



Thurston County Resource Stewardship Department

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Thurston County Resource Stewardship Department

2015 International Residential Code Plan Review and Inspection Checklist July 1, 2016

This document is part of the plans and shall remain attached to the approved set of plans. The approval of plans, specifications and computations shall not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code or, of any other ordinance of this jurisdiction. The approved plans shall be kept at the site of work and shall be open to inspection by the building official or a duly authorized representative.

NOTE: Not all items on the checklist are specifically called out on the drawings. Those items felt necessary by the plans examiner are called out on the plan and numerically referenced to the checklist.

All items listed herein shall be complied with if applicable to the project.

CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA

GROUND SNOW LOAD	DESIGN WIND SPEED	SEISMIC DESIGN CATEGORY	FROST LINE DEPTH	ASSUMED SOIL BEARING	WINTER DESIGN TEMP.
20 PSF	85 MPH	D2	12 INCHES	1500 PSF	17 DEG. F.

T.C. Ordinance. = Thurston County Ordinance Title14

IRC = 2015 International Residential Code

IFC = 2015 International Fire Code

IMC = 2015 International Mechanical Code

UPC = 2015 Uniform Plumbing Code

WSEC = 2015 Washington State Energy Code

ADMINISTRATION

R101.2 Scope. The provisions of the International Residential Code for One- and Two-Family Dwellings shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one- and two-family dwellings, adult family homes, and townhouses not more than three stories above grade plane in height with a separate means of egress and their accessory structures not more than three stories above grade plane in height.

R104.9.1 Used materials and equipment. Used materials, equipment and devices shall not be reused unless approved by the building official.

R105.1 Permit required. Any owner or owner's authorized agent who intends to construct, enlarge, alter, repair, move, demolish, or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the building official and obtain the required permit.

R105.6 Suspension or revocation. The building official is authorized to suspend or revoke a permit issued under the provisions of this code wherever the permit is issued in error or on the basis of incorrect, inaccurate or incomplete information, or in violation of any ordinance or regulation or any of the provisions of this code.

R105.7 Placement of permit. The building permit or copy thereof shall be kept on the site of the work until the completion of the project.

R105.8 Responsibility. It shall be the duty of every person who performs work for the installation or repair of building, structure, electrical, gas, mechanical or plumbing systems, for which this code is applicable, to comply with this code.

R106.1.2 Manufacturer's installation instructions. Manufacturer's installation instructions, as required by this code, shall be available on the job site at the time of inspection.

R106.3.1 Approval of construction documents. One set of construction documents shall be kept at the site of work and shall be open to inspection by the building official or his or her authorized representative.

R106.4 Amended construction documents. Work shall be installed in accordance with the approved construction documents, and any changes made during construction that are not in compliance with the approved construction documents shall be resubmitted for approval as an amended set of construction documents.

R109.1.1 Foundation inspection. Inspections of the foundation shall be made after poles or piers are set or trenches or basement areas are excavated and any required

forms erected and any required reinforcing steel is in place and supported prior to the placing of concrete.

R109.3 Inspection requests. It shall be the duty of the permit holder or their agent to notify the building official that such work is ready for inspection. It shall be the duty of the person requesting any inspections required by this code to provide access to and means for inspection of such work.

R109.4 Approval required. Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the building official. The building official upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or shall notify the permit holder or an agent of the permit holder wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the building official.

R110.1 Use and occupancy. No building or structure shall be used or occupied, and a change in the existing occupancy classification of a building or structure or portion thereof shall not be made until the building official has issued a certificate of occupancy therefor as provided herein. Issuance of a certificate of occupancy shall not be construed as an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Certificates presuming to give authority to violate or cancel the provisions of this code or other ordinances of the jurisdiction shall not be valid.

Exceptions:

1. Certificates of occupancy are not required for work exempt from permits under Section R105.2.
2. Accessory buildings or structures.

BUILDING PLANNING

R301.5 Live Load. Exterior balconies and decks = 60 psf. Attics without storage = 10 psf. Attics with limited storage = 20 psf. Habitable attics and attics served with fixed stairs = 30 psf. For attics with limited storage and constructed with trusses, this live load need be applied only to those portions of the bottom chord where there are two or more adjacent trusses with the same web configuration capable of containing a rectangle 42 inches high or greater by 2 feet wide or greater, located within the plane of the truss. The rectangle shall fit between the top of the bottom chord and the bottom of any other truss member, provided that each of the following criteria is met:

1. The attic area is accessible by a pull-down stairway or framed in accordance with Section R807.1.
2. The truss has a bottom chord pitch less than 2:12.
3. Required insulation depth is less than the bottom chord member depth. The bottom chords of trusses meeting the above criteria for limited storage shall be designed for the greater of the actual imposed dead load or 10 psf, uniformly distributed over the entire span.

R302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet of a lot line are permitted to have roof eave projections not exceeding 4 inches.
5. Foundation vents installed in compliance with this code are permitted.

**TABLE R302.1(1)
EXTERIOR WALLS**

EXTERIOR WALL ELEMENT		MIN. F-R RATING	MIN. FIRE SEPARATION DISTANCE
Walls	F-R rated	1 hour (both sides)	< 5 feet
	Not F-R rated	0 hours	>= 5 feet
Projections		N/A	< 2 feet
	F-R rated	1 hour (underside) ^{a, b}	>= 2 feet to < 5 feet
	Not F-R rated	0 hours	>= 5 feet
Wall Openings		N/A	< 3 feet
	Max 25% wall area per story	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	See Section R302.4	< 3 feet
		None required	3 feet

a. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fire blocking is provided from the wall top plate to the underside of the roof sheathing.

b. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided that gable vent openings are not installed.

R302.5. Dwelling/garage opening/penetration protection.

Openings and penetrations through the walls or ceilings separating the dwelling from the garage shall be in accordance with Sections R302.5.1 through R302.5.3.

R302.5.1 Opening protection. Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and residence shall be equipped with solid wood doors not less than 1 3/8 inches in thickness, solid or honeycomb core steel

doors not less than 13/8 inches thick, or 20-minute fire-rated doors, equipped with a self-closing device.

R302.5.2 Duct penetration. Ducts in the garage and ducts penetrating the walls or ceilings separating the dwelling from the garage shall be constructed of a minimum No. 26 gage sheet steel or other approved material and shall have no openings into the garage.

R302.6 Dwelling/garage fire separation. The garage shall be separated as required by Table R302.6. Openings in garage walls shall comply with Section R302.5. Attachment of gypsum board shall comply with Table R702.3.5. The wall separation provisions of Table R302.6 shall not apply to garage walls that are perpendicular to the adjacent dwelling unit wall.

**TABLE R302.6
DWELLING/GARAGE SEPARATION**

SEPARATION	MATERIAL
From the residence and attics	Not less than ½-inch gypsum board or equivalent applied to the garage side
From all habitable rooms above the garage	Not less than 5/8-inch Type X gypsum board or equivalent
Structure(s) supporting floor/ceiling assemblies used for required separation	Not less than ½-inch gypsum board or equivalent
Garages located less than 3 feet from a dwelling unit on the same lot	Not less than ½-inch gypsum board or equivalent applied to the interior side of exterior walls that are within this area

R302.7 Under stair protection. Enclosed accessible space under stairs shall have walls, under stair surface and any soffits protected on the enclosed side with 1/2-inch gypsum board.

R302.11 Fireblocking. In combustible construction, fireblocking shall be provided to cut off both vertical and horizontal concealed draft openings and to form an effective fire barrier between stories, and between a top story and the roof space. Fireblocking 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 fireblocking of chimneys and fireplaces, see Section

R1003.19.

6. Fireblocking of cornices of a two-family dwelling is required at the line of dwelling unit separation.

R302.11.1 Fireblocking materials. Except as provided in Section R302.11, Item 4, fireblocking shall consist of the following materials.

1. Two-inch (51 mm) 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 in accordance with ASTM E 119 or UL 263, for the specific application.

R302.13 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch gypsum wallboard membrane, 5/8-inch wood structural panel membrane, or equivalent on the underside of the floor framing member.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Appendix Q, NFPA13D, or other approved equivalent sprinkler system.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies can be unprotected when complying with the following:
 - 3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story;
 - 3.2. Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.
5. Wood floor assemblies using dimensional lumber or structural composite lumber with a cross sectional area equal to or greater than 2-inch by 10-inch nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.

R303.1 Habitable rooms. All habitable rooms shall be provided with aggregate glazing area of not less than 8 percent of the floor area of such rooms

Exception: The glazed areas need not be provided in rooms where artificial light is provided capable of producing an average illumination of 6 foot-candles over the area of the room at a height of 30 inches above the floor level.

R303.4 Minimum ventilation performance. Dwelling units shall be equipped with local exhaust and whole house

ventilation systems designed and installed as specified in Section M1507.

Exception: Additions with less than 500 square feet of conditioned floor area are exempt from the requirements in this code for Whole House Ventilation Systems.

R303.7 Interior stairway illumination. Interior stairways shall be provided with an artificial light source to illuminate the landings and treads. Stairway illumination shall receive primary power from the building wiring. The light source shall be capable of illuminating treads and landings to levels not less than 1 foot-candle measured at the center of treads and landings. There shall be a wall switch at each floor level to control the light source where the stairway has six or more risers.

Exception: A switch is not required where remote, central or automatic control of lighting is provided.

R303.7.1 Light activation. Where lighting outlets are installed in interior stairways, there shall be a wall switch at each floor level to control the lighting outlet where the stairway has six or more risers. The illumination of exterior stairways shall be controlled from inside the dwelling unit.

Exception:

Lights that are continuously illuminated or automatically controlled.

R303.8 Exterior stairway illumination. Exterior stairways shall be provided with an artificial light source located at the top landing of the stairway. Stairway illumination shall receive primary power from the building wiring. Exterior stairways providing access to a basement from the outdoor grade level shall be provided with an artificial light source located at the bottom landing of the stairway.

R303.9 Required heating. When the winter design temperature in Table R301.2(1) is below 60°F every dwelling unit shall be provided with heating facilities capable of maintaining a minimum room temperature of 68°F at a point 3 feet above the floor and 2 feet from exterior walls in all habitable rooms at design temperature. The installation of one or more portable heaters shall not be used to achieve compliance with this section. **Exception:** Unheated recreational tents or yurts not exceeding 500 square feet provided it is not occupied as a permanent dwelling.

R304.1 Minimum area. Habitable rooms shall have a floor area of not less than 70 square feet.

Exception: Kitchens.

R304.2 Minimum dimensions. Habitable rooms shall not be less than 7 feet in any horizontal dimension.

Exception: Kitchens

R304.3 Height effect on room area. Portions of a room with a sloping ceiling measuring less than 5 feet or a furred ceiling measuring less than 7 feet from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required habitable area for that room.

R305.1 Minimum height. Habitable space, hallways and portions of basements containing these spaces shall have a

ceiling height of not less than 7 feet. Bathrooms, toilet rooms and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches.

Exceptions:

1. For rooms with sloped ceilings, at least 50 percent of the required floor area of the room must have a ceiling height of at least 7 feet and no portion of the required floor area may have a ceiling height of less than 5 feet.
2. The ceiling height above bathroom and toilet room 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.
3. Beams, girders, ducts or other obstructions in basements containing habitable space shall be permitted to project within 6 feet 4 inches of the finished floor.

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

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

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

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

R308.4 Hazardous locations. The locations specified in Sections R308.4.1 through R308.4.7 shall be considered specific hazardous locations for the purposes of glazing:

R308.4.1. Glazing in doors. Glazing in all fixed and operable panels of swinging, sliding and bifold doors shall be considered a hazardous location.

Exceptions:

1. Glazed openings of a size through which a 3-inch diameter sphere is unable to pass.
2. Decorative glazing.

R308.4.2 Glazing adjacent to doors. Glazing in an individual fixed or operable panel adjacent to a door shall be considered to be a hazardous location where the bottom exposed edge of the glazing is less than 60 inches above the floor or walking surface and it meets either of the following conditions:

1. Where the glazing is within 24 inches of either side of the door in the plane of the door in a closed position.
2. Where the glazing is on a wall perpendicular to the plane of the door in a closed position and within 24 inches of the hinge side of an in-swinging door.

Exceptions:

1. Decorative glazing.
2. When there is an intervening wall or other permanent barrier between the door and the glazing.
3. Where access through the door is to a closet or storage area 3 feet or less in depth.

4. Glazing that is adjacent to the fixed panel of patio doors.

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

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; and
4. One or more walking surfaces are within 36 inches, measured horizontally and in a straight line, of the glazing.

Exceptions:

1. Decorative glazing.
2. When a horizontal rail is installed on the accessible side(s) of the glazing 34 to 38 inches above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per lineal foot without contacting the glass and be a minimum of 1 ½ inches in cross sectional height.
3. Outboard panes in insulating glass units and other multiple glazed panels when the bottom edge of the glass is 25 feet or more above grade, a roof, walking surfaces or other horizontal [within 45 degrees of horizontal] surface adjacent to the glass exterior.

R308.4.4 Glazing in guards and railings. Glazing in guards and railings, including structural baluster panels and nonstructural in-fill panels, regardless of area or height above a walking surface shall be considered a hazardous location

R308.4.4.1 Structural glass baluster panels. Guards with structural glass baluster panels shall be installed with an attached top rail or handrail. The top rail or handrail shall be supported by a minimum of three glass baluster panels, or shall be otherwise supported to remain in place should one glass baluster panel fail.

Exception:

An attached top rail or handrail is not required where the glass baluster panels are laminated glass with two or more glass plies of equal thickness and of the same glass type.

R308.4.5. 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.

Exception:

Glazing that is more than 60 inches, measured horizontally and in a straight line, from the water's edge of a bathtub, hot tub, spa, whirlpool or swimming pool or from the edge of a shower, sauna or steam room.

R308.4.6 Glazing adjacent stairs and ramps. Glazing where the exposed surface of the glazing is less than 60 inches above the plane of the adjacent walking surface of stairways, landings between flights of stairs and ramps shall be considered a hazardous location.

Exceptions:

1. When a rail is installed on the accessible side(s) of the glazing 34 to 38 inches above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot without contacting the glass and be a minimum of 1 1/2 inches in cross sectional height.
2. Glazing 36 inches or more measured horizontally from the walking surface.

R308.4.7. Glazing adjacent the bottom stair landing.

Glazing adjacent to the landing at the bottom of a stairway where the glazing is less than 36 inches above the landing and within a 60-inches horizontal arc less than 180 degrees from the bottom tread nosing shall be considered a hazardous location.

Exception:

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.

R310.1 Emergency escape and rescue required. Basements, habitable attics and every sleeping room shall have not less than one operable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, an emergency egress and rescue opening shall be required in each sleeping room. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.

Exception:

Storm shelters and basements used only to house mechanical equipment not exceeding a total floor area of 200 square feet.

R310.1.1 Operational constraints and opening control devices. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge. Window opening control devices complying with ASTM F 2090 shall be permitted for use on windows serving as a required emergency escape and rescue opening.

R310.2.1 Minimum opening area. Emergency escape and rescue openings shall have a net clear opening of 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.

Exception:

Grade floor or below grade openings shall have a minimum net clear opening of not less than 5 square feet.

R310.2.2 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.

R310.2.3 Window wells. The horizontal area of the window well shall be not less than 9 square feet, with a horizontal projection and width of not less than 36 inches. The area of the window well shall allow the emergency escape and rescue opening to be fully opened.

Exception:

The ladder or steps required by Section R310.2.3.1 shall be permitted to encroach not more than 6 inches into the required dimensions of the window well.

R310.2.3.1 Ladder and steps. Window wells with a vertical depth greater than 44 inches shall be equipped with a permanently affixed ladder or steps usable with the window in the fully open position. Ladders or steps required by this section shall not be required to comply with Sections R311.7 and R311.8. 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 window wall.

R310.2.4 Emergency escape and rescue openings under decks and porches. Emergency escape and rescue openings shall be permitted to be under decks and porches provided that the location of the deck allows the emergency escape and rescue openings to be fully opened and provides a path not less than 36 inches in height to a yard or court.

R311.1 Means of egress. Dwellings shall be provided with a means of egress in accordance with this section. The means of egress shall provide a continuous and unobstructed path of vertical and horizontal egress travel from all portions of the dwelling to the required egress door without requiring travel through a garage. The required egress door shall open directly into a public way or to a yard or court that opens to a public way.

R311.2 Egress door. Not less than 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.

R311.3 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 (2-percent).

Exception: Exterior balconies less than 60 square feet and only accessible from a door are permitted to have a landing less than 36 inches measured in the direction of travel.

R311.4 Vertical egress. Egress from habitable levels including habitable attics and basements not provided with an egress door in accordance with Section R311.3 shall be by ramp in accordance with Section R311.8 or a stairway in accordance with Section R311.7.

Exception: Stairs or ladders within an individual dwelling unit used for access to areas of 200 square feet or less, and not containing the primary bathroom or kitchen.

R311.6 Hallways. The minimum width of a hallway shall be not less than 3 feet.

R311.7.1 Stairway 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 ½ inches on either side of the stairway and the clear width of the stairway at and below the handrail height, including treads and landings, shall be not less than 31 ½ inches where a handrail is installed on one side and 27 inches where handrails are provided on both sides.

Exception:

The width of spiral stairways shall be in accordance with Section R311.7.10.1.

R311.7.2 Stairway headroom. The headroom in stairways shall be not 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.

Exceptions:

1. Where the nosings of treads at the side of a flight extend under the edge of a floor opening through which the stair passes, the floor opening shall be allowed to project horizontally into the required headroom not more than 4 ¾ inches.
2. The headroom for spiral stairs shall be in accordance with Section R311.7.10.1.

R311.7.3 Vertical rise. A flight of stairs shall not have a vertical rise larger than 147 inches between floor levels or landings.

R311.7.4 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.

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

R311.7.5.1 Risers. The riser height shall be not more than 7 ¾ inches. The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 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 degrees from the vertical. Open risers are permitted provided that the openings located more than 30 inches, as measured vertically, to the floor or grade below do not permit the passage of a 4-inch diameter sphere.

Exception:

The opening between adjacent treads is not limited on spiral stairs.

2. The riser height of spiral stairways shall be in accordance with Section R311.7.10.1.

R311.7.5.2 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 3/8 inch.

R311.7.5.2.1 Winders. 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 walk line. 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 walk line shall not exceed the smallest winder tread by more than 3/8 inch (9.5 mm). Consistently shaped winders at the walk line shall be allowed within the same flight, of stairs as rectangular treads and do not have to be within 3/8 inch (9.5 mm) of the rectangular tread depth.

R311.7.6 Landings for stairways. There shall be a floor or landing at the top and bottom of each stairway. The 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.

Exception:

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

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

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

Exceptions:

1. The use of a volute, turnout or starting easing shall be allowed over the lowest tread.
2. When handrail fittings or bendings are used provide continuous transition between flights, transitions at winder treads, the transition from handrail to guardrail or used at the start of a flight, the handrail height at the fittings or bendings shall be permitted to exceed 38 inches.

R311.7.8.2 Continuity. Handrails for stairways shall be continuous for the full length of the flight, from a point directly above the top riser of the flight to a point directly above the lowest riser of the flight. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than 1 1/2 inch between the wall and the handrails.

Exceptions:

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

R311.7.8.3 Grip size. See Thurston County Figure 12.

R311.7.9 Illumination Stairways shall be provided with illumination in accordance with Section R303.7.

R312.1 Guards. Guards shall be provided in accordance with Sections R312.1.1 through R312.1.4.

R312.1.1 Where required. Guards shall be located along 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 36 inches horizontally to the edge of the open side. Insect screening shall not be considered as a guard.

R312.1.2 Height. Required guards at open-sided walking surfaces, including stairs, porches, balconies or landings, shall be not less than 36 inches high measured vertically above the adjacent walking surface or the line connecting the leading edges of the treads.

Exceptions:

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

R312.1.3 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.

Exceptions:

1. The triangular openings at the open side of a 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 sides of stairs shall not have openings which allow passage of a sphere 4 3/8 inches in diameter.

R312.2 Window fall protection. Window fall protection shall be provided in accordance with Sections R312.2.1 and R312.2.2.

R312.2.2.1 Window sills. In dwelling units, where the top of the sill of an operable window is located less than 24 inches above the finished floor and greater than 72 inches above the finished grade or other surface below on the exterior of the building the operable window shall comply with one of the following:

1. Operable windows with openings that will not allow a 4-inch-diameter sphere to pass through the opening where the opening is in its largest open position.
2. Operable windows that are provided with window fall protection devices that comply with ASTM F 2090.
3. Operable windows that are provided with window opening control devices that comply with Section R312.2.2.

R312.2.2 Window opening control devices. Window opening control devices shall comply with ASTM F 2090. The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the net clear opening area of the window unit to less than the area required by Section R310.1.1.

R314.1 Smoke detection and notification. All smoke alarms shall be listed in accordance with UL 217 and installed in accordance with the provisions of this code and the household fire warning equipment provisions of NFPA 72.

R314.3 Location. Smoke alarms shall be installed in the following locations:

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

R314.3.1 Alterations, repairs and additions. When alterations, repairs or additions requiring a permit occur, or when one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be equipped with smoke alarms located as required for new dwellings.

Exceptions:

1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, are exempt from the requirements of this section.
2. Installation, alteration or repairs of plumbing, electrical or mechanical systems are exempt from the requirements of this section.

R314.4 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. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection.

Exceptions:

1. Smoke alarms shall be permitted to be battery operated when installed in buildings without commercial power.
2. Hard wiring of smoke alarms in existing areas shall not be required where the alterations or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for hard wiring without the removal of interior finishes.

R314.5 Interconnection. When more than one smoke alarm is required to be installed within an individual dwelling unit in accordance with Section R314.3, the alarm devices shall be interconnected in such a manner that the actuation of one

alarm will activate all of the alarms in the individual unit. Physical interconnection of smoke alarms shall not be required where listed wireless alarms are installed and all alarms sound upon activation of one alarm.

Exception:

Interconnection of smoke alarms in existing areas shall not be required where alterations or repairs do not result in removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for interconnection without the removal of interior finishes.

R315.1 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 bedroom in dwelling units and on each level of the dwelling unit and in accordance with the manufacturer's recommendations.

R315.3 Where required in existing dwellings. Existing dwellings shall be equipped with carbon monoxide alarms in accordance with Section R315.1. An inspection will occur when alterations, repairs or additions requiring a permit occur, or when one or more sleeping rooms are added or created.

Exceptions:

1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, or electrical permits are exempt from the requirements of this section.
2. Installation, alteration or repairs of nonfuel burning plumbing, electrical or mechanical systems are exempt from the inspection requirements of this section.
3. Owner-occupied single-family residences legally occupied before July 26, 2009. RCW 19.27.530(2)(b).

R315.3 Alarm requirements. Single station carbon monoxide alarms shall be listed as complying with UL 2034 and shall be installed in accordance with this code, NFPA 720-2012 and the manufacturer's installation instructions.

R317.1 Location required.

Protection of wood and wood based products from decay shall be provided in the following locations by the use of naturally durable wood or wood that is preservative-treated in accordance with AWP A U1 for the species, product, preservative and end use. Preservatives shall be listed in Section 4 of AWP A U1.

1. Wood joists or the bottom of a wood structural floor when closer than 18 inches or wood girders when closer than 12 inches to the exposed ground in crawl spaces or unexcavated area located within the periphery of the building foundation.
2. All wood framing members that rest on concrete or masonry exterior foundation walls and are less than 8 inches from the exposed ground.
3. Sills and sleepers on a concrete or masonry slab that is in direct contact with the ground unless separated from such slab by an impervious moisture barrier.
4. The ends of wood girders entering exterior masonry or concrete walls having clearances of less than 1/2 inch on tops, sides and ends.

5. Wood siding, sheathing and wall framing on the exterior of a building having a clearance of less than 6 inches from the ground or less than 2 inches measured vertically from concrete steps, porch slabs, patio slabs, and similar horizontal surfaces exposed to the weather.

6. Wood structural members supporting moisture-permeable floors or roofs that are exposed to the weather, such as concrete or masonry slabs, unless separated from such floors or roofs by an impervious moisture barrier.

7. Wood furring strips or other wood framing members attached directly to the interior of exterior masonry walls or concrete walls below grade except where an approved vapor retarder is applied between the wall and the furring strips or framing members.

R317.1.1 Field treatment.

Field-cut ends, notches and drilled holes of preservative-treated wood shall be treated in the field in accordance with AWP A M4.

R317.1.2 Ground contact.

All wood in contact with the ground, embedded in concrete in direct contact with the ground or embedded in concrete exposed to the weather that supports permanent structures intended for human occupancy shall be approved pressure-preservative-treated wood suitable for ground contact use, except untreated wood may be used where entirely below groundwater level or continuously submerged in fresh water.

R319.1 Address numbers. Buildings shall have approved address numbers, building numbers or approved building identification placed in a position that is plainly legible and visible from the street or road fronting the property. These numbers shall contrast with their background. Address numbers shall be Arabic numbers or alphabetical letters. Numbers shall be a minimum of 4 inches high with a minimum stroke width of 1/2 inch. Where access is by means of a private road and the building address cannot be viewed from the public way, a monument, pole or other sign or means shall be used to identify the structure.

FOUNDATIONS

R401.2 Requirements. Foundation construction shall be capable of accommodating all loads according to Section R301 and of transmitting the resulting loads to the supporting soil. Fill soils that support footings and foundations shall be designed, installed and tested in accordance with accepted engineering practice.

R401.3 Drainage.

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.

Exception:

Where lot lines, walls, slopes or other physical barriers prohibit 6 inches of fall within 10 feet, drains or swales shall be constructed to ensure drainage away from the structure. Impervious surfaces within 10 feet of the building foundation

shall be sloped a minimum of 2 percent away from the building.

