal be within 10 feet horizontally of such an opening unless it is not less than 3 feet above the top of such opening.

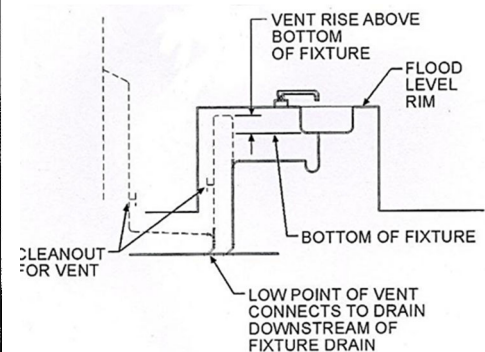
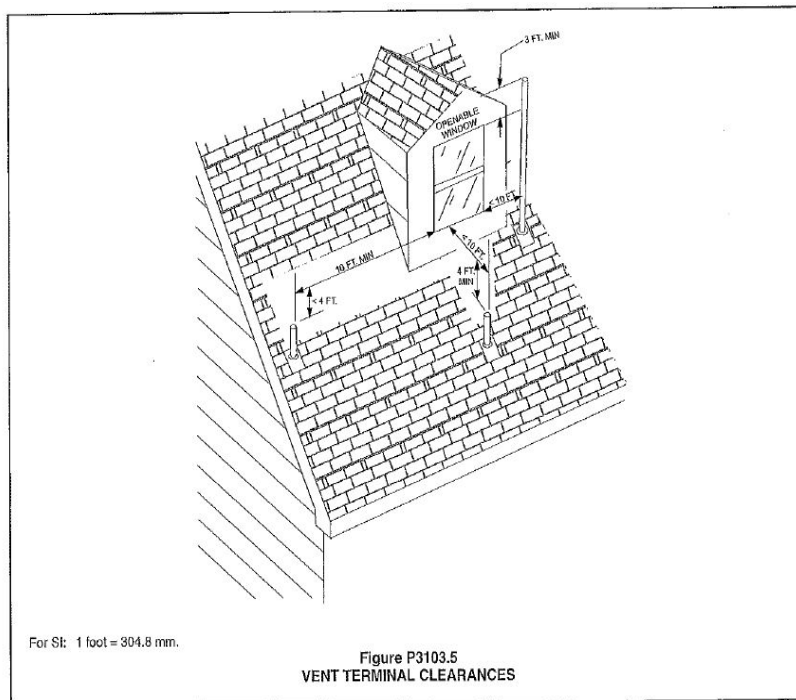
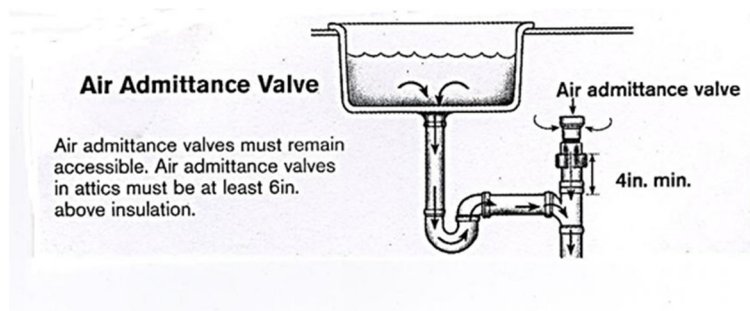


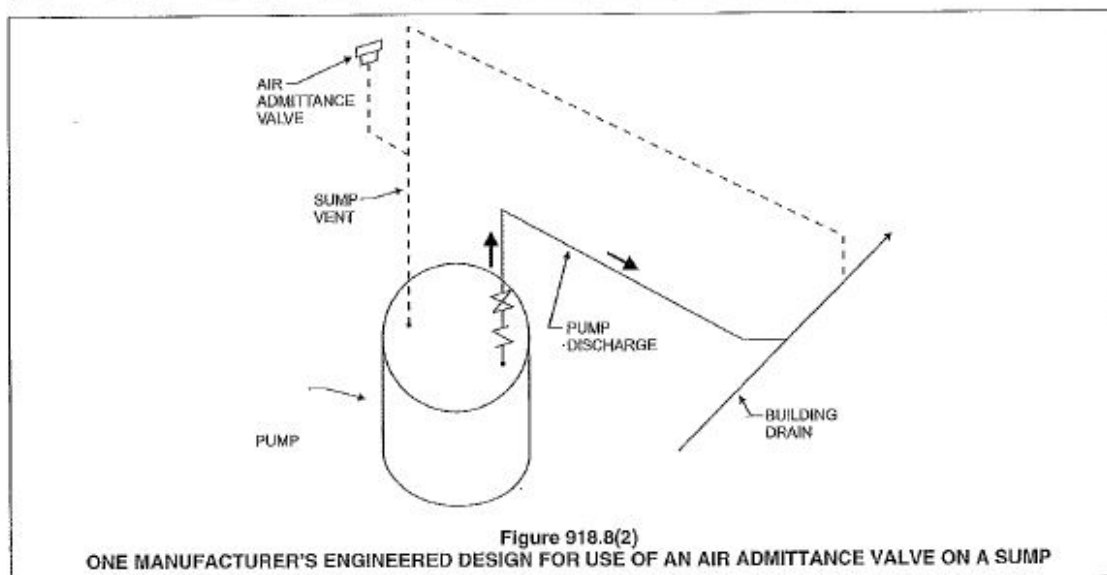
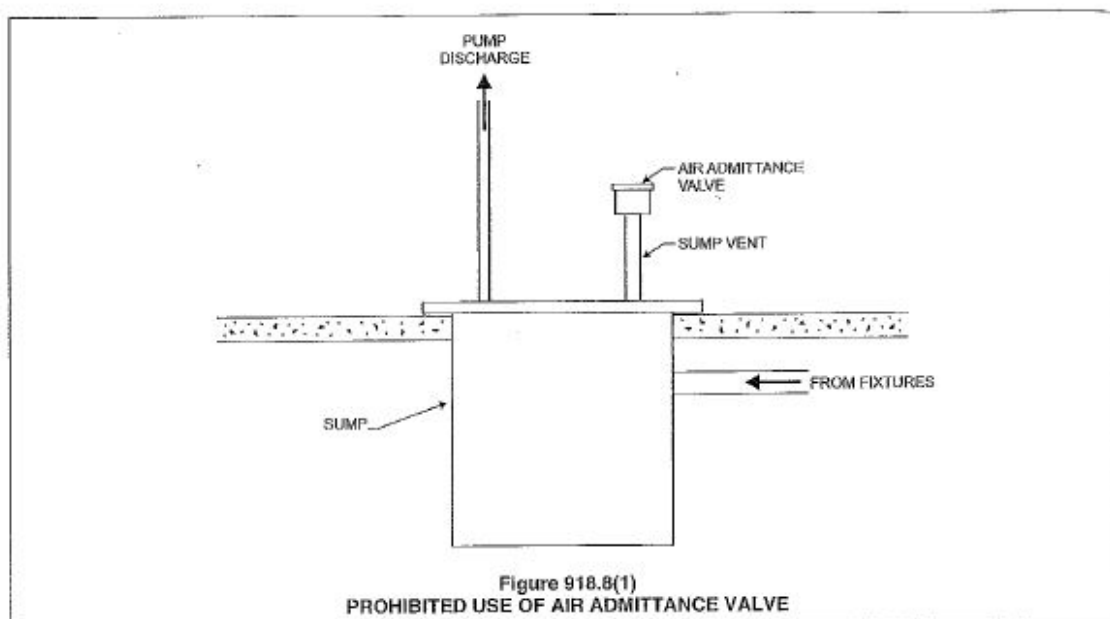
Figure P3112.2
ISLAND FIXTURE VENT

- Open vent pipes that extend through a roof shall be terminated not less than 6" above roof. P3103.1
- The island fixture vent shall connect to the fixture drain as required for an individual or common vent. The vent shall rise vertically to above the drainage outlet of the fixture being vented before offsetting horizontally or vertically downward. The vent or branch vent for multiple island fixture vents shall extend not less than 6 inches above the highest island fixture being vented before connecting to the outside vent terminal.

- Air admittance valves shall be located not less than 4" above the horizontal branch drain or fixture drain being vented. Stack type air admittance valves shall be located not less than 6" above the flood level rim of the highest fixture being vented. The air admittance valve shall be located within the maximum developed length permitted for the vent. The air admittance valve shall be installed not less than 6 inches above insulation materials where installed in attics. P3114.4



Prohibited installations. *Air admittance valves* shall not be used to vent sumps or tanks except where the vent system for the sump or tank has been designed by an engineer. *Air admittance valves* shall not be installed on outdoor vent terminals for the sole purpose of reducing clearances to gravity or mechanical air intakes. P3114.8



Maximum Distance of Fixture Trap From Vent		
Size of Trap (inches)	Slope (inch per foot)	Distance from Trap (feet)
1 1/4	1/4	5
1 1/2	1/4	6
2	1/4	8
3	1/8	12
4	1/8	16

- Horizontal drainage piping shall be installed in uniform alignment at uniform slopes not less than 1/4" per foot for 3" diameter and less, and not less than 1/8" per foot for diameters of 4" or more. 3005.3
- Floor drains shall have waste outlets not less than 2" in diameter and removable. P2719.1

TABLE P2605.1
PIPING SUPPORT

PIPING MATERIAL	MAXIMUM HORIZONTAL SPACING (feet)	MAXIMUM VERTICAL SPACING (feet)
ABS pipe	4	10 ^b
Aluminum tubing	10	15
Cast-iron pipe	5 ^a	15
Copper or copper-alloy pipe	12	10
Copper or copper-alloy tubing (1 1/4 inches in diameter and smaller)	6	10
Copper or copper-alloy tubing (1 1/2 inches in diameter and larger)	10	10
Cross-linked polyethylene (PEX) pipe, 1 inch and smaller	2.67 (32 inches)	10 ^b
Cross-linked polyethylene (PEX) pipe, 1 1/4 inch and larger	4	10 ^b
Cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX) pipe	2.67 (32 inches)	4 ^b
CPVC pipe or tubing (1 inch in diameter and smaller)	3	10 ^b
CPVC pipe or tubing (1 1/4 inches in diameter and larger)	4	10 ^b
Lead pipe	Continuous	4
PB pipe or tubing	2.67 (32 inches)	4
Polyethylene of raised temperature (PE-RT) pipe, 1 inch and smaller	2.67 (32 inches)	10 ^b
Polyethylene of raised temperature (PE-RT) pipe, 1 1/4 inch and larger	4	10 ^b
Polypropylene (PP) pipe or tubing (1 inch and smaller)	2.67 (32 inches)	10 ^b
Polypropylene (PP) pipe or tubing (1 1/4 inches and larger)	4	10 ^b
PVC pipe	4	10 ^b
Stainless steel drainage systems	10	10 ^b
Steel pipe	12	15

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

maximum horizontal spacing of cast-iron pipe hangers shall be increased to 10 feet where 10-foot lengths of pipe are installed.

b. For sizes 2 inches and smaller, a guide shall be installed midway between required vertical supports. Such guides shall prevent pipe movement in a direction perpendicular to the axis of the pipe.

