



**Oregon Amendments  
Effective October 1, 2014**

**2014 Oregon Residential Specialty Code  
Oregon Amendment Insert Pages**

The 2014 *Oregon Residential Specialty Code* (ORSC) was developed as a minor update to the 2011 ORSC, based on the 2009 *International Residential Code* (IRC). This code change cycle review was utilized as an opportunity to clarify regulations within the *Residential Code*, promote consistency and reduce cost to Oregon consumers and businesses. This code is effective October 1, 2014. The Building Codes Division anticipates the next ORSC review year, 2017, to be a major update that will include a review of the national model code.

The Oregon Amendments outlined on these insert pages were created for use in conjunction with the 2011 ORSC, available below in a read-only version online:

[2011 Oregon Residential Specialty Code \(ORSC\)](#)

These pages have been formatted so that when inserted, the amendments will face the page containing the existing code language.

Instructions:

1. Print these pages double-sided in “book” format.
2. The cover page can be inserted at the beginning of your code book.
3. The Table of Contents provides all the sections that have been updated.
4. The amended language is depicted as follows:  
~~Strikethrough~~ – Language deleted from the 2011 ORSC.  
Blue and Underlined – Language added to the 2011 ORSC.
5. Chapter 1 has been recreated. Replace the entire chapter with the Chapter 1 in these insert pages.

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# **2014 Oregon Residential Specialty Code**

**Effective October 1, 2014**

**DEPARTMENT OF CONSUMER and BUSINESS SERVICES**

**BUILDING CODES DIVISION**



# 2014 OREGON RESIDENTIAL SPECIALTY CODE (ORSC)

Authorized by ORS 455.020  
Oregon Department of Consumer and Business Services  
Building Codes Division  
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Front Photo Courtesy of Julie Waters

# 2014 Oregon Residential Specialty Code

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## CHAPTER 1

### SCOPE AND ADMINISTRATION

#### SECTION R101 GENERAL

**R101.1 Title.** These provisions shall be known as the *Oregon Residential Specialty Code*, and shall be cited as such and will be referred to herein as “this code.”

**R101.2 Scope.** The provisions of this code shall apply to the construction, *alteration*, movement, enlargement, replacement, repair, equipment, use, occupancy, and location of detached one- and two-family dwellings and townhouses not more than three stories above *grade plane* in height with a separate means of egress and their *accessory structures*.

The *Oregon Residential Specialty Code* as adopted by the State of Oregon, Building Codes Division, includes portions of the *International Residential Code* and the *International Fire Code* pertaining to any construction, reconstruction, alteration, repair and installation of materials and equipment in or part of buildings and structures covered under the *State Building Code*.

#### Exceptions:

1. The requirements of this code apply to:
  - 1.1. Detached one- and two-family dwellings and townhouses classified as Group R-3, and Group U occupancies; and
  - 1.2. Residences used for family child care home or foster care in accordance with ORS chapters 418, 443 and 657A; and
  - 1.3. Detached congregate living facilities (each accommodating 10 persons or less) and detached lodging houses containing not more than five guest rooms.
  - 1.4. Residential aircraft hangars as defined in Section R202.
  - 1.5. Live/work units complying with the requirements of Section 419 of the *International Building Code* shall be permitted to be built as one- and two-family *dwellings* or townhouses. Fire suppression required by Section 419.5 of the *International Building Code* when constructed under this code shall conform to Section 903.3.1.3 of the *Building Code*.
2. The requirements in this code do not apply to:
  - 2.1. Public utility facilities owned and maintained by the serving utility; and
  - 2.2. Agricultural buildings defined and regulated by ORS 455.315 and Appendix Chapter C in the *Building Code*.

~~3. The building envelope requirements of Chapter 11 for heated or cooled detached accessory structures that are not habitable rooms shall be those specified in the *Energy Code*, Section 101.4.3.~~

**R101.3 Owner-built dwellings.** For exempt owner-built dwellings and out-buildings, see ORS 455.320.

**ORS 455.320** is not part of this code but is reproduced here for the reader’s convenience:

#### **455.320 Owner-built dwellings exempt from certain structural code provisions; recording of exemption.**

- (1) As used in this section, unless the context requires otherwise:
  - (a) “Owner” means the owner of the title to real property or the contract purchaser of real property, of record as shown on the last available complete assessment roll which person has not taken advantage of the exemptions under subsection (2) of this section during the five years prior to applying for an exemption under this section.
  - (b) “Owner-built dwelling and outbuildings” means a single-family residence and adjacent auxiliary structures the structural components of which are constructed entirely by the owner who intends to occupy the structures or by that owner and friends and relatives of the owner assisting on an unpaid basis.
- (2) Owner-built dwellings and outbuildings shall be exempt from any requirements of the structural code for ceiling heights, room sizes and the maintenance of specific temperature levels in those structures. The exemption shall apply to the new construction, renovation, remodeling or alteration of an owner-built dwelling or outbuilding.
- (3) A building permit issued for an owner-built dwelling or outbuilding shall note whether the owner-built dwelling or outbuilding complies with the requirements it is exempted from under subsection (2) of this section. If the dwelling or other structure does not comply with these requirements, the owner-builder shall file a copy of the building permit with the county clerk, who shall make the permit a part of the permanent deed record of the property. The owner shall provide the county clerk with a description of the property sufficient if it were contained in a mortgage of the property to give constructive notice of the mortgage under the law of this state.
- (4) Noncompliance with subsection (3) of this section shall not affect, in any manner, any conveyance of interest in property subject to this section. [\[Formerly 456.920\]](#)

**R101.4 Intent.** The purpose of this code is to establish minimum requirements to safeguard the public safety, health and general welfare through affordability, structural strength, means of egress facilities, stability, sanitation, light and ventilation, energy conservation and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations.

**R101.5 Statutory references.** This code is adopted pursuant to Oregon Revised Statutes (ORS). Where this code and the statutes specify different requirements, the statute shall govern. Statutes related to this code include, but are not limited to, ORS 455.010 through 455.895.

Statutes referenced may be obtained from the Building Codes Division, 1535 Edgewater St. NW, Salem, OR 97304 or P.O. Box 14470, Salem, OR 97309 at a nominal cost or read online at <http://www.bcd.oregon.gov/statutes.html>.

**SECTION R102  
APPLICABILITY**

**R102.1 General.** Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern.

**R102.2 Other laws.** The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law.

**R102.3 Application of references.** References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section or provision of this code.

**R102.4 Referenced codes and standards.** The codes and standards referenced in this code shall be considered part of the requirements of this code to the prescribed extent of each such reference. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

**Exception:** Where enforcement of a code provision would violate the conditions of the listing of the equipment or appliance, the conditions of the listing and manufacturer’s instructions shall apply.

**102.4.1 ASCE Standard 24-05 Flood Resistant Design and Construction.** The following *ASCE Standard 24-05 Tables* are not adopted by the State of Oregon as the subject matter encompasses *Free Board, Base Flood Elevation and Design Flood Elevation*. The authority to establish the same is reserved for local government:

1. [Table 2-1. “Elevation of Lowest Floor”](#)
2. [Table 4-1. “Elevation of Bottom of Lowest Horizontal Structural Member”](#)
3. [Table 5-1. “Elevation Below Which Flood-Damage-Resistant Materials Shall be Used”](#)
4. [Table 6-1. “Elevation for Flood proofing”](#)
5. [Table 7-1. “Minimum Elevation of Utilities and Equipment”](#)

*Informational Note:*

*Each local community participating in the National Flood Insurance Program (NFIP) designates a local Flood Plain Administrator who is responsible to make sure communities meet their insurance program obligations. Certain matters comprised within the NFIP program may conflict with or overlap with the State Building Code. Certain decisions such as sill plate height and other NFIP criteria fall under*

*the authority and responsibility of the Flood Plain Administrator. Once decisions under the NFIP program are made, then the appropriate requirements of this code for the construction of the building are applied.*

*Local communities may choose to designate their local building official as the Flood Plain Administrator or may designate other staff. When a building official functioning in the capacity of Flood Plain Administrator exercises authority under the NFIP, such decisions are not part of this code nor subject to the building official duties and responsibilities as adopted by the Oregon Building Codes Division.*

*Per ORS 455.210(3)(c), local communities are prohibited from using building permit monies for any matter other than administration and enforcement of the State Building Code. Administration and implementation of NFIP requirements are not part of the State Building Code.*

**R102.5 Appendices.** Provisions in the appendices shall not apply unless specifically adopted. Appendices E, F, G, H, K, R and T are adopted and made part of this code.

**OAR 918-008-0000** is not part of this code but is provided here for the readers’ convenience:

**918-008-0000 Purpose and Scope**

(1) The Department of Consumer and Business Services, Building Codes Division, adopts model building codes, standards and other publications by reference, as necessary, through administrative rule to create the *State Building Code*. When a matter is included in a specialty code or referenced publication that is in conflict with Oregon Revised Statutes or Oregon Administrative Rules, the statute or rule applies and the code or standard provision does not. All remaining parts or application of the code or standard remain in effect.

(2) Unless required by law, matters generally not authorized for inclusion in a specialty code or referenced standard include, but are not limited to: licensing or certification requirements, or other qualifications and standards for businesses or workers; structures or equipment maintenance requirements; matters covered by federal or state law; and matters that conflict with other specialty codes or publications adopted by the department.

(3) OAR 918-008-0000 to OAR 918-008-0070 provides the process for adopting and amending the *State Building Code* that is consistent across all program areas.

(4) The *State Building Code* is derived from the most appropriate version of base model codes, which are updated periodically.

(5) The Oregon specialty code amendment process begins approximately midway into a code cycle.

(6) An appropriate advisory board approves or forwards the adoption of the Oregon specialty code and amendments to the Department for adoption.

(7) Notwithstanding sections (3) through (6) of this rule, the division may adopt supplemental code amendments as authorized by OAR 918-008-0028.

[Publications: Publications referenced are available from the agency.]

Stat. Auth.: ORS 447.020, 455.030 & 479.730

Stats. Implemented: ORS 447.020, 455.030 & 479.730

Hist.: BCD 26-1994, f. & cert. ef. 11-15-94; BCD 6-1997, f. & cert. ef. 4-1-97; BCD 3-2006(Temp), f. & cert. ef. 3-1-06 thru 8-27-06; BCD 9-2006, f. 6-30-06, cert. ef. 7-1-06; BCD 1-2014, f. 1-22-14, cert. ef. 4-1-14

**R102.6 Partial invalidity.** In the event any part or provision of this code is held to be illegal or void, this shall not have the effect of making void or illegal any of the other parts or provisions.