R401.4.1 Geotechnical evaluation. In lieu of a complete geotechnical evaluation, the load-bearing values in Table R401.4.1 shall be assumed. *A load-bearing value of 1500 pounds per square foot will be assumed for projects without other evidence submitted.*

R402.2 Concrete. Concrete shall have a minimum specified compressive strength (f'_c) as shown in Table R402.2.

TABLE R402.2
MINIMUM SPECIFIED COMPRESSIVE STRENGTH
OF CONCRETE

TYPE OR LOCATIONS OF CONCRETE CONSTRUCTION	MINIMUM SPECIFIED COMPRESSIVE STRENGTH (f'_c)
Basement walls, foundations and other concrete not exposed to the weather	2500
Basement slabs and interior slabs on grade, except garage floor slabs	2500
Basement walls, foundation walls, exterior walls and other vertical concrete work exposed to the weather	3000
Porches, carport slabs and steps exposed to the weather, and garage floor slabs	3000

R403.1 General.

All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other approved structural systems which shall be of sufficient design to accommodate all loads according to Section R301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil. Footings shall be supported on undisturbed natural soils or engineered fill.

R403.1.1 Minimum size. Minimum sizes for concrete and masonry footings shall be as set forth in Table R403.1 and Figure R403.1(1). *See Thurston County Figures 2,3 and 5.*

R403.1.2 Continuous footing in Seismic Design Categories D₀, D₁ and D₂. The braced wall panels at exterior and interior walls of buildings located in Seismic Design Categories D₀, D₁ and D₂ shall be supported by continuous footings. All required interior braced wall panels shall be supported on footings at intervals not exceeding 50 feet.

R403.1.3 Seismic reinforcing. Concrete footings located in Seismic Design Categories D₀, D₁ and D₂ shall have minimum reinforcement. *See Thurston County Figures 2,3 and 5.*

R403.1.3.1 Foundations with stemwalls. Foundations with stemwalls shall be provided with a minimum of one No. 4 bar within 12 inches of the top of the wall and one No. 4 bar located 3 inches to 4 inches from the bottom of the footing. *See Thurston County figures 2, 3, and 5.*

R403.1.3.2 Slabs-on-ground with turned-down footings. Slabs-on-ground with turned down footings shall have a minimum of one No. 4 bar at the top and bottom of the footing. *See Thurston County figures 2, 3, and 5.*

R403.1.4 Minimum depth. All exterior footings shall be placed at least 12 inches below the undisturbed ground surface.

R403.1.4.2 Seismic conditions. In Seismic Design Categories D₀, D₁ and D₂, interior footings supporting bearing or bracing walls and cast monolithically with a slab on grade shall extend to a depth of not less than 12 inches below the top of the slab.

R403.1.6 Foundation anchorage. Sill plates and walls supported directly on continuous foundations shall be anchored to the foundation in accordance with this section. Wood sole plates at all exterior walls on monolithic slabs, wood sole plates of braced wall panels at building interiors on monolithic slabs and all wood sill plates shall be anchored to the foundation with anchor bolts spaced a maximum of 6 feet on center. Bolts shall be at least 1/2 inch in diameter and shall extend a minimum of 7 inches into concrete or grouted cells of concrete masonry units. A nut and washer shall be tightened on each anchor bolt. There shall be a minimum of two bolts per plate section with one bolt located not more than 12 inches or less than seven bolt diameters from each end of the plate section. Interior bearing wall sole plates on monolithic slab foundation that are not part of a braced wall panel shall be positively anchored with approved fasteners. Sill plates and sole plates shall be protected against decay and termites where required by Sections R317 and R318. Cold-formed steel framing systems shall be fastened to wood sill plates or anchored directly to the foundation as required in Section R505.3.1 or R603.3.1.

Exceptions:

1. Foundation anchorage, spaced as required to provide equivalent anchorage to 1/2-inch-diameter (12.7 mm) anchor bolts.
2. Walls 24 inches total length or shorter connecting offset braced wall panels shall be anchored to the foundation with a minimum of one anchor bolt located in the center third of the plate section and shall be attached to adjacent braced wall panels at corners as shown in item 8 of Table R602.3(1).
3. Connection of walls 12 inches total length or shorter connecting offset braced wall panels to the foundation without anchor bolts shall be permitted. The wall shall be attached to adjacent braced wall panels at corners as shown in item 8 of Table R602.3(1).

R403.1.6.1 Foundation anchorage in Seismic Design Categories C, D₀, D₁ and D₂. In addition to the requirements of Section R403.1.6, the following requirements shall apply to wood light-frame structures in Seismic Design Categories D₀, D₁ and D₂ and wood light-frame townhouses in Seismic Design Category C.

1. Plate washers conforming to Section R602.11.1 shall be provided for all anchor bolts over the full length of required braced wall lines except where approved anchor straps are used. Properly sized cut washers shall be permitted for anchor bolts in wall lines not containing braced wall panels.
2. Interior braced wall plates shall have anchor bolts spaced at not more than 6 feet on center and located within 12 inches of the ends of each plate section when supported on a continuous foundation.
3. Interior bearing wall sole plates shall have anchor bolts spaced at not more than 6 feet on center and located within 12 inches of the ends of each plate section when supported on a continuous foundation.
4. The maximum anchor bolt spacing shall be 4 feet for buildings over two stories in height.
5. Stepped cripple walls shall conform to Section R602.11.2.
6. Where continuous wood foundations in accordance with Section R404.2 are used, the force transfer shall have a capacity equal to or greater than the connections required by Section R602.11.1 or the braced wall panel shall be connected to the wood foundations in accordance with the braced wall panel-to-floor fastening requirements of Table R602.3(1).

R403.1.7.1 Building clearances from ascending slopes. In general, buildings below slopes shall be set a sufficient distance from the slope to provide protection from slope drainage, erosion and shallow failures.

R403.1.7.2 Footing setback from descending slope surfaces. Footings on or adjacent to slope surfaces shall be founded in material with an embedment and setback from the slope surface sufficient to provide vertical and lateral support for the footing without detrimental settlement.

R404.1.2 Concrete foundation walls. Concrete foundation walls that support light-frame walls shall be designed and constructed in accordance with the provisions of this section, ACI 318, ACI 332 or PCA 100. *See Thurston County figures 2,3 & 5.*

R404.1.7 Backfill placement. Backfill shall not be placed against the wall until the wall has sufficient strength and has been anchored to the floor above, or has been sufficiently braced to prevent damage by the backfill.

Exception:

Such bracing is not required for walls supporting less than 4 feet of unbalanced backfill.

R404.3 Wood sill plates. Wood sill plates shall be a minimum of 2-inch by 4-inch nominal lumber.

R404.4 Retaining walls. Retaining walls not supporting a structure that are not laterally supported at the top and that retain in excess of 24 inches of unbalanced fill shall be designed to ensure stability against overturning, sliding, excessive foundation pressure and water uplift. Retaining walls shall be designed for a safety factor of 1.5 against lateral sliding and overturning.

R405.1 Concrete or masonry foundations. Drains shall be provided around all concrete or masonry foundations that retain earth and enclose habitable or usable spaces located

below grade. Drainage tiles, gravel or crushed stone drains, perforated pipe or other approved systems or materials shall be installed at or below the area to be protected and shall discharge by gravity or mechanical means into an approved drainage system. Gravel or crushed stone drains shall extend at least 1 foot beyond the outside edge of the footing and 6 inches above the top of the footing and be covered with an approved filter membrane material. The top of open joints of drain tiles shall be protected with strips of building paper. Perforated drains shall be surrounded with an approved filter membrane or the filter membrane shall cover the washed gravel or crushed rock covering the drain. Drainage tiles or perforated pipe shall be placed on a minimum of 2 inches of washed gravel or crushed rock at least one sieve size larger than the tile joint opening or perforation and covered with not less than 6 inches of the same material.

Exception:

A drainage system is not required when the foundation is installed on well-drained ground or sand-gravel mixture soils according to the Unified Soil Classification System, Group I Soils, as detailed in Table R405.1. *Group I soils include type GW, GP, SW, SP, GM and SM soils.*

R406.1 Concrete and masonry foundation dampproofing.

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 dampproofed from the top of the footing to the finished grade. Masonry walls shall have not less than $\frac{3}{8}$ inch portland cement parging applied to the exterior of the wall. The parging shall be dampproofed in accordance with one of the following:

1. Bituminous coating.
2. Three pounds per square yard of acrylic modified cement.
3. One-eighth inch 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.

Exception:

Parging of unit masonry walls is not required where a material is approved for direct application to the masonry.

R406.2 Concrete and masonry foundation waterproofing.

In areas where a high water table or other severe soil-water conditions are known to exist, exterior foundation walls that retain earth and enclose interior spaces and floors below grade shall be waterproofed with a membrane extending from the top of the footing to the finished grade.

R407.3 Structural requirements. The columns shall be restrained to prevent lateral displacement at the bottom end. Wood columns shall not be less in nominal size than 4 inches by 4 inches (102 mm by 102 mm). Steel columns shall not be less than 3-inch-diameter (76 mm) Schedule 40 pipe manufactured in accordance with ASTM A 53 Grade B or approved equivalent.

R408.1 Ventilation. The under-floor space between the bottom of the floor joists and the earth under any building (except space occupied by a basement) shall have ventilation openings through foundation walls or exterior walls.

R408.2 Openings for under-floor ventilation. The minimum net area of ventilation openings shall not be less than 1 square foot for each 300 square feet of under-floor space area. One ventilating opening shall be within 3 feet of each corner of the building, except one side of the building shall be permitted to have no ventilation openings. Ventilation openings shall be covered for their height and width with any of the following materials provided that the least dimension of the covering shall not exceed 1/4 inch:

1. Perforated sheet metal plates not less than 0.070 inch thick.
2. Expanded sheet metal plates not less than 0.047 inch thick.
3. Cast iron grills or grating.
4. Extruded load-bearing brick vents.
5. Hardware cloth of 0.035 inch wire or heavier.
6. Corrosion-resistant wire mesh, with the least dimension being 1/8 inch.

Exception:

The total area of ventilation openings shall be permitted to be reduced to $1/1,500$ of the under-floor area where the ground surface is covered with an approved Class I vapor retarder material and the required openings are placed to provide cross ventilation of the space. The installation of operable louvers shall not be prohibited. If the installed ventilation is less than 1/300, or if operable louvers are installed, a radon vent shall be installed to originate from a point between the ground cover and soil. The radon vent shall be installed in accordance with the requirements of Appendix F (Radon) of this code.

R408.4 Access. Access shall be provided to all under-floor spaces. Access openings through the floor shall be a minimum of 18 inches by 24 inches. Openings through a perimeter wall shall be no less than 16 inches by 24 inches.

R408.5 Removal of debris. The under-floor grade shall be cleaned of all vegetation and organic material. All wood forms used for placing concrete shall be removed before a building is occupied or used for any purpose. All construction materials shall be removed before a building is occupied or used for any purpose.

R408.6 Finished grade. The finished grade of under-floor surface may be located at the bottom of the footings; however, where there is evidence that the groundwater table can rise to within 6 inches of the finished floor at the building perimeter or where there is evidence that the surface water does not readily drain from the building site, the grade in the underfloor space shall be as high as the outside finished grade, unless an approved drainage system is provided.

FLOORS

R502.8 Drilling and notching. Structural floor members shall not be cut, bored or notched in excess of the limitations shown in Thurston County figures 10 and 11.

R502.8.2 Engineered wood products. Cuts, notches and holes bored in trusses and engineered structural wood members are prohibited except where permitted by manufacturer's recommendation or where designed by a registered design professional.

R506.2.2 Slab base. A 4-inch-thick base course consisting of clean graded sand, gravel, crushed stone or crushed blast-furnace slag passing a 2-inch sieve shall be placed on the prepared sub-grade when the slab is below grade.

Exception:

A base course is not required when the concrete slab is installed on well-drained or sand-gravel mixture soils classified as Group I according to the United Soil Classification System in accordance with Table R405.1.

R506.2.3 Vapor retarder. 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 prepared subgrade.

Exception:

The vapor retarder may be omitted from garages, utility buildings and other unheated accessory structures.

R507.1 Decks. 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. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered framing members, connections 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.

R507.2.2.1 Deck ledger connection to band joist. Deck ledger connections to band joists shall be in accordance with this section, Tables R507.2 and R507.2.1, and Figures R507.2.1(1) and R507.2.1(2).

R507.2.1 Ledger details. Deck ledgers installed in accordance with Section R507.2 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 installed in accordance with Section R507.2 shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer.

R507.2.2 Band joist details: Band joists attached by a ledger in accordance with Section R507.2 shall be a minimum 2-inch-nominal, solid-sawn, spruce-pine-fir lumber or a minimum 1-inch by 9 1/2 -inch dimensional, Douglas fir, laminated veneer lumber. Band joists attached by a ledger in accordance with Section R507.2 shall be fully supported by a wall or sill plate below.

R507.2.3 Ledger to band joist fastener details. Fasteners used in deck ledger connections in accordance with Table R507.2 shall be hot-dipped galvanized or stainless steel and shall be installed in accordance with Table R507.2.1 and Figures R507.2.1(1) and R507.2.1(2).

R507.2.4 Deck lateral load connection. The lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figure R507.2.3(1) or 507.2.3(2). Where the lateral load connection is provided in accordance

with Figure R507.2.3(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 1500 pounds. Where the lateral load connections are provided in accordance with Figure R507.2.3(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.

Exception:

Decks not more than 30 inches above grade at any point may be unattached.

FIGURE 507.2.3(1)
DECK ATTACHMENT FOR LATERAL LOADS

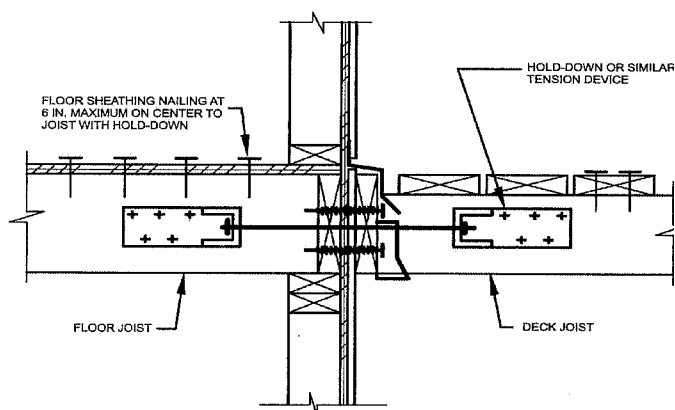
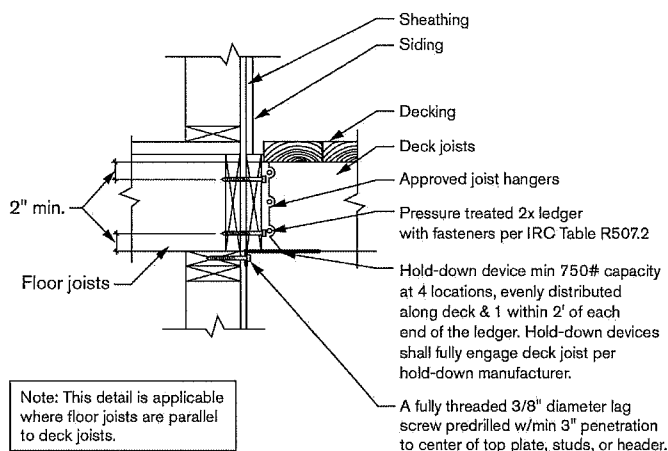


FIGURE 507.2.3(2)
DECK ATTACHMENT FOR LATERAL LOADS



WALL CONSTRUCTION

R602.1.1 Sawn lumber. Sawn lumber shall be identified by a grade mark of an accredited lumber grading or inspection agency and have design values certified by an accreditation body that complies with DOC PS 20. In lieu of a grade mark, a certification of inspection issued by a lumber grading or inspection agency meeting the requirements of this section shall be accepted. .

R602.2 Grade. Studs shall be a minimum No. 3, standard or stud grade lumber.

Exception:

Bearing studs not supporting floors and non-bearing studs may be utility grade lumber, provided the studs are spaced in accordance with Table R602.3(5).

R602.3 Design and construction. Studs shall be continuous from support at the sole plate to a support at the top plate to resist loads perpendicular to the wall. The support shall be a foundation or floor, ceiling or roof diaphragm or shall be designed in accordance with accepted engineering practice.

Exception:

Jack studs, trimmer studs and cripple studs at openings in walls that comply with Tables R602.7.1 and R602.7(2).

R602.3.1 Stud size, height and spacing. The size, height and spacing of studs shall be in accordance with Table R602.3.(5).

Exceptions:

1. Utility grade studs shall not be spaced more than 16 inches on center, shall not support more than a roof and ceiling, and shall not exceed 8 feet in height for exterior walls and load bearing walls or 10 feet for interior non-load-bearing walls.
2. Where snow loads are less than or equal to 25 pounds per square foot, and the ultimate design wind speed is less than or equal to 130 mph, 2-inch by 6-inch studs supporting a roof load with not more than 6 feet of tributary length shall have a maximum height of 18 feet where spaced at 16 inches on center, or 20 feet where spaced at 12 inches on center. Studs shall be minimum No. 2 grade lumber.

R602.3.2 Top plate. Wood stud walls shall be capped with a double top plate installed to provide overlapping at corners and intersections with bearing partitions. End joints in top plates shall be offset at least 24 inches. Plates shall be not less than 2 inches nominal thickness and have a width at least equal to the width of the studs.

Exception: A single top plate used as an alternative to a double top plate shall comply with the following:

1. The single top plate shall be tied at corners, intersecting walls, and at in-line splices in straight wall lines in accordance with Table R602.3.2.
2. The rafters or joists shall be centered over the studs with a tolerance of not more than 1 inch.
3. Omission of the top plate is permitted over headers where the headers are adequately tied to adjacent wall sections in accordance with Table R602.3.2.

R602.3.3 Bearing studs. Where joists, trusses or rafters are spaced more than 16 inches on center and the bearing studs below are spaced 24 inches on center, such members shall bear within 5 inches of the studs beneath.

Exceptions:

1. The top plates are two 2-inch by 6-inch or two 3-inch by 4-inch members.
2. A third top plate is installed.
3. Solid blocking equal in size to the studs is installed to reinforce the double top plate.

R602.3.4 Bottom (sole) plate. Studs shall have full bearing on a nominal 2X or larger plate or sill having a width at least equal to the width of the studs.

R602.4 Interior load-bearing walls. Interior load-bearing walls shall be constructed, framed and fireblocked as specified for exterior walls.

R602.9 Foundation cripple walls. Foundation cripple walls shall be framed of studs not less in size than the studding above. When exceeding 4 feet in height, such walls shall be framed of studs having the size required for an additional story. Cripple walls supporting bearing walls or exterior walls or interior braced wall panels as required in Section R403.1.2 and R602.10.9.1 with a stud height less than 14 inches shall be sheathed on at least one side with a wood structural panel that is fastened to both the top and bottom plates in accordance with Table R602.3(1), or the cripple walls shall be constructed of solid blocking. All cripple walls shall be supported on continuous foundations.

Exception: Footings supporting cripple walls used to support interior braced wall panels as required in Sections R403.1.2 and R602.10.9.1 shall be continuous for the required length of the cripple wall and construction beyond the cripple wall for a minimum distance of 4 inches and a maximum distance of the footing thickness. The footing extension is not required at intersections with other footings.

R602.10 Wall bracing. Buildings shall be braced in accordance with this section. Where a building, or portion thereof, does not comply with one or more of the bracing requirements in this section, those portions shall be designed and constructed in accordance with Section R301.1.

R602.10.8 Braced wall panel connections. A load path for lateral forces shall be provided between floor framing and braced wall panels located above or below a floor, as specified in Section R602.10.8.

Panel perpendicular to framing

Floor/ceiling above: 8d @ 6 inches o.c. to rim joist or full depth blocking continuous along length of braced wall panel.
Floor below: (3) 16d @ 16 inches o.c. to rim joist or full depth blocking continuous along length of braced wall panel.

Panel parallel to framing:

Floor/ceiling above: 8d @ 6 inches o.c. to rim joist aligned framing member directly above, or (3) 8d toenailed to full depth blocking @16 inches o.c. along length of braced wall panel.
Floor below: 8d @ 6 inches o.c. to rim joist aligned framing member directly below, or (3) 8d toenailed to full depth blocking @16 inches o.c. along length of braced wall panel.

R602.10.10 Panel joints. Vertical joints of panel sheathing shall occur over, and be fastened to, common studs. Horizontal joints in braced walls panels shall occur over, and be fastened to, common blocking of a minimum 1 ½ inch thickness.

Exceptions:

1. Vertical joints of panel sheathing shall be permitted to occur over double studs, where adjoining panel edges are attached to

separate studs with the required panel edge fastening schedule, and the adjacent studs are attached together with two rows of 10d box nails at 10 inches o.c.

2. Blocking at horizontal joints shall not be required in wall segments that are not counted as braced wall panels.

3. Where the bracing length provided is not less than twice the minimum length required by Tables R602.10.3(1) and R602.10.3(3), blocking at horizontal joints shall not be required in braced wall panels constructed using Methods WSP, SFB,GB, PBS or HPS.

R609.1 General. This section prescribes performance and construction requirements for exterior window and door installed in wall. Windows and doors shall be installed and flashed in accordance with the fenestration manufacturer's written installation instructions. Window and door openings shall be flashed in accordance with Section R703.4. Written installation instructions shall be provided by the fenestration manufacturer for each window or door.

WALL COVERING

R701.2 Installation. Products sensitive to adverse weather shall not be installed until adequate weather protection for the installation is provided. Exterior sheathing shall be dry before applying exterior cover.

R702.3.7 Water-resistant gypsum backing board. Gypsum board used as the base or backer for adhesive application of ceramic tile or other required nonabsorbent finish material shall conform to ASTM C 1396, C 1178 or C1278. Use of water-resistant gypsum backing board shall be permitted on ceilings. Water-resistant gypsum board shall not be installed over a Class I or II vapor retarder in a shower or tub compartment. Cut or exposed edges, including those at wall intersections, shall be sealed as recommended by the manufacturer.

Limitations. Water-resistant gypsum backing board shall not be used where there will be direct exposure to water, or in areas subject continuous high humidity.

R703.1 General. Exterior walls shall provide the building with a weather-resistant exterior wall envelope. The exterior wall envelope shall include flashing as described in Section R703.4.

R703.2 Water-resistive barrier. One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches. Where joints occur, felt shall be lapped not less than 6 inches. The felt or other approved material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1 The water-resistive barrier is not required for detached accessory buildings.

R703.4 Flashing. Approved corrosion-resistive flashing shall be provided in the exterior wall envelope in such a manner as

to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. Self-adhered membranes used as flashing shall comply with AAMA 711. Fluid-applied membranes used as flashing in exterior walls shall comply with AAMA 714. The flashing shall extend to the surface of the exterior wall finish. Approved corrosion-resistant flashings shall be installed at all of the following locations:

1. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Mechanically attached flexible flashings shall comply with AAMA 712.
2. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
3. Under and at the ends of masonry, wood or metal copings and sills.
4. Continuously above all projecting wood trim.
5. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
6. At wall and roof intersections.
7. At built-in gutters.

R703.5.2 Panel Siding. 3/8-inch wood structural panel siding shall not be applied directly to studs spaced more than 16 inches on center where long dimension is parallel to studs. Wood structural panel siding 7/16 inch or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing. Joints in wood, hardboard or wood structural panel siding shall be made as follows unless otherwise approved. Vertical joints in panel siding shall occur over framing members, unless wood or wood structural panel sheathing is used, and shall be shiplapped or covered with a batten. Horizontal joints in panel siding shall be lapped not less than 1 inch or shall be shiplapped or shall be flashed with Z-flashing and occur over solid blocking, wood or wood structural panel sheathing. Horizontal siding.

ROOF-CEILING CONSTRUCTION

R802.3. Framing details. Rafters shall be framed not more than 1 1/2 inches offset from each other to ridge board or directly opposite from each other with a gusset plate as a tie. Ridge board shall be not less than 1-inch nominal thickness and not less in depth than the cut end of the rafter. At valleys and hips there shall be a valley or hip rafter not less than 2-inch nominal 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 shall be designed to carry and distribute the specific load at that point. Where the roof pitch is less than 3/12, structural members that support rafters and ceiling joists, such as ridge beams, hips and valleys shall be designed as beams.

R802.10.1 Truss design drawings. Truss design drawings, prepared in conformance to Section R802.10.1, shall be provide to the building official and approved prior to

installation. Truss design drawings shall be provided with the shipment of trusses delivered at the job site.

R802.10.4 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 such as HVAC equipment or 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.

R802.11. Roof tie-down. Trusses shall be attached to supporting wall assemblies by connections capable of resisting uplift forces as specified on the Truss Design Drawings or as shown on the construction documents. Rafters and trusses in buildings not exceeding 36 foot roof span and 24 inch roof overhangs shall be connected to wall plates by the use of approved connectors having a resistance to uplift of not less than 188 pounds (Exposure B) and 404 pounds (Exposure C) and shall be installed in accordance with the manufacturer's specifications. See Table R802.11.

R806.1 Roof ventilation required. Enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain or snow. Ventilating openings shall be provided with corrosion-resistant wire mesh, with 1/16 inch minimum to 1/4 inch maximum openings.

R806.2 Minimum area. The total net free ventilating area shall not be less than 1 to 150 of the area of the vented space.