Sumps and Ejectors

- Building sub-drains that cannot be discharged to the sewer by gravity flow shall be discharged into a tightly covered and vented sump from which the liquid shall be lifted and discharged into the building gravity drainage system by automatic pumping equipment or other approved method. P3007.1
- A check valve and full open valve located on the discharge side of the check valve shall be installed in the pump or ejector discharge piping between the pump or ejector and the gravity drainage system. P3007.2

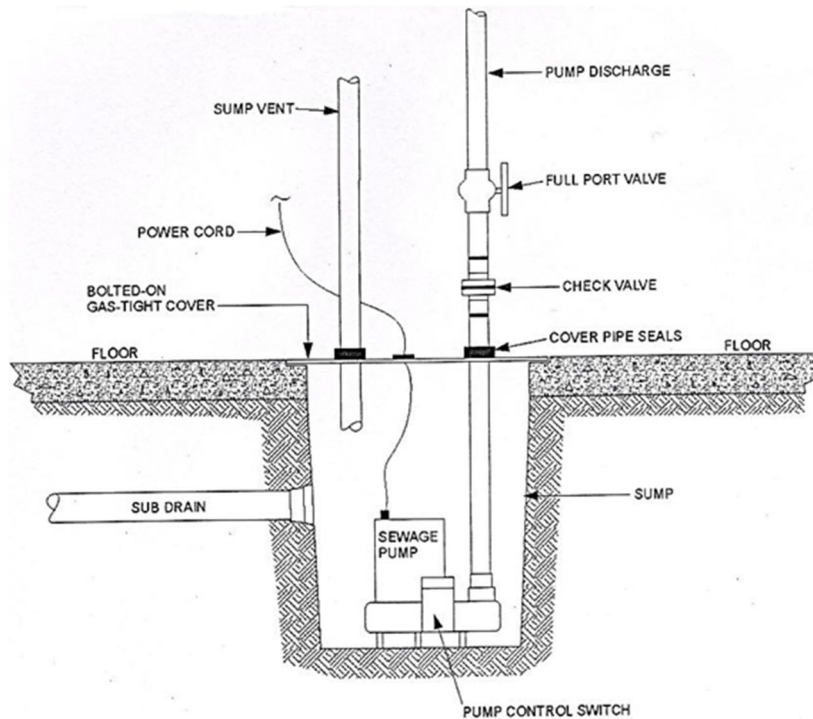
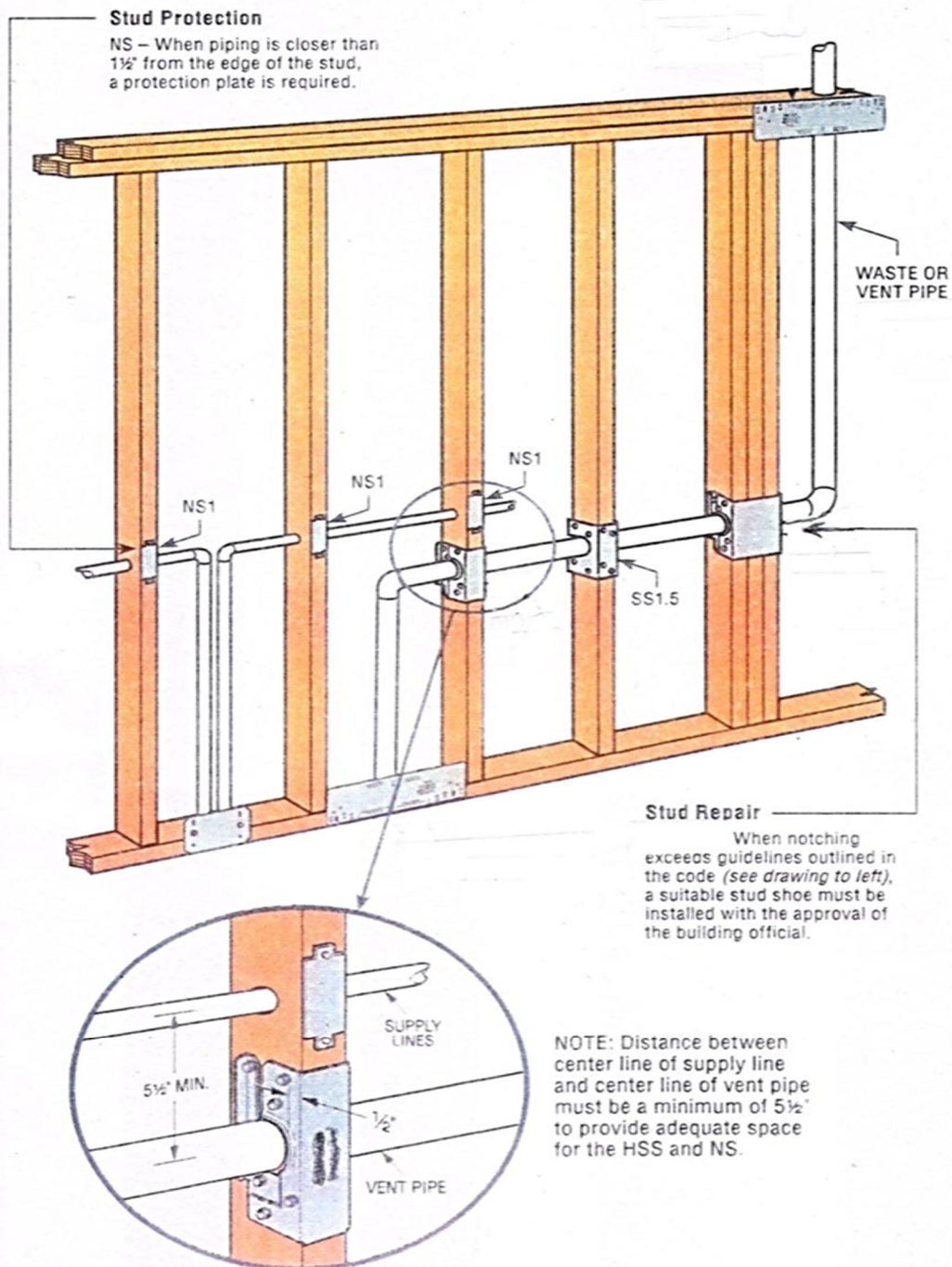


Figure P3007.1
SUBMERSIBLE SEWAGE PUMP

Drilling and Notching

- In the process of installing or repairing any part of a plumbing and drainage installation, the finished floors, walls, ceilings, tile work, or any other part of the building or premises that must be changed or replaced shall be left in a safe structural condition in accordance with the requirements of the building portion of this code. P2603.1
- Wood-framed structural members shall not be drilled, notched or altered in any manner except as provided in Sections R502, R602, R802, and R802. P2603.2
- In concealed locations, where piping, other than cast-iron or galvanized steel, is installed through holes or notches in studs, joists, rafters, or similar members less than 1 1/2" from the nearest edge of the member, the pipe shall be protected by steel shield plates. P2603.2.1
- Pipes passing through concrete or cinder walls and floors, cold-formed steel framing or other corrosive material shall be protected against external corrosion by a protective sheathing or wrapping or other means that will withstand any reaction from lime and acid of concrete, cinder, or other corrosive material.

REPAIRS/PROTECTION – IRC/IBC/IPC/IMC/UBC/UPC



Sewer Lateral

- Minimum 4" sch 40 pipe for sewer lateral.
- There shall be a clean out near the junction of the building drain and building sewer. Such cleanouts may be installed outside of the building within 5' of the building wall.
- All one and two family dwellings shall have a backwater valve installed to prevent the possibility of sewage backup into the residence. Backwater valves shall be installed with access. Ozark Ordinance Section 103-2(K)
- Where trenches are excavated such that the bottom of the trench forms the bed for the pipe, solid and continuous load bearing support shall be provided between joints. Where over-excavated, the trench shall be backfilled to the proper grade with compacted earth, sand, fine gravel or similar granular material. Piping shall not be supported on rocks or blocks at any point. Rocky or unstable soil shall be brought to the proper grade with suitable compacted granular material. P2604.1
- Backfill shall be free from discarded construction material and debris. Backfill shall be free from rocks, broken concrete and frozen chunks until the pipe is covered by not less than 12" of tamped earth. P2604.3

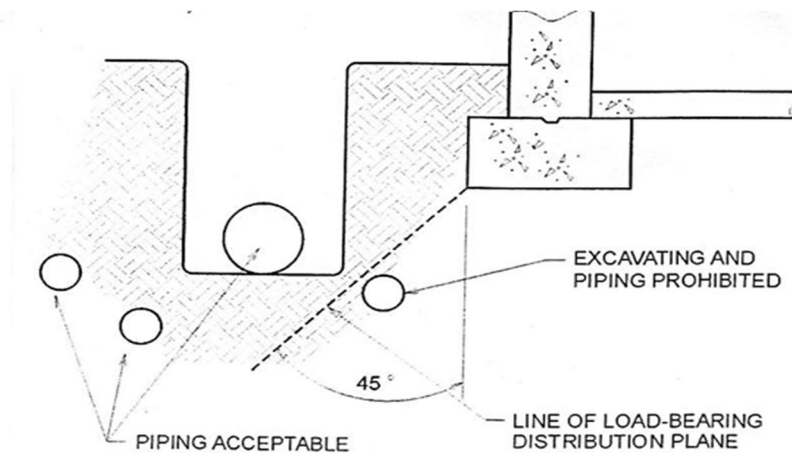


Figure P2604.4
EXCAVATION IN RELATION TO FOOTING

Gas Piping Systems. 2401

- The test pressure to be used shall be not less than 3 psi of design pressure. G2417.4.1
- The test duration shall be not less than 10 minutes. G2417.4.2
- **Prohibited locations.** Piping shall not be installed in or through a ducted supply, return or exhaust, or a clothes chute, chimney or gas vent, dumbwaiter or elevator shaft. Piping installed downstream of the point of delivery shall not extend through any townhouse unit other than the unit served by such piping. G2415.3
- **Fittings in concealed locations.** Fittings installed in concealed locations shall be limited to the following types:
 1. Threaded elbows, tees and couplings
 2. Brazed fittings.
 3. Welded fittings.
 4. Fittings listed to ANSI LC1/CSA 6.26 or ANSI LC4/ CSA 6.32.

- **Protection against physical damage.** Where *pipng* will be concealed within light-frame construction assemblies, the *pipng* shall be protected against penetration by fasteners in accordance with Sections F2415.7.1 through G2415.7.3
 - Exception:** Black steel *pipng* and galvanized steel *pipng* shall not be required to be protected.
- **Located within same room.** The shutoff valve shall be located in the same room as the *appliance*. The shutoff valve shall be within 6 feet of the *appliance*, and shall be installed upstream of the union, connector or quick disconnect device it serves. Such shutoff *valves* shall be provided with *access*. Shutoff valves serving movable appliances, such as cooking appliances and clothes dryers, shall be considered to be provided with access where installed behind such appliances. *Appliance shutoff valves* located in the firebox of a *fireplace* shall be installed in accordance with the *appliance* manufacturer's instructions. G2420.5.1
- **Protection from damage.** Connectors and *tubng* shall be installed so as to be protected against physical damage. G2422.1.1
- **Connector installation.** *Appliance* fuel connectors shall be installed in accordance with the manufac-
- **Minimum size.** Connectors shall have the capacity of the total *demand* of the connected *appliance*. G2422.1.2.2
- **Prohibited locations and penetrations.** Connectors shall not be concealed within, or extended through, walls, floors, partitions, ceilings or *appliance* housings. G2422.1.2.3
- Every meter shall be equipped with a shut-off valve located on the supply side of the meter. G2420.2

Mechanical

General Requirements M1301

- Appliances shall be accessible for inspection, service, repair and replacement without removing permanent construction, other appliances or any other piping or ducts not connected to the appliance being serviced, repaired or replaced. M1305.1
- Attics containing appliances shall be provided with an opening and a clear and unobstructed passageway large enough to allow removal of the largest appliance, but not less than 30" high and 22" wide and not more than 20' long measured along the centerline of the passageway from the opening to the appliance. The passageway shall have continuous solid flooring less than 24" wide. A level service space at least 30" deep and 30" wide shall be present along all sides of the appliance where access is required. The clear access opening dimensions shall be a minimum of 20" by 30", and large enough to allow removal of the largest appliance. M1305.1.3

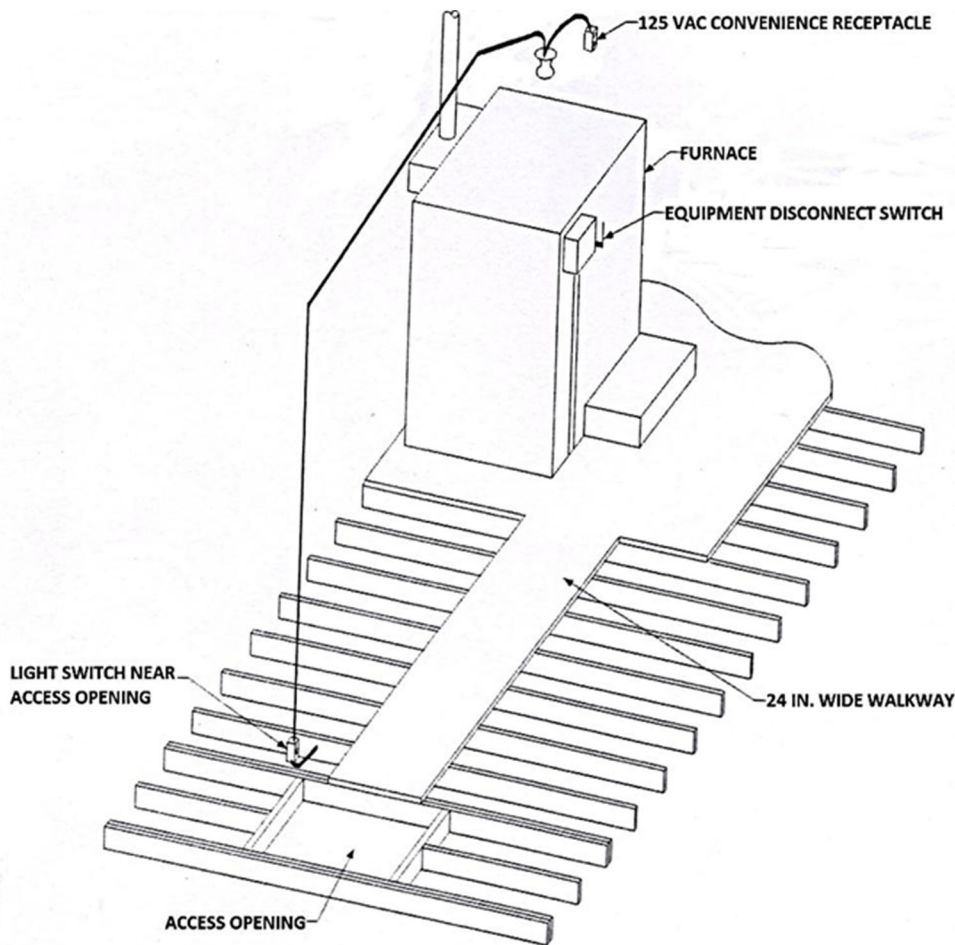


FIGURE M1305.1.3
REMOTE LOCATION REQUIREMENTS (ATTIC INSTALLATION)