**R102.7 Existing structures.** The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, or as is deemed necessary by the *building official* for the general safety and welfare of the occupants and the public.

**R102.7.1 Additions, alterations or repairs.** *Additions, alterations* or repairs (excluding ordinary repairs) to any structure shall conform to the requirements for a new structure without requiring the existing structure to comply with all of the requirements of this code, unless otherwise stated. *Additions, alterations* or repairs shall not cause an existing structure to become unsafe or adversely affect the performance of the building. An unsafe condition shall be deemed to have been created if an addition or alteration will cause the existing building or structure to become structurally unsafe or overloaded; will not provide adequate egress in compliance with the provisions of this code or will obstruct existing exits; will create a fire hazard; will reduce required fire resistance; or will otherwise create conditions dangerous to human life. Any building, plus new additions shall not exceed the height and stories specified for new buildings in Section R101.2.

**Exception:** Structural changes that improve the resistance of the building to seismic forces may be made without complying with the current code requirements providing:

1. The strength of the existing structural elements is not reduced; and
2. An unsafe condition is not created.

Replacement of an existing water heater shall not require the existing plumbing, mechanical or electrical system to comply with the provisions of this code for new construction, provided that installation complies with the listing requirements of the appliance.

**Exception:** Water heaters installed in garages must comply with Sections M1307.3 and the *Plumbing Code*.

**SECTION R103  
DEPARTMENT OF BUILDING SAFETY**

**Not adopted by the State of Oregon**

**SECTION R104  
DUTIES AND POWERS OF THE  
BUILDING OFFICIAL**

**R104.1 General.** The *building official* is hereby authorized and directed to enforce the provisions of this code. The *building official* shall have the authority to render interpretations of

this code and to adopt policies and procedures in order to clarify the application of its provisions. Such interpretations, policies and procedures shall be in compliance with the intent and purpose of this code. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in this code or statewide code interpretations.

**R104.2 Applications and permits.** The *building official* shall receive applications, review *construction documents* and issue permits for the erection, alteration and moving of buildings and structures, inspect the premises for which such permits have been issued and enforce compliance with the provisions of this code.

**R104.3 Notices and orders.** The *building official* shall issue all necessary notices or orders to ensure compliance with this code.

**R104.4 Inspections.** The *building official* is authorized to make all of the required inspections, or the *building official* shall have the authority to accept reports of inspection by *approved agencies* or individuals. Reports of such inspections shall be in writing and be certified by a responsible officer of such *approved* agency or by the responsible individual. The *building official* is authorized to engage such expert opinion as deemed necessary to report upon unusual technical issues that arise, subject to the approval of the appointing authority.

**R104.5 Identification.** Not adopted by the State of Oregon.

**R104.6 Right of entry.** Where it is necessary to make an inspection to enforce the provisions of this code, or where the *building official* has reasonable cause to believe that there exists in a structure or upon a premises a condition which is contrary to or in violation of this code which makes the structure or premises unsafe, dangerous or hazardous, the *building official* or designee is authorized to enter the structure or premises at reasonable times to inspect or to perform the duties imposed by this code, provided that if such structure or premises be occupied that credentials be presented to the occupant and entry requested. If such structure or premises be unoccupied, the *building official* shall first make a reasonable effort to locate the owner or other person having charge or control of the structure or premises and request entry. If entry is refused, the *building official* shall have recourse to the remedies provided by law to secure entry.

**R104.7 Department records.** The *building official* shall keep official records, as dictated by OAR 166-150-0020 where a county has jurisdiction; OAR 166-200-0025 where a city has jurisdiction; and OAR 166 Division 300 et al for the cities and counties where the State of Oregon has jurisdiction. Such records shall be retained in the official records for the period indicated in the respective OARs noted above. The building official shall maintain a permanent record of all permits issued in flood hazard areas, including copies of inspection reports and certifications required in Section R109.1.3. (See also Section R106.5)

**R104.8 Liability.** Not adopted by the State of Oregon. [See ORS 30.265 for regulations relating to liability.](#)

ORS 30.265 is not a part of this code but is reproduced here for the reader's convenience:

**30.265 Scope of liability of public body, officers, employees and agents; liability in nuclear incident.**

(1) Subject to the limitations of ORS 30.260 to 30.300, every public body is subject to civil action for its torts and those of its officers, employees and agents acting within the scope of their employment or duties, whether arising out of a governmental or proprietary function or while operating a motor vehicle in a ridesharing arrangement authorized under ORS 276.598.

(2) The sole cause of action for a tort committed by officers, employees or agents of a public body acting within the scope of their employment or duties and eligible for representation and indemnification under ORS 30.285 or 30.287 is an action under ORS 30.260 to 30.300. The remedy provided by ORS 30.260 to 30.300 is exclusive of any other action against any such officer, employee or agent of a public body whose act or omission within the scope of the officer's, employee's or agent's employment or duties gives rise to the action. No other form of civil action is permitted.

(3) If an action under ORS 30.260 to 30.300 alleges damages in an amount equal to or less than the damages allowed under ORS 30.271, 30.272 or 30.273, the sole cause of action for a tort committed by officers, employees or agents of a public body acting within the scope of their employment or duties and eligible for representation and indemnification under ORS 30.285 or 30.287 is an action against the public body. If an action is filed against an officer, employee or agent of a public body, and the plaintiff alleges damages in an amount equal to or less than the damages allowed under ORS 30.271, 30.272 or 30.273, the court upon motion shall substitute the public body as the defendant. Substitution of the public body as the defendant does not exempt the public body from making any report required under ORS 742.400.

(4) If an action under ORS 30.260 to 30.300 alleges damages in an amount greater than the damages allowed under ORS 30.271, 30.272 or 30.273, the action may be brought and maintained against an officer, employee or agent of a public body, whether or not the public body is also named as a defendant. An action brought under this subsection is subject to the limitations on damages imposed under ORS 30.271, 30.272 or 30.273, and the total combined amount recovered in the action may not exceed those limitations for a single accident or occurrence without regard to the number or types of defendants named in the action.

(5) Every public body is immune from liability for any claim for injury to or death of any person or injury to property resulting from an act or omission of an officer, employee or agent of a public body when such officer, employee or agent is immune from liability.

(6) Every public body and its officers, employees and agents acting within the scope of their employment or duties, or while operating a motor vehicle in a ridesharing arrangement authorized under ORS 276.598, are immune from liability for:

- (a) Any claim in connection with the assessment and collection of taxes.
- (b) Any claim in connection with the assessment and collection of taxes.
- (c) Any claim based upon the performance of or the failure to exercise or perform a discretionary function or duty, whether or not the discretion is abused.
- (d) Any claim that is limited or barred by the provisions of any other statute, including but not limited to any statute of ultimate repose.
- (e) Any claim arising out of riot, civil commotion or mob action or out of any act or omission in connection with the prevention of any of the foregoing.

(f) Any claim arising out of an act done or omitted under apparent authority of a law, resolution, rule or regulation that is unconstitutional, invalid or inapplicable except to the extent that they would have been liable had the law, resolution, rule or regulation been constitutional, valid and applicable, unless such act was done or omitted in bad faith or with malice.

(7) This section applies to any action of any officer, employee or agent of the state relating to a nuclear incident, whether or not the officer, employee or agent is acting within the scope of employment, and provided the nuclear incident is covered by an insurance or indemnity agreement under 42 U.S.C. 2210.

(8) Subsection (6)(c) of this section does not apply to any discretionary act that is found to be the cause or partial cause of a nuclear incident covered by an insurance or indemnity agreement under the provisions of 42 U.S.C. 2210, including but not limited to road design and route selection. [1967 c.627 §§2,3,10; 1969 c.429 §1; 1975 c.609 §12; 1977 c.823 §2; 1981 c.490 §4; 1985 c.731 §31; 1987 c.705 §7; 1991 c.861 §1; 2005 c.22 §19; 2007 c.803 §4; 2011 c.270 §1]

**R104.9 Approved materials and equipment.** Materials, equipment and devices approved by the building official shall be constructed and installed in accordance with such approval.

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

**R104.10 Modifications.** Wherever there are practical difficulties involved in carrying out the provisions of this code, the building official shall have the authority to grant modifications for individual cases, upon application of the owner or owner's representative, provided the building official shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, life and fire safety or structural requirements. The details of action granting modifications shall be recorded and entered in the jurisdiction's files.

**R104.10.1 Areas prone to flooding.** (Not adopted by the State of Oregon Building Codes Division as part of the State Building Code.) (Adopted by the State of Oregon for optional use in municipalities) The building official shall not grant modifications to any provision related to areas prone to flooding as established by the local jurisdiction without the granting of a variance to such provisions by the board of appeals.

**R104.11 Alternative materials, design and methods of construction and equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety. Compliance with the specific performance-based provisions of the current editions of the Oregon Specialty Codes in lieu of specific requirements of this code shall also be permitted as an alternate. For the process governing alternate rulings acceptable statewide, see ORS 455.060.

**ORS 455.060** is not part of this code but is reproduced here for the reader's convenience:

**455.060 Rulings on acceptability of material, design or method of construction; effect of approval; fees.**

(1) Any person who desires to use or furnish any material, design or method of construction or installation in the state, or any building official, may request the Director of the Department of Consumer and Business Services to issue a ruling with respect to the acceptability of any material, design or method of construction about which there is a question under any provision of the state building code. Requests shall be in writing and, if made by anyone other than a building official, shall be made and the ruling issued prior to the use or attempted use of such questioned material, design or method.

(2) In making rulings, the director shall obtain the approval of the appropriate advisory board as to technical and scientific facts and shall consider the standards and interpretations published by the body that promulgated any nationally recognized model code adopted as a specialty code of this state.

(3) A copy of the ruling issued by the director shall be certified to the person making the request. Additional copies shall be transmitted to all building officials in the state. The director shall keep a permanent record of all such rulings, and shall furnish copies thereof to any interested person upon payment of such fees as the director may prescribe.

(4) A building official or inspector shall approve the use of an material, design or method of construction approved by the director pursuant to this section if the requirements of all other local ordinances are satisfied. [\[Formerly 456.845\]](#)

**R104.11.1 Tests.** Whenever there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the *building official* shall have the authority to require tests as evidence of compliance to be made at no expense to the *jurisdiction*. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the *building official* shall approve the testing procedures. Tests shall be performed by an *approved agency*. Reports of such tests shall be retained by the *building official* for the period required for retention of public records.