Exception: The minimum net free ventilation area shall be 1/300 of the vented space provided one or more of the following conditions are met:

1. In Climate Zones 6, 7 and 8, a Class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.
2. Not less than 40 percent and not more than 50 percent of the required ventilating area is provided with ventilators located in the upper portion of the attic or rafter space. Upper ventilators shall be located not more than 3 feet below the ridge or highest point of the space, measured vertically, with the balance of the required ventilation provided by eave or cornice vents. Where the location of wall or roof framing members conflicts with the installation of upper ventilators, installation mor than 3 feet below the ridge or highest point of the space shall be permitted.

R806.3 Vent and insulation clearance. Where eave or cornice vents are installed, insulation shall not block the free flow of air. Not less than a 1-inch space shall be provided between the insulation and roof sheathing and a the location of the vent.

R807.1 Attic access. Buildings with combustible ceiling or roof construction shall have an attic access opening to attic areas that have a vertical height of 30 inches or greater over an area of not less than 30 square feet. The vertical height shall be measured from the the top of the ceiling framing members to the underside of the roof framing members. The rough-framed opening shall not be less than 22 inches by 30 inches and shall be located in a hallway or other readily

accessible location. Where located in a wall, the opening shall be not less than 22 inches wide by 30 inches high. Where the access is located in a ceiling, minimum unobstructed headroom in the attic space shall be 30 inches at some point above the access measured vertically from the bottom of ceiling members. See M1305.1.3 for access requirements where mechanical equipment is located in attics.

ROOF ASSEMBLIES

R903.2 Flashing. Flashings shall be installed in a manner that prevents moisture from entering the wall and roof through joints in copings, through moisture permeable materials and at intersections with parapet walls and other penetrations through the roof plane.

R903.2.1 Locations. Flashings shall be installed at wall and roof intersections; wherever there is a change in roof slope or direction; and around roof openings. A flashing shall be installed to divert the water away from where the eave of a sloped roof intersects a vertical sidewall..

R903.4 Roof drainage. Unless roofs are sloped to drain over roof edges, roof drains shall be installed at each low point of the roof.

R904.4 Product identification. Roof covering materials shall be delivered in packages bearing the manufacturer's identifying marks and approved testing agency labels required.

R905.1 Roof covering application. Roof coverings shall be applied in accordance with the applicable provisions of this section and the manufacturer's installation instructions.

R905.1.1 Underlayment application. For roof slopes from two units vertical in 12 units horizontal (2:12), up to four units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied in the following manner. apply a 19-inch strip of underlayment felt parallel with and starting at the eaves. Starting at the eave, apply 36-inch-wide sheets of underlayment, overlapping successive sheets 19 inches, and fastened sufficiently to hold in place. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. For roof slopes of four units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied in the following manner. Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet.

R905.2.2 Slope. Asphalt shingles shall only be used on roof slopes of two units vertical in 12 units horizontal (2:12) or greater. For roof slopes from two units vertical in 12 units horizontal (2:12) up to four units vertical in 12 units horizontal (4:12), double underlayment application is required in accordance with Section R905.1.1.

R905.2.6 Attachment. Asphalt shingles shall have the minimum number of fasteners required by the manufacturer, but not less than four fasteners per strip shingle or two fasteners per individual shingle. Where the roof slope exceeds

21 units vertical in 12 units horizontal (21:12), shingles shall be installed as required by the manufacturer.

R905.2.8.1 Base and cap flashing. Base and cap flashing shall be installed in accordance with manufacturer's installation instructions.

R905.2.8.2 Valleys. Valley linings shall be installed in accordance with manufacturer's installation instructions before applying shingles.

R905.2.8.3 Sidewall flashing. Base flashing against a vertical sidewall shall be continuous or step flashing and shall be not less than 4 inches in height and 4 inches in width and shall direct water away from the vertical sidewall onto the roof or into the gutter. Where siding is provided on the vertical sidewall, the vertical leg of the flashing shall be continuous under the siding.

R905.2.8.5 Drip edge. A drip edge shall be provided at eaves and rake edges of shingle roofs. Adjacent segments of drip edge shall be overlapped not less than 2 inches. Drip edges shall extend not less than ¼ inch below the roof sheathing and extend up back onto the roof deck not less than 2 inches. Drip edges shall be mechanically fastened to the roof deck at not more than 12 inches o.c. with fasteners as specified in Section R902.5. Underlayment shall be installed over the drip edge along eaves and under the underlayment along rake edges.

R908.1 General. Materials and methods of application used for recovering or replacing an existing roof covering shall comply with the requirements of Chapter 9.

Exception:

Re-roofing shall not be required to meet the minimum design slope requirement of one-quarter unit vertical in 12 units horizontal (2-percent slope) in Section R905 for roofs that provide positive roof drainage.

R908.2 Structural and construction loads. The structural roof components shall be capable of supporting the roof covering system and the material and equipment loads that will be encountered during installation of the roof covering system.

R908.3.1.1 Roof re-cover. A roof re-cover shall not be permitted where any of the following conditions occur:

1. Where the existing roof or roof covering is water-soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.
2. Where the existing roof covering is slate, clay, cement or asbestos-cement tile.
3. Where the existing roof has two or more applications of any type of roof covering.

R908.4 Roof re-covering. Where the application of a new roof covering over wood shingle or shake roofs creates a combustible concealed space, the entire existing surface shall be covered with gypsum board, mineral fiber, glass fiber or other approved materials securely fastened in place.

R908.6 Flashings. Flashings shall be reconstructed in accordance with approved manufacturer's installation

instructions. Metal flashing to which bituminous materials are to be adhered shall be primed prior to installation.

CHIMNEYS AND FIREPLACES

R1001.2. Footings and foundations. Footings for masonry fireplaces and their chimneys shall be constructed of concrete or solid masonry not less than 12 inches thick and shall extend at least 6 inches beyond the face of the fireplace or foundation wall on all sides.

R1001.3. Seismic reinforcing. Masonry or concrete chimneys in Seismic Design Categories D₀, D₁ and D₂ shall be reinforced.

R1001.7.1 Damper. Masonry fireplaces shall be equipped with a ferrous metal damper located at least 8 inches above the top of the fireplace opening. Dampers shall be installed in the fireplace or the chimney venting the fireplace, and shall be operable from the room containing the fireplace. Fireplaces shall be provided with each of the following:

1. Tightly fitting flue dampers, operated by a readily accessible manual or approved automatic control.

Exception:

Fireplaces with gas logs shall be installed in accordance with the International Mechanical Code Section 901, except that the standards for liquefied petroleum gas installations shall be NFPA 58 (Liquefied Petroleum Gas Code) and NFPA 54 (National Fuel Gas Code).

1. An outside source for combustion air ducted into the firebox. The duct shall be at least 6 square inches, and shall be provided with an operable outside air duct damper.

2. Site built fireplaces shall have tight fitting glass or metal doors, or a flue draft induction fan or as approved for minimizing back-drafting. Factory built fireplaces shall use doors listed for the installed appliance.

R1004.2 Hearth extensions. Hearth extensions of approved factory-built fireplaces shall be installed in accordance with the listing of the fireplace. The hearth extension shall be readily distinguishable from the surrounding floor area.

R1005.1 Listing. Factory-built chimneys shall be listed and labeled and shall be installed and terminated in accordance with the manufacturer's installation instructions.

R1005.2 Decorative shrouds. Decorative shrouds shall not be installed at the termination of chimneys for factory-built fireplaces except where such shrouds are listed and labeled for use with the specific factory-built fireplace system and installed in accordance with the manufacturer's installation instructions.

R1006.2 Solid fuel burning appliances and fireplaces. Solid fuel burning appliances and fireplaces shall be provided with tight fitting metal or ceramic glass doors, and:

1. A source from outside the structure of primary combustion air, connected to the appliance as per manufacturer's specification. The air inlet shall originate at a point below the fire box. The duct shall be 4 inches or greater in diameter, not

exceed 20 feet in length, and be installed as per manufacturer's instructions; or

2. The appliance and manufacturer's recommended combustion air supply, as an installed unit, shall be certified by an independent testing laboratory to have passed Test No. 11-Negative Pressure Test, Section 12.3, of ULC S627-M1984 "Space Heaters for Use with Solid Fuels," modified as follows: Negative pressure of 8 Pascal shall be initially established with the chamber sealed and the air supply, if not directly connected to the appliance, closed off. The air supply if not directly connected to the appliance, shall then be opened. The maximum allowable air exchange rate from chamber leakage and intentional air supply for the unit (appliance with combustion air supply) in the test chamber is 3.5 air changes per hour, or 28 cfm, whichever is less.

Exception:

Combustion air may be supplied to the room in which the solid fuel burning appliance is located in lieu of direct ducting, provided that one of the following conditions is met:

1. The solid fuel burning appliance is part of a central heating plant and installed in an unconditioned space in conformance with the International Mechanical Code; or 2. The solid fuel burning appliance is installed in existing construction directly on a concrete floor or surrounded by masonry materials as in a fireplace. The combustion air terminus shall be located as close to the solid fuel burning appliance as possible and shall be provided with a barometric damper or equivalent. The combustion air source shall be specified by the manufacturer or no less than 4 inches in diameter or the equivalent in area or as approved.

GENERAL MECHANICAL SYSTEM REQUIREMENTS

M1305.1 Appliance access for inspection, service, repair and replacement. 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 inspected, serviced, repaired or replaced. A level working space not less than 30 inches deep and 3 inches wide shall be provided in front of the control side to service an appliance.

M1305.1.1 Furnaces and air handlers. Furnaces and air handlers within compartments or alcoves shall have a minimum working space clearance of 3 inches along the sides, back and top with a total width of the enclosing space being at least 12 inches wider than the furnace or air handler. Furnaces having a firebox open to the atmosphere shall have at least a 6-inch working space along the front combustion chamber side. Combustion air openings at the rear or side of the compartment shall comply with the requirements of Chapter 17.

M1305.1.2 Appliances in rooms. Appliances installed in a compartment, alcove, basement or similar space shall be accessed by an opening or door and an unobstructed passageway measuring not less than 24 inches wide and large enough to allow removal of the largest appliance in the space, provided there is a level service space of not less than 30 inches deep and the height of the appliance, but not less than

30 inches at the front or service side of the appliance with the door open.

M1305.1.3 Appliances in attics. 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 inches high and 22 inches wide and not more than 20 feet long measured along the centerline of the passageway from the opening to the appliance. The passageway shall have continuous solid flooring in accordance with Chapter 5 not less than 24 inches wide. A level service space at least 30 inches deep and 30 inches 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 inches by 30 inches, and large enough to allow removal of the largest appliance.

M1305.1.3.1 Electrical requirements. A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be installed at or near the appliance location. Exposed lamps shall be protected from damage by location or lamp guards.

M1305.1.4 Appliances under floors. Underfloor spaces containing appliances shall be provided with an unobstructed passageway large enough to remove the largest appliance, but not less than 30 inches high and 22 inches wide, nor more than 20 feet long measured along the centerline of the passageway from the opening to the appliance. A level service space at least 30 inches deep and 30 inches wide shall be present at the front or service side of the appliance. If the depth of the passageway or the service space exceeds 12 inches below the adjoining grade, the walls of the passageway shall be lined with concrete or masonry extending 4 inches above the adjoining grade in accordance with Chapter 4. The rough-framed access opening dimensions shall be a minimum of 22 inches by 30 inches, and large enough to remove the largest appliance.

M1305.1.4.1 Ground clearance. Equipment and appliances supported from the ground shall be level and firmly supported on a concrete slab or other approved material extending not less than 3 inches above the adjoining ground. Such support shall be in accordance with the manufacturer's installation instructions. Appliances suspended from the floor shall have a clearance of not less than 6 inches from the ground.

M1306.1 Appliance clearance. Appliances shall be installed with the clearances from unprotected combustible materials as indicated on the appliance label and in the manufacturer's installation instructions.

M1307.2 Anchorage of appliances. Appliances designed to be fixed in position shall be fastened or anchored in an approved manner. Thermal storage units shall be anchored or strapped to resist horizontal displacement caused by earthquake motion in accordance with one of the following:

1. Anchorage and strapping shall be designed to resist a horizontal force equal to one-third of the operating weight of the water storage tank, acting in any horizontal direction.
2. The anchorage strapping shall be in accordance with the appliance manufacturer's recommendations. Seismic

anchorage and strapping of water heaters shall be in accordance with Section 507.2 of the state plumbing code.

M1307.3 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.

Exception: Elevation of the ignition source is not required for appliances that are listed as flammable vapor ignition resistant.

M1307.3.1 Protection from impact. Appliances shall not be installed in a location subject to vehicle damage except where protected by approved barriers.

HEATING AND COOLING EQUIPMENT

M1401 Installation. Heating and cooling equipment and appliances shall be installed in accordance with the manufacturer's instructions and the requirements of this code.

M1401.2 Access. Heating and cooling equipment and appliances shall be located with respect to building construction and other equipment and appliances to permit maintenance, servicing and replacement. Clearances shall be maintained to permit cleaning of heating and cooling surfaces; replacement of filters, blowers, motors, controls and vent connections; lubrication of moving parts; and adjustment.

M1401.4 Exterior installations. Equipment and appliances installed outdoors shall be listed and labeled for outdoor installation. Supports and foundations shall prevent excessive vibration, settlement or movement of the equipment. Supports and foundations shall be in accordance with Section M1305.1.4.1.

M1411.3 Condensate disposal. Condensate from cooling coils or evaporators shall be conveyed from the drain pan outlet to an approved place of disposal. Such piping shall maintain a minimum horizontal slope in the direction of discharge of not less than 1/8 unit vertical in 12 units horizontal (1-percent slope). Condensate shall not discharge into a street, alley or other areas where it would cause a nuisance.

M1411.8 Locking access port caps. Refrigerant circuit access ports located outdoors shall be fitted with locking type tamper resistant copas or shall be otherwise secured to prevent unauthorized access.

EXHAUST SYSTEMS

M1502.1 General. Clothes dryers shall be exhausted in accordance with the manufacturer's instructions.

M1502.2 Independent exhaust systems. Dryer exhaust systems shall be independent of all other systems and shall convey the moisture to the outdoors.

Exception:

This section shall not apply to listed and labeled condensing (ductless) clothes dryers.

M1502.3 Duct termination. Exhaust ducts shall terminate on the outside of the building. Exhaust duct terminations shall be in accordance with the dryer manufacturer's installation instructions.

If the manufacturer's instructions do not specify a termination location, the exhaust duct shall terminate not less than 3 feet in any direction from openings into buildings. Exhaust duct terminations shall be equipped with a backdraft damper. Screens shall not be installed at the duct termination.

M1502.4 Dryer exhaust ducts. Dryer exhaust ducts shall conform to the requirements of Sections M1502.4.1 through M1502.4.7.

M1502.4.1 Material and size. Exhaust ducts shall have a smooth interior finish and shall be constructed of metal a minimum 0.0157-inch thick (No. 28 gage). The exhaust duct size shall be 4 inches nominal in diameter.

M1502.4.2 Duct installation. Exhaust ducts shall be supported at intervals not to exceed 12 feet and secured in place. The insert end of the duct shall extend into the adjoining duct or fitting in the direction of airflow. Exhaust duct joints shall be sealed in accordance with Section M1601.4 and shall be mechanically fastened. Ducts shall not be joined with screws or similar fasteners that protrude more than 1/8 inch into the inside of the duct.

M1502.4.3 Transition duct. Transition ducts used to connect the dryer to the exhaust duct system shall be a single length that is listed and labeled in accordance with UL 2158A. Transition ducts shall be a maximum of 8 feet in length. Transition ducts shall not be concealed within construction.

M1502.4.5 Duct length. The maximum allowable exhaust duct length shall be determined by one of the methods specified in Section M1502.4.5.1 or M1502.4.5.3.

M1502.4.5.1 Specified length. The maximum length of the exhaust duct shall be 35 feet 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.

M1502.4.5.2 Manufacturer's instructions. The size and maximum length of the exhaust duct shall be determined by the dryer manufacturer's installation instructions. The code official shall be provided with a copy of the installation instructions for the make and model of the dryer at the concealment inspection. In the absence of fitting equivalent length calculations from the clothes dryer manufacturer, Table M1502.4.5.1 shall be used.

M1502.4.6 Length identification. Where the exhaust duct equivalent length exceeds 35 feet, the equivalent length of the exhaust duct shall be identified on a permanent label or tag. The label or tag shall be located within 6 feet of the exhaust duct connection.

M1503.1 General. Range hoods shall discharge to the outdoors through a duct. The duct serving the hood shall have a smooth interior surface, shall be air tight, shall be equipped with a backdraft 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.

Exception:

Where installed in accordance with the manufacturer's installation instructions, and where mechanical or natural ventilation is otherwise provided, listed and labeled ductless range hoods shall not be required to discharge to the outdoors.

M1503.2 Duct material. Ducts serving range hoods shall be constructed of galvanized steel, stainless steel or copper.

Exception:

Ducts for domestic kitchen cooking appliances equipped with downdraft exhaust systems shall be permitted to be constructed of schedule 40 PVC pipe provided that the installation complies with all of the following:

1. The duct shall be installed under a concrete slab poured on grade,
2. The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel,
3. The PVC duct shall extend not greater than 1 inch above the indoor concrete floor surface,
4. The PVC duct shall extend not greater than 1 inch above grade outside of the building, and
5. The PVC ducts shall be solvent cemented.

M1503.4 Makeup air required. Exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute shall be mechanically or naturally provided with makeup air at a rate approximately equal to the exhaust air rate. Such makeup air systems shall be equipped with not less than one damper. Each damper shall be a gravity damper or an electrically operated damper that automatically opens when the exhaust system operates. Dampers shall be accessible for inspection, service, repair and replacement without removing permanent construction or any other ducts not connected to the damper being inspected, serviced, repaired or replaced.

M1507.1 General. Local exhaust and whole-house mechanical ventilation systems and equipment shall be designed in accordance with this section.

M1507.2 Recirculation of air. Exhaust air from bathrooms and toilet rooms shall not be recirculated within a residence or to another dwelling unit and shall be exhausted directly to the outdoors. Exhaust air from bathrooms and toilet rooms shall not discharge into an attic, crawl space or other areas of the building.

M1507.3 Whole-house mechanical ventilation system. Whole-house mechanical ventilation systems shall be designed in accordance with Sections M1507.3.1 through M1507.3.3.

M1507.3.1 System design. Each dwelling unit or guestroom shall be equipped with a ventilation system complying with Section M1507.3.4, M1507.3.5, M1507.3.6 or M1507.3.7. Compliance is also permitted to be demonstrated through

compliance with the International Mechanical Code or ASHRAE Standard 62.2.

M1507.3.2 Control and operation.

1. Location of controls. Controls for all ventilation systems shall be readily accessible by the occupant.
2. Instructions. Operating instructions for whole-house ventilation systems shall be provided to the occupant by the installer of the system.
3. Local exhaust systems. Local exhaust systems shall be controlled by manual switches, dehumidistats, timers, or other approved means.
4. Continuous whole-house ventilation systems. Continuous whole-house ventilation systems shall operate continuously and be equipped with an override control. A "fan on" switch shall be permitted as an override control. Controls shall be capable of operating the ventilation system without energizing other energy-consuming appliances. A clearly visible label shall be affixed to the controls that reads "Whole House Ventilation (see operating instructions)."
5. Intermittent whole-house ventilation systems. Intermittent whole-house ventilation systems shall comply with the following:
 - 5.1. They shall be capable of operating intermittently and continuously.
 - 5.2. They shall have controls capable of operating the exhaust fans, forced-air system fans, or supply fans without energizing other energy consuming appliances.
 - 5.3. The ventilation rate shall be adjusted according to the exception in Section M1507.3.3.
 - 5.4. The system shall be designed so that it can operate automatically based on the type of control timer installed.
 - 5.5. The intermittent mechanical ventilation system shall operate at least one hour out of every four.
 - 5.6. The system shall have a manual control and automatic control, such as a 24-hour clock timer.
 - 5.7. At the time of final inspection, the automatic control shall be set to operate the whole-house fan according to the schedule used to calculate the whole-house fan sizing.
 - 5.8. A label shall be affixed to the control that reads "Whole House Ventilation (see operating instructions)."

M1507.3.2.1 Operating instructions. Installers shall provide the manufacturer's installation, operating instructions, and a whole-house ventilation system operation description.

M1507.3.3 Mechanical ventilation rate. The whole-house mechanical ventilation system shall provide outdoor air to each dwelling unit at a continuous rate of not less than that determined in accordance with Table M1507.3.3(1).

Exception: The whole-house mechanical ventilation system is permitted to operate intermittently where the system has controls that enable operation for not less than 25 percent of each 4-hour segment and the ventilation rate prescribed in Table M1507.3.3(1) is multiplied by the factor determined in accordance with Table M1507.3.3(2).

M1507.3.4 Whole-house ventilation using exhaust fans.

This section establishes minimum prescriptive requirements for whole-house ventilation systems using exhaust fans. A system which meets all the requirements of this section shall

be deemed to satisfy the requirements for a whole-house ventilation system.

M1507.3.4.1 Whole-house ventilation fans. Exhaust fans providing whole-house ventilation shall have a flow rating at 0.25 inches water gauge as specified in Table M1507.3.3(1). Manufacturers' fan flow ratings shall be determined according to HVI 916 or AMCA 210.

M1507.3.4.2 Fan noise. Whole-house fans located 4 feet or less from the interior grille shall have a sone rating of 1.0 or less measured at 0.1 inches water gauge. Manufacturer's noise ratings shall be determined as per HVI 915 (March 2009). Remotely mounted fans shall be acoustically isolated from the structural elements of the building and from attached duct work using insulated flexible duct or other approved material.

M1507.3.4.3 Fan controls. The whole-house ventilation fan shall meet the requirements of Section M1507.3.2 and M1507.3.2.1.

M1507.3.4.4 Ventilation openings. Each habitable space shall be provided with outdoor air inlets or operable windows with an openable area not less than 4 square inches of net free area of opening for each 10 cfm of outdoor air required by Table M1507.3.3(1). Where outdoor air supplies are separated from exhaust points by doors, provisions shall be made to ensure air flow by installation of distribution ducts, undercutting doors, installation of grilles, transoms, or similar means. Doors shall be undercut to a minimum of 1/2 inch above the surface of the finish floor covering.

Individual room outdoor air inlets shall:

1. Have controllable and secure openings;
2. Be sleeved or otherwise designed so as not to compromise the thermal properties of the wall or window in which they are placed;
3. Any inlet or combination of inlets which provide 10 cfm at 10 Pascals are deemed equivalent to 4 square inches net free area.

Ventilation opening shall be screened or otherwise protected from entry by leaves or other material. Openings shall be controllable, securable and shall be designed to not compromise the thermal properties of the building envelope. Ventilation openings shall be located so as not to take air from the following areas:

1. Closer than 10 feet from an appliance vent outlet, unless such vent outlet is 3 feet above the outdoor air inlet.
2. Where it will pick up objectionable odors, fumes or flammable vapors.
3. A hazardous or unsanitary location.
4. A room or space having any fuel-burning appliances therein.
5. Closer than 10 feet from a vent opening of a plumbing drainage system unless the vent opening is at least 3 feet above the air inlet.
6. Attic, crawl spaces, or garages.
7. Asphalt roofs unless it is shown that no other location is permissible. In such cases the inlet opening shall be located a minimum of 2 feet from the nearest surface of the asphalt roofing, measured from the intake opening.

M1507.3.5 Whole-house ventilation integrated with a forced-air system. This section establishes minimum prescriptive requirements for whole-house ventilation systems integrated with forced-air ventilation systems. A system which meets all the requirements of this section shall be deemed to satisfy the requirements for a whole-house ventilation system.

M1507.3.5.1 Integrated whole-house ventilation systems. Integrated whole-house ventilation systems shall provide outdoor air at the rate calculated using Section M1507.3.3. Integrated forced-air ventilation systems shall distribute outdoor air to each habitable space through the forced-air system ducts. Integrated forced-air ventilation systems shall have an outdoor air inlet duct connecting a terminal element on the outside of the building to the return air plenum of the forced-air system, at a point within 4 feet upstream of the air handler. The outdoor air inlet duct connection to the return air stream shall be located upstream of the forced air system blower and shall not be connected directly into a furnace cabinet to prevent thermal shock to the heat exchanger. The system will be equipped with a motorized damper connected to the automatic ventilation control as specified in Section M1507.3.2. The required flow rate shall be verified by field testing with a flow hood or a flow measuring station

M1507.3.5.2 Ventilation duct insulation. All supply ducts in the conditioned space shall be insulated to a minimum of R-4.

M1507.3.5.3 Outdoor air inlets. Inlets shall be screened or otherwise protected from entry by leaves or other material. Outdoor air inlets shall be located so as not to take air from the following areas:

1. Closer than 10 feet from an appliance vent outlet, unless such vent outlet is 3 feet above the outdoor air inlet.
2. Where it will pick up objectionable odors, fumes or flammable vapors.
3. A hazardous or unsanitary location.
4. A room or space having any fuel-burning appliances therein.
5. Closer than 10 feet from a vent opening of a plumbing drainage system unless the vent opening is at least 3 feet above the air inlet.
6. Attic, crawl spaces, or garages.

M1507.3.6 Whole-house ventilation using a supply fan. This section establishes minimum prescriptive requirements for whole-house ventilation systems using an inline supply fan. A system which meets all the requirements of this section shall be deemed to satisfy the requirements for a whole-house ventilation system.

M1507.3.6.1 Outdoor air. Supply fan ventilation systems shall distribute outdoor air to each habitable space through the forced-air system ducts or through dedicated ducts to each habitable space. Supply fans shall have the capacity to provide the amount of outdoor air specified in Table M1507.3.3(1) at 0.40 inches water gauge as per HVI 916. The outdoor air must be filtered before it is delivered to habitable spaces. The filter may be located at the intake device, in line with the fan, or, in the case of a connection to the return plenum of the air

handler, using the furnace filter. An outdoor air inlet shall be connected to either the supply or return air stream.