- When a furnace is installed in an under floor area, it is suspended a minimum of 6" above grade or installed on a slab a minimum 4" thick. M1305.1.3.1
- Equipment installed in pits or excavated areas do not come in direct contact with the surrounding soil. Soils held back a minimum 12" from the equipment. When depth exceeds 12" below adjacent grade, the walls of the pit are lined with concrete or masonry extending a minimum 4" above grade. M1305.1.3.2
- A passageway is provided large enough to remove the largest piece of equipment, but no less than 22"x36" required to access equipment in under-floor areas and no longer than 20' in length. A 30"x30" working space is provided. M1305.1.3
- **Elevation of ignition source.** Appliances having an *ignition source* shall be elevated such that the source of ignition is not less than 18 inches above the floor in garages. For the purpose of this section, rooms or spaces that are not part of the *living space* of a *dwelling unit* and that communicate with a private garage through openings shall be considered to be part of the garage. . M1307.3
- Appliances shall not be installed in a location subject to vehicle damage except where protected by approved barriers. M1307.3.1
- Condensate from all cooling coils or evaporators shall be conveyed from the drain pan outlet to an approved place of disposal. M1411.3
- Refrigerant circuit access ports located outdoors shall be fitted with locking type tamper resistant caps or shall be otherwise secured to prevent unauthorized access. M1411.6
- Two permanent openings, one commencing within 12" of the top and one commencing within 12" of the bottom of the enclosure, shall be provided. The openings shall communicate directly, or by ducts, with the outdoors or spaces that freely communicate with the outdoors. M1307.4.1.1

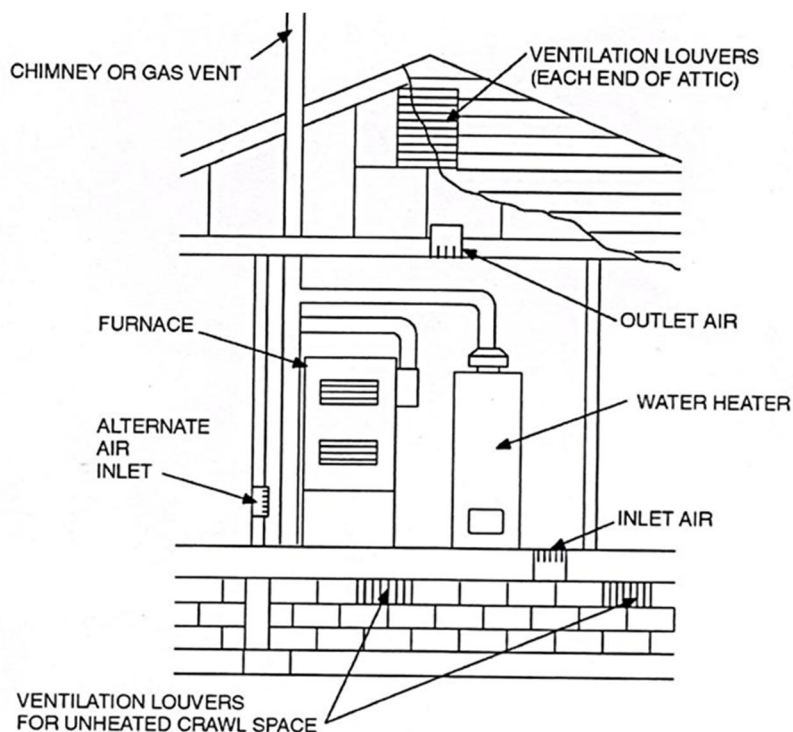


FIGURE G2407.6.1(1) [304.6.1(1)]
ALL AIR FROM OUTDOOR-INLET AIR FROM VENTILATED CRAWL SPACE AND OUTLET AIR TO VENTILATED ATTIC

Duct Installation M1601

- Joints, seams, and fittings, of ducts sealed with tapes, mastic, or other approved means. M1601.4.1
- Ducting (including enclosed stud bays or joist cavities used to transport air) installed outside the conditioned space have all seams and joints, both longitudinal and transverse, sealed. M1601.4.1
- Flex duct support with 1 1/2" strap every 4' or per manufacturer's specifications. (see figure 10)

4.8 Supporting Flexible Duct

Flexible duct shall be supported at manufacturer's recommended intervals, but at no greater distance than 5' [1.5 m]. Maximum permissible sag is 1/2" per foot [42 mm per meter] of spacing between supports.

A connection to rigid duct or equipment shall be considered a support joint. Long horizontal duct runs with sharp bends shall have additional supports before and after the bend approximately one duct diameter from the center line of the bend.

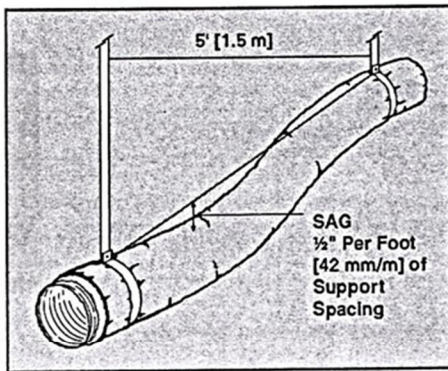


Figure 10

Hanger or saddle material in contact with the flexible duct shall be of sufficient width to prevent any restriction of the internal diameter of the duct when the weight of the supported section rests on the hanger or saddle material. In no case will the material contacting the flexible duct be less than 1 1/2" [38 mm] wide.

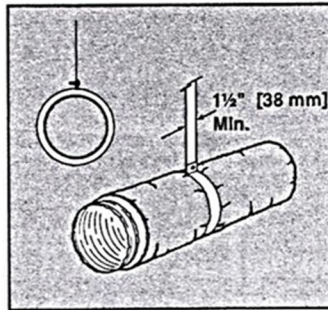
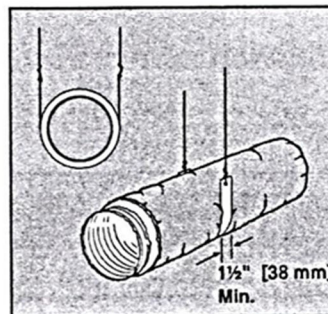


Figure 11



- Factory-made ducts listed in accordance with UL 181 shall be supported in accordance with the manufacturer's installation instructions. Field- and shop-fabricated fibrous glass ducts shall be supported in accordance with the SMACNA Fibrous Glass Duct Construction Standards or the NAIMA Fibrous Glass Duct Construction Standards. Field- and Shop-fabricated metal and flexible ducts shall be supported in accordance with the SMACNA HVAC Duct Construction Standard—Metal and Flexible. . M1601.4.4
- Fuel burning appliances shall be vented to the outdoors in accordance with their listing and label and manufacturer's installation instructions except appliances listed and labeled for unvented use. M1801.1
- Joints between sections of connector piping and connections to flue collars and draft hood outlets shall be fastened by one of the following methods: G2427.10.6
 1. Sheet metal screws
 2. Vent connectors of listed vent material assembled and connected to flue collars or draft hood outlets in accordance with the manufacturer's instructions.
 3. Other approved means.

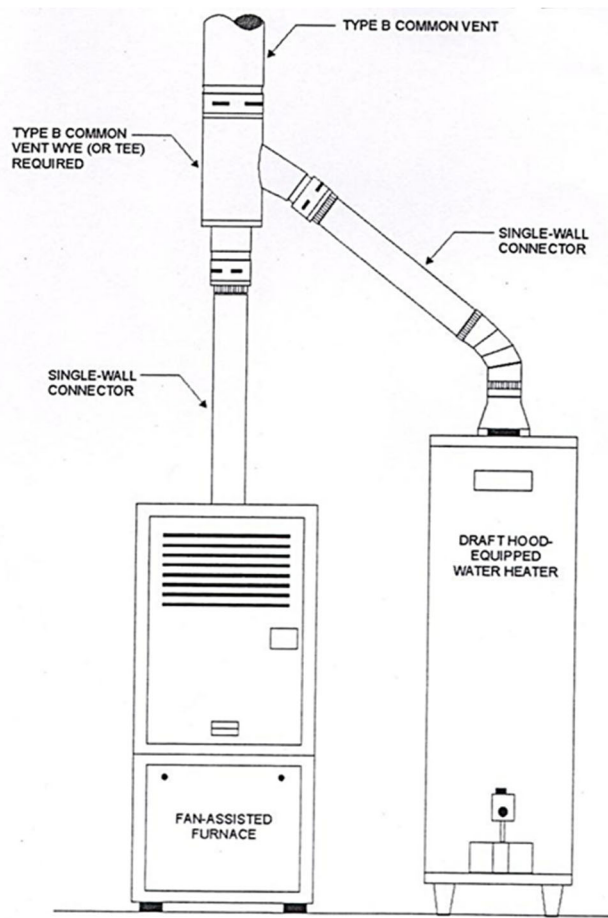


Figure G2428.3.9.1
SINGLE-WALL TEES AND WYES PROHIBITED IN TYPE B COMMON VENT SYSTEMS

- A Type B or L gas vent shall terminate at least 5 feet in vertical height above the highest connected appliance draft hood or flue collar. G2427.6.4

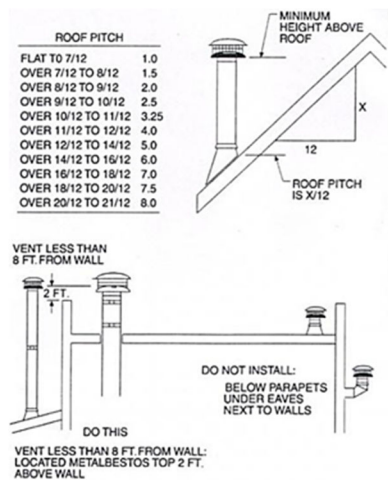
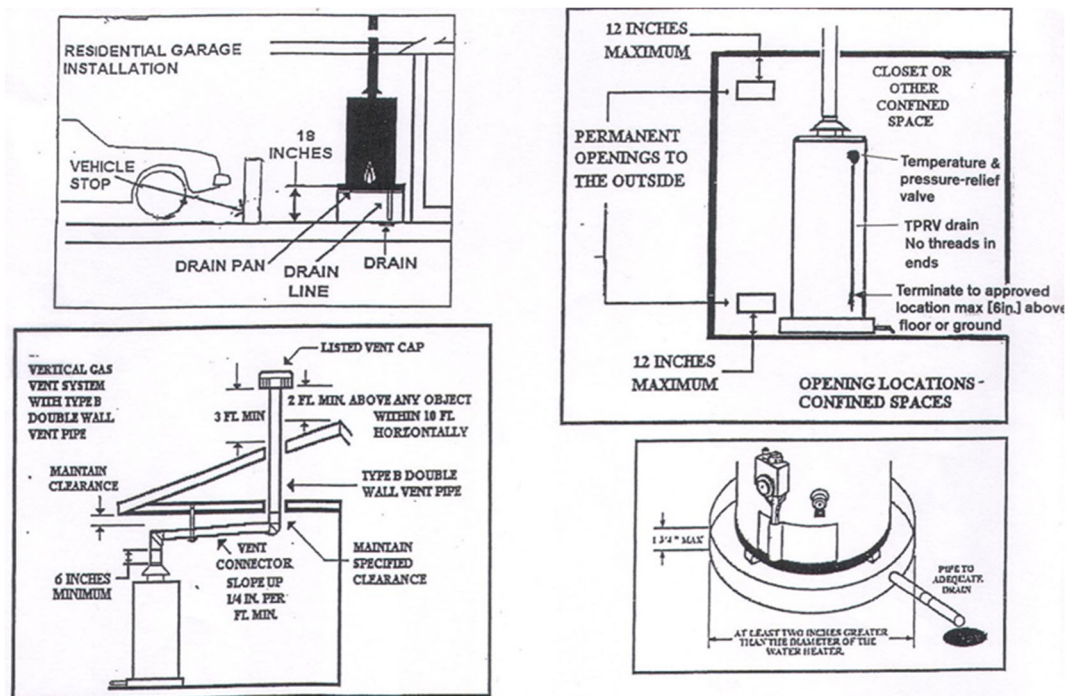


Figure courtesy of Selkirk, L.L.C.
For SI: 1 foot = 304.8 mm.