**SECTION R105  
PERMITS**

**R105.1 Required.** A permit shall be obtained through application to the building official when constructing, enlarging, altering, repairing, moving or changing the occupancy, or installing any electrical, gas, mechanical or plumbing system regulated by this code. This requirement applies to an owner, contractor or authorized agent who constructs, enlarges, alters, repairs, moves, changes the occupancy of a building or structure; or for the purpose of erecting, installing, enlarging, altering, repairing, converting or replacing any electrical, gas, mechanical or plumbing system.

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

**Building:**

1. Nonhabitable one-story detached *accessory structures* uses as tool and storage sheds, playhouses and similar uses, provided the floor area does not exceed 200 square feet (18.58 m<sup>2</sup>) and a height of 10 feet (3048 mm) measured from the finished floor level, to the average height of roof surface.
2. Except for barriers around swimming pools as required in Appendix G fences not over ~~6 feet (1829 mm)~~ [7 feet \(2133 mm\)](#) high [and typical field fencing not over 8 feet \(2438 mm\) high where constructed of woven wire or chain link.](#)
3. Retaining walls that are not over 4 feet (1219 mm) in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge.
4. Water tanks supported directly upon *grade* if the capacity does not exceed 5,000 gallons (18 927 L) and the ratio of height to diameter or width does not exceed 2 to 1.
5. Concrete sidewalks, slabs, platforms and driveways.
6. Painting, papering, tiling, carpeting, cabinets, counter tops, interior wall, floor or ceiling covering and similar finish work.
7. Prefabricated swimming pools accessory to a Group R-3 occupancy where the pool walls are entirely above the adjacent grade. Barrier requirements found in Appendix G are not exempt.
8. Swings and other playground equipment.
9. Patio [covers, as defined in AH102](#), and porch covers not over 200 square feet (11 m<sup>2</sup>) and supported by an exterior building wall.
10. Window awnings supported by an exterior wall which do not project more than 54 inches (1372mm) from the exterior wall and do not require additional support.
11. Nonbearing partitions, except when such partitions create habitable rooms.
12. Replacement or repair of siding not required to be fire-resistive.
13. Retrofitted insulation.
14. Masonry repair.
15. Porches and decks, where the floor or deck is not more than 30 inches (762 mm) above adjacent grade measured at any point within 3 feet (914 mm) horizontally of the floor or deck, and where in the case of a covered porch, the covered portion of the porch does not come closer than 3 feet (914 mm) to property lines.
16. Gutters and downspouts.

- 17. Door and window replacements (where no structural member is changed).
- 18. Re-roofing, where replacement or repair of roofing does not exceed 30 percent of the required live load design capacity and the roof is not required to be fire-resistive.

**Exceptions:**

- 1. Permits for re-roofing are required for structures in wildfire hazard zones as provided in Section R324; and
- 2. Structures falling within the scope of Section R317.2.
- 3. Permits for re-roofing are required where more than 15 percent of the existing space sheathing is removed to facilitate the installation of new sheathing.
- 19. Plastic glazed storm windows.
- 20. Framed-covered non-habitable accessory buildings not more than 500 square feet (46.45 m<sup>2</sup>) in area, one story in height and not closer than 3 feet (914mm) to a property line, where the structure is composed of a rigid framework that supports a fabric membrane.

Unless otherwise exempted, separate plumbing, electrical and mechanical permits may be required for the above exempted items. In addition, all new construction and substantial improvements (including the placement of prefabricated buildings and certain building work exempt from permit under Section R105.2) determined to be in a flood hazard zone by the Flood Plain Administrator shall be designed and constructed with methods, practices and materials that minimize flood damage in accordance with this code, ~~FEMA regulations~~ and ASCE 24.

**Electrical:**

- 1. *Listed* cord-and-plug connected temporary decorative lighting.
- 2. *Minor* repair work, including the replacement of lamps or the connection of *approved* portable electrical *equipment* to *approved* permanently installed receptacles.

**Mechanical:**

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

- 8. Portable-fuel-cell *appliances* that are not connected to a fixed piping system and are not interconnected to a power grid.

**Plumbing:**

The stopping of leaks in drains, water, soil, waste or vent pipe; provided, however, that if any concealed trap, drain-pipe, water, soil, waste or vent pipe becomes defective and it becomes necessary to remove and replace the same with new material, such work shall be considered as new work and a *permit* shall be obtained and inspection made as provided in this code.

The clearing of stoppages or the repairing of leaks in pipes, valves or fixtures, and the removal and reinstallation of water closets, provided such repairs do not involve or require the replacement or rearrangement of valves, pipes or fixtures.

**R105.2.1 Emergency repairs.** Where mechanical *equipment* replacements and repairs must be performed in an emergency situation, the *permit* application shall be submitted to the building official within the next five working business days. ~~to the building official.~~

For electrical emergency repairs, see ORS 479.570 550 and OAR 918-309-0080. For plumbing emergency repairs, see OAR 918-780-0035 and ~~918-785-0200~~ the Plumbing Code.

**Note:** ORS 479.570 550, OAR chapter 918, divisions 309, and 780 ~~and 785~~ are available online at [www.bcd.oregon.gov](http://www.bcd.oregon.gov).

ORS 455.058 is not part of this code but is reprinted here for the reader's convenience:

**455.058 Investigation fee for work commenced without permit; rules.**

(1) Except as provided in subsection (2) of this section, the Department of Consumer and Business Services, or a municipality administering and enforcing a building inspection program, may assess an investigation fee against a person that is required to obtain a permit for work on the electrical, gas, mechanical, elevator, boiler, plumbing or other systems of a building or structure if the work is commenced before the permit required for the work is obtained. The amount of the investigation fee shall be the average or actual additional cost of ensuring that a building, structure or system is in conformance with State Building Code requirements that results from the person not obtaining a required permit before work for which the permit is required commences.

(2) This section does not apply to:

(a) An emergency repair required for health, safety, the prevention of property damage or the prevention of financial harm if the required building permit for the repair is obtained no later than five business days after commencement of the repair; or

(b) Any project for which construction, alteration, repair, maintenance or installation in a building or structure prior to obtaining a permit is expressly authorized by law.

(3) The department may adopt rules and establish policies and procedures for use by the department or municipalities in assessing an investigation fee under this section. [2013 c.324 §2]

**R105.2.1.1 Structural temporary repairs.** For temporary (180 days) structural supports, structural replacement or repairs performed in an emergency on an existing structure, the authority having jurisdiction shall be notified within 72 hours and permit application for the temporary work shall be submitted to the building official within the next 40 5 business days.

**R105.2.2 Repairs.** Application or notice to the *building official* is not required for ordinary repairs to structures, replacement of lamps or the connection of *approved* portable electrical *equipment* to *approved* permanently installed receptacles. Such repairs shall not include the cutting away of any wall, partition or portion thereof, the removal or cutting of any structural beam or load-bearing support, or the removal or change of any required means of egress, or rearrangement of parts of a structure affecting the egress requirements; nor shall ordinary repairs include *addition* to, *alteration* of, replacement or relocation of any water supply, sewer, drainage, drain leader, gas, soil, waste, vent or similar piping, electric wiring or mechanical or other work affecting public health or general safety.

**R105.2.3 Public service agencies.** A *permit* shall not be required for the installation, alteration or repair of generation, transmission, distribution, metering or other related *equipment* that is under the ownership and control of public service agencies by established right.

**R105.3 Application for permit.** To obtain a *permit*, the applicant shall first file an application therefor in writing on a form furnished by the department of building safety for that purpose. Such application shall:

1. Identify and describe the work to be covered by the *permit* for which application is made.
2. Describe the land on which the proposed work is to be done by legal description, street address or similar description that will readily identify and definitely locate the proposed building or work.
3. Indicate the use and occupancy for which the proposed work is intended.
4. Be accompanied by *construction documents* and other information as required in Section R106.1.
5. State the valuation of the proposed work.
6. Be signed by the applicant or the applicant's authorized agent.
7. Give such other data and information as required by the *building official*.

**R105.3.1 Action on application.** The *building official* shall examine or cause to be examined applications for permits and amendments thereto within a reasonable time after filing. If the application or the *construction documents* do not conform to the requirements of pertinent laws, the *building official* shall reject such application in writing stating the reasons therefor. If the *building official* is satisfied that the proposed work conforms to the requirements of this code and laws and ordinances applicable thereto, the *building official* shall issue a *permit* therefor as soon as practicable.

**R105.3.1.1 Determination of substantially improved or substantially damaged existing buildings in flood hazard areas.** ~~Adopted by the State of Oregon for optional use in municipalities. Not adopted by the State of Oregon Building Codes Division as part of the State Building Code.~~ For applications for reconstruction, rehabilitation, *addition* or other improvement of existing buildings or structures located in an area prone to flooding as established by the local jurisdiction, the *building official* shall examine or cause to be examined the *construction documents* and shall prepare a finding with regard to the value of the proposed work. For buildings that have sustained damage of any origin, the value of the proposed work shall include the cost to repair the building or structure to its pre-damaged condition. If the *building official* finds that the value of proposed work equals or exceeds 50 percent of the market value of the building or structure before the damage has occurred or the improvement is started, the finding shall be provided to the board of appeals for a determination of substantial improvement or substantial damage. Applications determined by the board of appeals to constitute substantial improvement or substantial damage shall require all existing portions of the entire building or structure to meet the requirements of Section R322.

**R105.3.2 Time limitation of application.** An application or a *permit* for any proposed work shall be deemed to have been abandoned 180 days after the date of filing unless such application has been pursued in good faith or a *permit* has been issued; except that the *building official* is authorized to grant one or more extensions of time for additional periods not exceeding 180 days each. The extension shall be requested in writing and justifiable cause demonstrated.

**R105.4 Validity of permit.** The issuance or granting of a *permit* 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 the *jurisdiction*. Permits presuming to give authority to violate or cancel the provisions of this code or other ordinances of the *jurisdiction* shall not be valid. The issuance of a *permit* based on *construction documents* and other data shall not prevent the *building official* from requiring the correction of errors in the *construction documents* and other data. The *building official* is also authorized to prevent occupancy or use of a structure where in violation of this code or of any other ordinances of this *jurisdiction*.

**R105.5 Expiration.** Every *permit* issued shall become invalid unless the work authorized by such *permit* is commenced within 180 days after its issuance, or if the work authorized by such *permit* is suspended or abandoned for a period of 180 days after the time the work is commenced. The *building official* is authorized to grant, in writing, one or more extensions of time, for periods not more than 180 days each. The extension shall be requested in writing and justifiable cause demonstrated.

**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. It shall be the duty of every contractor who performs work or enters into contract for work to comply with adopted state and local rules and regulations concerning licensing.