M1507.3.6.2 Ducts. An outdoor air inlet duct connection to the supply air stream shall be located downstream of the forced-air system blower. An outdoor air inlet duct connection to the return air stream shall be located at least 4 feet upstream of the forced-air system blower and its filter. Neither type of duct shall be connected directly into a furnace cabinet to prevent thermal shock to the heat exchanger. The outdoor air inlet duct shall be prescriptively sized in accordance with Table M1507.3.6.2. The terminal element on the outside of the building shall be sized 2 inches in diameter larger than the outdoor air inlet duct.

**TABLE M1507.3.6.2
PRESCRIPTIVE SUPPLY FAN DUCT SIZING**

Supply Fan Tested CFM at 0.40" w.g.		
Specified Volume from Table M1507.3.3.1	Minimum Smooth Duct Diameter	Minimum Flex Duct Diameter
50-90 cfm	4 inch	5 inch
90-150 cfm	5 inch	6 inch
150-250 cfm	6 inch	7 inch
250-400 cfm	7 inch	8 inch

M1507.3.6.3 Dampers. The system shall be equipped with a back-draft damper and one of the following:

1. A calibrated manual volume damper installed and set to meet the measured flow rates specified in Table M1507.3.3(1) by field testing with a pressure gauge and/or following manufacturer's installation instructions; or
2. A manual volume damper installed and set to meet the measured flow rates specified in Table M1507.3.3(1) by field testing with a flow hood or a flow measuring station; or
3. An automatic flow-regulating device sized to the specified flow rates in Table M1507.3.3(1) which provides constant flow over a pressure range of 0.20 to 0.60 inches water gauge.

M1507.3.6.4 Ventilation duct insulation. All supply ducts in the conditioned space shall be insulated to a minimum of R-4.

M1507.3.6.5 Outdoor air inlets. Inlets shall be screened or otherwise protected from entry by leaves or other material. Outdoor air inlets shall be located so as not to take air from the following areas:

1. Closer than 10 feet from an appliance vent outlet, unless such vent outlet is 3 feet above the outdoor air inlet.
2. Where it will pick up objectionable odors, fumes or flammable vapors.
3. A hazardous or unsanitary location.
4. A room or space having any fuel-burning appliances therein.
5. Closer than 10 feet from a vent opening of a plumbing drainage system unless the vent opening is at least 3 feet above the air inlet.
6. Attic, crawl spaces, or garages.

M1507.3.7 Whole-house ventilation using a heat recovery ventilation system. This section establishes minimum

prescriptive requirements for whole-house ventilation using a heat recovery ventilation system.

M1507.3.7.1 Heat recovery ventilation systems. All duct work in heat recovery systems shall be sized and installed per the manufacturer's instructions. System minimum flow rating shall be not less than that specified in Table M1507.3.3(1). Heat recovery ventilation systems shall have a filter on the upstream side of the heat exchanger in both the intake and exhaust airstreams with a minimum efficiency rating value (MERV) of 6.

M1507.3.7.2 Ventilation duct insulation. All supply ducts in the conditioned space installed upstream of the heat exchanger shall be insulated to a minimum of R-4.

M1507.3.7.3 Outdoor air inlets. Inlets shall be screened or otherwise protected from entry by leaves or other material. Outdoor air inlets shall be located so as not to take air from the following areas:

1. Closer than 10 feet from an appliance vent outlet, unless such vent outlet is 3 feet above the outdoor air inlet.
2. Where it will pick up objectionable odors, fumes or flammable vapors.
3. A hazardous or unsanitary location.
4. A room or space having any fuel-burning appliances therein.
5. Closer than 10 feet from a vent opening of a plumbing drainage system unless the vent opening is at least 3 feet above the air inlet.
6. Attic, crawl spaces, or garages.

M1507.4 Local exhaust. Local exhaust shall be provided in each kitchen, bathroom, water closet, laundry room, indoor swimming pool, spa, and other rooms where water vapor or cooking odor is produced. Local exhaust systems shall be designed to have the capacity to exhaust the minimum air flow rate determined in accordance with Table M1507.4.

Table M1507.4
MINIMUM REQUIRED LOCAL EXHAUST RATES
FOR ONE- AND TWO-FAMILY DWELLINGS

AREA TO BE EXHAUSTED	EXHAUST RATES
Kitchens	Intermittent: 100 cfm Continuous: 25 cfm
Bathrooms-toilet rooms, laundry rooms , indoor swimming pools & spas	Intermittent: 50 cfm Continuous: 20 cfm

M1507.4.1 Local exhaust fans. Exhaust fans providing local exhaust shall have a minimum fan flow rating not less than 50 cfm at 0.25 inches water gauge for bathrooms, laundries, or similar rooms and 100 cfm at 0.25 inches water gauge for kitchens. Manufacturers' fan flow ratings shall be determined as per HVI 916 (April 1995) or AMCA 210.

Exception:

Where a range hood or down draft exhaust fan is used to satisfy the local exhaust requirements for kitchens, the range hood or down draft exhaust shall not be less than 100 cfm at 0.10 inches water gauge.

M1507.4.2 Local exhaust controls. Local exhaust systems shall be controlled by manual switches, dehumidistats, timers, or other approved means. Local exhaust system controls shall be readily accessible.

DUCT SYSTEMS

M1601.4.4 Support. Factory-made ducts listed in accordance with UL 181 shall be supported in accordance with the manufacturer's installation instructions.

M1601.4.6 Duct insulation. Duct coverings shall not penetrate a fire blocked wall or floor.

M1601.4.8 Duct separation. Ducts shall be installed with not less than 4 inches separation from earth except where they meet the requirements of Section M1601.1.2.

M1602.2 Return air openings. Return air openings for heating, ventilation and air conditioning systems shall comply with all of the following:

1. Openings shall not be located less than 10 feet measured in any direction from an open combustion chamber or draft hood of another appliance located in the same room or space.
2. The amount of return air taken from any room or space shall be not greater than the flow rate of supply air delivered to such room or space.
3. Return and transfer openings shall be sized in accordance with the appliance or equipment manufacturers' installation instructions, Manual D or the design of the registered design professional.
4. Return air shall not be taken from a closet, bathroom, toilet room, kitchen, garage, mechanical room, boiler room, furnace room or unconditioned attic.

Exceptions:

1. Taking return air from a kitchen is not prohibited where such return air openings serve the kitchen only, and are located not less than 10 feet from the cooking appliance.
2. Dedicated forced-air systems serving only the garage shall not be prohibited from obtaining return air from the garage.
3. Taking return air from an unconditioned crawl space shall not be accomplished through a direct connection to the return side of a forced-air furnace. Transfer openings in the crawl space enclosure shall not be prohibited.
4. Return air from one dwelling unit shall not be discharged into another dwelling unit.

COMBUSTION AIR

M1701.1 Scope. Solid-fuel-burning appliances shall be provided with combustion air in accordance with the appliance manufacturer's installation instructions. Oil-fired appliances shall be provided with combustion air in accordance with NFPA 31. The methods of providing combustion air in this chapter do not apply to fireplaces, fireplace stoves and direct-vent appliances. The requirements for combustion and dilution air for gas-fired appliances shall be in accordance with Chapter 24. Fireplaces shall comply with Chapter 10.

CHIMNEYS AND VENTS

M1801.1 Venting required. Fuel-burning appliances shall be vented to the outdoors in accordance with the listing and label and manufacturer's installation instructions except appliances listed and labeled for unvented use. Venting systems shall consist of approved chimneys or vents, or venting assemblies that are integral parts of labeled appliances. Gas-fired appliances shall be vented in accordance with Chapter 24.

SPECIAL APPLIANCES, EQUIPMENT AND SYSTEMS

M1901.2 Clearances. Freestanding or built-in ranges shall have a vertical clearance above the cooking top of not less than 30 inches to unprotected combustible material. Reduced clearances are permitted in accordance with the listing and labeling of the range hoods or appliances. The installation of a listed and labeled cooking appliance or microwave oven over a listed and labeled cooking appliance shall be in accordance with Section M1504.

M1901.2 Cooking appliances. Cooking appliances shall be listed and labeled for household use and shall be installed in accordance with the manufacturer's instructions. The installation shall not interfere with the combustion air or access for operation and servicing.

WATER HEATERS

M2004.1 General. Water heaters used to supply both potable hot water and hot water for space heating shall be installed in accordance with this chapter, Chapter 24, Chapter 28 and the manufacturer's instructions.

M2005.1 General. Water heaters shall be installed in accordance with Chapter 5 of the state plumbing code, the manufacturer's instructions and the requirements of this code. Water heaters installed in an attic shall comply with the requirements of Section M1305.1.3. Gas-fired water heaters shall comply with the requirements in Chapter 24. Domestic electric water heaters shall comply with UL 174

M2005.2 Prohibited locations. 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. Installation of direct-vent water heaters within an enclosure is not required.

M2005.2.1 Water heater access. Access to water heaters that are located in an attic or underfloor crawl space is permitted to be through a closet located in a sleeping room or bathroom where ventilation of those spaces is in accordance with this code.

HYDRONIC PIPING SYSTEMS

M2101.1 General. Hydronic piping shall conform to Table M2101.1. Approved piping, valves, fittings and connections shall be installed in accordance with the manufacturer's instructions. Pipe and fittings shall be rated for use at the operating temperature and pressure of the hydronic system.

M2101.2 System drain down. Hydronic piping systems shall be installed to permit draining of the system.

M2101.3 Protection of potable water. The potable water system shall be protected from backflow in accordance with the provisions listed in Section 603 of the state plumbing code.

M2101.4 Pipe penetrations. Openings through concrete or masonry building elements shall be sleeved.

M2101.5 Contact with building material. A hydronic piping system shall not be in direct contact with any building material that causes the piping material to degrade or corrode.

M2101.8 Expansion, contraction and settlement. Piping shall be installed so that piping, connections and equipment shall not be subjected to excessive strains or stresses. Provisions shall be made to compensate for expansion, contraction, shrinkage and structural settlement.

M2101.9 Piping support. Hangers and supports shall be of material of sufficient strength to support the piping, and shall be fabricated from materials compatible with the piping material. Piping shall be supported at intervals not exceeding the spacing specified in Table M2101.9.

M2101.10 Tests. Hydronic piping shall be tested hydrostatically at a pressure of one and one-half times the maximum system design pressure, but not less than 100 pounds per square inch for not less than 15 minutes and not more than 20 minutes.

FLOOR HEATING SYSTEMS

M2103.1 Piping materials. Piping for embedment in concrete or gypsum materials shall be standard-weight steel pipe, copper and copper alloy pipe and tubing, cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX) pressure pipe, chlorinated polyvinyl chloride (CPVC), polybutylene, cross-linked polyethylene (PEX) tubing, polyethylene of raised temperature (PE-RT) or polypropylene (PP) with a minimum rating of 100 psi at 180°F.

M2103.3 Piping joints. Copper and copper alloy systems shall be soldered in accordance with ASTM B 828. Fluxes for soldering shall be in accordance with ASTM B 813. Brazing fluxes shall be in accordance with AWS A5.31. Piping joints that are embedded shall be installed in accordance with the following requirements:

1. Steel pipe joints shall be welded.
2. Copper tubing shall be joined by brazing complying with Section 605.3.1 of the state plumbing code.
3. Polybutylene pipe and tubing joints shall be installed with socket-type heat-fused polybutylene fittings.
4. CPVC tubing shall be joined using solvent cement joints.
5. Polypropylene pipe and tubing joints shall be installed with socket-type heat-fused polypropylene fittings.
6. Cross-linked polyethylene (PEX) tubing shall be joined using cold expansion, insert or compression fittings.
7. Raised temperature polyethylene (PE-RT) tubing shall be joined using insert or compression fittings.

M2103.4 Testing. Piping or tubing to be embedded shall be tested by applying a hydrostatic pressure of not less than 100 psi. The pressure shall be maintained for 30 minutes, during which all joints shall be visually inspected for leaks.

FUEL GAS

G2406.2 Prohibited locations. Appliances shall not be located in sleeping rooms, bathrooms, toilet rooms, storage closets or surgical rooms, or in a space that opens only into such rooms or spaces, except where the installation complies with one of the following:

1. The appliance is a direct-vent appliance installed in accordance with the conditions of the listing and the manufacturer's instructions.
2. Vented room heaters, wall furnaces, vented decorative appliances, vented gas fireplaces, vented gas fireplace heaters and decorative appliances for installation in vented solid fuel-burning fireplaces are installed in rooms that meet the required volume criteria of Section G2407.5.
3. A single wall-mounted unvented room heater is installed in a bathroom and such unvented room heater is equipped as specified in Section G2445.6 and has an input rating not greater than 6,000 Btu/h. The bathroom shall meet the required volume criteria of Section G2407.5.
4. A single wall-mounted unvented room heater is installed in a bedroom and such unvented room heater is equipped as specified in Section G2445.6 and has an input rating not greater than 10,000 Btu/h. The bedroom shall meet the required volume criteria of Section G2407.5.
5. The appliance is installed in a room or space that opens only into a bedroom or bathroom, and such room or space is used for no other purpose and is provided with a solid weather-stripped door equipped with an approved self-closing device. All combustion air shall be taken directly from the outdoors in accordance with Section G2407.6.

PLUMBING:

P105.1 General. No plumbing system or portion thereof shall be concealed or put to use until inspected and approved as prescribed in this code. Plumbing systems regulated by this code shall not be connected to the water, the energy fuel supply, or the sewer system until authorized by Thurston County.

P303.1 General. It shall be unlawful for a person to cause, suffer, or permit the disposal of sewage, human excrement, or other liquid wastes, in a place or manner, except through and by means of an approved drainage system, installed and maintained in accordance with the provisions of this code.

P304.1 General. Plumbing fixtures, drains, appurtenances, and appliances, used to receive or discharge liquid wastes or sewage, shall be connected properly to the drainage system of the building or premises, in accordance with the requirements of this code..

312.6 Freezing Protection. No water, soil, or waste pipe shall be installed or permitted outside of a building, in attics or crawl spaces, or in an exterior wall unless, where necessary, adequate provision is made to protect such pipe from freezing.

All hot and cold water pipes installed outside the conditioned space shall be insulated to a minimum R-3.

P312.8 Waterproofing of Openings. Joints at the roof around pipes, ducts, or other appurtenances shall be made watertight by the use of lead, copper, galvanized iron, or other approved flashings or flashing material. Exterior wall openings shall be made watertight. Counterflashing shall not restrict the required internal cross-sectional area of the vent.

P312.9 Steel Nail Plates. Plastic and copper or copper alloy piping penetrating framing members to within 1 inch of the exposed framing shall be protected by steel nail plates not less than No. 18 gauge in thickness. The steel nail plate shall extend along the framing member not less than 1 ½ inches beyond the outside diameter of the pipe or tubing.

P312.10 Sleeves. Sleeves shall be provided to protect piping through concrete and masonry walls and concrete floors.

Exception:

Sleeves shall not be required where openings are drilled or bored.

P313.1 General. Piping, fixtures, appliances, and appurtenances shall be supported in accordance with this code, the manufacturer's installation instructions, and in accordance with Thurston County.

**TABLE P313.1
HANGERS AND SUPPORTS (ABRIDGED)**

MATERIAL	HORIZONTAL	VERTICAL
Copper tube & pipe	<= 1 ½ in., 6 ft. >= 2 in., 10 ft.	Ea. Floor, 10 ft. max.
Sched 40 PVC & ABS DWV	4 ft., allow for expansion every 30 ft.	Base & ea. Floor; provide mid-story guides; provide for expansion every 30 ft.
CPVC	<= 1 in., 3 ft. >= 1 ¼ in., 4 ft.	Base & ea. Floor; provide mid-story guides
PEX	<= 1 in., 32 in. >= 1 ¼ in., 4 ft.	

PLUMBING FIXTURES

402.5 Setting. Fixtures shall be set level and in proper alignment with reference to adjacent walls. No water closet or bidet shall be set closer than 15 inches from its center to any side wall or obstruction nor closer than 30 inches center to center to any similar fixture. The clear space in front of any water closet, lavatory or bidet shall be not less than 24 inches. No urinal shall be set closer than 12 inches from its center to any side wall or partition, nor closer than 24 inches center to center.

Exceptions:

1. The clear space in front of a water closet, lavatory or bidet in dwelling units and sleeping units shall be not less than 21 inches.
2. The installation of paper dispensers or accessibility grab bars shall not be considered obstructions.

P402.8 Installation. Fixtures shall be installed in accordance with the manufacturer's installation instructions.

P407.2 Water Consumption. The maximum water use allowed in gallons per minute (gpm) for any of the following faucets and replacement aerators is the following:

Lavatory faucets	2.5 gpm
Kitchen faucets	2.5 gpm
Replacement aerators	2.5 gpm
Public lavatory faucets (other than metering)	0.5 gpm

P408.2 Water Consumption. Showerheads shall have a maximum flow rate of not more than 2.5 gpm at 80 psi.

408.6 Shower Compartments. Shower compartments, regardless of shape, shall have a minimum finished interior of 900 square inches and shall also be capable of encompassing a 30-inch circle. The minimum required area and dimensions shall be measured at a height equal to the top of the threshold and at a point tangent to its centerline. The area and dimensions shall be maintained to a point of not less than 70 inches above the shower drain outlet with no protrusions other than the fixture valve or valves, shower head, soap dishes, shelves, and safety grab bars or rails. Fold-down seats in accessible shower stalls shall be permitted to protrude into the 30-inch circle.

Exceptions:

- (1) Showers that are designed to comply with ICC/ANSI A117.1.
- (2) The minimum required area and dimensions shall not apply for a shower receptor having overall dimensions of not less than 30 inches in width and 60 inches in length.

P408.7.5 Tests for Shower Receptors. Shower receptors shall be tested for watertightness by filling with water to the level of the rough threshold. The test plug shall be so placed that both upper and under sides of the subpan shall be subjected to the test at the point where it is clamped to the drain.

P408.10 Water Supply Riser. A water supply riser from the shower valve to the showerhead outlet, whether exposed or not, shall be securely attached to the structure.

P409.6 Installation and Access. Bathtubs and whirlpool bathtubs shall be installed in accordance with the manufacturer's installation instructions. Access openings shall be of size and opening to permit the removal and replacement of the circulation pump.

411.2 Water Consumption. Water closets shall have a maximum consumption not to exceed 1.6 gallons (6.0 L) of water per flush in accordance with ASME A112.19.2/CSA B45.1. No water closet that operates on a continuous flow or continuous flush basis shall be permitted.

414.3 Drainage Connection. Domestic dishwashing machines shall discharge indirectly through an air gap fitting in accordance with Section 807.4 into a waste receptor, a wye branch fitting on the tailpiece of a kitchen sink, or dishwasher

connection of a food waste disposer. Commercial dishwashing machines shall discharge indirectly through an air gap.

P417.5 Separate Controls for Hot and Cold Water. Where two separate handles control the hot and cold water, the left-hand control of the faucet facing the fixture fitting outlet shall control the hot water. Faucets and diverters shall be connected to the water distribution system so that hot water corresponds to the left side of the fixture fitting. Single-handle mixing valves installed in showers and tub-shower combinations shall have the flow of hot water correspond to the markings on the fixture fitting.

P420.2 Water Consumption. Sink faucets shall have a maximum flow rate of not more than 2.2 gpm at 60 psi.

WATER HEATERS

P501.1 Applicability. The minimum capacity for storage water heaters shall be in accordance with the first hour rating listed in Table P501.1(1).

**TABLE P501.1(1)
FIRST HOUR RATING**

Number of Bathrooms	1 to 1.5		2 to 2.5			3 to 3.5	
Number of Bedrooms	1	2-3	2	3-4	5	3	4-6
First Hour Rating, Gallons	42	54	54	67	80	67	80

504.1 Location. Water heater installation in bedrooms and bathrooms shall comply with one of the following:

1. Fuel-burning water heaters may be installed in a closet located in the bedroom or bathroom provided the closet is equipped with a listed, gasketed door assembly and a listed self-closing device. The self-closing door assembly shall meet the requirements of Section 505.1.1. The door assembly shall be installed with a threshold and bottom door seal and shall meet the requirements of Section 505.1.2. All combustion air for such installations shall be obtained from the outdoors in accordance with the International Mechanical Code. The closet shall be for the exclusive use of the water heater.
2. Water heater shall be of the direct vent type.

P504.4 Pressure-Limiting Devices. A water heater installation shall be provided with overpressure protection by means of an approved, listed device installed in accordance with the terms of its listing and the manufacturer's installation instructions.

P504.5 Temperature-Limiting Devices. A water heater installation or a hot water storage vessel shall be provided with overtemperature protection by means of an approved, listed device installed in accordance with the terms of its listing and the manufacturer's installation instructions.

P504.6 Temperature, Pressure and Vacuum Relief Devices. Temperature, pressure and vacuum relief devices or

combinations thereof, and automatic gas shutoff devices, shall be installed in accordance with the terms if their listings and the manufacturer's installation instructions. A shutoff valve shall not be placed between the relief valve and the water heater or on discharge pipes between such valves and the atmosphere. The hourly BTU discharge capacity or the rated steam relief capacity of the device shall be not less than the input rating of the water heater.

WATER SUPPLY

P601.1 Hot and Cold Water Required. Each plumbing fixture shall be provided with an adequate supply of potable running water piped thereto in an approved manner, so arranged as to flush and keep it in a clean and sanitary condition without danger of backflow or cross-connection. Water closets and urinals shall be flushed by means of an approved flush tank or flushometer valve.

Exceptions:

Listed fixtures that do not require water for their operation and are not connected to the water supply.

In occupancies where plumbing fixtures are installed for private use, hot water shall be required for bathing, washing, laundry, cooking purposes, dishwashing or maintenance.

603.1 General. Cross-connection control shall be provided in accordance with the provisions of this chapter. Devices or assemblies for protection of the public water system must be models approved by the Department of Health under WAC 246-290-490. The Authority Having Jurisdiction shall coordinate with the local water purveyor where applicable in all matters concerning cross-connection control within the property lines of the premises. No person shall install any water operated equipment or mechanism, or use any water treating chemical or substance, if it is found that such equipment, mechanism, chemical or substance may cause pollution or contamination of the domestic water supply. Such equipment or mechanism may be permitted only when equipped with an approved backflow prevention device or assembly.

603.2 Approval of Devices or Assemblies. Before any device or assembly is installed for the prevention of backflow, it shall have first been approved by the authority having jurisdiction. Devices or assemblies shall be tested for conformity with recognized standards or other standards acceptable to the authority having jurisdiction. Backflow prevention devices and assemblies shall comply with Table 603.2, except for specific applications and provisions as stated in Section 603.5.1 through 603.5.21. All devices or assemblies installed in a potable water supply system for protection against backflow shall be maintained in good working condition by the person or persons having control of such devices or assemblies. Such devices or assemblies shall be tested in accordance with Section 603.4.2 and WAC 246-290-490. If found to be defective or inoperative, the device or assembly shall be replaced or repaired. No device or assembly shall be removed from use or relocated or other device or assembly substituted, without the approval of the authority having jurisdiction. Testing shall be performed by a Washington State Department of Health certified backflow assembly tester.

P604.1 Pipe, Tube, and Fittings. Pipe, tube, fittings, solvent cements, thread sealants, solders, and flux used in potable water systems intended to supply drinking water shall be in accordance with the requirements of NSF 61.

Materials used in the water supply system, except valves and similar devices, shall be of a like material, except where otherwise approved by the Authority Having Jurisdiction.

P604.5 Flexible Connectors. Flexible water connectors shall be installed in readily accessible locations, and where under continuous pressure shall be in accordance with ASME A112.18.6/CSA B125.6.

P604.12 Flexible Corrugated Connectors. Flexible corrugated connectors of copper, copper alloy, or stainless steel shall be limited to the following connector lengths:

- | | |
|---------------------------------------|------------|
| 1. Fixture Connectors | 30 inches |
| 2. Washing Machine Connectors | 72 inches |
| 3. Dishwasher and Icemaker Connectors | 120 inches |

P604.13 Water Heater Connectors. Flexible metallic (copper and stainless steel), reinforced flexible, braided stainless steel, or polymer braided with EPDM core connectors that connect a water heater to the piping system shall be in accordance with ASME A112.18.6/CSA B125.6. Copper, copper alloy, or stainless steel flexible connectors shall not exceed 24 inches. PEX-AL-PEX, PE-AL-PE or PE-RT tubing shall not be installed within the first eighteen inches of piping connected to a water heater.:

P606.5 Control Valve. A control valve shall be installed immediately ahead of each water-supplied appliance and immediately ahead of each slip joint or appliance supply. Parallel water distribution systems shall provide a control valve either immediately ahead of each fixture being supplied or installed at the manifold, and shall be identified with the fixture being supplied. Where parallel water distribution system manifolds are located in attics, crawl spaces, or other locations not accessible, a separate shutoff valve shall be required immediately ahead of each individual fixture or appliance served.

P606.6 Accessible. Required shutoff or control valves shall be accessible.

P608.3 Expansion Tanks, and Combination Temperature and Pressure-Relief Valves. A water system provided with a check valve, backflow preventer, or other normally closed device that prevents dissipation of building pressure back into the water main, independent of the type of water used, shall be provided with an approved, listed, and adequately sized expansion tank or other approved device having a similar function to control thermal expansion. Such expansion tank or other approved device shall be installed on the building side of the check valve, backflow preventer, or other device and shall be sized and installed in accordance with the manufacturer's installation instructions.

Exception: Instantaneous hot water systems installed in accordance with the manufacturer's installation instructions.