Figure G2427.6.3
TOP LOCATION RULES

Water Heaters M2005

- Fuel fired water heaters shall not be installed in a room used as a storage closet. Water heaters located in a bedroom or bathroom shall be installed in a sealed enclosure so that combustion air will not be taken from the living space. M2005.2
- Where a storage tank type water heater or a hot water storage tank is installed in a location where water leakage from the tank will cause damage. P2801.5
- Water heaters having an ignition source shall be elevated such that the source of ignition is not less than 18 inches above the floor. M2801.7
- Appliances shall not installed in a location subject to vehicle damage except where protected by approved barriers. M1307.3.1



Exhaust Systems M1501

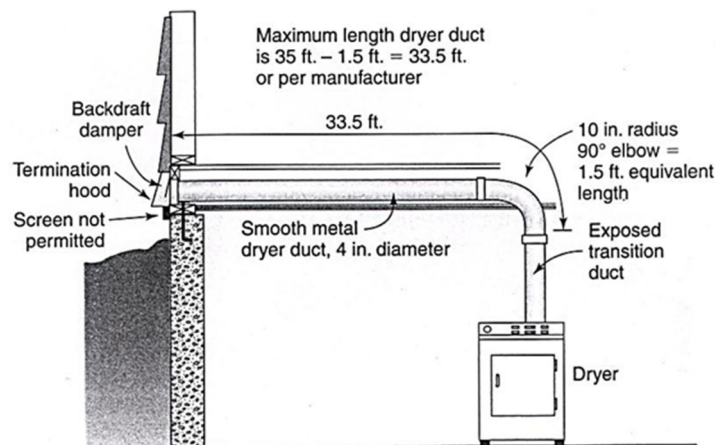
- The primary intent of this section is to avoid exhausting contaminants into areas that may be occupied by people or into concealed spaces such as attics and crawl spaces where moisture can damage the building components.
- The air removed by every mechanical exhaust system shall be discharged to the outdoors. Air shall not be exhausted into an attic, soffit, ridge vent or crawl space. M1501.1
- Clothes dryers shall be exhausted in accordance with the manufacturer's instructions. M1502.1
- Dryer exhaust systems shall be independent of all other systems and shall convey the moisture to the outdoors. M1502.2
- The maximum length of the exhaust duct shall be 35' from the connection to the transition duct from the dryer to the outlet terminal. Where fittings are used, the maximum length of the exhaust duct shall be reduced in accordance with Table M1502.4.5.1

**TABLE M1502.4.5.1
DRYER EXHAUST DUCT FITTING EQUIVALENT LENGTH**

DRYER EXHAUST DUCT FITTING TYPE	EQUIVALENT LENGTH
4-inch radius mitered 45-degree elbow	2 feet 6 inches
4-inch radius mitered 90-degree elbow	5 feet
6-inch radius smooth 45-degree elbow	1 foot
6-inch radius smooth 90-degree elbow	1 foot 9 inches
8-inch radius smooth 45-degree elbow	1 foot
8-inch radius smooth 90-degree elbow	1 foot 7 inches
10-inch radius smooth 45-degree elbow	9 inches
10-inch radius smooth 90-degree elbow	1 foot 6 inches

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.0175 rad.

- Exhaust ducts shall have a smooth interior finish and constructed of metal. The duct shall be 4" nominal in diameter. M1502.4.1



- Exhaust ducts shall be supported at intervals not to exceed 12 feet and shall be secured in place. Ducts shall not be joined with screws or similar fasteners that protrude more than 1/8" into the inside of the duct. M1502.4.2
- Range hoods shall discharge to the outdoors through a single wall duct. The duct serving the hood shall have a smooth interior surface, shall be air tight, shall be equipped with a back draft damper, and shall be independent of all other exhaust systems. Ducts serving range hoods shall not terminate in an attic or crawl space or areas inside the building. M1503.1

Fireplaces

Zero clearance fireplaces shall be installed in accordance with manufacturer's installation instructions.

Exterior Decks

Requirements R507

Deck. Wood-framed decks shall be in accordance with this section. For decks using materials and conditions not prescribed in the section, refer to Section R301.

Materials. Materials used for the construction of decks shall comply with this section. R507.2

Wood materials. Wood materials shall be No. 2 grade or better lumber, preservative-treated in accordance with Section R317, or *approved*, naturally durable lumber, and termite protected where required in accordance with Section R318. Where design in accordance with Section R301 is provided, wood structural members shall be designed using the wet service factor defined in AWC NDS. Cuts, notches and drilled holes of preservative-treated wood members shall be treated in accordance with Section R317.1.1. All preservative-treated wood products in contact with the ground shall be labeled for such usage. R507.2.1

Engineered wood products. Engineered wood products shall be in accordance with Section R502. R507.2.1.1

Plastic composite deck boards, stair treads, guards, or handrails. Plastic composite exterior deck boards, stair treads, guards and handrails shall comply with the requirements of ASTM D7032 and this section. R507.2.2

Labeling. Plastic composite deck boards and stair treads, or their packaging, shall bear a label that indicates compliance with ASTM D7032 and includes the allowable load and maximum allowable span determined in accordance with ASTM D7032. Plastic or composite handrails and guards, or their packaging, shall bear a label that indicates compliance with ASTM D7032 and includes the maximum allowable span determined in accordance with ASTM D7032.

Flame spread index. Plastic composite deck boards, stair treads, guards, and handrails shall exhibit a flame spread index not exceeding 200 when tested in accordance with ASTM E84 or UL 723 with the test specimen remaining in place during the test.

Exception: Plastic composites determined to be noncombustible.

Decay resistance. Plastic composite deck boards, stair treads, guards and handrails containing wood, cellulosic or other biodegradable materials shall be decay resistant in accordance with ASTM D7032. R507.2.2.3

Termite resistance. Where required by Section 318, plastic composite deck boards, stair treads, guards and handrails containing wood, cellulosic or other biodegradable materials shall be termite resistant in accordance with ASTM D7032. R507.2.2.4

Installation of plastic composites. Plastic composite deck boards, stair treads, guards and handrails shall be installed in accordance with this code and the manufacturer's instructions. R507.2.2.5

Fasteners and connectors. Metal fasteners and connectors used for all decks shall be in accordance with Section R317.3 and Table R507.2.3. R507.2.3

Flashing. Flashing shall be corrosion-resistant metal or nominal thickness not less than 0.019 inch or *approved* nonmetallic material that is compatible with the substrate of the structure and the decking materials.

Alternate materials. Alternative materials, including glass and metals, shall be permitted.

Footings. Decks shall be supported on concrete footings or other approved structural systems designed to accommodate all loads in accordance with Section R301. Deck footings shall be sized to carry the imposed loads from the deck structure to the ground as shown in Figure R507.3. The footing depth shall be in accordance with Section R403.1.4.

Exception. Free-standing decks consisting of joists directly supported on grade over their entire length.

TABLE R507.2.3
FASTENER AND CONNECTOR SPECIFICATIONS FOR DECKS^{a, b}

ITEM	MATERIAL	MINIMUM FINISH/COATING	ALTERNATE FINISH/COATING ^c
Nails and timber rivets	<u>In accordance with ASTM F1667</u>	<u>Hot-dipped galvanized per ASTM A153</u>	Stainless steel, silicon bronze or copper
Bolts ^c Lag screws ^d (including nuts and washers)	In accordance with <u>ASTM A307</u> (bolts), <u>ASTM A563</u> (nuts), <u>ASTM F844</u> (washers)	Hot-dipped galvanized per <u>ASTM A153</u> , Class C (Class D for 3/8-inch diameter and less) or mechanically galvanized per <u>ASTM B695</u> , Class 55 or 410 stainless steel	Stainless steel, silicon bronze or copper
Metal connectors	Per manufacturer's specification	<u>ASTM A653</u> type G185 zinc coated galvanized steel or post hot-dipped galvanized per <u>ASTM A123</u> providing a minimum average coating weight of 2.0 oz./ft ² (total both sides)	Stainless steel

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

- a. Equivalent materials, coatings and finishes shall be permitted.
- b. Fasteners and connectors exposed to salt water or located within 300 feet of a salt water shoreline shall be stainless steel.
- c. Holes for bolts shall be drilled a minimum 1/32 inch and a maximum 1/16 inch larger than the bolt.
- d. Lag screws 1/2 inch and larger shall be predrilled to avoid wood splitting per the National Design Specification (NDS) for Wood Construction.
- e. Stainless-steel-driven fasteners shall be in accordance with ASTM F1667.

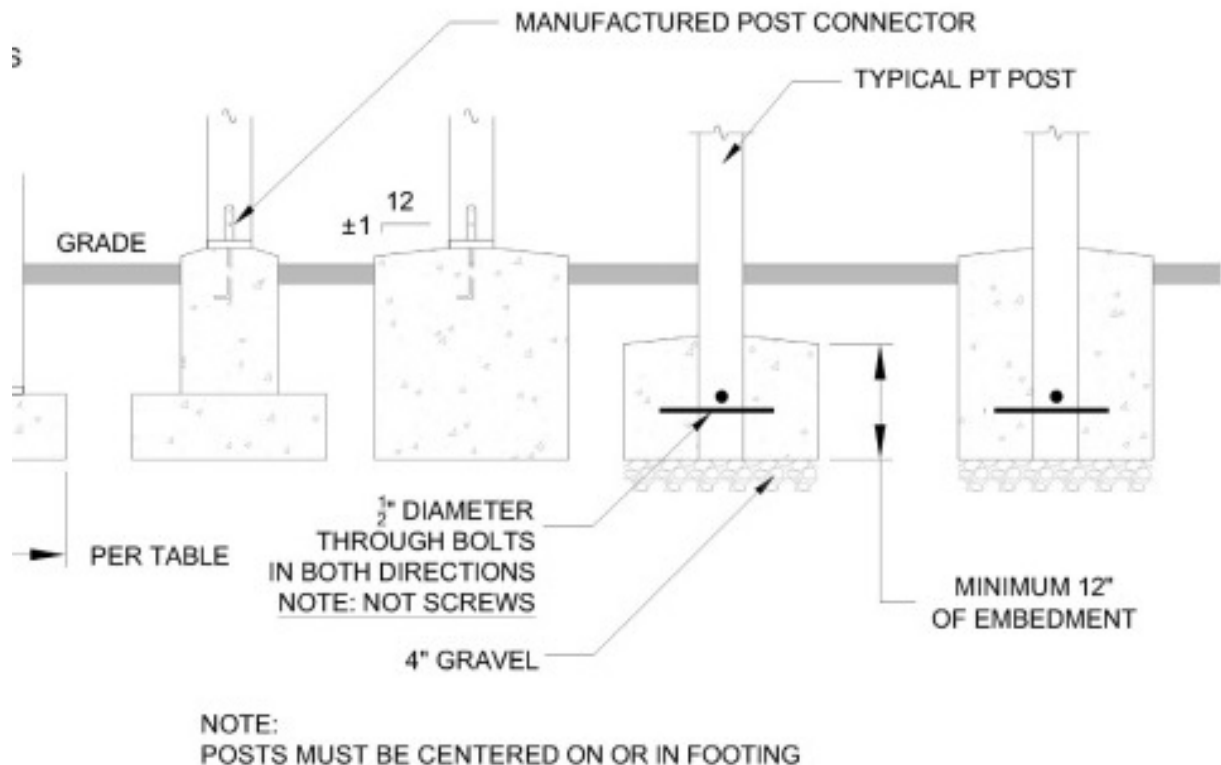


FIGURE R507.3
DECK POSTS TO DECK FOOTING CONNECTION

Minimum depth. Exterior footings shall be placed not less than 12 inches below the undisturbed ground surface. R403.1.4

- 18" below finished grade
- 18" square or 18" round diameter

Deck posts. For single-level wood-framed decks, post sizes shall be 6x6 and a maximum height shall be 14'0".