**R105.9 Preliminary inspection.** Before issuing a *permit*, the *building official* is authorized to examine or cause to be examined buildings, structures and sites for which an application has been filed.

**SECTION R106  
CONSTRUCTION DOCUMENTS**

**R106.1 Submittal documents.** Submittal documents consisting of *construction documents*, and other data shall be submitted in two or more sets with each *permit* application. The *construction documents* 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 *building official* is authorized to require additional *construction documents* to be prepared by a registered *design professional*.

**ORS 672.107** is not part of this code but is reproduced here for the reader’s convenience:

**672.107 Structural engineer registration for performing engineering services on significant structures; rules.**

(1) For purposes of this section:

(a) “Significant structure” means:

- (A) Hazardous facilities and special occupancy structures, as defined in ORS 455.447;
- (B) Essential facilities, as defined in ORS 455.447, that have a ground area of more than 4,000 square feet or are more than 20 feet in height;
- (C) Structures that the Director of the Department of Consumer and Business Services determines to have irregular features; and
- (D) Buildings that are customarily occupied by human beings and are more than four stories or 45 feet above average ground level.

(b) “Significant structure” does not mean:

- (A) One-family and two-family dwellings and accompanying accessory structures;
- (B) Agricultural buildings or equine facilities, both as defined in ORS 455.315; or
- (C) Buildings located on lands exempt from Department of Consumer and Business Services enforcement of building code regulations.

(2) Consistent with ORS 672.255, the State Board of Examiners for Engineering and Land Surveying shall adopt rules establishing standards of competence in structural engineering analysis and design relating to seismic influence.

(3) An engineer may not provide engineering services for significant structures unless the engineer possesses a valid professional structural engineer certificate of registration issued by the board.

[Formerly 672.129]

**Exceptions:**

1. The *building official* is authorized to waive the submission of *construction documents* and other data not required to be prepared by a registered *design professional* if it is found that the nature of the work applied for is such that reviewing of *construction documents* is not necessary to obtain compliance with this code.
2. Plans, calculations and specifications, diagrams and other data prepared and designed by an architect or an engineer licensed by the state to practice as such are not required for the following work, provided the building official determines that the work is not of a highly technical nature or there is unreasonable potential risk to life and/or safety of the structure:
  - 2.1 The erection, enlargement or alteration of any building, or any appurtenance thereto, where the resulting building has a ground area of 4,000 square feet (372 m<sup>2</sup>) or less and is not more than 20 feet (6096 mm) in height from the top surface of the lowest floor to the highest interior overhead finish (see ORS 671.030).
  - 2.2. A single-family dwelling, a farm agricultural building, nonfarm agricultural building, or accessory building to a single-family dwelling.
  - 2.3. Alterations or repairs that do not involve structural parts of the building.

**Note:** ORS 671.030 is available online at [www.bcd.oregon.gov](http://www.bcd.oregon.gov).

**R106.1.1 Information on construction documents.** *Construction documents* shall be drawn upon suitable material. Electronic media documents are permitted to be submitted when *approved* by the *building official*. *Construction documents* shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the *building official*. All braced wall lines, shall be identified on the *construction documents* and all pertinent information including, but not limited to, bracing methods, location and length of braced wall panels, foundation requirements of braced wall panels at top and bottom shall be provided.

**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.

**R106.1.3 Information for construction in flood hazard areas.** For buildings and structures located in whole or in part in flood hazard areas as established by the ~~local jurisdiction~~ [Flood Plain Administrator](#), *construction documents* shall include:

1. Delineation of flood hazard areas, floodway boundaries and flood zones and the design flood elevation, as appropriate;
2. The elevation of the proposed lowest floor, including *basement*; in areas of shallow flooding (AO Zones), the height of the proposed lowest floor, including *basement*, above the highest adjacent *grade*;

3. The elevation of the bottom of the lowest horizontal structural member in coastal high hazard areas (V Zone); and
4. ~~If design flood elevations are not included on the community's Flood Insurance Rate Map (FIRM), the building official and the applicant shall obtain and reasonably utilize any design flood elevation and floodway data available from other sources.~~

**R106.2 Site plan or plot plan.** The *construction documents* submitted with the application for *permit* shall be accompanied by a site plan showing the size and location of new construction and existing structures on the site and distances from *lot lines*. In the case of demolition, the site plan shall show construction to be demolished and the location and size of existing structures and construction that are to remain on the site or plot. The *building official* is authorized to waive or modify the requirement for a site plan when the application for permit is for alteration or repair or when otherwise warranted.

**R106.3 Examination of documents.** The *building official* shall examine or cause to be examined accompanying *construction documents* and shall ascertain by such examination whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances.

**R106.3.1 Approval of construction documents.** When the *building official* issues a *permit*, the *construction documents* shall be *approved* in writing or by a stamp which states "REVIEWED FOR CODE COMPLIANCE." One set of *construction documents* so reviewed shall be retained by the *building official*. The other set shall be returned to the applicant, shall be kept at the site of work and shall be open to inspection by the *building official* or a duly authorized representative. Construction documents shall be approved in the timelines specified in ORS 455.467.

**Note:** ORS 455.467 is available online at [www.bcd.oregon.gov](http://www.bcd.oregon.gov).

**R106.3.2 Previous approvals.** This code shall not require changes in the *construction documents*, construction or designated occupancy of a structure for which a lawful *permit* has been heretofore issued or otherwise lawfully authorized, and the construction of which has been pursued in good faith within 180 days after the effective date of this code and has not been abandoned.

**R106.3.3 Phased approval.** The *building official* is authorized to issue a *permit* for the construction of foundations or any other part of a building or structure before the *construction documents* for the whole building or structure have been submitted, provided that adequate information and detailed statements have been filed complying with pertinent requirements of this code. The holder of such *permit* for the foundation or other parts of a building or structure shall proceed at the holder's own risk with the building operation and without assurance that a *permit* for the entire structure will be granted.

#### R106.3.4 Design professional in responsible charge.

**106.3.4.1 General.** When it is required that documents be prepared by a registered design professional, the building official shall be authorized to require the owner to engage and designate on the building permit application a registered design professional who shall act as the registered design professional in responsible charge. If the circumstances require, the owner shall designate a substitute registered design professional in responsible charge who shall perform the duties required of the original registered design professional in responsible charge. The building official shall be notified in writing by the owner if the registered design professional in responsible charge is changed or is unable to continue to perform the duties.

The registered design professional in responsible charge shall be responsible for reviewing and coordinating submittal documents prepared by others, including phased and deferred submittal items, for compatibility with the design of the building.

**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*.

**R106.5 Retention of construction documents.** One set of *approved construction documents* shall be retained by the *building official* for a period of not less than that dictated by OAR 166-150-0020 where a county has jurisdiction; OAR 166-200-0025 where a city has jurisdiction; and OAR 166-300 et al for the jurisdictions where the State of Oregon has jurisdiction. One set of approved plans and specifications shall be returned to the applicant, and said set shall be kept on the site of the building or work at all times during which the work authorized thereby is in progress. The *building official* shall maintain a permanent record of all permits issued in flood hazard areas, including copies of inspection reports and certifications required in Section R109.1.3.

### SECTION R107 TEMPORARY STRUCTURES AND USES

**R107.1 General.** The *building official* is authorized to issue a *permit* for temporary structures and temporary uses. Such permits shall be limited as to time of service, but shall not be permitted for more than 180 days. The *building official* is authorized to grant extensions for demonstrated cause.

**R107.2 Conformance.** Temporary structures and uses shall conform to the structural strength, fire safety, means of egress, light, ventilation and sanitary requirements of this code as necessary to ensure the public health, safety and general welfare.

**R107.3 Temporary power.** Refer to applicable electrical laws.

**R107.4 Termination of approval.** The *building official* is authorized to terminate such *permit* for a temporary structure or use and to order the temporary structure or use to be discontinued.

**SECTION R108  
FEES**

**R108.1 Payment of fees.** A permit shall not be valid until the fees prescribed by law have been paid. Nor shall an amendment to a permit be released until the additional fee, if any, has been paid.

**R108.2 Schedule of permit fees.** Permit and plan review fees shall be as adopted by the authority having jurisdiction, except as otherwise limited by statute. On buildings, structures, electrical, gas, mechanical and plumbing systems or alterations requiring a permit, a fee for each permit shall be paid as required, in accordance with the schedule as established by the applicable governing authority municipality under authority of ORS 455.020 and 455.210, or as set forth in OAR chapter 918, division 480 where the State of Oregon has jurisdiction.

ORS 455.020(2) is not a part of this code but is reprinted here for the reader's convenience:  
**455.020(2) Purpose: scope of application; exceptions; scope of rules; fees by rule.**  
 (2) The rules adopted pursuant to this chapter shall include structural standards; standards for the installation and use of mechanical, heating and ventilating devices and equipment; and standards for prefabricated structures; and shall, subject to ORS 455.210, prescribe reasonable fees for the issuance of building permits and similar documents, inspections and plan review services by the Department of Consumer and Business Services. The department may also establish, by rule, the amount of any fee pertaining to the *State Building Code* or any specialty code that is authorized by statute, but for which an amount is not specified by statute. [Formerly 456.755; 1991 c.227 §2; 1991 c.310 §2; 1995 c.304 §1; 1995 c.400 §5; 1999 c.1045 §13; 1999 c.1082 §11; 2001 c.710 §8]

ORS 455.210(3)(a) is not a part of this code but is reproduced for the reader's convenience:  
**455.210 Fees; appeal of fees; surcharge; reduced fees; rules.**  
 (3)(a) A municipality may adopt by ordinance or regulation such fees as may be necessary and reasonable to provide for the administration and enforcement of any specialty code or codes for which the municipality has assumed responsibility under ORS 455.148 or 455.150. A municipality shall give the director notice of the proposed adoption of a new or increased fee under this subsection. The municipality shall give the notice to the director at the time the municipality provides the opportunity for public comment under ORS 294.160 regarding the fee or, if the proposed fee is contained in an estimate of municipal budget resources, at the time notice of the last budget meeting is published under ORS 294.426. [Subsections (1) to (5) formerly 456.760; subsection (6) enacted as 1987 c.604 §6; 1997 c.856 §1; 1999 c.432 §1; 1999 c.1045 §24; 1999 c.1082 §9; 2001 c.573 §9; 2001 c.673 §1; 2005 c.193 §1; 2005 c.833 §3; 2007 c.69 §5; 2011 c.473 §29]

**R108.2.1 Plan review fees.** When submittal documents are required by Section R106.1, a plan review fee shall be paid at the time of submitting the submittal documents for plan review. Said plan review fee shall be a percentage of the building permit fee as established under Section R108.2. The plan review fees specified in this section are separate from the permit fees specified in Section R108.2 and are in addition to the permit fees. The state surcharge is not applied to plan review fees. When submittal documents are

incomplete or changed so as to require additional plans an additional plan review fee shall be charged according to the rate established by the municipality, or OAR chapter 918, division 480 where the State of Oregon has jurisdiction.