P608.3.1 Combination Temperature and Pressure Relief Valve. A water system containing storage water heating equipment shall be provided with an approved, listed, adequately sized combination temperature and pressure relief valve, except for listed non-storage instantaneous heater having an inside diameter of not more than 3 inches. Each such approved combination temperature and pressure-relief valve shall be installed on the water-heating device in an approved location based on its listing requirements and the manufacturer's installation instructions. Each such combination temperature and pressure-relief valve shall be provided with a drain in accordance with Section 608.5.

608.5 Discharge Piping. The discharge piping serving a temperature relief valve, pressure relief valve, or combination of both shall have no valves, obstructions, or means of isolation and be provided with the following:

- (1) Equal to the size of the valve outlet and shall discharge full size to the flood level of the area receiving the discharge and pointing down.
- (2) Materials shall be rated at not less than the operating temperature of the system and approved for such use.
- (3) Discharge pipe shall discharge independently by gravity through an air gap into the drainage system or outside of the building with the end of the pipe not exceeding 2 feet and not less than 6 inches above the ground and pointing downwards.
- (4) Discharge in such a manner that does not cause personal injury or structural damage.
- (5) No part of such discharge pipe shall be trapped or subject to freezing.
- (6) The terminal end of the pipe shall not be threaded.
- (7) Discharge from a relief valve into a water heater pan shall be prohibited.

Exception: Where no drainage was provided, replacement water heating equipment shall only be required to provide a drain pointing downward from the relief valve to extend between 2 feet and 6 inches from the floor. No additional floor drain need be provided.

P609.2 Trenches. Water pipes shall not be run or laid in the same trench as building sewer or drainage piping constructed of clay or materials that are not approved for use within a building unless both of the following conditions are met:

1. The bottom of the water pipe, shall be not less than 12 inches above the top of the sewer or drain line.
2. The water pipe shall be placed on a solid shelf excavated at one side of the common trench with a clear horizontal distance of not less than 12 inches from the sewer or drain line. Water pipes crossing sewer or drainage piping constructed of clay or materials that are not approved for use within a building shall be laid not less than 12 inches above the sewer or drain pipe.

P609.4 Testing. Upon completion of a section or of the entire hot and cold water supply system, it shall be tested and proved tight under a water pressure not less than the working pressure under which it is to be used. The water used for tests shall be obtained from a potable source of supply. Except for plastic piping, a 50 psi air pressure shall be permitted to be substituted for the water test. In either method of test, the piping shall withstand the test without leaking for 15 minutes.

P609.10 Water Hammer. Building water supply systems where quick-acting valves are installed shall be provided with water hammer arresters to absorb high pressures resulting from the quick closing of these valves. Water hammer arresters shall be approved mechanical devices in accordance with ASSE 1010 or PDI-WH 201 and shall be installed as close as possible to quick-acting valves.

P610.1 Size. The size of each water meter and each potable water supply pipe from the meter or other source of supply to the fixture supply branches, risers, fixtures, connections, outlets, or other uses shall be based on the total demand and shall be determined according to the methods and procedures outlined in this section. Water piping systems shall be designed to ensure that the maximum velocities allowed by the code and the applicable standard are not exceeded.

DRAINS

P701.1 Drainage material shall be cast iron, galvanized steel or wrought iron, lead, copper, brass, Stainless Steel 304 or 316L, schedule 40 ABS DWV, or Schedule 40 PVC DWV. Galvanized pipe shall be kept at least 6" above ground.

701.2 Drainage Piping. Materials for drainage piping shall be in accordance with one of the referenced standards in Table 701.1 except that:

1. No galvanized wrought-iron or galvanized steel pipe shall be used underground and shall be kept not less than 6 inches above ground.
2. ABS and PVC DWV piping installations shall be installed in accordance with applicable standards in Table 1701.1. Except for individual single family dwelling units, materials exposed within ducts or plenums shall have a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, when tested in accordance with ASTM E-84 and UL 723.
3. No vitrified clay pipe or fittings shall be used above ground or where pressurized by a pump or ejector. They shall be kept not less than 12 inches below ground.
4. Copper tube for drainage and vent piping shall have a weight of not less than that of copper drainage tube type DWV.
5. Stainless steel 304 pipe and fittings shall not be installed underground and shall be kept not less than 6 inches above ground.
6. Cast-iron soil pipe and fittings shall be listed and tested in accordance with standards referenced in Table 1701.1. Such pipe and fittings shall be marked with country of origin and identification of the original manufacturer in addition to markings required by referenced standards.

P706.1 Approved Fittings. Changes in direction of drainage piping shall be made by the appropriate use of approved fittings and shall be of the angles presented by 1/16 bend; 1/8 bend; 1/6 bend; or other approved fittings of equivalent sweep.

P706.2 Horizontal to Vertical. Horizontal drainage lines, connecting with a vertical stack, shall enter through 45 degree wye branches, 60 degree wye branches, combination wye and 1/8 bend branches, sanitary tee or sanitary tapped tee

branches, or other approved fittings of equivalent sweep. No fitting having more than one inlet at the same level shall be used unless such fitting is constructed so that the discharge from one inlet cannot readily enter any other inlet. Double sanitary tees shall be permitted to be used where the barrel of the fitting is at least two pipe sizes larger than the largest inlet.

P706.3 Horizontal to Horizontal. Horizontal drainage lines connecting with other horizontal drainage lines shall enter through 45 degree wye branches, combination wye and 1/8 bend branches, or other approved fittings of equivalent sweep. Branches or offsets of 60 degrees shall be permitted to be used where installed in a true vertical position.

P706.4 Vertical to Horizontal. Vertical drainage lines connecting with horizontal drainage lines shall enter through 45 degree wye branches, combination wye and 1/8 bend branches, or other approved fittings of equivalent sweep. Branches or offsets of 60 degrees shall be permitted to be used where installed in a true vertical position.

P707.4 Cleanout Location. Each horizontal drainage pipe shall be provided with a cleanout at its upper terminal, and each run of piping, that is more than 100 feet in total developed length, shall be provided with a cleanout for each 100 feet, or fraction thereof, in length of such piping. An additional cleanout shall be provided in a drainage line for each aggregate horizontal change of direction exceeding 135 degrees.

Exceptions:

1. Cleanouts shall be permitted to be omitted on a horizontal drain line less than 5 feet in length unless such line is serving sinks or urinals.
2. Cleanouts shall be permitted to be omitted on a horizontal drainage pipe installed on a slope of 72 degrees or less from the vertical angle.
3. Excepting the building drain, its horizontal branches, and urinals, a cleanout shall not be required on a pipe or piping that is above the floor level of the lowest floor of the building.
4. An approved type of two-way cleanout fitting, installed inside the building wall near the connection between the building drain and the building sewer or installed outside of a building at the lower end of a building drain and extended to grade, shall be permitted to be substituted for an upper terminal cleanout.

P708.1 General. Horizontal drainage piping shall be run in practical alignment and a uniform slope of not less than 1/4 inch per foot or 2 percent toward the point of disposal unless first approved by the Authority Having Jurisdiction.

P712.1 Media. The piping of the plumbing, drainage, and venting systems shall be tested with water or air except that plastic pipe shall not be tested with air.

P712.2 Water Test. The water test shall be applied to the drainage and vent systems either in its entirety or in sections. Openings in the piping shall be tightly closed, except the highest opening, and the system filled with water to point of overflow. The water shall be kept in the system, or in the portion under test, for not less than 15 minutes before inspection starts. The system shall then be tight at all points.

P712.3 Air Test. The air test shall be made by attaching an air compressor testing apparatus to a suitable opening and, after closing all other inlets and outlets to the system, forcing air into the system until there is a uniform gauge pressure of 5 psi. The pressure shall be held without introduction of additional air for a period of not less than 15 minutes.

P804.1 Standpipe Receptors. Plumbing fixtures or other receptors receiving the discharge of indirect waste pipes shall be approved for the use proposed and shall be of such shape and capacity as to prevent splashing or flooding and shall be located where they are readily accessible for inspection and cleaning. No standpipe receptor for a clothes washer shall extend more than 30 inches, or not less than 18 inches above its trap. No trap for a clothes washer standpipe receptor shall be installed below the floor, but shall be roughed in not less than 6 inches and not more than 18 inches above the floor. No indirect waste receptor shall be installed in a toilet room, closet, cupboard, or storeroom, nor in a portion of a building not in general use by the occupants thereof; except standpipes for clothes washers shall be permitted to be installed in toilet and bathroom areas where clothes washer is installed in the same room.

P807.3 Domestic Dishwashing Machine. No domestic dishwashing machine shall be directly connected to a drainage system or food waste disposer without the use of an approved dishwasher air gap fitting on the discharge side of the dishwashing machine. Listed air gaps shall be installed with the flood-level (FL) marking at or above the flood level of the sink or drainboard, whichever is higher.

VENTS

P901.2 Vents Required. Each plumbing fixture trap, except as otherwise provided in this code, shall be protected against siphonage and backpressure, and air circulation shall be ensured throughout all parts of the drainage system by means of vent pipes installed in accordance with the requirements of this chapter and as otherwise required by this code.

P904.1 Size. The size of vent piping shall be determined from its length and the total number of fixture units connected thereto, in accordance with Table 703.2. The diameter of an individual vent shall be not less than 1 1/4 inches nor less than 1/2 the diameter of the drain to which it is connected. In addition, the drainage piping of each building and each connection to a public sewer or a private sewage disposal system shall be vented by means of one or more vent pipes, the aggregate cross-sectional area of which shall be not less than that of the largest required building sewer, as determined from Table 703.2. Vent pipes from fixtures located upstream from pumps, ejectors, backwater valves, or other devices that obstruct the free flow of air and other gases between the building sewer and the outside atmosphere shall not be used for meeting the cross-sectional area venting requirements of this section.

P904.2 Length. Not more than 1/3 of the total permitted length, in accordance with Table 703.2, of a minimum sized vent shall be installed in a horizontal position.

Exception;

Where a minimum sized vent is increased one pipe size for its entire length, the maximum length limitation shall not apply.

P905.1 Grade. Vent and vent branch pipes shall be free from drops or sags, and each such vent shall be level, or shall be so graded as to drop back by gravity to the drainage pipe it serves.

P905.3 Vent Pipe Rise. Unless prohibited by structural conditions, each vent shall rise vertically to a point not less than 6 inches above the flood-level rim of the fixture served before offsetting horizontally, and where two or more vent pipes converge, each such vent pipe shall rise to a point not less than 6 inches in height above the flood-level rim of the fixture it serves before being connected to any other vent. Vents less than 6 inches above the flood-level rim of the fixture shall be installed with the approved drainage fittings, material and grade to the drain.

P905.4 Vent Termination. Vent pipes shall extend undiminished in size above the roof, or shall be reconnected with a soil or waste vent of proper size.

P906.1 Roof termination. Each vent pipe or stack shall extend through its flashing and shall terminate vertically not less than 6 inches above the roof nor less than 1 foot from a vertical surface.

P906.2 Clearance. Each vent shall terminate not less than 10 feet from, or less than 3 feet above, an openable window, door opening, air intake, or vent shaft, or not less than 3 feet in every direction from a lot line, alley and street excepted.

P906.5 Joints. Joints at the roof around vent pipes shall be made watertight by the use of approved flashings or flashing material.

TRAPS

P1001.1 Where required. Each plumbing fixture, shall be separately trapped by an approved type of liquid seal trap. This section shall not apply to fixtures with integral traps. Not more than one trap shall be permitted on a trap arm. Food waste disposers installed with a set of restaurant, commercial, or industrial sinks shall be connected to a separate trap. Each domestic clothes washer and each laundry tub shall be connected to a separate and independent trap, except that a trap serving a laundry tub shall be permitted to also receive the waste from a clothes washer set adjacent thereto. The vertical distance between a fixture outlet and the trap weir shall be as short as practicable, but in no case shall the tailpiece from a fixture exceed 24 inches in length. One trap shall be permitted to serve a set of not more than 3 single compartment sinks or laundry tubs of the same depth or 3 lavatories immediately adjacent to each other and in the same room where the waste outlets are not more than 30 inches apart and the trap is centrally located where three compartments are installed.

ENERGY CODE

N103.1 General. Construction documents, technical reports, and other supporting data shall be submitted in one or more sets with each application for a permit. The construction documents and technical reports shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the code official is authorized to require necessary construction documents to be prepared by a registered design professional.

Exception:

The code official is authorized to waive the requirements for construction documents or other supporting data if the code official determines they are not necessary to confirm compliance with this code.

N103.2 Information on construction documents.

Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when approved by the code official. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, the following as applicable:

1. Insulation materials and their R-values.
2. Fenestration U-factors and SHGCs.
3. Area-weighted U-factor and SHGC calculations.
4. Mechanical system design criteria.
5. Mechanical and service water heating system and equipment types, sizes and efficiencies.
6. Equipment and systems controls
7. Duct sealing, duct and pipe insulation and location.
8. Air sealing details.

N103.2.1 Building thermal envelope depiction. The building's thermal envelope shall be represented on the construction documents.

N103.4 Amended construction documents. Work shall be installed in accordance with the approved construction documents, and any changes made during construction that are not in compliance with the approved construction documents shall be resubmitted for approval as an amended set of construction documents.

N104.1 General. Construction or work for which a permit is required shall be subject to inspection by the code official or his or her designated agent, and such construction or work shall remain accessible and exposed for inspection purposes until approved. It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the code official nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.

N104.5 Inspection requests. It shall be the duty of the holder of the permit or their duly authorized agent to notify the code official when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

N104.6 Reinspection and testing. Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the code official for inspection and testing.

N303.1 Identification. Materials, systems and equipment shall be identified in a manner that will allow a determination of compliance with the applicable provisions of this code.

N303.1.1 Building thermal envelope insulation. An R-value identification mark shall be applied by the manufacturer to each piece of building thermal envelope insulation 12 inches or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and R-value of insulation installed in each element of the building thermal envelope. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled R-value, installed density, coverage area and number of bags installed shall be listed on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and R-value of installed thickness shall be listed on the certification. For insulated siding, the R-value shall be labeled on the product's package and shall be listed on the certification. The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

N303.1.1.1 Blown or sprayed roof/ceiling insulation. The thickness of blown-in or sprayed roof/ceiling insulation (fiberglass or cellulose) shall be written in inches on markers that are installed at least one for every 300 square feet (28 m²) throughout the attic space. The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness with numbers a minimum of 1 inch (25 mm) in height. Each marker shall face the attic access opening. Spray polyurethane foam thickness and installed R-value shall be listed on certification provided by the insulation installer.

N303.1.2 Insulation mark installation. Insulating materials shall be installed such that the manufacturer's R-value mark is readily observable upon inspection.

N303.2 Installation. All materials, systems and equipment shall be installed in accordance with the manufacturer's installation instructions and the International Building Code or International Residential Code, as applicable.

N303.2.1 Protection of exposed foundation insulation. Insulation applied to the exterior of basement walls, crawlspace walls and the perimeter of slab-on-grade floors shall have a rigid, opaque and weather-resistant protective covering to prevent the degradation of the insulation's thermal performance. The protective covering shall cover the exposed exterior insulation and extend a minimum of 6 inches below grade.

N401.3 Certificate (Mandatory). A permanent certificate shall be completed by the builder or registered design professional and posted on a wall in the space where the furnace is located, a utility room, or an approved location inside the building. When located on an electrical panel, the

certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label, or other required labels. The certificate shall list the predominant R-values of insulation installed in or on ceiling/roof, walls, foundation (slab, below-grade wall, and/or floor) and ducts outside conditioned spaces; U-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration, and the results from any required duct system and building envelope air leakage testing done on the building. Where there is more than one value for each component, the certificate shall list the value covering the largest area. The certificate shall list the types and efficiencies of heating, cooling and service water heating equipment. Where a gas-fired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall list "gas-fired unvented room heater," "electric furnace" or "baseboard electric heater," as appropriate. An efficiency shall not be listed for gas-fired unvented room heaters, electric furnaces or electric baseboard heaters.

N402.2.3 Eave baffle. For air permeable insulations in vented attics, a baffle shall be installed adjacent to soffit and eave vents. Baffles shall maintain an opening equal or greater than the size of the vent. The baffle shall extend over the top of the attic insulation. The baffle shall be permitted to be any solid material.

N402.2.4 Access hatches and doors. Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weatherstripped and insulated to a level equivalent to the insulation on the surrounding surfaces. Access shall be provided to all equipment that prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the attic access is opened, and to provide a permanent means of maintaining the installed R-value of the loose fill insulation.

Exception: Vertical doors that provide access from conditioned to unconditioned spaces shall be permitted to meet the fenestration requirements of Table R402.1.1.

N402.2.7 Floors. Floor framing cavity insulation shall be installed to maintain permanent contact with the underside of the subfloor decking. Insulation supports shall be installed so spacing is no more than 24-inches on center. Foundation vents shall be placed so that the top of the vent is below the lower surface of the floor insulation.

Exceptions:

1. The floor framing cavity insulation shall be permitted to be in contact with the top side of sheathing or continuous insulation installed on the bottom side of floor framing where combined with insulation that meets or exceeds the minimum Wood Frame R-value in Table R402.1.1 and extends from the bottom to the top of all perimeter floor framing members.
2. When foundation vents are not placed so that the top of the vent is below the lower surface of the floor insulation, a permanently attached baffle shall be installed at an angle of 30° from horizontal, to divert air flow below the lower surface of the floor insulation.

3. Substantial contact with the surface being insulated is not required in enclosed floor/ceiling assemblies containing ducts where full R-value insulation is installed between the duct and the exterior surface.

N402.4 Air leakage (Mandatory). The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.4.

N402.4.1.2 Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 5 air changes per hour. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. Where required by the code official, testing shall be conducted by an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope. Once visual inspection has confirmed sealing (see Table R402.4.1.1), operable windows and doors manufactured by small business shall be permitted to be sealed off at the frame prior to the test.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
3. Interior doors, if installed at the time of the test, shall be open, access hatches to conditioned crawl spaces and conditioned attics shall be open;
4. Exterior openings for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
6. Supply and return registers, if installed at the time of the test, shall be fully open.

Exceptions:

1. Additions less than 500 square feet of conditioned floor area.
2. Additions tested with the existing home having a combined maximum air leakage rate of 7 air changes per hour. To qualify for this exception, the date of construction of the existing house must be prior to the 2009 Washington State Energy Code.

N402.4.5 Recessed lighting. Recessed luminaires installed in the building thermal envelope shall be Type IC-rated and certified under ASTM E283 as having an air leakage rate not more than 2.0 cfm when tested at a 1.57 psf pressure differential and shall have a label attached showing compliance with this test method. All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.

N403.1 Controls (Mandatory). At least one thermostat shall be provided for each separate heating and cooling system.

N403.3.1 Insulation (Prescriptive). Ducts outside the building thermal envelope shall be insulated to a minimum of

R-8. Ducts within a concrete slab or in the ground shall be insulated to R-10 with insulation designed to be used below grade.

Exception: Ducts or portions thereof located completely inside the building thermal envelope. Ducts located in crawl spaces do not qualify for this exception.

N403.3.3 Duct testing (Mandatory). Ducts shall be leak tested in accordance with WSU RS-33, using the maximum duct leakage rates specified.

Exception: The total leakage test or leakage to the outdoors is not required for ducts and air handlers located entirely within the building thermal envelope. For forced air ducts, a maximum of 10 linear feet of return ducts and 5 linear feet of supply ducts may be located outside the conditioned space. All metallic ducts located outside the conditioned space must have both transverse and longitudinal joints sealed with mastic. If flex ducts are used, they cannot contain splices. Flex duct connections must be made with nylon straps and installed using a plastic strapping tensioning tool. Ducts located in crawl spaces do not qualify for this exception. A written report of the results shall be signed by the party conducting the test and provided to the code official.

N403.3.3 Building cavities (Mandatory). Building framing cavities shall not be used as ducts or plenums. Installation of ducts in exterior walls, floors or ceilings shall not displace required envelope insulation.

N403.5.3 Hot water pipe insulation (Prescriptive).

Insulation for hot water pipe, both within and outside the conditioned space, shall have a minimum thermal resistance (R-value) of R-3.

Exception: Pipe insulation is permitted to be discontinuous where it passes through studs, joists or other structural members and where the insulated pipes pass other piping, conduit or vents, provided the insulation is installed tight to each obstruction.

N403.5.5 Electric water heater insulation. All electric water heaters in unheated spaces or on concrete floors shall be placed on an incompressible, insulated surface with a minimum thermal resistance of R-10.

N403.7.1 Electric resistance zone heated units.

All detached one- and two-family dwellings and multiple single-family dwellings (townhouses) up to three stories in height above grade plan using electric zonal heating as the primary heat source shall install an inverter-driven ductless mini-split heat pump in the largest zone in the dwelling. Building permit drawings shall specify the heating equipment type and location of the heating system.

Exception: Total installed heating capacity of 2Kw per dwelling or less.

N404.1 Lighting equipment (Mandatory). A minimum of 75 percent of lamps in permanently installed lighting fixtures shall be high-efficacy lamps.

N501.1.1 Additions, alterations, or repairs. Additions, alterations, or repairs to an existing building, building system

or portion thereof shall comply with Sections R502, R503 or R504. Unaltered portions of the existing building or building supply system shall not be required to comply with this code.

N502.1 General. Additions to an existing building, building system or portion thereof shall conform to the provisions of this code as those provisions relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this code. Additions shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code where the addition alone complies, where the existing building and addition comply with this code as a single building, or where the building with the addition uses no more energy than the existing building. Additions shall be in accordance with Section R502.1.1 or R502.1.2.

N503.1 General. Alterations to any building or structure shall comply with the requirements of the code for new construction. Alterations shall be such that the existing building or structure is no less conforming to the provisions of this code than the existing building or structure was prior to the alteration. Alterations to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. Alterations shall not create an unsafe or hazardous condition or overload existing building systems. Alterations shall be such that the existing building or structure uses no more energy than the existing building or structure prior to the alteration. Alterations to existing buildings shall comply with Section R503.1.1 through R503.2. The code official may approve designs of alterations which do not fully conform to all of the requirements of this code where in the opinion of the building official full compliance is physically impossible and/or economically impractical and:

1. The alteration improves the energy efficiency of the building; or
2. The alteration is energy efficient and is necessary for the health, safety, and welfare of the general public.

N505.1 Change in occupancy or use. Any space not within the scope of Section R101.2 which is converted to space that is within the scope of Section R101.2 shall be brought into full compliance with this code. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Any space that is converted to a dwelling unit or portion thereof from another use or occupancy shall comply with this code.

Exception: Where the simulated performance option in Section R405 is used to comply with this section, the annual energy use of the proposed design is permitted to be 110 percent of the annual energy use otherwise allowed by Section R405.3.

**TABLE R402.4.1.1
AIR BARRIER AND INSULATION INSTALLATION**

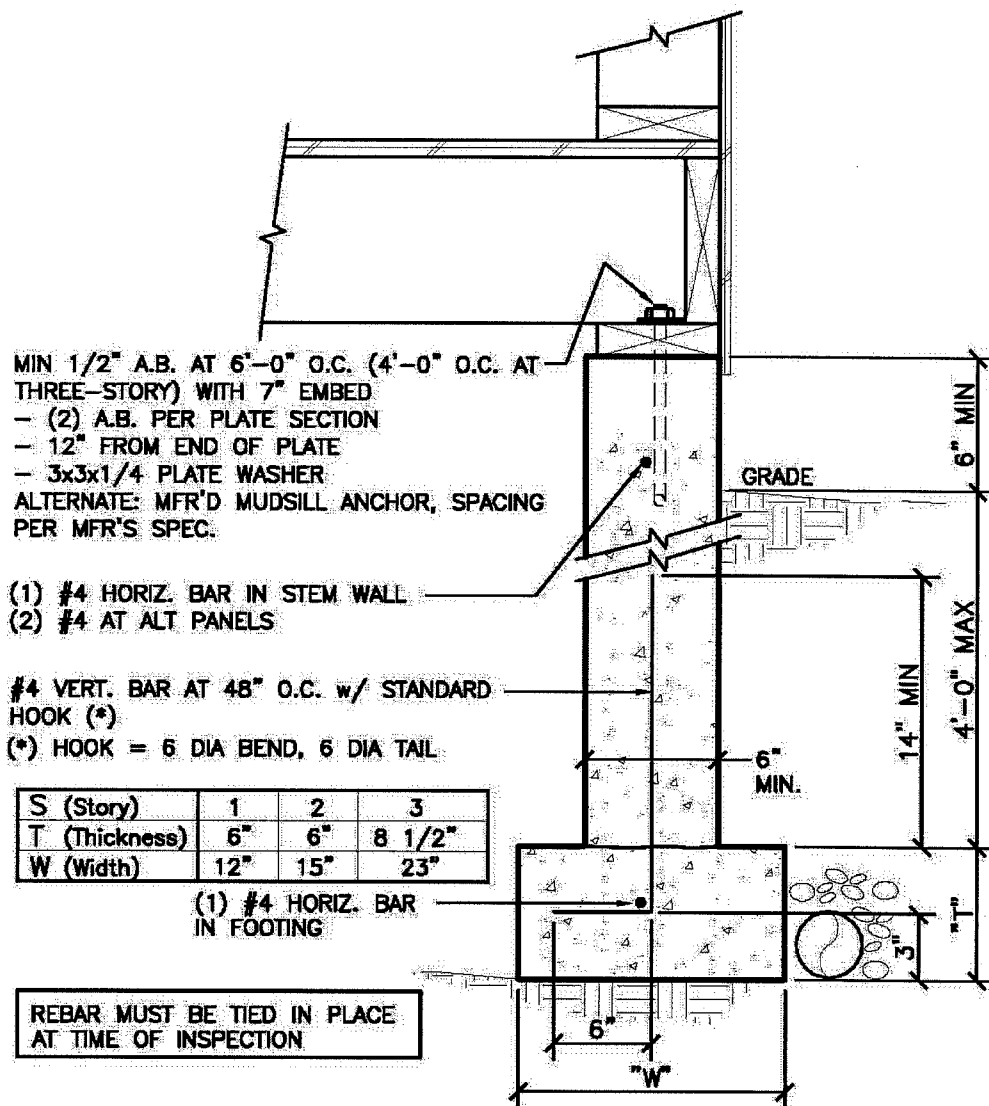
COMPONENT	AIR BARRIER CRITERIA^a	INSULATION CRITERIA^a
General Requirements	A continuous air barrier shall be installed in the building envelope. Exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed.	Air-permeable insulation shall not be used as a sealing material.
Cavity insulation installation		All cavities in the thermal envelope shall be filled with insulation. The density of the insulation shall be at the manufacturers' product recommendation and said density shall be maintained for all volume of each cavity. Batt type insulation will show no voids or gaps and maintain an even density for the entire cavity. Batt insulation shall be installed in the recommended cavity depth. Where an obstruction in the cavity due to services, blocking, bracing or other obstruction exists, the batt product will be cut to fit the remaining depth of the cavity. Where the batt is cut around obstructions, loose fill insulation shall be placed to fill any surface or concealed voids, and at the manufacturers' specified density. Where faced batt is used, the installation tabs must be stapled to the face of the stud. There shall be no compression to the batt at the edges of the cavity due to inset stapling installation tabs. Insulation that upon installation readily conforms to available space shall be installed filling the entire cavity and within the manufacturers' density recommendation.
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.	The insulation in any dropped ceiling/soffit shall be aligned with the air barrier Batt insulation installed in attic roof assemblies may be compressed at exterior wall lines to allow for required attic ventilation.
Walls	The junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Knee walls shall be sealed.	Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance of R-3 per inch minimum. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed.	
Rim Joists	Rim joists shall include the air barrier.	Rim joists shall be insulated.
Floors (including above garage and cantilevered floors)	The air barrier shall be installed at any exposed edge of insulation.	Floor framing cavity insulation shall be installed to maintain permanent contact with the underside of subfloor decking or floor framing cavity insulation shall be permitted to be in contact with the topside of sheathing or continuous insulation

		installed on the underside of floor framing and extend from the bottom to the top of all perimeter floor framing members.
Crawl space walls	Exposed earth in unvented crawl spaces shall be covered with a Class I, black vapor retarder with overlapping joints taped.	Where provided instead of floor insulation, insulation shall be permanently attached to the crawlspace walls.
Shafts, penetrations	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.	
Narrow cavities		Batts in narrow cavities shall be cut to fit and installed to the correct density without any voids or gaps or compression, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.	
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be sealed to the drywall.	Recessed light fixtures installed in the building thermal envelope shall be air tight and IC rated.
Plumbing and wiring		Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls. There shall be no voids or gaps or compression where cut to fit. Insulation that on installation readily conforms to available space shall extend behind piping and wiring.
Shower/tub on exterior wall	The air barrier installed at exterior walls adjacent to showers and tubs shall separate them from the showers and tubs.	Exterior walls adjacent to showers and tubs shall be insulated.
Electrical/phone box on exterior wall	The air barrier shall be installed behind electrical or communication boxes or air sealed boxes shall be installed.	
HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.	
Concealed sprinklers	When required to be sealed, concealed fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.	