Exception: Landings and decks less than 30" in height can use 4x4 post.

Deck posts to deck footing connection. Where posts bear on concrete footings in accordance with Section R403 and Figure R507.4.1, lateral restraint shall be provided by manufactured connectors or a minimum post embedment of 12 inches in surrounding soils or concrete piers. Other footing systems shall be permitted. R507.4.1

Exception: Where expansive, compressible, shifting or other questionable soils are present, surrounding soils shall not be relied on for lateral support.

Deck Beams. Maximum allowable spans for wood deck beams, as shown in Figure R507.5 shall be in accordance with table R507.5. Beam plies shall be fastened with two rows of 10d (3-inch x 0.128-inch) nails minimum at 16 inches on center along each edge. Beams shall be permitted to cantilever at each end up to one-fourth of the allowable beam span. Deck beams of other materials shall be permitted where designed in accordance with accepted engineering practices. R507.5

Deck beam bearing. The ends of beams shall have not less than 1 1/2 inches of bearing on wood or metal and not less than 3 inches of bearing on concrete or masonry for the entire width of the beam. Where multiple –span beams bear on intermediate posts, each ply must have full bearing on the post in accordance with Figures R507.5.1 (1) and R507.5.2 (2) R507.5.1

Deck beam connection to supports. Deck beams shall be attached to supports in a manner capable of transferring vertical loads and resisting horizontal displacement. Deck beam connections to wood posts shall be in accordance with Figures R507.5.1(1) and R507.5.1(2). Manufactured post-to-beam connectors shall be sized for the post and beam sizes. Bolts shall have washers under the head and nut.

Deck joists. Maximum allowable spans for wood deck joists, as shown in Figure R507.6 shall be in accordance with Table R507.6. The maximum joist spacing shall be limited by the decking materials in accordance with Table R507.37. The maximum joist cantilever shall be limited to one-fourth of the joist span or the maximum cantilever length specified in Table R507.6, whichever is less. R507.6

Deck joist bearing. The ends of joists shall have not less than 1 1/2 inches of bearing on wood or metal and not less than 3 inches of bearing on concrete or masonry over its entire width. Joists bearing on top of a multiple-ply beam or ledger shall be attached by a mechanical connector. Joist framing into the side of a beam or ledger board shall be supported by approved joist hangers. R507.6.1

Deck joist lateral restraint. Joist ends and bearing locations shall be provided with lateral resistance to prevent rotation. Where lateral restraint is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where lateral restraint is provided by rim joists, they shall be secured to the end of each joist with not fewer than three 10d (3-inch by 0.128-inch) nails OR THREE No. 10x3-inch long wood screws.

Decking. Maximum allowable spacing for joists supporting decking shall be in accordance with Table R507.7. Wood decking shall be attached to each supporting member with not less than two 8d threaded nails or two No. 8 wood screws. Other approved decking or fastener systems shall be installed in accordance with the manufacturer's installation requirements.

Vertical and lateral supports. Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. For decks with cantilevered framing members, connection to exterior walls or other framing members shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting.

Vertical and lateral supports at band joist. Vertical and lateral supports for decks shall comply with this section. R507.9

Vertical supports. Vertical loads shall be transferred to band joists with ledgers in accordance with this section. R507.9.1

Ledger details. Deck ledgers shall be a minimum 2-inch by 8-inch nominal, pressure-preservative-treated Southern pine, incised pressure-preservative-treated hem-fir, or approved, naturally durable, No. 2 grade or better lumber. Deck ledgers shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer. R507.9.1.1

Band joist details. Band joists supporting a ledger shall be a minimum 2-inch solid-sawn, spruce-pine-fir or better lumber or a minimum 1-inch by 9 1/2-inch dimensional, Douglas fir or better, laminated veneer lumber. Band joists shall bear fully on the primary structure capable of supporting all required loads. R507.9.1.2

Ledger to band joist details. Fasteners used in deck ledger connections in accordance with Table R507.9.1.3(1) shall be hot-dipped galvanized or stainless steel and shall be installed in accordance with Table R507.9.1.3(2) and Figures R507.9.1.3(1) and R507.9.1.3(2). R507.9.1.3

Lateral connection. Lateral loads shall be transferred to the ground or to a structure capable of transmitting them to the ground. Where the lateral load connection is provided in accordance with Figure R507.9.2(1), hold-down tension devices shall be installed in not less than two locations per deck, within 24 inches of each end of the deck. Each device shall have an allowable stress design capacity of not less than 1,500 pounds. Where the lateral load connections are provided in accordance with Figure R507.9.2(2), the hold-down tension devices shall be installed in not less than four locations per deck, and each device shall have an allowable stress design capacity of not less than 750 pounds. R507.9.2

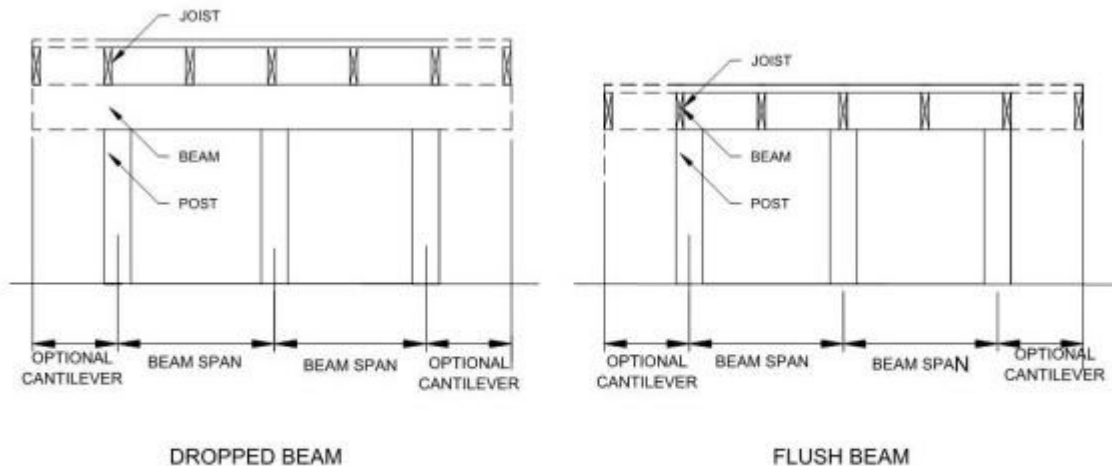


FIGURE R507.5
TYPICAL DECK JOIST SPANS

TABLE R507.5
DECK BEAM SPAN LENGTHS^{a, b, g} (feet - inches)

SPECIES ^c	SIZE ^d	DECK JOIST SPAN LESS THAN OR EQUAL TO: (feet)						
		6	8	10	12	14	16	18
Southern pine	1 – 2 × 6	4-11	4-0	3-7	3-6	3-0	2-10	2-8
	1 – 2 × 8	5-11	5-1	4-7	4-2	2-10	3-7	3-5
	1 – 2 × 10	7-0	6-0	5-5	4-11	4-7	4-3	4-0
	1 – 2 × 12	8-3	7-4	6-4	5-10	5-5	5-0	4-9
	2 – 2 × 6	6-11	5-11	5-4	4-10	4-6	4-3	4-0
	2 – 2 × 8	8-9	7-7	6-9	6-2	5-9	5-4	5-0
	2 – 2 × 10	10-4	9-0	8-0	7-4	6-9	6-4	6-0
	2 – 2 × 12	12-2	10-7	9-5	8-7	8-0	7-6	7-0
	3 – 2 × 6	8-2	7-5	6-8	6-1	5-8	5-3	5-0
	3 – 2 × 8	10-10	9-6	8-6	7-9	7-2	6-8	6-4
	3 – 2 × 10	13-0	11-3	10-0	9-2	8-6	7-11	7-6
Douglas fir-larch ^e , hem-fir ^e , spruce-pine-fir ^e , redwood, west- ern cedars, ponder- osa, red	3 × 6 or 2 – 2 × 6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	3 × 8 or 2 – 2 × 8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	3 × 10 or 2 – 2 × 10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3 × 12 or 2 – 2 × 12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4 × 6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4 × 8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4 × 10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4 × 12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3 – 2 × 6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3 – 2 × 8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3 – 2 × 10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	3 – 2 × 12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

a. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied at the end.

b. Beams supporting deck joists from one side only.

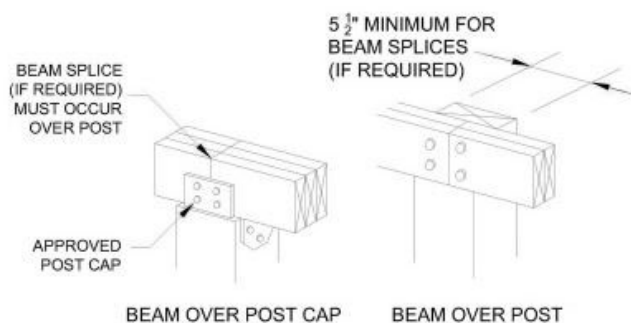
c. No. 2 grade, wet service factor.

d. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.

e. Includes incising factor.

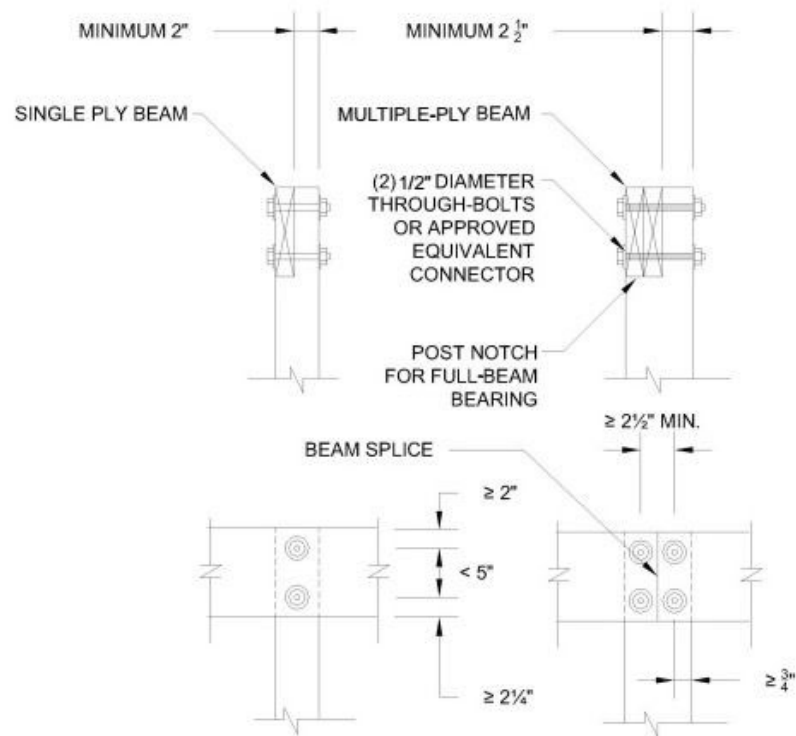
f. Northern species. Incising factor not included.

g. Beam cantilevers are limited to the adjacent beam's span divided by 4.



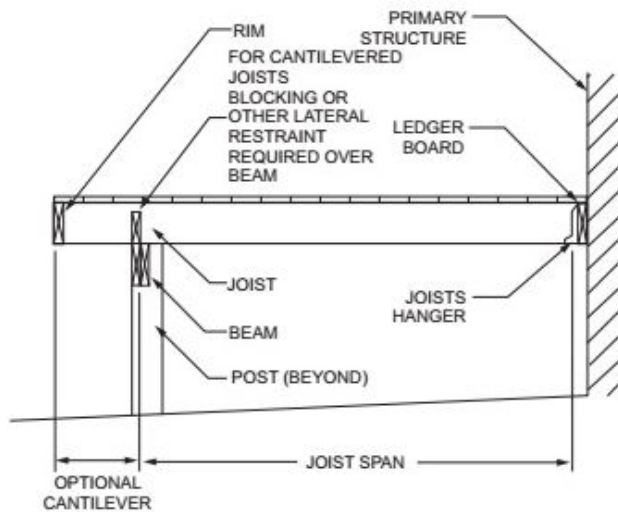
For SI: 1 inch = 25.4 mm.