**R108.3 Building permit valuations.** The applicant for a permit shall provide an estimated permit value at time of application. Permit valuation shall include total value of work including materials and labor, for which the permit is being issued such as electrical, gas, mechanical, plumbing equipment and other permanent systems. If, in the opinion of the building official, the valuation is underestimated on the application, the permit shall be denied, unless the applicant can show detailed estimates to meet the approval of the building official. Final building permit valuation shall be set by the building official. Structural and mechanical building permit valuations shall be based upon the Uniform Fee methodologies as established by OAR 918-050-0100.

OAR 918-050-0100 is not part of this code but is reproduced here for the reader's convenience.  
**918-050-0100 Statewide Fee Methodologies for Residential and Commercial Permits**  
(1) Residential construction permit fees shall be calculated using the following methodologies:  
 (a) A plumbing permit fee for new construction includes one kitchen and is based on the number of bathrooms, from one to three, on a graduated scale. An additional set fee shall be assessed for each additional bath or kitchen.  
 (A) No additional fee shall be charged for the first 100 feet of water and sewer lines, hose bibbs, icemakers, underfloor low-point drains, and rain drain packages that include the piping, gutters, downspouts, and perimeter system.  
 (B) The plumbing permit fee described in this section does not include:  
 (i) Any storm water retention/detention facility;  
 (ii) Irrigation and fire suppression systems; or  
 (iii) Additional water, sewer and service piping or private storm drainage systems exceeding the first 100 feet.  
 (C) Permit fees for an addition, alteration, or repair shall be calculated based on the number of fixtures, appurtenances, and piping, with a set minimum fee.  
 (b) A mechanical permit fee shall be calculated per appliance and related equipment, with a set minimum fee.  
 (c) Effective January 1, 2009, a structural permit fee for new construction and additions shall be calculated using the ICC Building Valuation Data Table current as of April 1 of each year, multiplied by the square footage of the dwelling to determine the valuation. The valuation shall then be applied to the municipality's fee schedule to determine the permit fee. The plan review fee shall be based on a predetermined percentage of the permit fee set by the municipality.  
 (A) The square footage of a dwelling, addition, or garage shall be determined from outside exterior wall to outside exterior wall for each level.  
 (B) The square footage of a carport, covered porch, patio, or deck shall be calculated separately at fifty percent of the value of a private garage from the ICC Building Valuation Data Table current as of April 1.  
 (C) Permit fees for an alteration or repair shall be calculated based on the fair market value as determined by the building official, and

then applying the valuation to the municipality's fee schedule.

(2) Commercial construction permit fees shall be calculated using the following methodologies:

(a) A plumbing permit fee shall be calculated based on the number of fixtures and footage of piping, with a set minimum fee.

(b) A mechanical permit fee shall be calculated based on the value of the mechanical equipment and installation costs and applied to the municipality's fee schedule with a set minimum fee.

(c) A structural permit fee shall be calculated by applying the valuation to the municipality's fee schedule with a minimum set fee. Valuation shall be the greater of either:

(A) The valuation based on the ICC Building Valuation Data Table current as of April 1 of each year, using the occupancy and construction type as determined by the building official, multiplied by the square footage of the structure; or

(B) The value as stated by the applicant.

(C) When the construction or occupancy type does not fit the ICC Building Valuation Data Table, the valuation shall be determined by the building official with input from the applicant.

Stat. Auth.: ORS 455.048 & 455.055  
 Stats. Implemented: ORS 455.046 & 455.055  
 Hist.: BCD 9-2000, f. 6-15-00, cert. ef. 10-1-00; BCD 31-2005, f. 12-30-05, cert. ef. 1-1-06; BCD 5-2007, f. 5-11-07, cert. ef. 7-1-07; BCD 27-2008, f. ef. 12-12-08, cert. ef. 1-1-09; BCD 7-2009, f. 9-30-09, cert. ef. 10-1-09

**R108.4 Related fees.** The payment of the fee for the construction or alteration for work done in connection to or concurrently with the work authorized by a building *permit* shall not relieve the applicant or holder of the *permit* from the payment of other fees that are prescribed by law.

**R108.5 Refunds.** The *building official* is authorized to establish a refund policy.

**R108.6 Work commencing before permit issuance.** Any person who commences work requiring a *permit* on a building or structure, ~~electrical, gas, or~~ mechanical or plumbing system before obtaining the necessary permits shall be subject to an investigation fee equal to the permit fee that shall be in addition to the required *permit* fees. The amount of the investigative fee shall be the average or actual additional cost of ensuring that a building, structure or system is in conformance with this code and shall be in addition to the required *permit* fees.

**Exception:** Work as permitted in Section R105.2.

ORS 455.058 is not part of this code but is reprinted here for the reader's convenience:

**455.058 Investigation fee for work commenced without permit; rules.**

(1) Except as provided in subsection (2) of this section, the Department of Consumer and Business Services, or a municipality administering and enforcing a building inspection program, may assess an investigation fee against a person that is required to obtain a permit for work on the electrical, gas, mechanical, elevator, boiler, plumbing or other systems of a building or structure if the work is commenced before the permit required for the work is obtained. The amount of the investigation fee shall be the average or actual additional cost of ensuring that a building, structure or system is in conformance with *State Building Code* requirements that results from the person not obtaining a required permit before work for which the permit is required commences.

(2) This section does not apply to:

(a) An emergency repair required for health, safety, the prevention of property damage or the prevention of financial harm if the required building permit for the repair is obtained no later than five business days after commencement of the repair, or

(b) Any project for which construction, alteration, repair, maintenance or installation in a building or structure prior to obtaining a permit is expressly authorized by law.

(3) The department may adopt rules and establish policies and procedures for use by the department or municipalities in assessing an investigation fee under this section. [2013 c.324 §2]

## SECTION R109 INSPECTIONS

**R109.1 General.** Construction or work for which a permit is required shall be subject to inspection by the building official and such construction or work shall remain accessible and exposed for inspection purposes until approved. Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other laws or ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other laws or ordinances of the jurisdiction shall not be valid. It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the building official nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material required to allow inspection.

**R109.1.1 Foundation inspection.** Inspection 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. The foundation inspection shall include excavations for thickened slabs intended for the support of bearing walls, partitions, structural supports, or *equipment* and special requirements for wood foundations.

**R109.1.1.1 Concrete slab or under-floor inspection.** Concrete slab or under-floor inspection shall be made after in-slab or under-floor building service equipment, conduit, piping accessories and other ancillary equipment items are in place but before any concrete is placed or floor sheathing installed, including sub-floor.

**R109.1.2 Plumbing, mechanical, gas and electrical systems inspection.** Rough inspection of plumbing, mechanical, gas and electrical systems shall be made prior to covering or concealment, before fixtures or *appliances* are set or installed, and prior to framing inspection.

**Exception:** Back-filling of ground-source heat pump loop systems tested in accordance with Section M2105. 1 prior to inspection shall be permitted.

**R109.1.3 Floodplain inspections.** ~~For construction in areas prone to flooding as established by the local jurisdiction, upon placement of the lowest floor, including *basement*, and prior to further vertical construction, the *building official* shall require submission of documentation, prepared and sealed by a registered *design professional*, of the elevation of the lowest floor, including *basement*, required~~

~~in Section R322. In flood hazard areas, upon placement of the lowest floor, including the basement, and prior to further vertical construction, an elevation certification as required by the Flood Plain Administrator shall be prepared and sealed by a registered design professional. The certification shall be submitted to the building official as required for building code administration and to the Flood Plain Administrator in the management of any NFIP requirements.~~

**R109.1.4 Frame and masonry inspection.** Inspection of framing and masonry construction shall be made after the roof, masonry, all framing, firestopping, draftstopping and bracing are in place and after the plumbing, mechanical and electrical rough inspections are *approved*.

**R109.1.4.1 Moisture content.** After the framing inspection and prior to the installation of interior finishes, the building official shall be notified in writing by the general contractor that all moisture-sensitive wood framing members used in construction have a moisture content of not more than 19 percent of the weight of dry wood framing members.

**R109.1.5 Other inspections.** In addition to the inspections specified above, the *building official* is authorized to make or require other inspections to ascertain compliance with the provisions of this code and other laws that are enforced by the *building official*.

**R109.1.5.1 Fire-resistance-rated construction inspection.** Where fire-resistance-rated construction is required between *dwelling units* or due to location on property, the *building official* shall require an inspection of such construction after all lathing and/or wallboard is in place, but before any plaster is applied, or before wallboard joints and fasteners are taped and finished.

**R109.1.5.2 Insulation and vapor barrier inspection.** Inspection shall be made after all insulation and required vapor barriers are in place, but before any lath or gypsum board interior wall covering is applied.

**Exceptions:**

1. Ceiling and floor insulation visible during final inspection.
2. The building official may allow the frame, insulation and vapor barrier inspections to be performed simultaneously.

**R109.1.5.3 Reinforced masonry, insulating concrete form (ICF) and conventionally formed concrete wall inspection.** Reinforced masonry walls, insulating concrete form (ICF) walls and conventionally formed concrete walls located in Seismic Design Categories D<sub>1</sub>, D<sub>2</sub>, and E shall be inspected after plumbing, mechanical, and electrical systems embedded within the walls, and reinforcing steel are in place and prior to placement of grout or concrete. Inspection shall verify the correct size, location, spacing, and lapping of reinforcing. For masonry walls, inspection shall also verify that the location of grout cleanouts and size of grout spaces comply with the requirements of this code.

**R109.1.6 Final inspection.** Final inspection shall be made after all work required by the building permit is completed.

**R109.2 Inspection agencies.** The *building official* is authorized to accept reports of *approved* agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

**R109.3 Inspection requests.** It shall be the duty of the holder of the building permit or their duly authorized agent to notify the *building official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspection of such work that are required by this code.

**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 notify the *permit* holder or their duly authorized agent 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*.

**SECTION R110  
CERTIFICATE OF OCCUPANCY**

**R110.1 Use and occupancy.** No building or structure shall be used or occupied, and no change in the existing character, use or occupancy classification of a building or structure or portion thereof shall be made until the *building official* has issued a certificate of occupancy for such change in character, use or occupancy as specified in OAR 918-480-0140. 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*.