IC = insulation contact

- a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

TC Figure 2 Typical Foundation Wall





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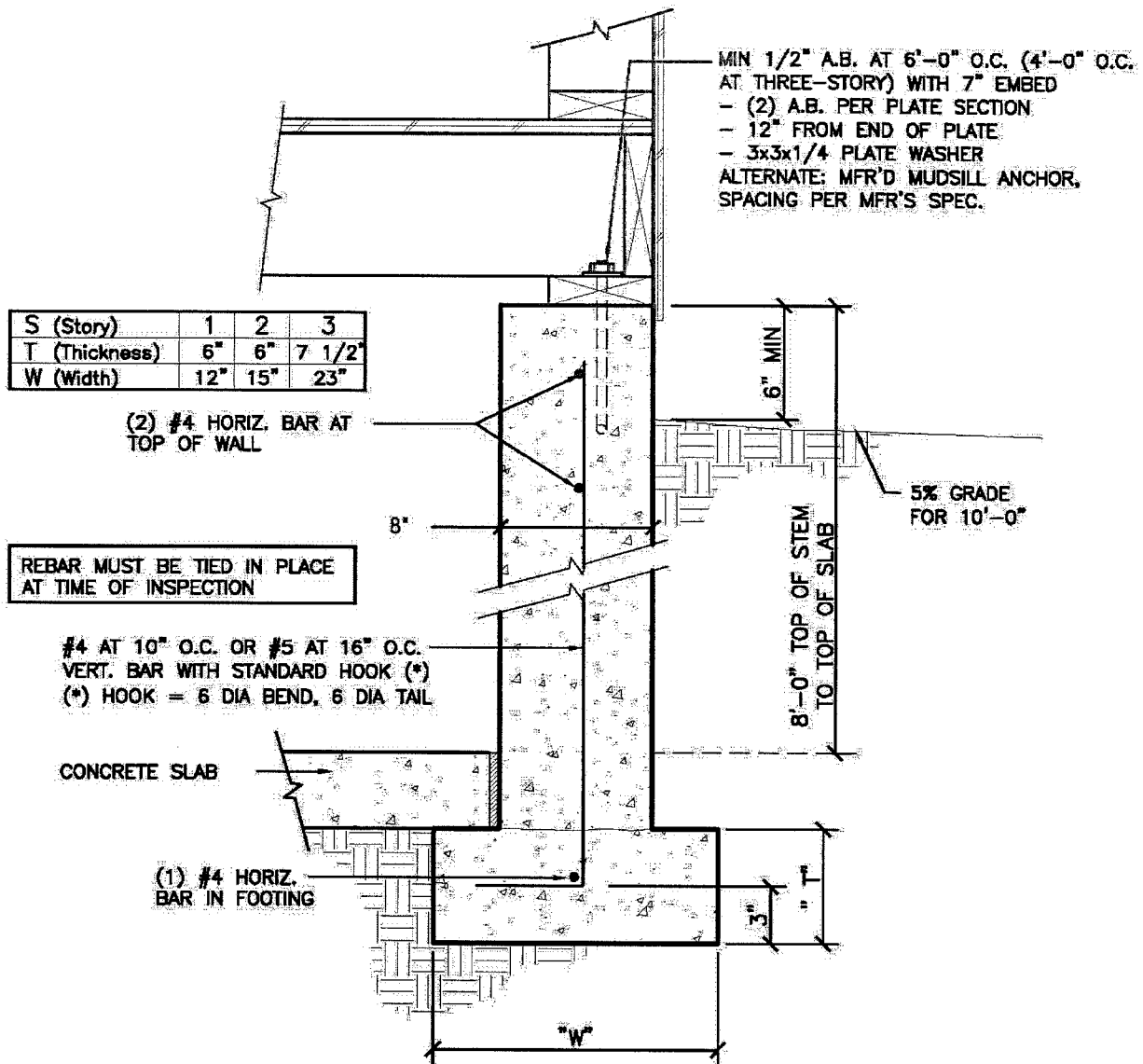
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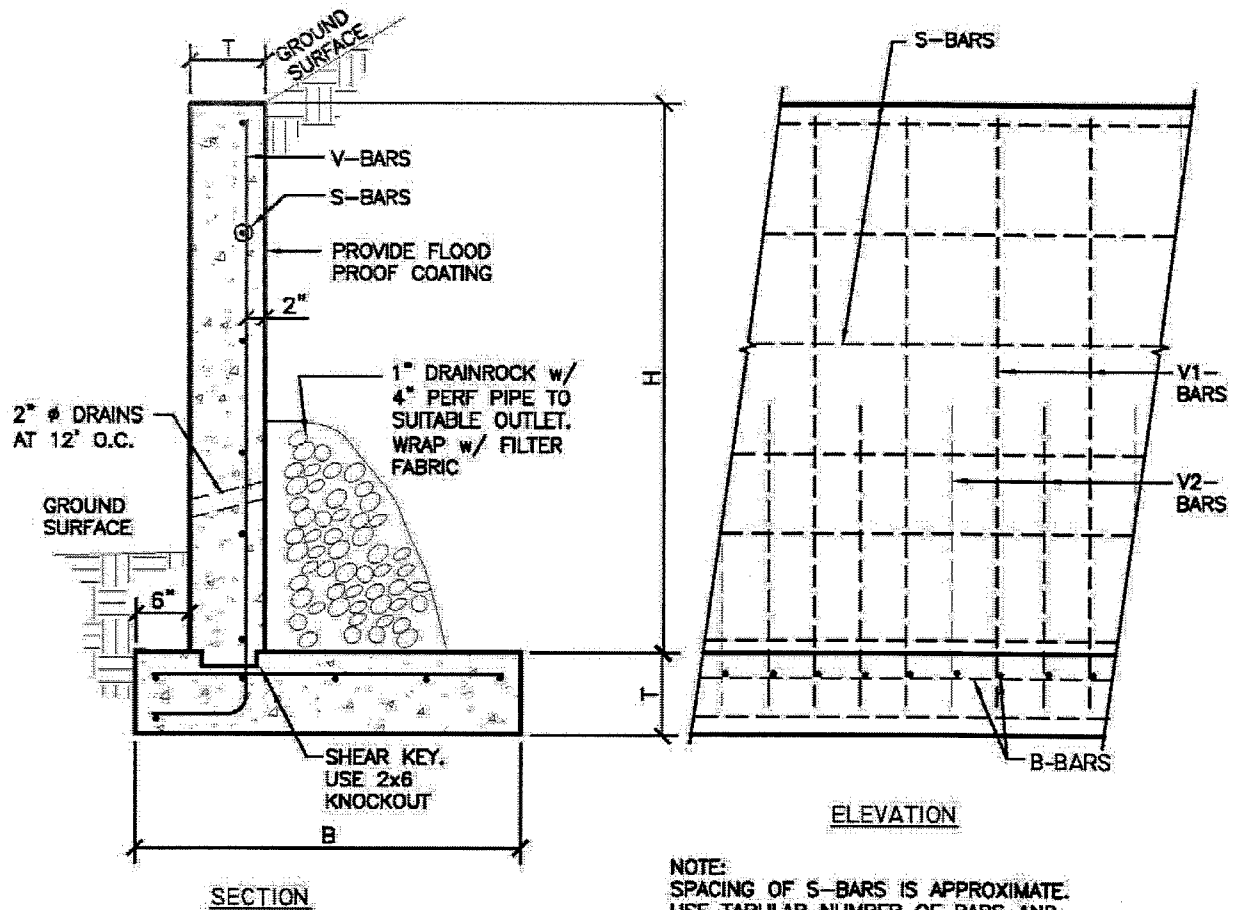
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TC Figure 3 Reinforced Foundation Wall



TC Figure 4 Concrete Retaining Wall

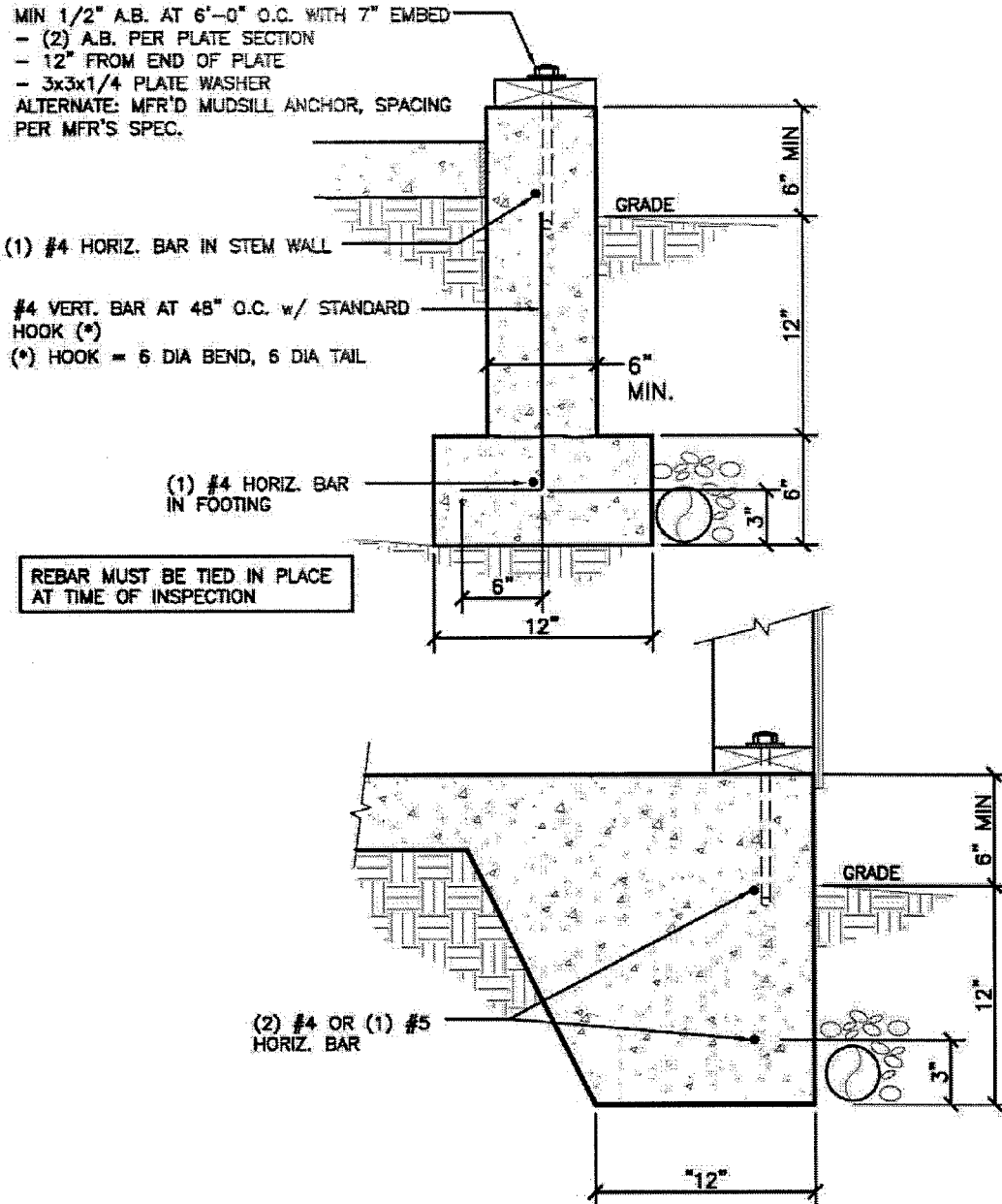


NOTE:
SPACING OF S-BARS IS APPROXIMATE.
USE TABULAR NUMBER OF BARS AND
SPACE EVENLY w/ 2" COVER

REBAR MUST BE TIED IN PLACE
AT TIME OF INSPECTION

H	B	T	VOL CONC	V-BARS	LENGTHS	B-BARS	S-BARS	REINFORCEMENT
FT	FT-IN	IN	YDS ³ / FT	SIZE SPACING	V1-BARS V2-BARS	SIZE SPACING LENGTH	# SIZE SPACING	LBS PER FT
5	3-6	10	0.25	3/8" 10"	6'-4" —	3/8" 10" 3'-2"	9 3/8" 12"	7.7
6	4-3	10	0.30	1/2" 10"	7'-4" —	1/2" 10" 3'-10"	11 3/8" 12"	13.1
7	5-0	10	0.35	1/2" 7"	8'-4" —	1/2" 7" 4'-8"	13 3/8" 12"	19.8
8	6-0	12	0.47	5/8" 9"	9'-8" 6'-0"	5/8" 9" 5'-8"	15 3/8" 12"	24.4
9	7-0	13.5	0.59	5/8" 7"	11'-0" 6'-8"	5/8" 7" 6'-8"	17 3/8" 12"	34.1
10	7-9	15	0.71	3/4" 9"	12'-2" 6'-10"	3/4" 9" 7'-4"	19 3/8" 12"	40.9

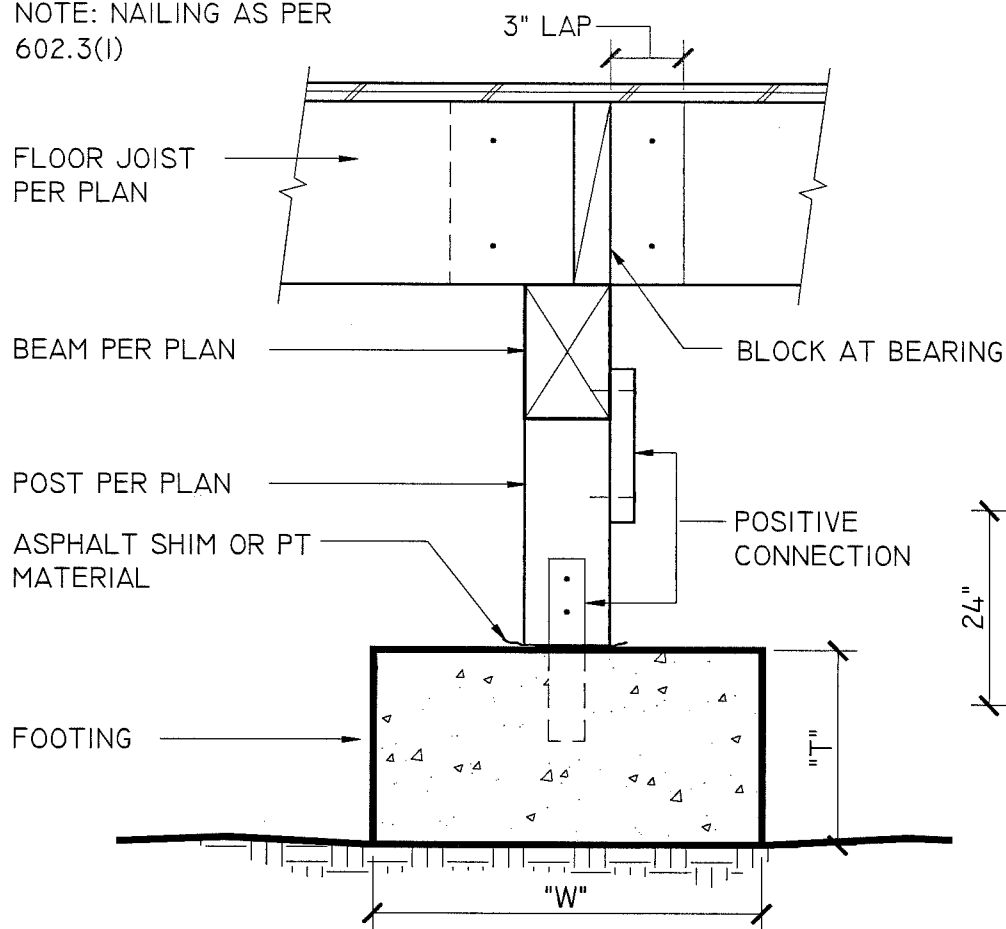
TC Figure 5 Typical Accessory Foundations



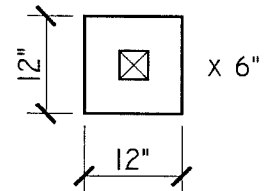
TC Figure 6 Isolated Footings

MAX LOAD	1,500#	2,500#	6,000#
T (THICKNESS)	6"	8"	12"
W (WIDTH)	12"	16"	24"

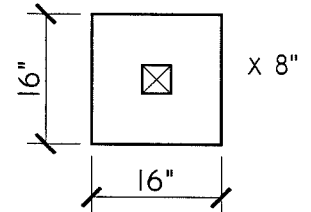
NOTE: NAILING AS PER
602.3(I)



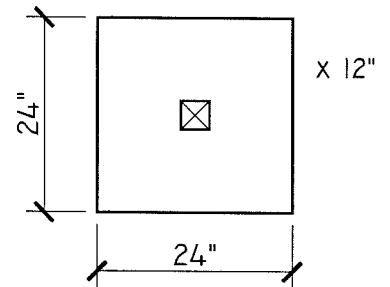
MAX LOAD
1,500#



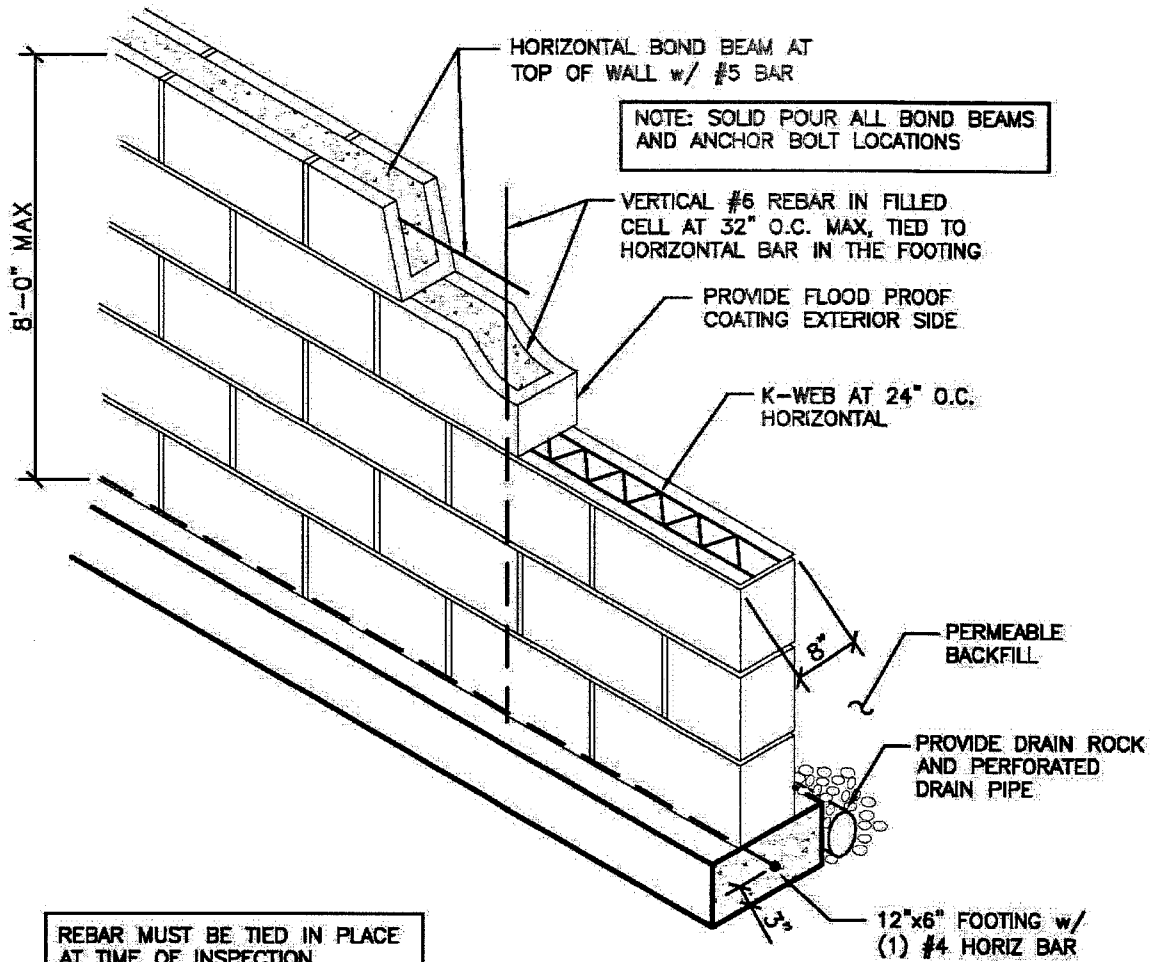
MAX LOAD
2,500#



MAX LOAD
6,000#



TC Figure 7 Concrete Masonry Unit Wall

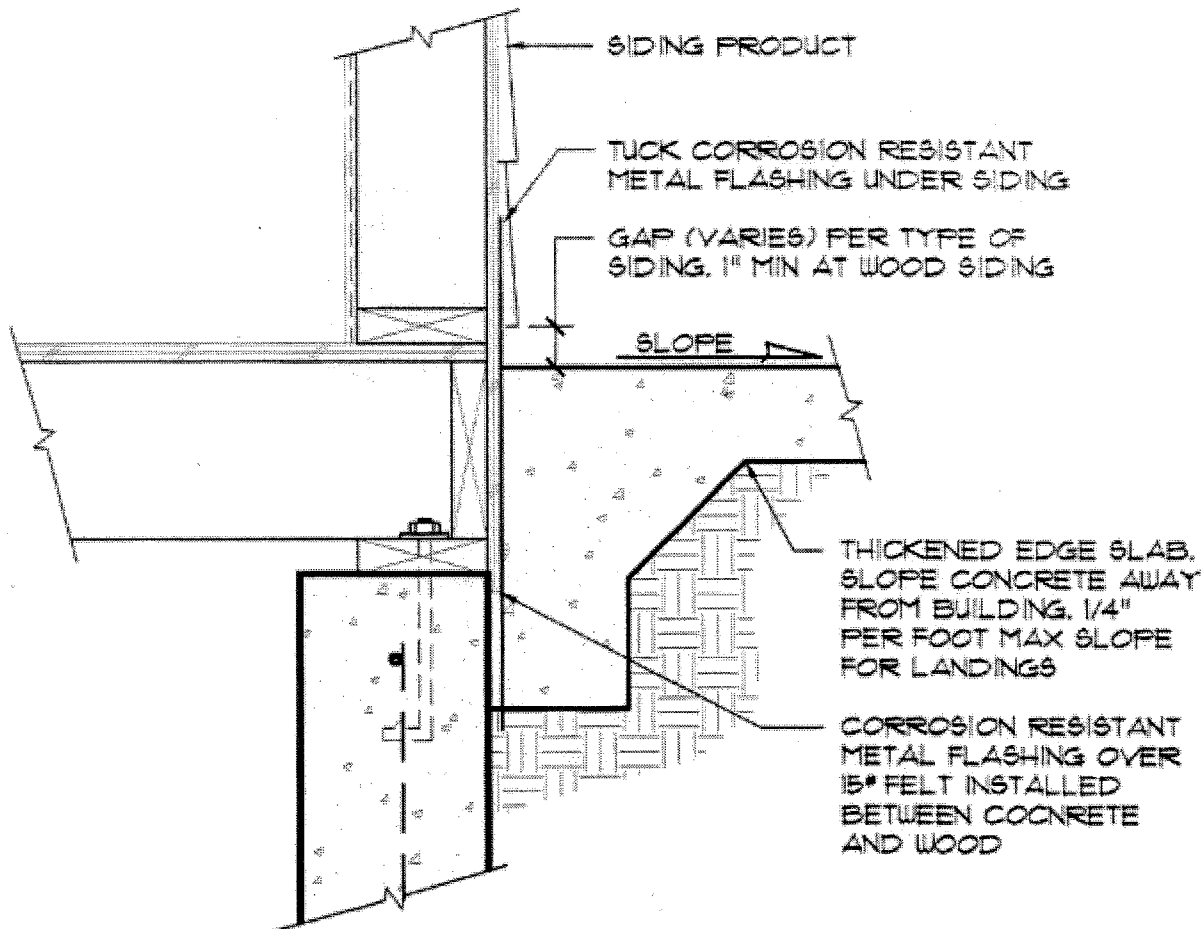


NOTES:

FOR WALL LESS THAN 4'-0" HIGH VERTICAL #4 AT 4'-0" O.C. HORIZONTAL K-WEB AT 16" O.C. NO BOND BEAM REQUIRED FOR WALLS LESS THAN 4'-0" HIGH

UNBALANCED BACKFILL HEIGHT SHALL NOT EXCEED 4'-0". DESIGN PER TABLE 404.1.1.(2) 8"

TC Figure 9 Wood to Concrete Separation

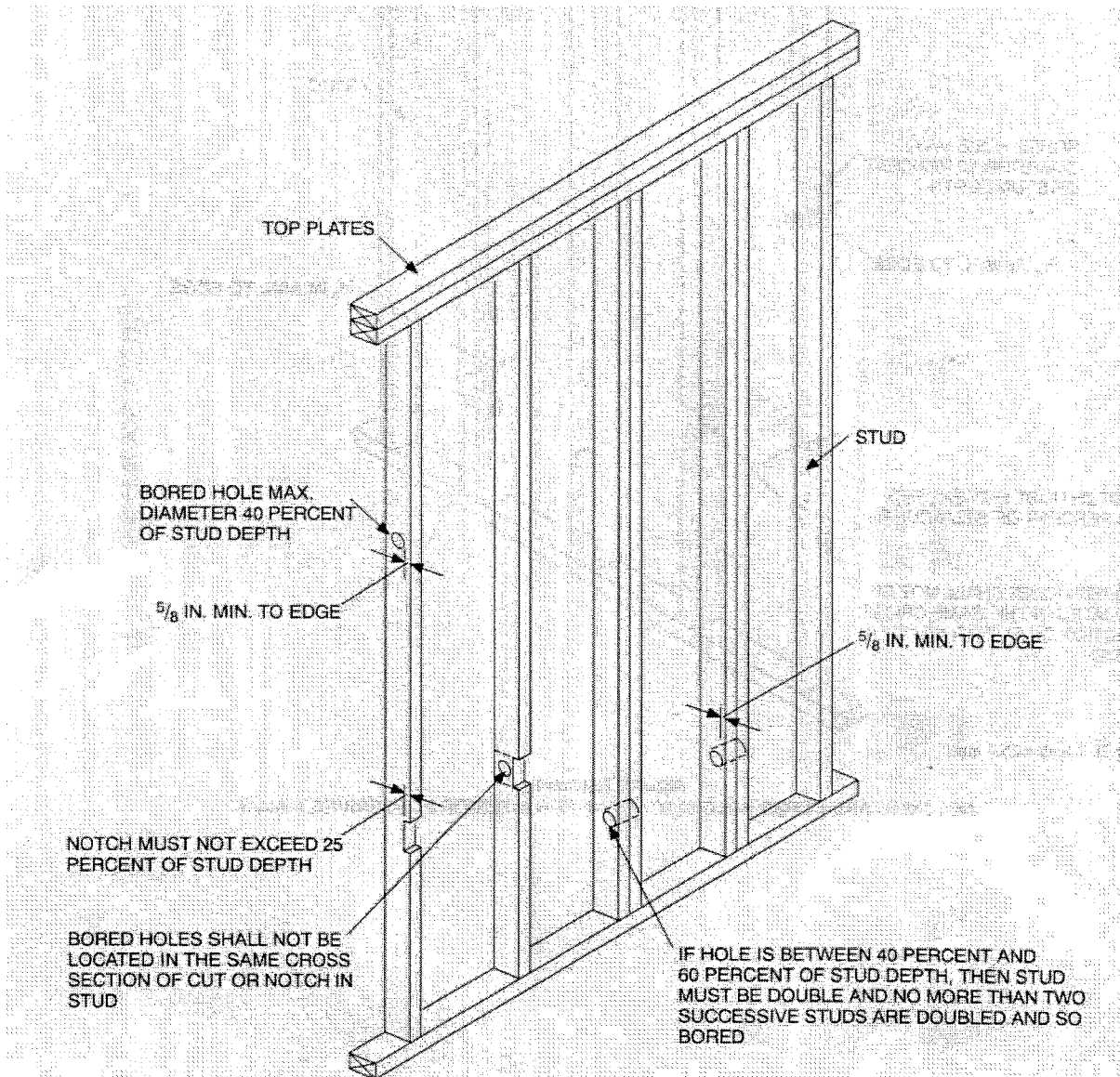


Concrete cannot be poured directly against non-pressure treated wood nor can concrete be poured against manufactured siding.

Concrete can be poured against non-pressure treated wood when flashing and felt paper have been applied over the wood. With wood siding a 1" vertical clearance has to be maintained between the siding and the concrete and with manufactured siding the minimum vertical distance has to be maintained as stated in the manufacturer's installation guide.

WOOD TO CONCRETE SEPARATION

TC Figure 10 Cutting & Notching Wall Studs

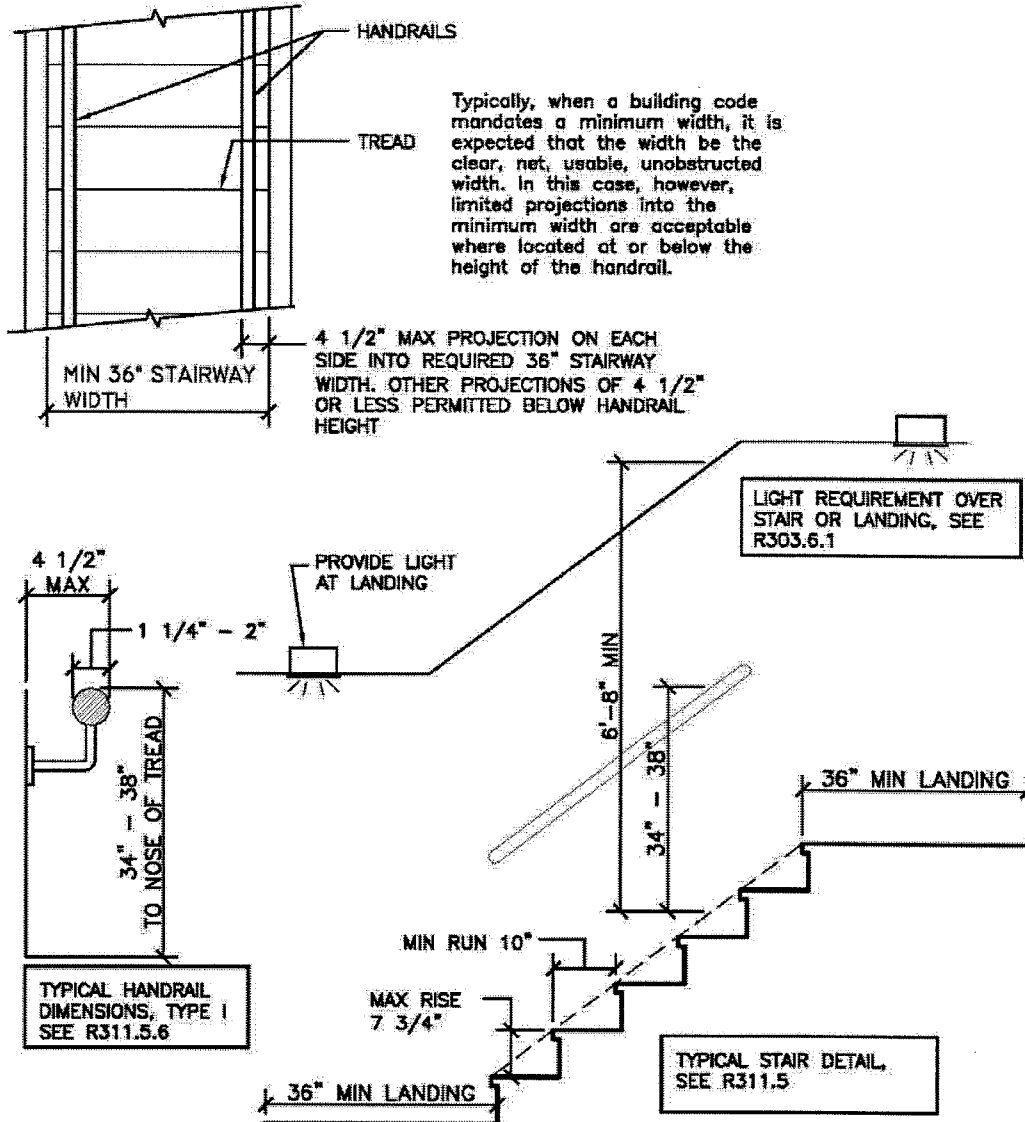


For SI: 1 inch = 25.4 mm.

Note: Condition for exterior and bearing walls.

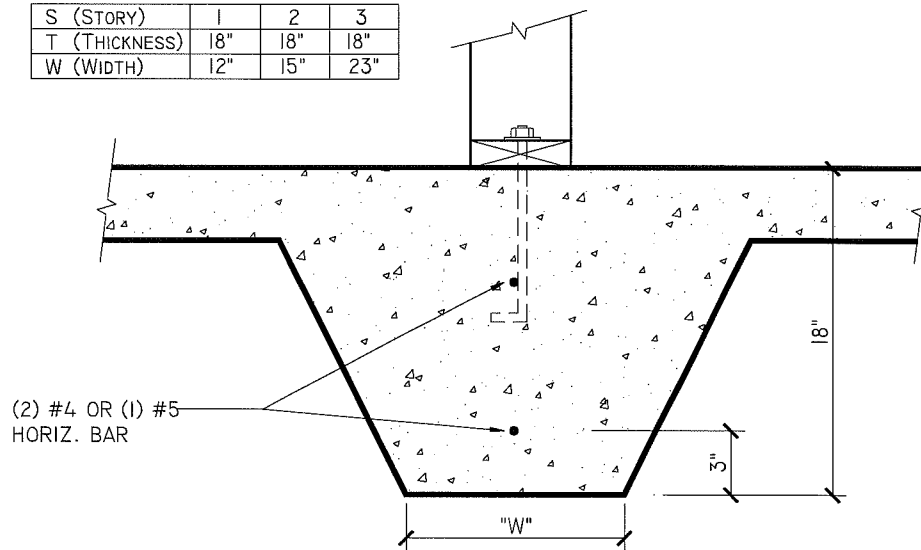
FIGURE R602.6(1)
NOTCHING AND BORED HOLE LIMITATIONS FOR EXTERIOR WALLS AND BEARING WALLS

TC Figure 12 Stair / Handrail

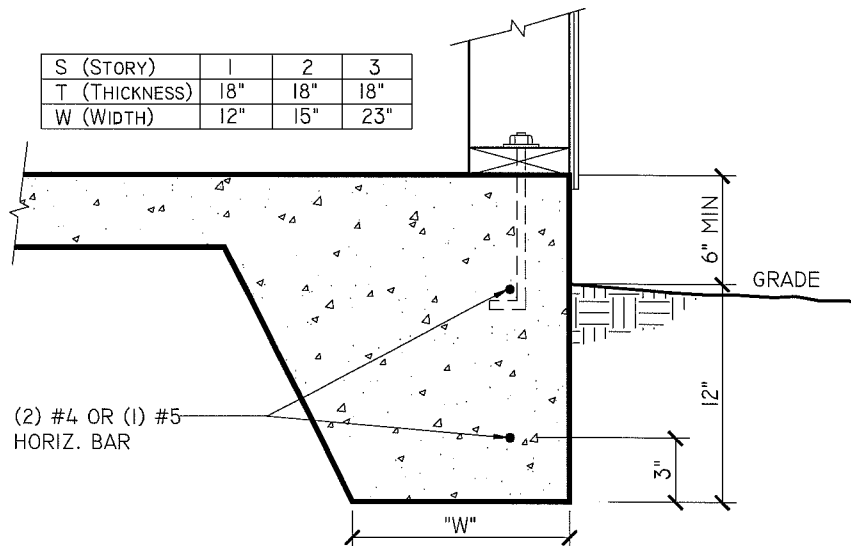


TC Figure 13 Monopour Foundation

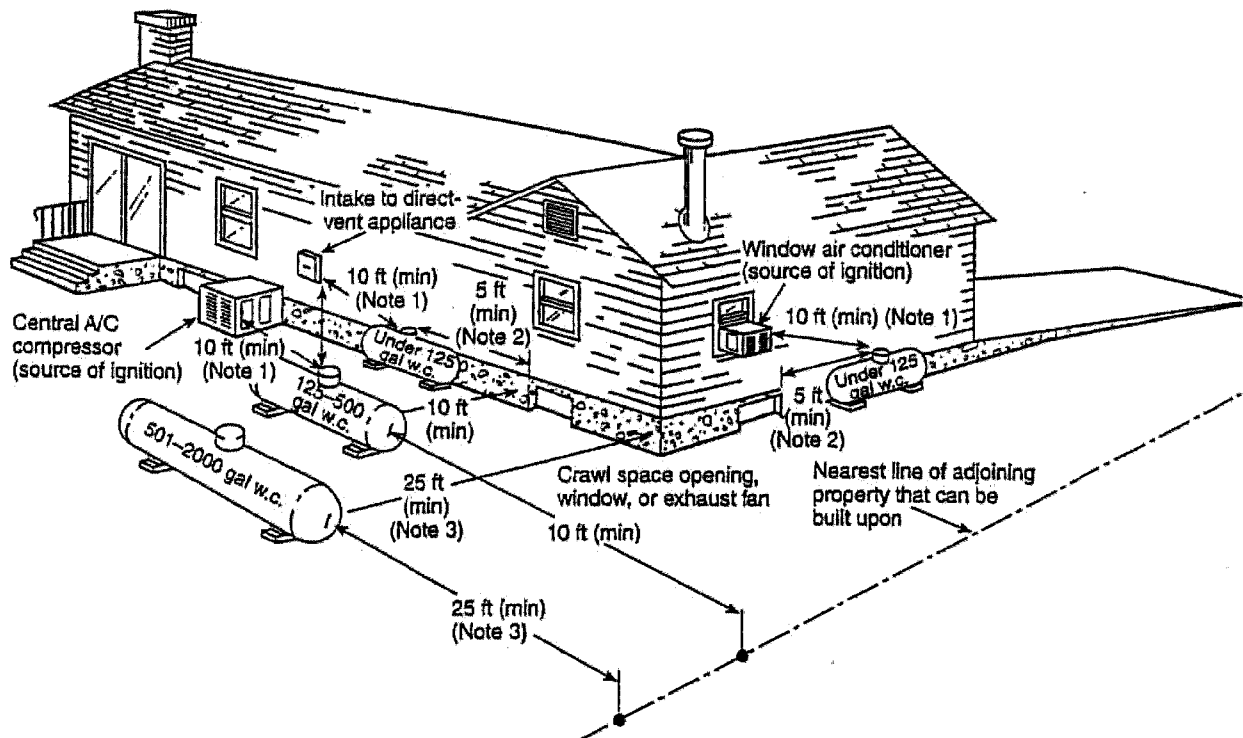
S (STORY)	1	2	3
T (THICKNESS)	18"	18"	18"
W (WIDTH)	12"	15"	23"



S (STORY)	1	2	3
T (THICKNESS)	18"	18"	18"
W (WIDTH)	12"	15"	23"



TC Figure 15 Propane Tank Setbacks



Note 1: Regardless of its size, any ASME container filled on site must be located so that the filling connection and fixed maximum liquid level gauge are at least 10 ft from any external source of ignition (e.g., open flame, window A/C, compressor), intake to direct-vented gas appliance, or intake to a mechanical ventilation system. Refer to 6.3.9.

Note 2: Refer to 6.3.9.

Note 3: This distance may be reduced to no less than 10 ft for a single container of 1200 gal (4.5 m³) water capacity or less, provided such container is at least 25 ft from any other LP-Gas container of more than 125 gal (0.5 m³) water capacity. Refer to 6.3.3.



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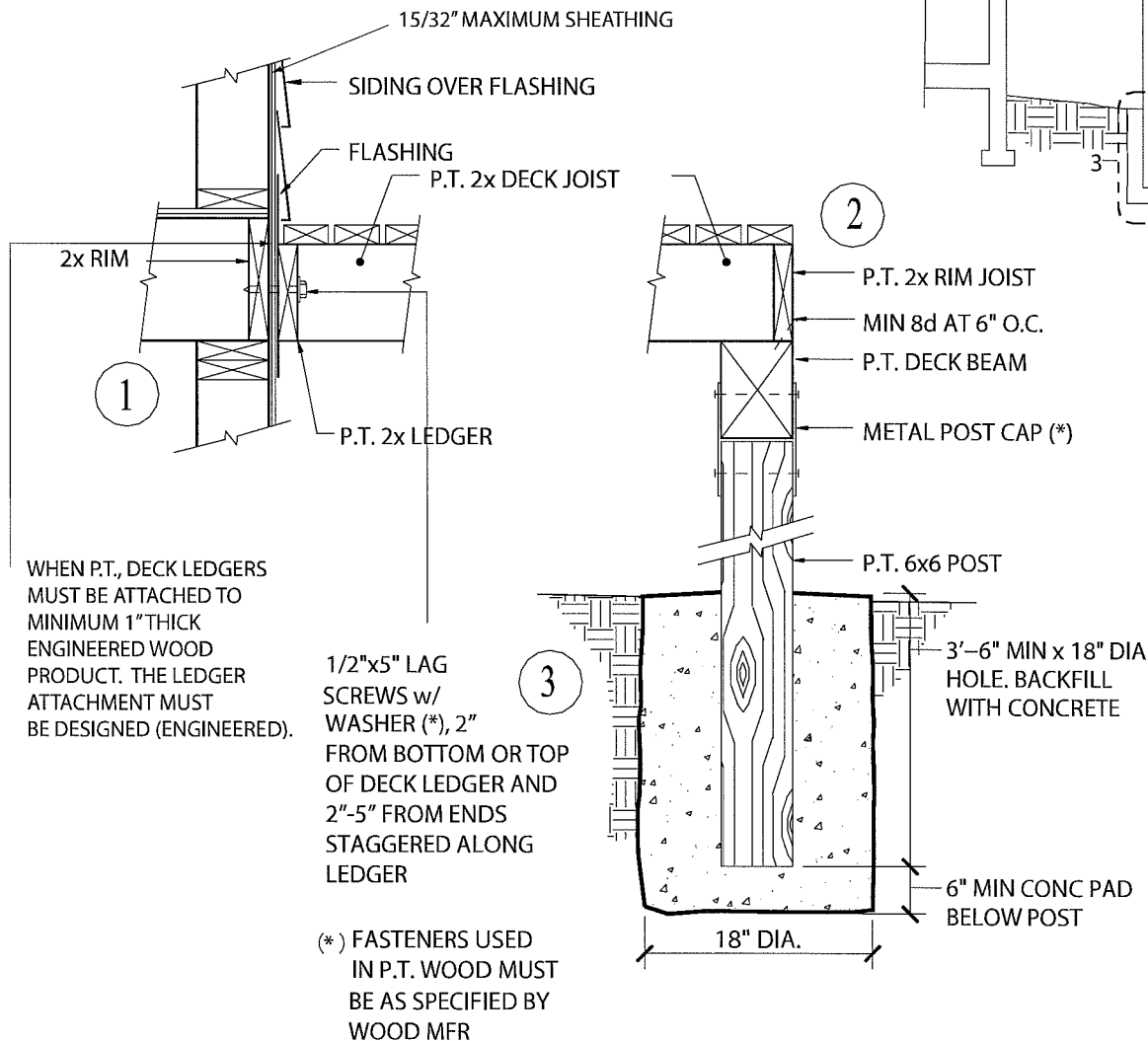
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TC Figure 20 Deck Construction

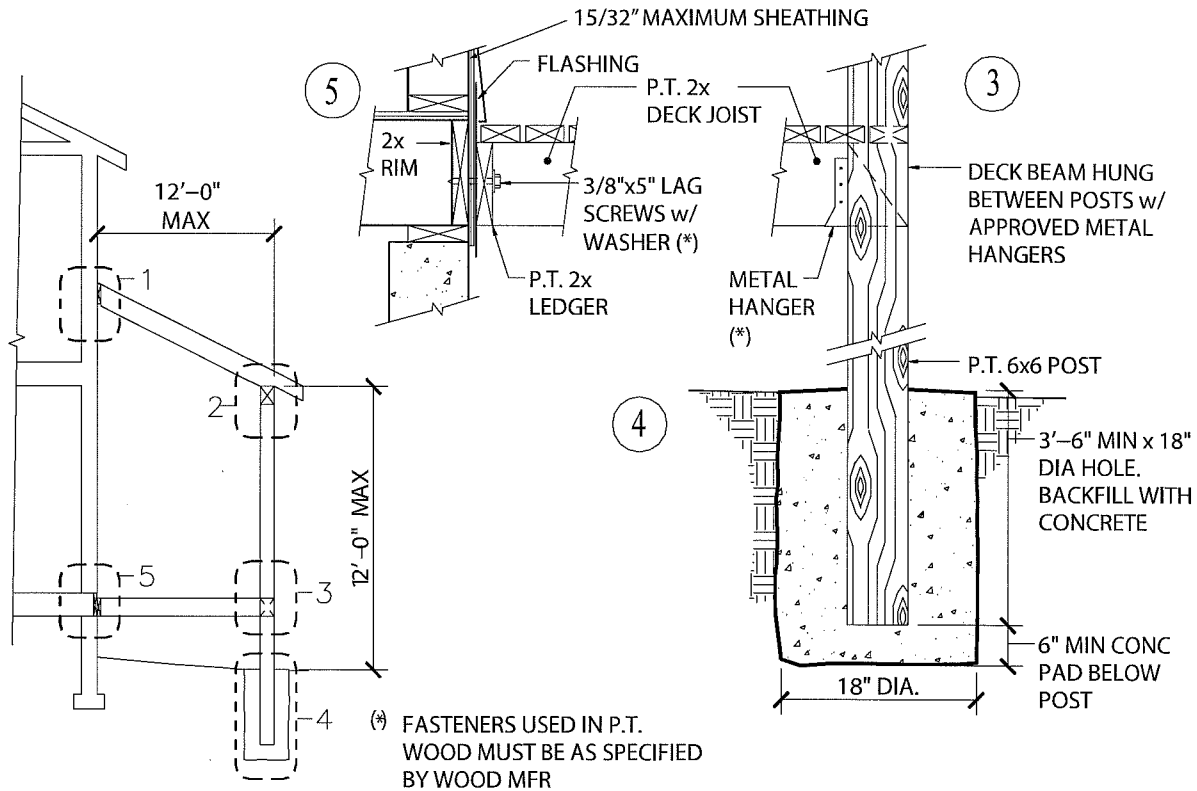
REQUIRED LEDGER CONNECTION FOR EXT. - STAGGERED DECKS USING MIN 1/2" LAG SCREWS w/ WASHERS

JOIST SPAN	6'	8'	10'	12'
SPACING OF LAG SCREWS WITH 15/32" SHEATHING	30"	23"	18"	13"

LAGS INTO MANUFACTURED LUMBER MUST HAVE APPROVAL DOCUMENTATION OR HAVE SOLID WOOD RIM BACKING w/ PENETRATING LAG SCREWS

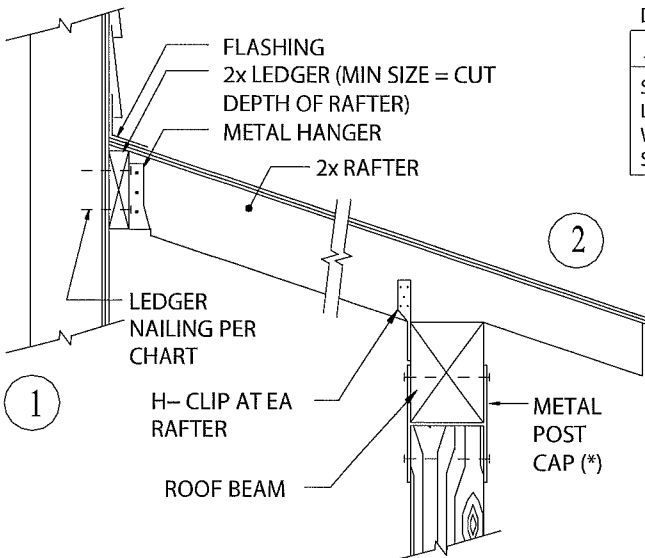


TC Figure 21 Porch Construction



REQUIRED LEDGER CONNECTION FOR EXT. - STAGGERED DECKS USING MIN 1/2" LAG SCREWS w/ WASHERS

JOIST SPAN	6'	8'	10'	12'
SPACING OF LAG SCREWS WITH 15/32" SHEATHING	30"	23"	18"	13"