FIGURE R507.5.1(1)
DECK BEAM TO DECK POST

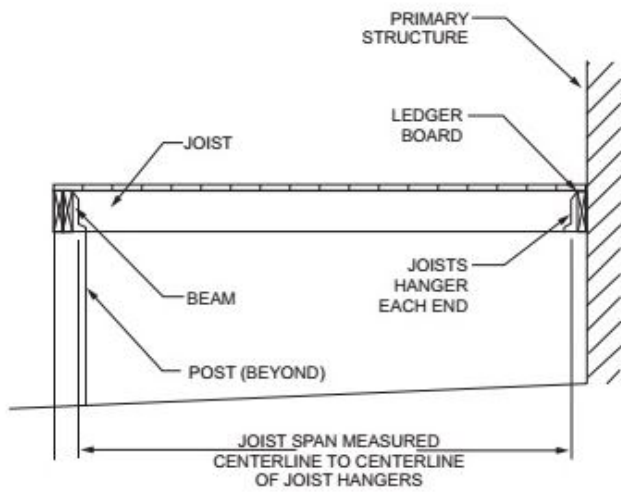


For SI: 1 inch = 25.4 mm.

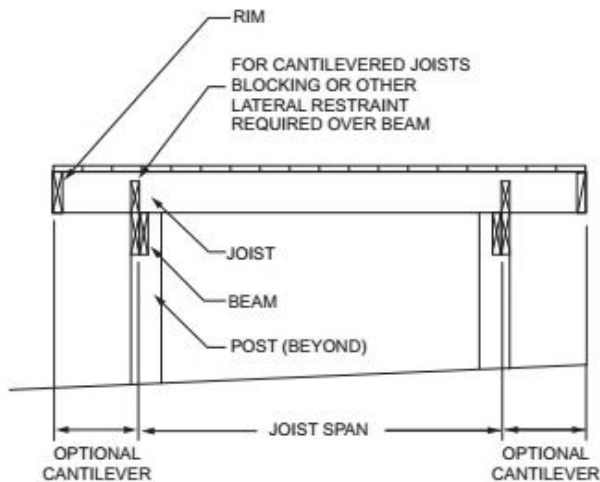
FIGURE R507.5.1(2)
NOTCHED POST-TO-BEAM CONNECTION



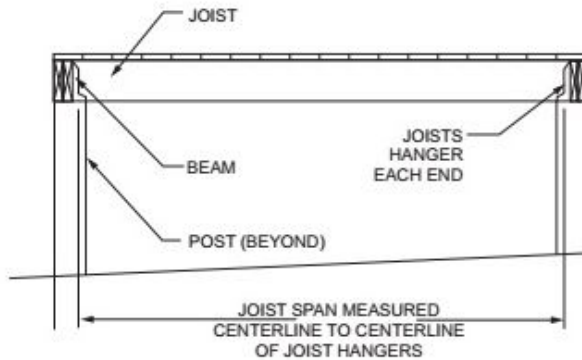
CANTILEVERED JOISTS WITH DROPPED BEAM



JOISTS WITH FLUSH BEAM



JOISTS ON FREE-STANDING DECK WITH DROPPED BEAM



JOISTS ON FREE-STANDING DECK WITH FLUSH BEAM

FIGURE R507.6
TYPICAL DECK JOIST SPANS

TABLE R507.6
DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft. - in.)

SPECIES ^a	SIZE	ALLOWABLE JOIST			MAXIMUM ^f		
		SPACING OF DECK JOISTS (inches)			SPACING OF DECK JOISTS WITH (inches)		
		12	16	24	12	16	24
Southern pine	2 × 6	9-11	9-0	7-7	1-3	1-4	1-6
	2 × 8	13-1	11-10	9-8	2-1	2-3	2-5
	2 × 10	16-2	14-0	11-5	3-4	3-6	2-10
	2 × 12	18-0	16-6	13-6	4-6	4-2	3-4
Douglas fir-, hem- spruce-pine-,	2 × 6	9-6	8-8	7-2	1-2	1-3	1-5
	2 × 8	12-6	11-1	9-1	1-11	2-1	2-3
	2 × 10	15-8	13-7	11-1	3-1	3-5	2-9
	2 × 12	18-0	15-9	12-10	4-6	3-11	3-3
Redwood, western cedars, ponderosa , red	2 × 6	8-0	8-0	7-0	1-0	1-1	1-2
	2 × 8	11-18	10-7	8-8	1-8	1-10	2-0
	2 × 10	14-11	13-0	10-7	2-8	2-10	2-8
	2 × 12	17-5	15-1	12-4	3-10	3-9	3-1

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

a. No. 2 grade with wet service factor.

b. Ground snow load, live load = 40 psf, dead load = 10 psf, $L/\Delta = 360$.

c. Ground snow load, live load = 40 psf, dead load = 10 psf, $L/\Delta = 360$ at main span, $L/\Delta = 180$ at cantilever with a 220-pound point load applied to end.

d. Includes incising factor.

e. Northern species with no incising factor.

f. Cantilevered spans not exceeding the nominal depth of the joist are permitted.

TABLE R507.7
MAXIMUM JOIST SPACING FOR DECKING

DECKING MATERIAL TYPE AND NOMINAL SIZE	MAXIMUM ON-CENTER JOIST SPACING	
	Decking perpendicular to joist	Decking diagonal to joist ^a
1 1/4-inch-thick wood	16 inches	12 inches
2-inch-thick wood	24 inches	16 inches
Plastic composite	In accordance with Section R507.2	In accordance with Section R507.2

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.01745 rad.

a. Maximum angle of 45 degrees from perpendicular for wood deck boards.

TABLE R507.9.1.3(1)

DECK LEDGER CONNECTION TO BAND JOIST^{a, b} (Deck live load = 40 psf, deck dead load = 10 psf, snow load ≤ 40 psf)

CONNECTION DETAILS	JOIST SPAN						
	6' and less	6'1" to 8'	8'1" to 10'	10'1" to 12'	12'1" to 14'	14'1" to 16'	16'1" to 18'
	On-center spacing of fasteners						
1/2-inch diameter lag screw with 1/2-inch maximum sheathing ^d	30	23	18	15	13	11	10
1/2-inch diameter bolt with 1/2-inch maximum sheathing ^d	36	36	34	29	24	21	19
1/2-inch diameter bolt with 1-inch maximum sheathing ^e	36	36	29	24	21	18	16

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- a. Ledgers shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joist.
- b. Snow load shall not be assumed to act concurrently with live load.
- c. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
- d. Sheathing shall be wood structural panel or solid sawn lumber.
- e. Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard, lumber or foam sheathing. Up to 1/2-inch thickness of stacked washers shall be permitted to substitute for up to 1/2 inch of allowable sheathing thickness where combined with wood structural panel or lumber sheathing.

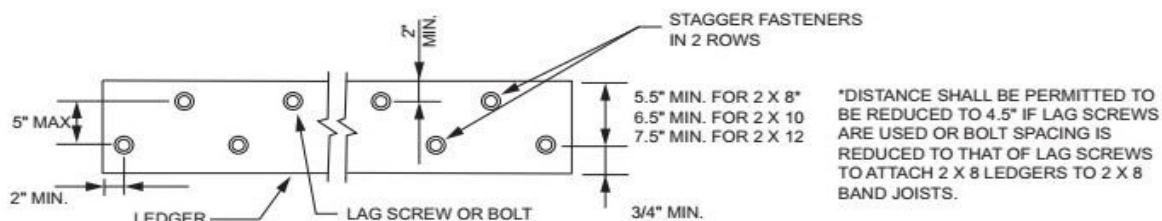
TABLE R507.9.1.3(2)

PLACEMENT OF LAG SCREWS AND BOLTS IN DECK LEDGERS AND BAND JOISTS

MINIMUM END AND EDGE DISTANCES AND SPACING BETWEEN ROWS				
	TOP EDGE	BOTTOM EDGE	ENDS	ROW SPACING
Ledger ^a	2 inches ^d	3/4 inch	2 inches ^b	15/8 inches ^b
Band Joist ^c	3/4 inch	2 inches	2 inches ^b	15/8 inches ^b

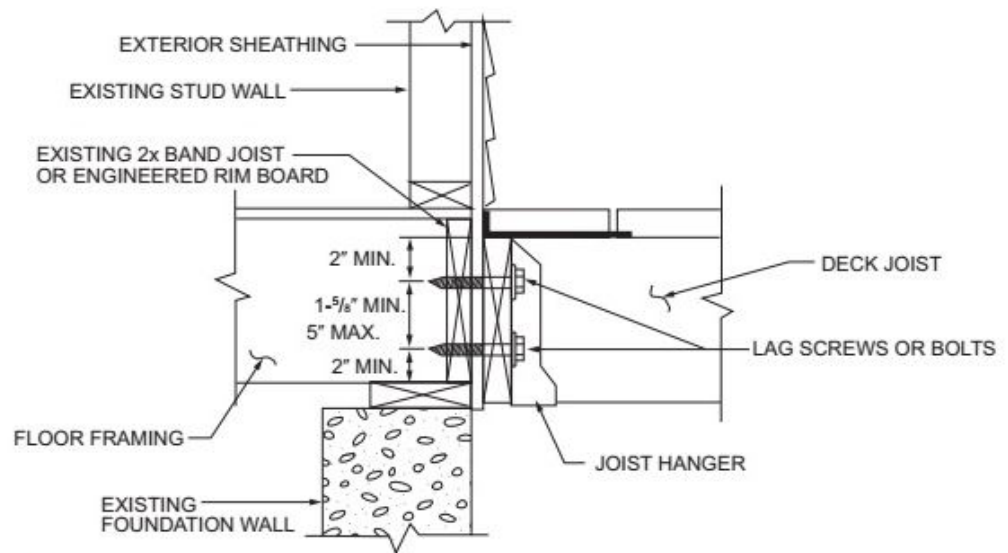
For SI: 1 inch = 25.4 mm.

- a. Lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger in accordance with Figure R507.9.1.3(1).
- b. Maximum 5 inches.
- c. For engineered rim joists, the manufacturer's recommendations shall govern.
- d. The minimum distance from bottom row of lag screws or bolts to the top edge of the ledger shall be in accordance with Figure R507.9.1.3(1).



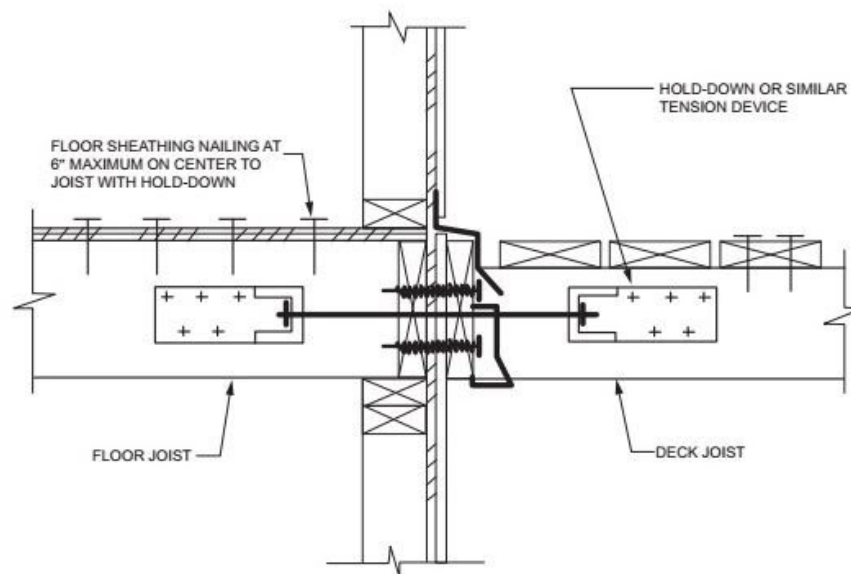
For SI: 1 inch = 25.4 mm.