**Exceptions:**

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

**OAR 918-480-0140** is not part of this code but is reproduced here for the reader's convenience:

**918-480-0140 Residential Certificates of Occupancy.**

- (1) Prior to occupancy of a new residential dwelling or townhouse the building official must issue a certificate of occupancy in the form and format established by the division, unless a temporary certificate of occupancy is issued by the building official.
- (2) This rule applies to a new residential dwelling or townhouse, if the structural permit for construction of the residential dwelling or townhouse was applied for on or after April 1, 2008.
- (3) For purposes of this rule, the terms "residential dwelling" and "townhouse" have the same meaning as in section R202 of the 2008 *Oregon Residential Specialty Code*.
- (4) Before the certificate of occupancy is issued, the general contractor or owner who was issued the structural permit for construction must provide to the building official the contact information and relevant license information for the general contractor, as well as any electrical contractor, HVAC contractor and plumbing contractor that performed work on the residential dwelling or townhouse.
- (5) A building official may revoke a certificate of occupancy or a temporary certificate of occupancy when the residential dwelling

or townhouse is in violation of applicable law that poses a threat to health and safety. The revocation must be in writing and state the basis for the revocation of the certificate of occupancy.

[Stat. Auth.: ORS 455.055](#)

[Stat. Implemented: ORS 455.055](#)

[Hist.: BCD 3-2008, f. 2-21-08, cert. ef. 4-1-08; BCD 13-2011, f. 5-13-11, cert. ef. 7-1-11](#)

**R110.2 Change in use or occupancy.** No change shall be made in the use or occupancy of any building that would place the building in a different division of the same group of occupancy or in a different group of occupancies, unless such building is made to comply with the requirements of this code and Chapter 11 Accessibility, in the *Building Code* for such division or group of occupancy. Subject to the approval of the building official, the use or occupancy of existing buildings shall be permitted to be changed and the building is allowed to be occupied for purposes in other groups without conforming to all the requirements of this code for those groups, provided the new or proposed use is less hazardous, based on life and fire risk, than the existing use.

**R110.3 Certificate issued.** After the *building official* inspects the building or structure and finds no violations of the provisions of this code or other laws that are enforced by the department of building safety, the *building official* shall issue a certificate of occupancy which shall contain the following:

1. The building *permit* number.
2. The address of the structure.
3. The name and address of the owner.
4. A description of that portion of the structure for which the certificate is issued.
5. A statement that the described portion of the structure has been inspected for compliance with the requirements of this code.
6. The name of the *building official*.
7. The edition of the code under which the *permit* was issued.
8. If an automatic sprinkler system is provided and whether the sprinkler system is required.
9. Any special stipulations and conditions of the building *permit*.

**R110.4 Temporary occupancy.** The *building official* is authorized to issue a temporary certificate of occupancy before the completion of the entire work covered by the *permit*, provided that such portion or portions shall be occupied safely. The *building official* shall set a time period during which the temporary certificate of occupancy is valid.

**R110.5 Revocation.** The *building official* is authorized to, in writing, suspend or revoke a certificate of occupancy or completion issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

## SECTION R111 SERVICE UTILITIES

**R111.1 Connection of service utilities.** No person shall make connections from a utility, source of energy, fuel or power to any building or system that is regulated by this code for which a *permit* is required, until *approved* by the *building official*.

**R111.2 Temporary connection.** The *building official* shall have the authority to authorize and approve the temporary connection of the building or system to the utility, source of energy, fuel or power.

**R111.3 Authority to disconnect service utilities.** The *building official* shall have the authority to authorize disconnection of a fuel supply or appliance that does not conform to this code. The building official shall also have the authority to order disconnected a gas utility service, or energy supplies to a building, structure, premises or equipment in case of emergency when necessary to eliminate an immediate hazard to life or property. A notice shall be attached to the energy supply or appliances stating the reason for disconnection. Such notices shall not be removed nor shall the system or appliance be reconnected until authorized by the building official. The owner or occupant of the building, structure or service system shall be notified in writing as soon as practical thereafter.

## SECTION R112 BOARD OF APPEALS

**R112.1 General.** In order to hear and decide appeals of orders, decisions or determinations made by the *building official* relative to the application and interpretation of this code, the local jurisdiction shall establish an appeals procedure.

**R112.1.1 Alternate appeals process.** ORS 455.475 provides an alternate appeals process to that set forth by the local municipality.

**ORS 455.475** is not part of this code but is reproduced here for the reader's convenience:

**455.475 Appeal of decision of building official.** A person aggrieved by a decision made by a building official under authority established pursuant to ORS 455.148, 455.150 or 455.467 may appeal the decision. The following apply to an appeal under this section:

(1) An appeal under this section shall be made first to the appropriate specialty code chief inspector of the Department of Consumer and Business Services. The decision of the department chief inspector may be appealed to the appropriate advisory board. The decision of the advisory board may only be appealed to the Director of the Department of Consumer and Business Services if codes in addition to the applicable specialty code are at issue.

(2) If the appropriate advisory board determines that a decision by the department chief inspector is a major code interpretation, then the inspector shall distribute the decision in writing to all applicable specialty code public and private inspection authorities in the state. The decision shall be distributed within 60 days after the board's determination, and there shall be no charge for the distribution of the decision. As used in this subsection, a "major code interpretation" means a code interpretation decision that affects or may affect more than one job site or more than one inspection jurisdiction.

(3) If an appeal is made under this section, an inspection authority shall extend the plan review deadline by the number of days it takes for a final decision to be issued for the appeal. [\[1999 c.1045 §23; 2001 c.573 §15; 2013 c.528 §13\]](#)

**Note:** Forms for appeals under ORS 455.690 and ORS 455.475 are available online at [www.bcd.oregon.gov](http://www.bcd.oregon.gov).

**R112.2 Limitations on authority.** An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply, or an equally good or better form of construction is proposed. The board shall have no authority to waive requirements of this code.

**ORS 455.690** is not part of this code but is reproduced here for the reader's convenience:

**455.690 Appeal to advisory boards.** Any person aggrieved by the final decision of a municipal appeals board or a subordinate officer of the Department of Consumer and Business Services as to the application of any provision of a specialty code may, within 30 days after the date of the decision, appeal to the appropriate advisory board. The appellant shall submit a fee of \$20, payable to the department, with the request for appeal. The final decision of the involved municipality or state officer shall be subject to review and final determination by the appropriate advisory board as to technical and scientific determinations related to the application of the specialty code involved. [\[Formerly 456.850; 1993 c.744 §98\]](#)

**R112.2.1 Determination of substantial improvement in areas prone to flooding.** ~~Not adopted by the State of Oregon.~~ [Not adopted by the State of Oregon Building Codes Division as part of the State Building Code.](#)

**R112.2.2 Criteria for issuance of a variance for areas prone to flooding.** ~~Not adopted by the State of Oregon.~~ [Not adopted by the State of Oregon Building Codes Division as part of the State Building Code.](#)

**R112.3 Qualifications.** An appeals board shall consist of members who are qualified by experience and training to pass on matters pertaining to building construction.

**R112.4 Administration.** Not adopted by the State of Oregon.

**SECTION R113  
VIOLATIONS**

**R113.1 Prohibited acts are as described in ORS 455.450.**

**ORS 455.450** is not part of this code but is reproduced here for the reader's convenience:

**455.450 Prohibited acts.** A person shall not:

(1) Violate, or procure or assist in the violation of, any final order of the Director of the Department of Consumer and Business Services, an advisory board, a state administrative officer or any local appeals board, building official or inspector, concerning the application of the *State Building Code* in a particular case or concerning a license, certificate, registration or other authorization.

(2) Engage in, or procure or assist any other person to engage in, any conduct or activity for which a permit, label, license, certificate, registration or other formal authorization is required by any specialty code, any provision of ORS 446.003 to 446.200, 446.225 to 446.285, 446.395 to 446.420, 446.566 to 446.646, 446.666 to 446.746, 479.510 to 479.945, 479.950 and 480.510 to 480.670, this chapter or ORS chapter 447, 460 or 693, or any rule adopted or order issued for the administration and enforcement of those provisions, without first having obtained such permit, label, license, certificate, registration or other formal authorization.

(3) Violate, or procure or assist in the violation of, any standard, specification, requirement, prohibition or other technical provision set forth in the *State Building Code* or an applicable local building code or in any rule or order of the Department of Consumer and Business Services, an advisory board, a local governing body or local building official. [\[Formerly 456.885 \(1\); 2007 c.306 §3\]](#)

**R113.2 Notice of violation.** The *building official* is authorized to serve a notice of violation or order on the person responsible for the erection, construction, alteration, extension, repair, moving, removal, demolition or occupancy of a building or structure in violation of the provisions of this code, or in violation of a detail statement or a plan *approved* thereunder, or in violation of a *permit* or certificate issued under the provisions of this code. Such order shall direct the discontinuance of the illegal action or condition and the abatement of the violation.

**R113.3 Prosecution of violation.** If the notice of violation is not complied with in the time prescribed by such notice, the *building official* is authorized to request the legal counsel of the *jurisdiction* to institute the appropriate proceeding at law or in equity to restrain, correct or abate such violation, or to require the removal or termination of the unlawful occupancy of the building or structure in violation of the provisions of this code or of the order or direction made pursuant thereto.

**R113.4 Violation penalties.** Any person who violates a provision of this code or fails to comply with any of the requirements thereof or who erects, constructs, alters or repairs a building or structure in violation of the *approved construction documents* or directive of the *building official*, or of a *permit* or certificate issued under the provisions of this code, shall be subject to penalties as prescribed by law.

**SECTION R114  
STOP WORK ORDER**

**R114.1 Authority.** Whenever the building official finds any work regulated by this code being performed in a manner either contrary to the provisions of this code or dangerous or unsafe, the building official is authorized to issue a stop work order.

**R114.2 Issuance.** The stop work order shall be in writing and shall be given to the owner of the property involved, or to the owner's agent, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order, and the conditions under which the cited work will be permitted to resume.

**R114.3 Unlawful continuance.** Any person who shall continue any work after having been served with a stop work order,

except such work as that person is directed to perform to remove a violation or unsafe condition, shall be subject to penalties as prescribed by law.