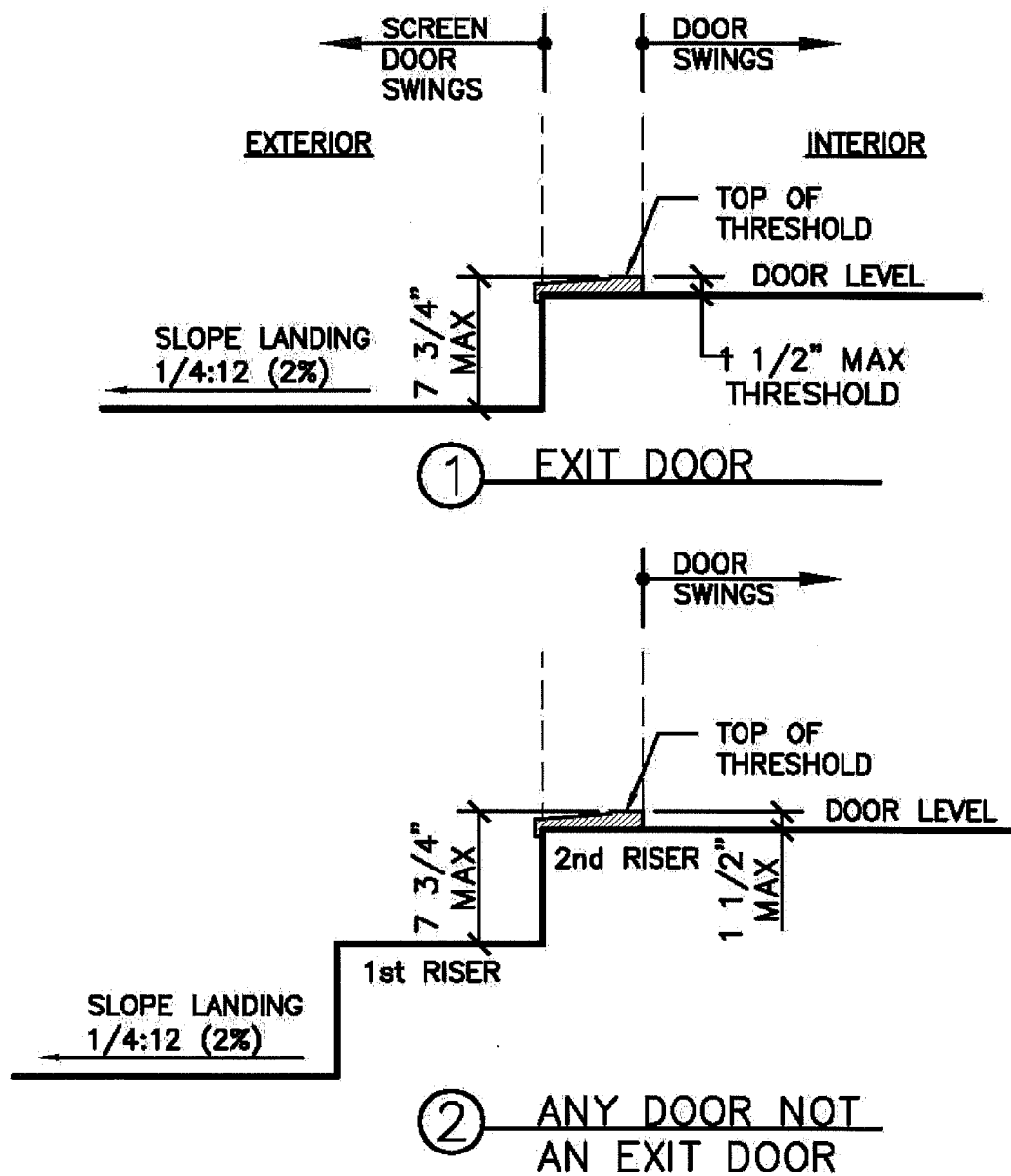


REQUIRED LEDGER CONNECTION FOR COVERED PORCH USING MIN 16d COMMON NAILS

RAFTER SPAN	6'	8'	10'	12'
NAIL SPACING	2 NAILS	2 NAILS	3 NAILS	3 NAILS
12"	2 NAILS	3 NAILS	3 NAILS	3 NAILS
16"	4 NAILS	4 NAILS	4 NAILS	4 NAILS
24"	4 NAILS	4 NAILS	4 NAILS	4 NAILS

LAGS INTO MANUFACTURED LUMBER MUST HAVE APPROVAL DOCUMENTATION OR HAVE SOLID WOOD RIM BACKING w/ PENET RATING LAG SCREWS

TC Figure 23 Exterior Door Landings



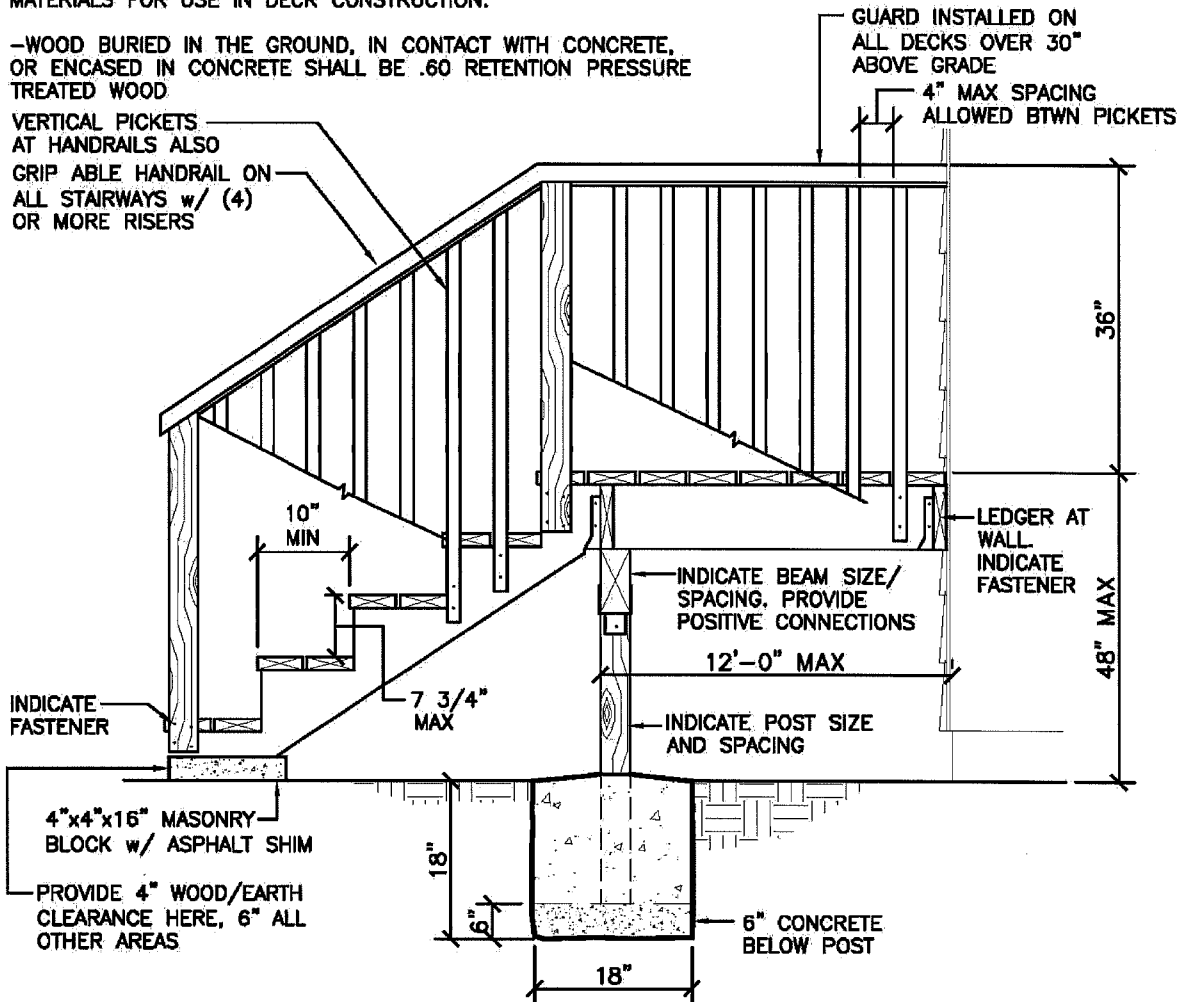
TC Figure 24 Landing Construction

CONSTRUCTION MATERIALS

— CEDAR, REDWOOD, SUNWOOD, WOLMANIZED WOOD AND .40 RETENTION PRESSURE TREATED WOOD ARE ALL ACCEPTABLE MATERIALS FOR USE IN DECK CONSTRUCTION.

—WOOD BURIED IN THE GROUND, IN CONTACT WITH CONCRETE, OR ENCASED IN CONCRETE SHALL BE .60 RETENTION PRESSURE TREATED WOOD

VERTICAL PICKETS AT HANDRAILS ALSO
GRIP ABLE HANDRAIL ON ALL STAIRWAYS w/ (4) OR MORE RISERS





THURSTON COUNTY
WASHINGTON
SINCE 1852

Thurston County Development Services

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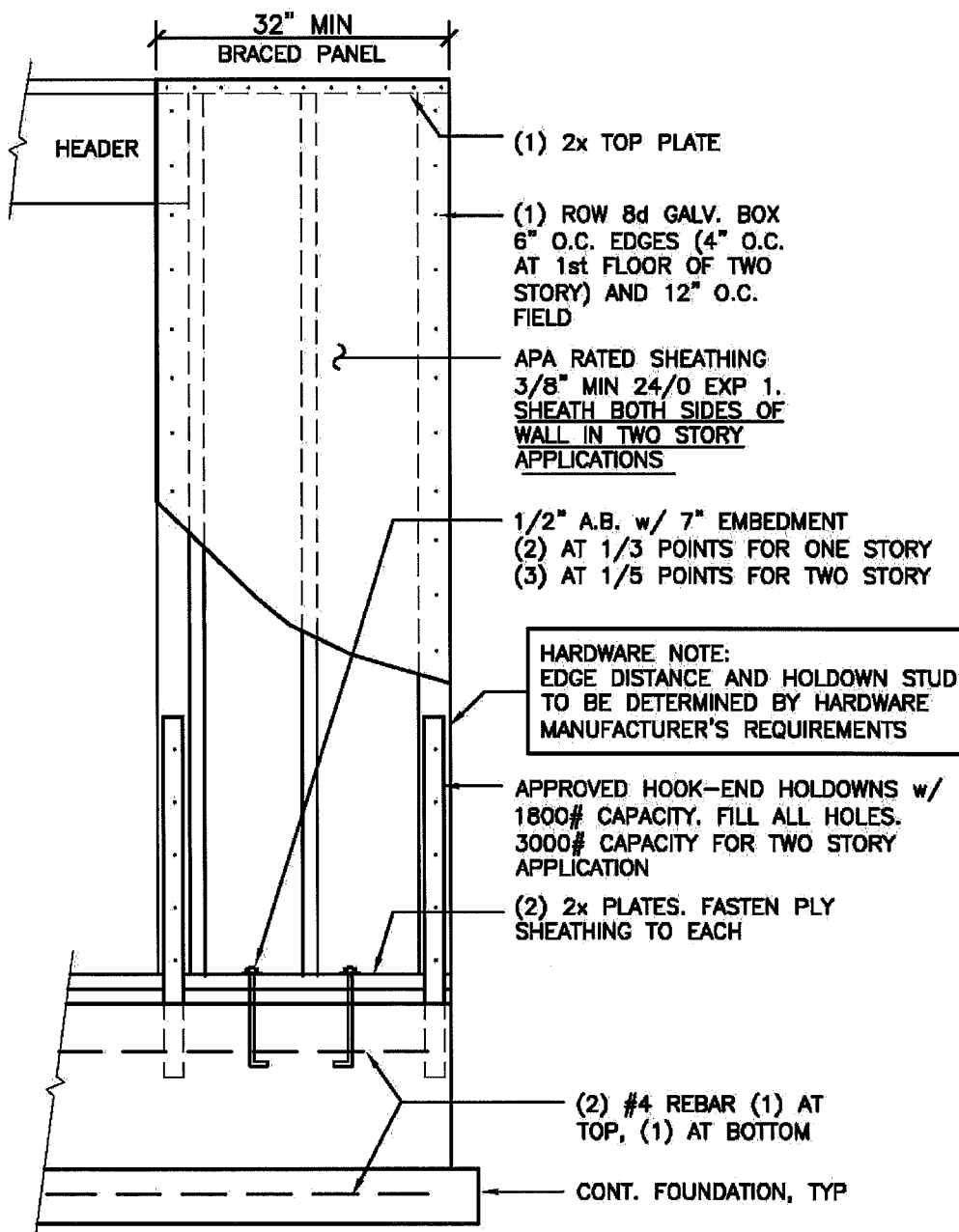
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TC Figure 32 IRC Alternate Braced Panel





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Thurston County Fig 33 Table 602.3(1) NAILING SCHEDULE

DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER ⁸ . "6."	SPACING OF FASTENERS
Joist to sill or girder, toe nail	3-8d	—
1" x 6" subfloor or less to each joist, face nail	2-8d 2 staples, 1 ³ / ₄ "	—
2" subfloor to joist or girder, blind and face nail	2-16d	—
Sole plate to joist or blocking, face nail	16d	16" o.c.
Top or sole plate to stud, end nail	2-16d	—
Stud to sole plate, toe nail	3-8d or 2-16d	—
Double studs, face nail	10d	24" o.c.
Double top plates, face nail	10d	24" o.c.
Sole plate to joist or blocking at braced wall panels	3-16d	16" o.c.
Double top plates, minimum 24-inch offset of end joints, face nail in lapped area	8-16d	—
Blocking between joists or rafters to top plate, toe nail	3-8d	—
Rim joist to top plate, toe nail	8d	6" o.c.
Top plates, laps at corners and intersections, face nail	2-10d	—
Built-up header, two pieces with 1/2" spacer	16d	16" o.c. along each edge
Continued header, two pieces	16d	16" o.c. along each edge
Ceiling joists to plate, toe nail	3-8d	—
Continuous header to stud, toe nail	4-8d	—
Ceiling joist, laps over partitions, face nail	3-10d	—
Ceiling joist to parallel rafters, face nail	3-10d	—
Rafter to plate, toe nail	2-16d	—
1" brace to each stud and plate, face nail	2-8d 2 staples, 1 ³ / ₄ "	~
1" x 6" sheathing to each bearing, face nail	2-8d 2 staples, 1 ³ / ₄ "	~
1" x 8" sheathing to each bearing, face nail	2-8d 3 staples, 1 ³ / ₄ "	~
Wider than 1" x 8" sheathing to each bearing, face nail	3-8d 4 staples, 1 ³ / ₄ "	~
Built-up corner studs	10d	24" o.c.
Built-up girders and beams, 2-inch lumber layers	10d	Nail each layer as follows: 32" o.c. at top and bottom and staggered. Two nails at ends and at each splice.
2" planks	2-16d	At each bearing
Roof rafters to ridge, valley or hip rafters: toe nail face nail	4-16d 3-16d	—
Rafter ties to rafters, face	3-8d	—
Wood structural panels, subfloor, roof and wall sheathing to framing, and particleboard wall sheathing to framing		
5/16"-1/2" 6d common nail (subfloor, wall) 8d common nail (roof) ^f	6	12 ^g
19/32"-1" 8d common nail	6	12 ^g
1 1/8"-1 1/4" 10d common nail or 8d deformed nail	6	12

CONTINUED



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Thurston County Fig 33 cont. Table 602.3(1) NAILING SCHEDULE CONTINUED

DESCRIPTION OF BUILDING MATERIALS	DESCRIPTION OF FASTENER ^{b, c, d, e}	SPACING OF FASTENERS	
		Edges (inches) ⁱ	Intermediate supports ^{c, e} (inches)
Other wall sheathing ^h			
1/2" regular cellulosic fiberboardsheathing	1 1/2" galvanized roofing nail 6d common nail staple 16 ga., 1 1/2 long	3	6
1/2" structural cellulosic fiberboard sheathing	1 1/2" galvanized roofing nail 8d common nail staple 16 ga., 1 1/4 long	3	6
2/32" structural cellulosic fiberboard sheathing	1 3/4" galvanized roofing nail 8d common nail staple 16 ga., 1 3/4 long	3	6
1/2" gypsum sheathing	1 1/2" galvanized roofing nail; 6d common nail; staple galvanized, 1 1/4" long; 1 5/8 screws, Type W or S	4	8
5/8" gypsum sheathing	1 3/4" galvanized roofing nail; 8d common nail; staple galvanized, 1 5/8" long; 1 5/8" screws, Type W or S	4	8
Wood structural panels, combination subfloor underlayment to framing			
3/4" and less	6d deformed nail or 8d common nail	6	12
7/8" – 1"	8d common nail or 8d deformed nail	6	12
1 1/8" – 1 1/4"	10d common nail or 8d deformed nail	6	12

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 1.609 km/h.

a. All nails are smooth-common, box or deformed shanks except where otherwise stated. Nails used for framing and sheathing connections shall have minimum

average bending yield strengths as shown: 80 ksi (551 MPa) for shank diameter of 0.192 inch (20d common nail), 90 ksi (620 MPa) for shank diameters larger than

0.142 inch but not larger than 0.177 inch, and 100 ksi (689 MPa) for shank diameters of

0.142 inch or less,

b. Staples are 16 gage wire and have a minimum ⁷/₁₆-inch on diameter crown width.

c. Nails shall be spaced at not more than 6 inches on center at all supports where spans are 48 inches or greater,

d. Four-foot-by-8-foot or 4-foot-by-9-foot panels shall be applied vertically,

e. Spacing of fasteners not included in this table shall be based on Table R602.3(l).

f. For regions having basic wind speed of 110 mph or greater, 8d deformed nails shall be used for attaching plywood and wood structural panel roof sheathing to

framing within minimum 48-inch distance from gable end walls, if mean roof height is more than 25 feet, up to 35 feet maximum,

g. For regions having basic wind speed of 100 mph or less, nails for attaching wood structural panel roof sheathing to gable end wall framing shall be spaced 6 inches

on center. When basic wind speed is greater than 100 mph, nails for attaching panel roof sheathing to intermediate supports shall be spaced 6 inches on center for

minimum 48-inch distance from ridges, eaves and gable end walls; and 4 inches on center to gable end wall framing,

h. Gypsum sheathing shall conform to ASTM C 79 and shall be installed in accordance with GA 253. Fiberboard sheathing shall conform to either AHA 194.1 or

ASTM C 208.

i. Spacing of fasteners on floor sheathing panel edges applies to panel edges supported by framing members and at all floor perimeters only.

Spacing of fasteners on

roof sheathing panel edges applies to panel edges supported by framing members and at all roof plane perimeters. Blocking of roof or

floor sheathing panel edges

perpendicular to the framing members shall not be required except at intersection of adjacent roof planes. Floor and roof perimeter shall be supported by framing

members or solid blocking.



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Thurston County Fig 34 Table 602.3(2) ALTERNATE FASTENERS

NOMINAL MATERIAL THICKNESS (Inches)	DESCRIPTION ^{a b} OF FASTENER AND LENGTH (inches)	SPACING ^c OF FASTENERS	
		Edges (inches)	Intermediate supports (inches)
Wood structural panels subfloor, roof and wall sheathing to framing and particleboard wall sheathing to framing ^f			
5/16	0.097 - 0.099 Nail 1 1/2 Staple 15 ga. 1 3/8 Staple 16 ga. 1 3/4	6	12
3/8	Staple 15 ga. 1 3/8	6	12
	0.097 - 0.099 Nail 1 1/2	4	10
	Staple 16 ga. 1 3/4	6	12
15/32 and 1/2	Staple 15 ga. 1 7/8	6	12
	0.097 - 0.099 Nail 1 5/8	3	6
	Staple 16 ga.	6	12
19/32 and 5/8	0.113 Nail 1 7/8 Staple 15 and 16 ga. 1 5/8	6	12
	0.097 - 0.099 Nail 1 3/4	3	6
	23/32 and 3/4	Staple 14 ga. 1 3/4	6
Staple 15 ga. 1 3/4		5	10
0.097 - 0.099 Nail 1 7/8		3	6
Staple 16 ga. 2		4	8
NOMINAL MATERIAL THICKNESS (inches)	DESCRIPTION ^{a,b} OF FASTENER AND LENGTH	SPACING ^c OF FASTENERS	
		Edges (inches)	Body of panel (Inches)
Floor underlayment; plywood-hardboard-particleboard ^f			
Plywood			
1/4 and 5/16	1 1/4 ring or screw shank nail — minimum 12 1/2 ga. (0.099") shank diameter	3	6
	Staple 18 ga., 7/8, 3/16 crown width	2	5
11/32, 3/8, 15/32 and 1/2	1 1/4 ring or screw shank nail — minimum 12 1/2 ga. (0.099) shank diameter	6	8 ^e
19/32, 5/8, 23/32 and 3/4	1 1/2 ring or screw shank nail — minimum 12 1/2 ga. (0.099) shank diameter	6	12
	Staple 16 ga. 1 1/4	6	8
Particleboard			
V ₄	4d ring-grooved underlayment nail	3	6
	Staple 18 ga., 7/8 long, 3/16 crown	3	6
3/8	6d ring-grooved underlayment nail	6	10
	Staple 16 ga., 1 1/8 long, 3/8 crown	3	6
1/2, 5/8	6d ring-grooved underlayment nail	6	10
	Staple 16 ga., 1 5/8 long, 3/8 crown	3	6

For SI: 1 inch = 25.4 mm.

a. Nail is a general description and may be T-head, modified round head or round head.

b. Staples shall have a minimum crown width of 7/16-inch on diameter except as noted.

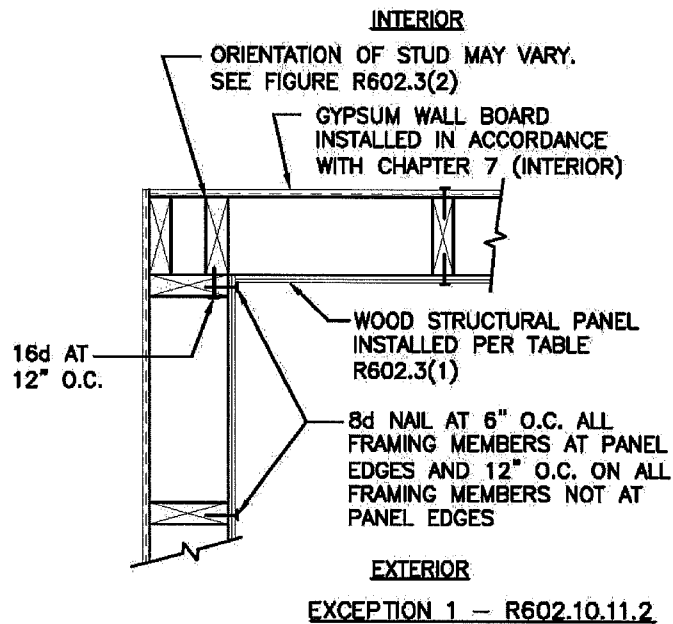
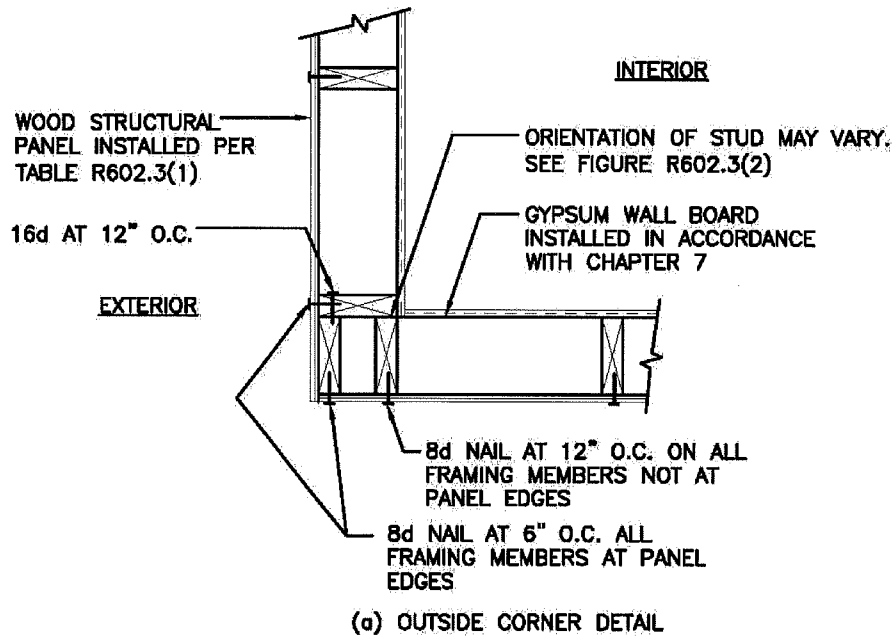
c. Nails or staples shall be spaced at not more than 6 inches on center at all supports where spans are 48 inches or greater. Nails or staples shall be spaced at not more

than 12 inches on center at intermediate supports for floors,

d. Fasteners shall be placed in a grid pattern throughout the body of the panel,

e. For 5-ply panels, intermediate nails shall be spaced not more than 12 inches on center each way.

TC Figure 35 IRC R602.10.11.2 - Exception 1



TC Figure 40 Plumbing DWV