FIGURE R507.9.1.3(1)
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGERS



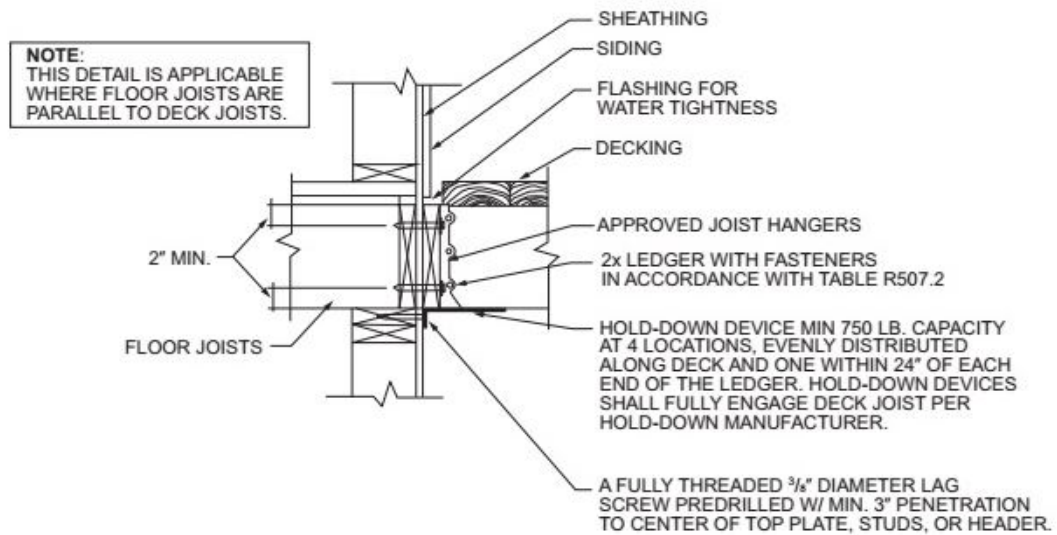
For SI: 1 inch = 25.4 mm.

FIGURE R507.9.1.3(2)
PLACEMENT OF LAG SCREWS AND BOLTS IN BAND JOISTS



For SI: 1 inch = 25.4 mm.

FIGURE R507.9.2(1)
DECK ATTACHMENT FOR LATERAL LOADS



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

FIGURE R507.9.2(2)
DECK ATTACHMENT FOR LATERAL LOADS

Stairways, handrails and guardrails, refer to Stairways R311.7 page: [51](#)

Final Residential Inspection Checklist

This checklist is not intended to be all inclusive but rather, a guide to assist you in preparing for your final inspection.

- ☐ Permit and approved plans are on site for the inspector.
- ☐ All site work will be completed before calling for a final inspection.
- ☐ House numbers are plainly visible from the street minimum 4" and a contrasting color.
- ☐ Final grade is a minimum 6" fall in 10'.
- ☐ A minimum of 2 trees. Front or back
- ☐ Check for cracked and or broken concrete in sidewalks, driveways.
- ☐ Verify that water, gas, and electric meter are operational.
- ☐ Outdoor receptacles protected by GFCI and provided with in-use weather proof covers.
- ☐ Seal all exterior holes in walls and roofs. They should be weather tight.
- ☐ Backflow preventer is required on all irrigation systems.
- ☐ Vacuum breakers type hose bibs.
- ☐ All exterior lighting fixtures are installed correctly and are outdoor types.
- ☐ Crawl space access should be at least 18"x24".
- ☐ Remove all debris from crawl space.
- ☐ Floor girders are supported on piers.
- ☐ HVAC duct work is properly supported.
- ☐ Plumbing drain waste has correct slope & is supported.
- ☐ Backwater valve on main plumbing waste line is installed.
- ☐ Floor joist have not been notched.
- ☐ Attic access is 22"x30".
- ☐ Check attic insulation.
- ☐ Foam plastic insulation is covered with a thermal barrier.
- ☐ Verify all HVAC, plumbing, and mechanical vents terminate outside.
- ☐ Circuit breakers in main electrical service panels and subpanels are to be properly labeled.
- ☐ No unused knockout in electrical panel.
- ☐ Circuit breaker amperage to be within listed operating range of a/c equipment
- ☐ All electric outlets must be trimmed out.
- ☐ No suspended lighting fixtures within 8' of rim of bath tub.
- ☐ Test electrical outlets for proper wiring, continuity, GFCI, AFCI working condition.
- ☐ Distance between lighting and shelving in storage closets.
- ☐ All mechanical equipment will function properly. Equipment shut off valves and vents will be installed with proper clearances and support and slope. Adequate combustion air is required.
- ☐ Smoke and Carbon Monoxide detectors are tested.

- ☐ Check for water leaks at all plumbing fixtures.
- ☐ Provide minimum size access hole, for whirl pool tubs.
- ☐ Locks and hardware will be installed on all doors and windows.
- ☐ All doors will be provided with landings.
- ☐ Provide proper handrails and guardrails at all decks, stairs and platforms.

Construction Sediment & Erosion Control Guidelines

As you may or may not be aware, the EPA with the help of MoDNR has instituted a storm water pollution prevention program entitled: National Pollution Discharge Elimination System (NPDES). Within this NPDES program is information outlining the Municipal Separate Storm Sewer System (MS4) program. The document contains requirements that: any municipality, county or other form of government that has a population of 10,000 or more has a "Duty to Comply".

The City of Ozark, as a regulated small MS4 has been given this Duty to Comply. Among other things, the City of Ozark is required to: "develop, implement, and enforce a storm water management program and plan (SWMP) designed to reduce the discharge of pollutants from the permittee's (City of Ozark) regulated small MS4 to the maximum extent practicable, to protect water quality, and to satisfy the appropriate water quality requirements of the Missouri Clean Water Law".

This handout contains guidelines and procedures sufficient for typical One & Two Family construction. It is not intended to address all circumstances that can occur during construction. The goal of this handout is to educate home builders so they can eliminate or reduce the amount of sediment that leaves construction sites and is deposited onto City streets and into the storm sewer system. Since our streets and storm sewer systems convey storm water to lakes and rivers, it is important that we keep these sediments and pollutants off City streets and out of the City's storm sewer system keeping sediment out of our lakes and rivers

Best Management Practices:

Also known as BMP's, these include but are not limited to; temporary vehicle tracking pads, silt fence, seeding, erosion control blankets, construction phasing or any other device or procedure that helps reduce erosion and sediment loss.

Installation Sequencing:

The following is the order in which most BMP's are to be utilized:

1. Grass Buffer Strips – Ensure that the existing grass buffer strip along the curb lines are not disturbed. If grass is already established, and a buffer strip of 10 feet wide can be left in place, we would ask you to do so.
2. Inlet Protection -Ensure that all storm inlets that receive storm water runoff from your lot are properly protected.
3. Perimeter Control– Devices such as silt fence, wattles, or straw bales must be properly installed on all areas where runoff leaves your site.
4. All debris that is tracked off site onto the city street is to be removed at the end of each work day.
5. Grading/Excavating – All BMP's should be installed prior to any grading or excavation. Dewatering for any trenching or excavation must be done in such a manner as to not deposit sediment downstream. Wattles, filter logs, sedimentation basins or some other means of removing sediment from dewatering must be used prior to discharging water off site. Discharge water should be clear.
6. Stockpiles –Perimeter control should be installed around all stock piles.
7. Backfill and rough grading– Care should be taken to avoid disturbing the grass buffer strips

8. Maintenance – All BMP's should be maintained so the devices are functioning properly. All sediment should be removed from the streets, gutters and inlets at the end of each work day and after each rain event in which sedimentation occurs.
9. Final Grading – All BMP's should be left in place until the site has adequate vegetation established.
10. Seeding or Sodding – Should be done as soon as practicable.

Permit Holders Responsibility:

1. If a lot is part of a subdivision, the NPDES permit holder for that development must comply with said permit regulations and SWPPP for the life of the project (until such time the permit can be terminated).
2. Ensure that adequate BMP's are in place and functioning until the project is complete.
3. Provide periodic inspection (as outlined in the permit) of BMP's at least once a week and after significant rainfalls.
4. Maintain all BMP's in working order. Remove sediment from inlet protection, perimeter control and other devices as needed.

Maintenance requirements:

1. Maintain the grass buffer behind the curb at all times.
2. All perimeter controls that are: collapsed, torn down, or ineffective, are to be replaced or repaired as needed.
3. Remove accumulated sediment from perimeter control BMP's when sediment reaches 1/3 the height of the device.
4. Remove accumulated sediment from inlet protection when it accumulates.

Inspections – City:

The City of Ozark will conduct erosion and sediment control inspections in conjunction with routine building inspections to ensure that the appropriate erosion and sediment control measures are in place and properly secured. The first inspection will occur during footing inspection. It is expected that: the grass buffer strip is maintained, inlet protection and perimeter control be installed, stockpiles protected, and vehicle tracking pads installed (if practicable). BMP's that are not installed or are installed improperly will result in a failed footing inspection. At all subsequent inspections, the BMP's will be subject to inspection to make sure they are working properly. If at any time during construction, sediment deposits are found off the construction site, a stop work order may be issued until the deposit(s) are removed and the proper BMP's have been established. Upon final completion of the project the entire site must be properly stabilized. This can be done through sodding or seed and straw on the entire site. Only when vegetation is adequately established may the sediment control devices be removed.

Construction BMP's:

The following items give examples of the types of BMP's that should be on every site. Additional BMP's may be required depending on the site, its topography, location, layout, etc.

Boulevard Vegetation:

The City of Ozark requests that during new home construction, the boulevard area (the right of way behind the curb to the beginning of the lot line) be vegetated or stabilized the entire time during construction. If the lot has already been graded and has turf grass established, then all that is requested during construction is to leave a 10' grass strip behind the curb when the excavation for the house begins. If this area has not been seeded or if work is required in the boulevard, then additional BMP's may be required to prevent sediment from leaving the property. This boulevard vegetation acts as a buffer strip and helps prevent sediment from being discharged into the streets and storm sewer system.

Perimeter Control:

Perimeter control is required on all downstream areas of the site where runoff could leave the site. Items that can be used for perimeter control include but are not limited to: silt fence, wattles (fiber logs or silt soxx), seeded soil berm, or straw bales. **Silt Fence** is the most common type of perimeter control used. To be effective the silt fence must be installed correctly. To achieve this, the bottom of the fence must be installed in a 6 inch deep trench and anchored with dirt spoils from trenching. **Wattles** (also known as fiber rolls, fiber logs, silt soxx or sediment logs) are made of straw or wood fiber bound by a net to form the shape of a tube. They are typically 6 to 12 inches in diameter and 8 to 10 feet long (or can be laid continuous as perimeter protection). The wattles are held in place by staking. The wattles are easy to install and work great for providing perimeter control next to sidewalks or curb and gutter.

Straw bales work as excellent perimeter control to prevent sediment from running into wetlands or low areas if correctly installed with the binding strings on the sides of the bales not next to the ground.

Inlet Protection:

Inlet protection is required on all storm sewer inlets (curb inlet and area inlets) located downstream of the construction site where storm water runoff may enter. The inlet protection must be installed prior to disturbing the ground, and only removed when vegetation on the lot is adequately established.

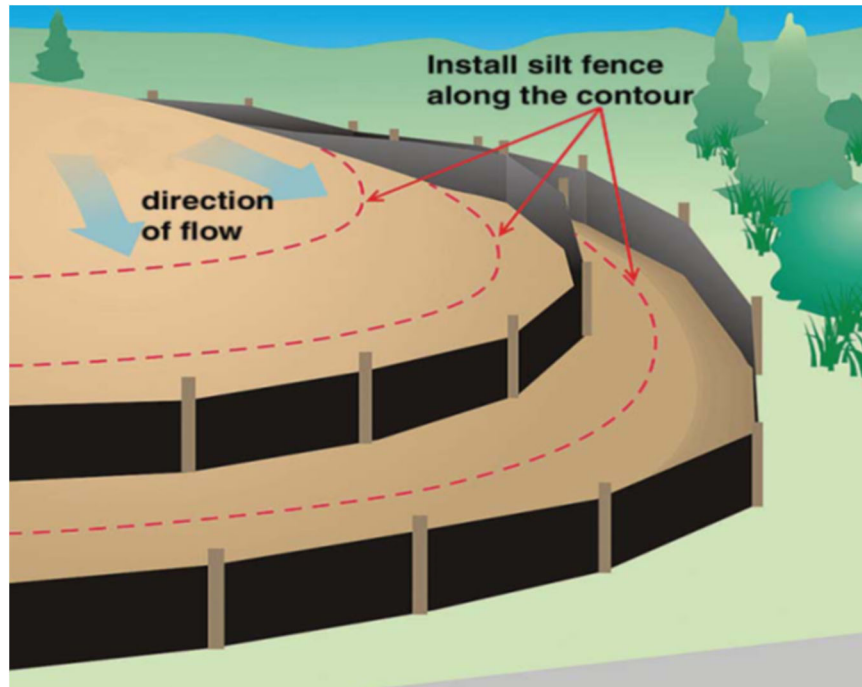
Miscellaneous Items:

Other pollution control items that need to be addressed during construction include: site waste control, concrete washout, and dewatering. During construction, all construction waste on the site should be put in an approved container with a lid. Care should be taken to prevent debris and garbage from being blown off site. Hazardous materials such as gas, oils, paints and solvents should be stored in proper containers to prevent leaks and should be disposed of properly. A concrete washout area should be constructed in a manner & location so as to not discharge off site. Washing concrete out into the street or into storm water inlets is considered an illegal discharge.