**SECTION R115  
PREFABRICATED CONSTRUCTION**

**R115.1 General.** See ORS 455.010 and OAR chapter 918, division 674.

**ORS 455.010(6)** is not part of this code but is reproduced here for the reader’s convenience:

**455.010(6)** “Prefabricated structure” means a building or subassembly that has been in whole or substantial part manufactured or assembled using closed construction at an off-site location to be wholly or partially assembled on-site. “Prefabricated structure” does not include a manufactured dwelling, recreational structure or recreational vehicle, as those terms are defined in ORS 446.003. [\[Formerly 456.750; 1991 c.227 §1; 1991 c.310 §1; 1993 c.18 §112; 1993 c.744 §85; 1997 c.259 §3; 1999 c.484 §1; 1999 c.1045 §12; 2003 c.655 §75; 2003 c.675 §§10,11; 2009 c.567 §§4,13\]](#)

**Note:** OAR Chapter 918, Division 674 is available online at [www.bcd.oregon.gov](http://www.bcd.oregon.gov).

**SECTION R116  
SWIMMING POOLS, SPAS AND HOT TUBS**

**R116.1 General.** Barrier provisions for swimming pools, spas and hot tubs are contained in Appendix G as amended.

**R116.2 In-ground pools.** In-ground pools shall be designed and constructed in accordance with ANSI/NSPI-5 as listed in Appendix G, Section AG103.1.

**SECTION R117  
INSPECTION CARD**

**R117.1 Record required.** The permit holder or permit holder’s agent shall post the inspection record on the job site in an accessible and conspicuous place to allow the building official to make the required entries. The record shall be maintained by the permit holder until the final inspection has been made and approved.

**SECTION R118  
MOVED BUILDINGS**

**R118.1 Moved buildings.** See ORS 455.410.

**ORS 455.410** is not part of this code but is reproduced here for the reader’s convenience:

**455.410 Relocated buildings; substantial compliance required; permits.**

(1) Existing buildings or structures which are removed from their foundation and relocated to another site within this state shall be in substantial compliance as defined in subsections (2) and (3) of this section.

(2) “Substantial compliance” means compliance with local construction codes in effect as of the original permit date of the building or structure, or where there was no permitting required at the time of original construction, with basic health and safety standards, as described in the closest dated *Uniform Housing Code*, as published by the International Conference of Building Officials as of the date of construction. Only the insulation, overhead and underneath the structure, shall be upgraded to the current insulation requirements of the *State Building Code*, or to the maximum extent possible subject to the design of the structure. Nothing in this statute shall be construed to mean that all heating, plumbing and electrical systems shall be replaced with systems meeting current standards for new construction, except that any life-threatening deficiencies in those systems shall be repaired, notwithstanding that the cost of rehabilitation may exceed 50 percent of the value of the structure before rehabilitation.

(3) All foundation and basement construction on the structure and any remodeling at the new location shall be constructed subject to all applicable local current building and safety codes, or where none exist, with the applicable standards as described in the *Uniform Housing Code* described in subsection (2) of this section.

(4) All moved houses shall be provided with either battery-operated or hard-wired smoke detection devices located in accordance with the provisions of the *State Building Code*.

(5) Nothing in this section is intended to permit any person to move a structure unless the person first consults the appropriate building inspection authority and obtains all required permits. [\[Formerly 456.756; 1989 c.1068 §1\]](#)

**SECTION R119  
HISTORIC BUILDINGS**

**R119.1 Repairs, alterations and additions.** Repairs, alterations and additions necessary for the preservation, restoration, rehabilitation or continued use of an historical building may be made without conforming to all of the requirements of this code when authorized by the building official, provided:

- 1. The building has been officially designated an historic building.
- 2. Unsafe conditions are corrected.
- 3. The restored building will be no more hazardous based on life, fire safety and sanitation than the existing building.
- 4. The building official seeks the advice of the State of Oregon Historic Preservation Office.

In the case of appeals related to historic buildings, the local appeals board or the appropriate state appeals board shall seek the advice of the state historic preservation officer.

## *Part I—Definitions*

### CHAPTER 2 DEFINITIONS

**ATTIC.** The [unfinished](#) space between the ceiling assembly of the top story and the roof assembly.

455.715 Definitions for ORS 455.715 to 455.740. As used in ORS 455.715 to 455.740, unless the context otherwise requires: (1) “Building official” means a person charged by a municipality with responsibility for administration and enforcement of the state building code in the municipality. [\[Formerly 456.805; 1991 c.361 §1; 1995 c.304 §5; 2003 c.675 §37; 2009 c.593 §§5.6; 2013 c.110 §4\]](#)

## DEFINITIONS

**DESIGN FLOOD ELEVATION.** The elevation of the “design flood” including wave height, relative to the datum specified on the community’s legally designated flood hazard map as established by the Flood Plain Administrator.

**FIRE CODE.** ~~Shall mean the *Oregon Fire Code* as adopted by OAR 837-040-0010.~~ For the purpose of the *Oregon Residential Specialty Code*, fire code shall mean those portions of the Oregon Fire Code (OFC) as adopted by OAR 837-040-0010, which include construction, reconstruction, alteration, repair or installation of materials and equipment that is covered by the *State Building Code* .

## DEFINITIONS

**FLOOD HAZARD AREA.** An area designated by the Flood Plain Administrator as a flood hazard area.

**MANUFACTURED HOME.** See ORS 446.003~~(26)~~.[\(24\)](#)

[ORS 446.003 \(24\) is not part of this code but is reproduced here for the reader's convenience:](#)

[446.003 Definitions for ORS 446.003 to 446.200 and 446.225 to 446.285 and ORS Chapters 195, 196, 197, 215 and 227.](#)

**[ORS 446.003\(24\)](#)**

[\(a\) "Manufactured home," except as provided in paragraph \(b\) of this section, means a structure constructed for movement on the public highways that has sleeping, cooking and plumbing facilities, that is intended for human occupancy, that is being used for residential purposes and that was constructed in accordance with federal manufactured housing construction and safety standards and regulations in effect at the time of construction.](#)

[\(b\) For purposes of implementing any contract pertaining to manufactured homes between the department and the federal government, "manufactured home" has the meaning given the term in the contract. \[1975 c.546 §10 \(enacted in lieu of 446.002 and 446.004\); 1979 c.884 §1; 1983 c.707 §1; 1987 c.274 §1; 1987 c.414 §21; 1989 c.527 §1; 1989 c.648 §§1,1a; 1989 c.683 §1; 1989 c.919 §6b; 1991 c.226 §1; 1991 c.844 §21; 1993 c.744 §47; 1995 c.251 §1; 1997 c.205 §1; 1999 c.758 §7; 2003 c.675 §6; 2005 c.22 §313; 2009 c.259 §25; 2009 c.567 §28; 2013 c.161 §2; 2013 c.196 §21\]](#)

**DEFINITIONS**



## DEFINITIONS

**STATE BUILDING CODE.** The combined specialty codes adopted pursuant to ORS 455 and any code regulation or requirement in effect at the time of construction – regardless of when the building or structure was built.



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

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

The seismic provisions of this code shall apply as follows:

1. Townhouses in Seismic Design Categories C, D<sub>1</sub> and D<sub>2</sub>.
2. Detached one- and two-family dwellings in Seismic Design Categories D<sub>1</sub> and D<sub>2</sub>.

**R301.2.4 Floodplain construction.** Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established by the local jurisdiction ~~shall adopt a flood hazard map and supporting data.~~ [Flood Plain Administrator](#) shall be designed and constructed in accordance with Section R322. ~~The jurisdiction shall adopt a flood hazard map and supporting data. The flood hazard map shall include, at a minimum, areas of special flood hazard as identified by the Federal Emergency Management Agency (FEMA) in an engineering report entitled "The Flood Insurance Study for [INSERT NAME OF JURISDICTION]," dated [INSERT DATE OF ISSUANCE], as amended or revised with the accompanying Flood Insurance Rate Map (FIRM) and Flood Boundary and Floodway Map (FBFM) and related supporting data along with any revisions thereto. The adopted flood hazard map and supporting data are hereby adopted by reference and declared to be part of this section.~~



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



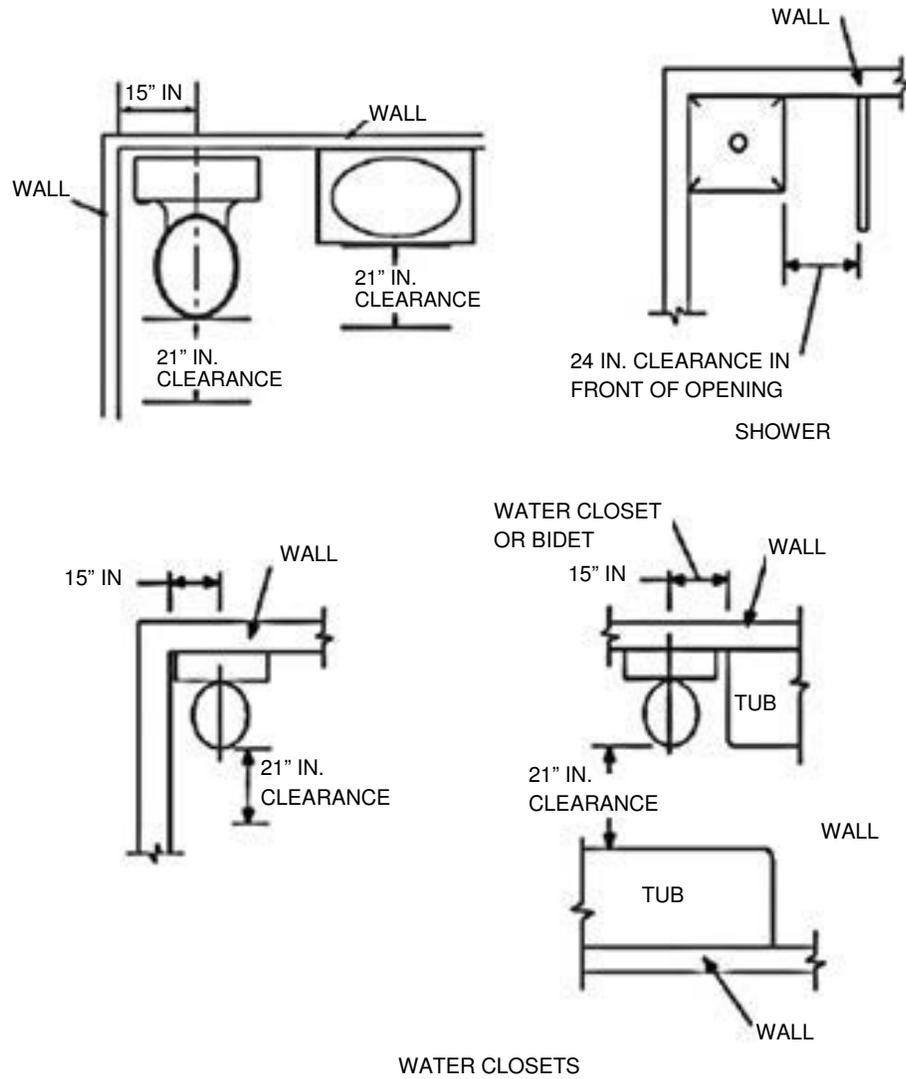
the required floor area may have a ceiling height of less than 5 feet (1524 mm).