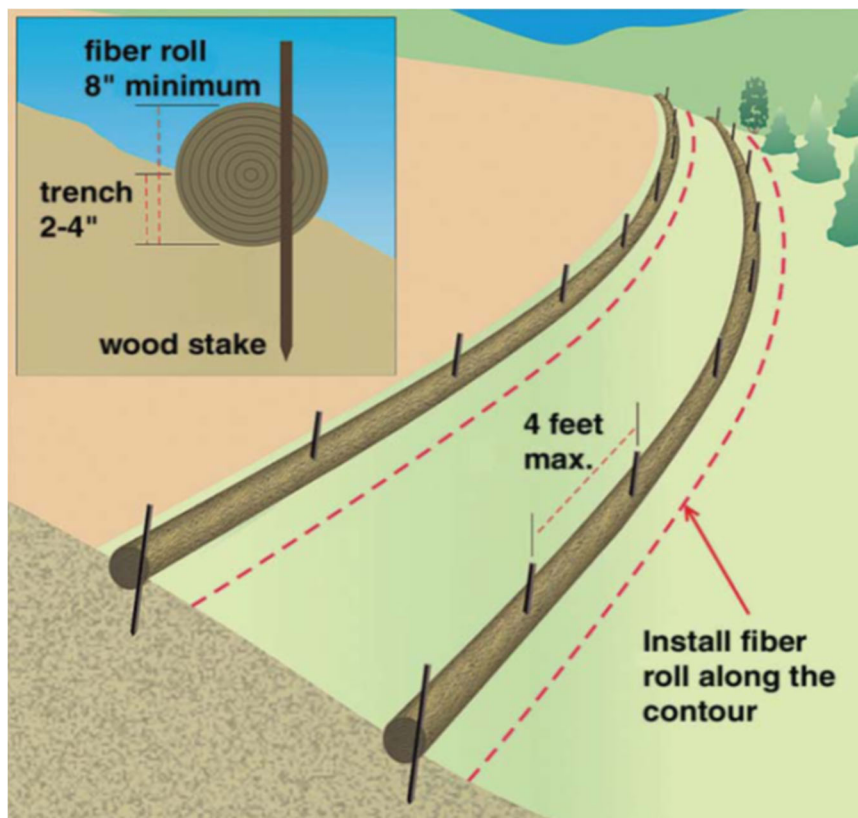
Dewatering is another construction item that needs to be addressed. All water from dewatering practices must be clear before it is discharged off site. If the water is turbid or sediment laden it must be treated with appropriate BMP's before discharging offsite. This may include using a filter bag, dewatering into a sedimentation basin or into a grass swale where the water can infiltrate into the ground. Sediment laden water that is discharged off site is considered an illegal discharge.

For more information concerning the City of Ozark's Sediment & Erosion Control Ordinance or the MS4 program; contact the City of Ozark Planning & Development Department at (417)581-2407, or the City of Ozark Public Works Department at (417)582-0415, or online www.ozarkmissouri.com.

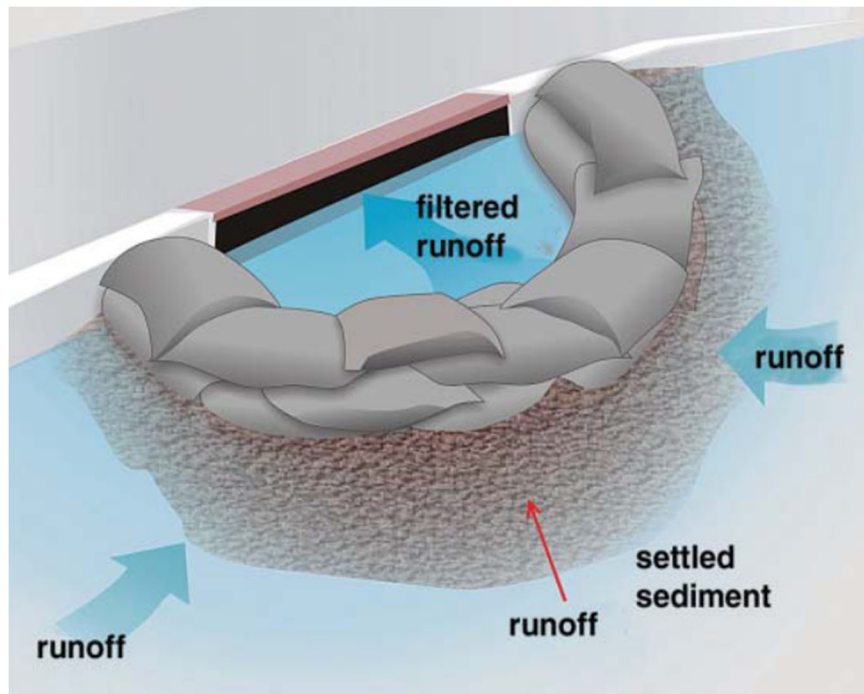
Proper Silt Fence Installation



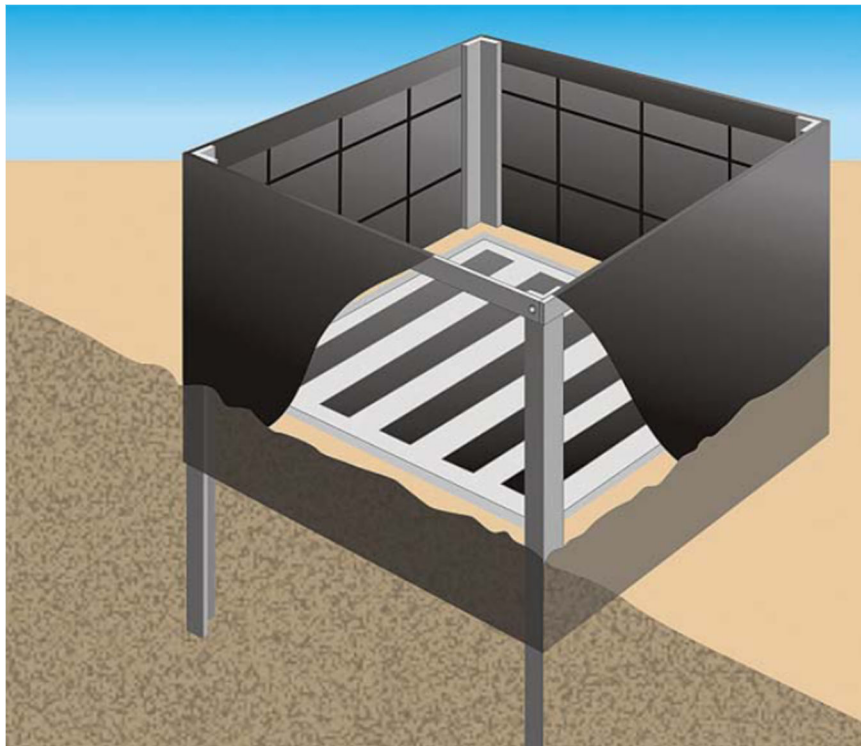
Proper Waddle or Fiber Roll Installation

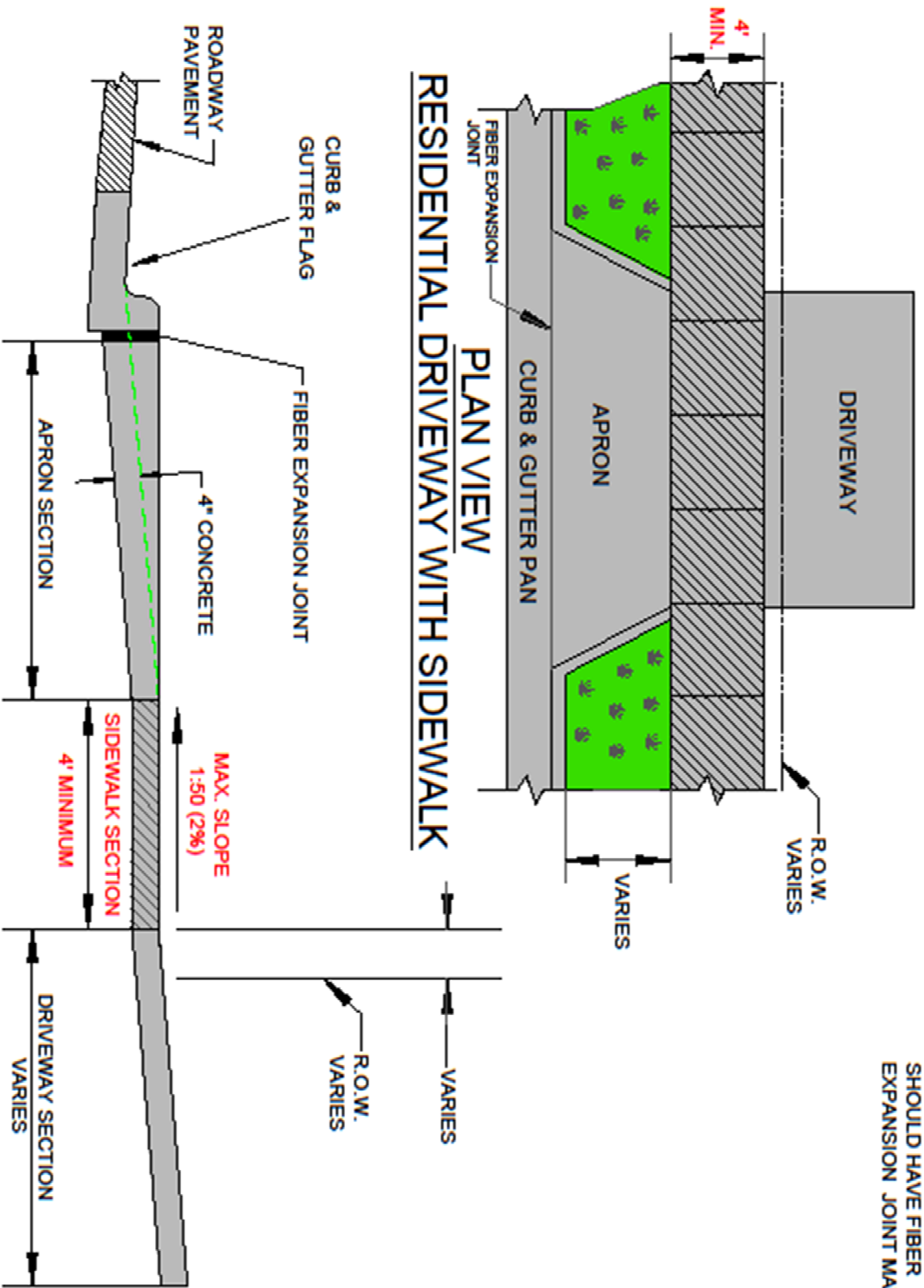


Proper Curb Inlet Protection Installation



Proper Area Inlet Protection Installation





NOTE: ALL COLD JOINTS
SHOULD HAVE FIBER
EXPANSION JOINT MATERIAL

RESIDENTIAL DRIVEWAY WITH SIDEWALK

NTS



RESIDENTIAL DRIVEWAY WITH SIDEWALK

DATE: 2-2-17

DWG: RDWSW

This informational handout is based on the 2012 IRC one and two family dwelling code, the 2011 National Electric Code and other Ozark City Ordinances.

The purpose of this handout is to better present and clarify code interpretation and enforcement for construction of a one or two family dwelling; however, it by no means attempts to address every code item.

The Building Department's mission is to work with the Contractors and the public so that the consumer may purchase a quality home that meets or exceeds the requirements of the code in the City of Ozark.

Please call our office at 417-581-2407 if you have any questions. Our office hours are 8:00 AM to 4:00 PM. For inspections we require a 1 day notice. However, depending on our inspection load it could take up to 24 hours to get a scheduled appointment.

The City of Ozark
Planning and Development Department
PO Box 395
715 W Mt. Vernon
Ozark, MO 65714
417-725-5850