3. Not more than 75 percent of the floor area of a bathroom or toilet room is permitted to have a sloped ceiling less than 7 feet (2134 mm) in height, provided an area of 21 inches by 24 inches (534 mm by 610 mm) in front of toilets and lavatories has a minimum of 6 feet, 4 inches (1931 mm) in height, measured from the finished floor. An area of 24 inches by 30 inches (610 mm by 762mm) in front of and inside a tub or shower shall have a minimum of 6 feet, 4 inches (1931 mm) in height, measured from the standing surface of the fixture.
4. Conversion of existing non-habitable spaces, such as a basement or attic, to habitable space, shall provide a minimum 6 feet, 8 inches (2032 mm) ceiling height for flat ceilings or the portion required under Exception 2 above.

**R305.1 Minimum height.** *Habitable space*, hallways, bathrooms, toilet rooms, laundry rooms and portions of *basements* containing these spaces shall have a ceiling height of not less than 7 feet (2134 mm).

**Exceptions:**

1. Beams and girders spaced not less than 4 feet(1219 mm) on center may project not more than 6 inches (152 mm) below the required ceiling height.
2. 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 (2134 mm) and no portion of



For SI: 1 inch = 25.4 mm.

**(Revised) FIGURE R307.1**  
**MINIMUM FIXTURE CLEARANCES**  
*(See Oregon Plumbing Specialty Code for shower clearances)*

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

1. Glazing in all fixed and operable panels of swinging, sliding and bifold doors.

**Exceptions:**

1. Glazed openings of a size through which a 3-inch diameter (76 mm) sphere is unable to pass.
  2. Decorative glazing.
2. Glazing in an individual fixed or operable panel adjacent to a door ~~where the nearest vertical edge is within a 24 inch (610 mm) arc of the door in a closed position and whose~~ shall be considered a hazardous location where the bottom edge is less than 60 inches (1524 mm) above the floor or walking surface: and it meets either of the following conditions:
    - a. Where the glazing is within 24 inches of either side of the door in the plane of the door in a closed position.
    - b. Where the glazing is on a wall perpendicular to the plane of the door in a closed position and within a 24 inch arc of the hinged side in the direction of swing. See Figure R308.4.1

**Exceptions:**

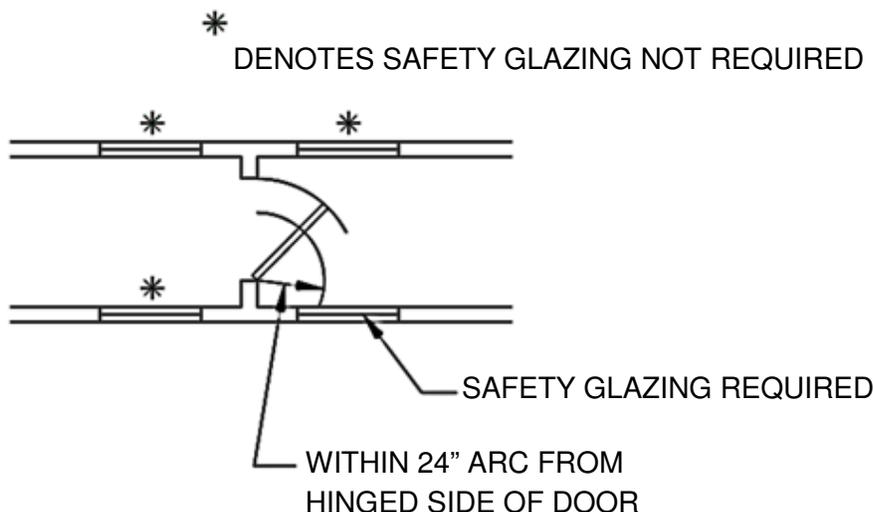
1. Decorative glazing.
2. When there is an intervening wall or other permanent barrier between the door and the glazing.
3. ~~Glazing in walls on the latch side of and perpendicular to the plane of the door in a closed position.~~
3. Glazing adjacent to a door where access through the door is to a closet or storage area 3 feet (914 mm) or less in depth.
4. Glazing that is adjacent to the fixed panel of patio doors

3. Glazing in an individual fixed or operable panel that meets all of the following conditions:

- 3.1. The exposed area of an individual pane is larger than 9 square feet (0.836 m<sup>2</sup>); and
- 3.2. The bottom edge of the glazing is less than 18 inches (457 mm) above the floor; and
- 3.3. The top edge of the glazing is more than 36 inches (914 mm) above the floor; and
- 3.4. One or more walking surfaces are within 36 inches (914mm), 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 (864 to 965) above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot (730 N/m) without contacting the glass and be a minimum of 1½ inches (38 mm) 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 (7620 mm) or more above *grade*, a roof, walking surfaces or other horizontal [within 45 degrees (0.79 rad) of horizontal] surface adjacent to the glass exterior.
4. All glazing in railings regardless of area or height above a walking surface. Included are structural baluster panels and nonstructural infill panels.
5. Glazing in enclosures for or walls facing hot tubs, whirlpools, saunas, steam rooms, bathtubs and showers where the bottom exposed edge of the glazing is less than 60



**FIGURE R308.4.2  
GLAZING ADJACENT TO DOOR**

## BUILDIGN PLANNING

inches (1524 mm) measured vertically above any standing or walking surface.

**Exception:** Glazing that is more than 60 inches (1524 mm), measured horizontally and in a straight line, from the waters edge of a hot tub, whirlpool, saunas, steam rooms or bathtubs and showers.

6. Glazing in walls and fences adjacent to indoor and outdoor swimming pools, hot tubs and spas where the bottom edge of the glazing is less than 60 inches (1524mm) above a walking surface and within 60 inches (1524 mm), measured horizontally and in a straight line, of the water's edge. This shall apply to single glazing and all panes in multiple glazing.
7. Glazing adjacent to stairways, landings and ramps within 36 inches (914mm) horizontally of a walking surface when the exposed surface of the glazing is less than 60 inches (1524 mm) above the plane of the adjacent walking surface.

### Exceptions:

1. When a rail is installed on the accessible side(s) of the glazing 34 to 38 inches (864 to 965mm) above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot (730 N/m) without contacting the glass and be a minimum of 1½ inches (38 mm) in cross sectional height.
  2. The side of the stairway has a guardrail or hand-rail, including balusters or in-fill panels, complying with Sections R3 11.7.7 and R3 12 and the plane of the glazing is more than 18 inches (457 mm) from the railing; or
  3. When a solid wall or panel extends from the plane of the adjacent walking surface to 34 inches (863 mm) to 36 inches (914 mm) above the walking surface and the construction at the top of that wall or panel is capable of withstanding the same horizontal load as a *guard*.
8. Glazing adjacent to the landing stairways within 60 inches (1524 mm) horizontally of at the bottom tread of a stairway where the glazing is less than 36 inches (914 mm) above the landing and within a in any direction when the exposed surface of the glazing is less than 60 inches (1524 mm) horizontal arc less than 180 degrees (3.14 rad) from the bottom tread nosing shall be considered a hazardous location ~~above the nose of the tread.~~

### Exceptions:

1. The side of the stairway has a guardrail or hand-rail, including balusters or in-fill panels, complying with Sections R311.7.7 and R312 and the plane of the glass is more than 18 inches (457 mm) from the railing; or
2. When a solid wall or panel extends from the plane of the adjacent walking surface to 34 inches (864 mm) to 36 inches (914 mm) above the walking surface and the construction at the top of that wall or panel is capable of withstanding the same horizontal load as a *guard*.

**R309.3 Flood hazard areas.** For buildings located in flood hazard areas as established by the local jurisdiction ~~local jurisdiction~~ [Flood Plain Administrator](#), garage floors shall be:

1. Elevated to or above the design flood elevation as determined ~~in Section R322~~ [by the Flood Plain Administrator](#);  
or
2. Located below the design flood elevation provided they are at or above *grade* on at least one side, are used solely for parking, building access or storage, meet the requirements of Section R322 and are otherwise constructed in accordance with this code



**R311.7.5 Landings for stairways.** There shall be a floor or landing at the top and bottom of each stairway. The minimum width perpendicular to the direction of travel shall be no less than the width of the flight served. Landings of shapes other than square or rectangular shall be permitted provided the depth at the walk line and the total area is not less than that of a quarter circle with a radius equal to the required landing width. Where the stairway has a straight run the minimum depth in the direction of travel shall be not less than 36 inches (914 mm). A flight of stairs shall not have a vertical rise larger than 12 feet (3658 mm) between floor levels or landings. The width of each landing shall not be less than the width of the stairway served. ~~Every landing shall have a minimum dimension of 36 inches (914 mm) measured in the direction of travel.~~

**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.



ORS 479.250 through 479.300 are statutes relating to smoke alarms and are under the enforcement authority of the State Fire Marshal's Office.

ORS 479.297 is not part of this code but is reproduced here for the reader's convenience:

**479.297 Ionization S-smoke alarms; required equipment; exemptions.**

(1) All ionization smoke alarms sold in this state that are solely battery operated shall be packaged with a 10-year battery.

(2) All ionization smoke alarms sold in this state shall include a "hush" mechanism that allows a person to temporarily disengage the alarm for a period of not more than 15 minutes.

(3) The provisions of this section do not apply to:

(a) Smoke alarms specifically designed for hearing impaired persons;

(b) Smoke alarms sold in this state for shipment out of state; or

(c) Smoke alarms sold for installation in recreational vehicles, commercial vehicles, railroad equipment, aircraft, marine vessels or manufactured dwellings.

(4) The sale of a recreational vehicle, commercial vehicle, railroad equipment, aircraft, marine vessel or new manufactured dwelling containing a smoke alarm does not constitute sale of a smoke alarm.

[\[1997 c.647 §2.3; 1999 c.307 §12; 2007 c.70 §274\]](#)

## BUILDING PLANNING

**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. ~~Smoke alarms shall be interconnected.~~

### Exceptions:

1. Smoke alarms shall be permitted to be battery operated when installed in buildings without commercial power.
2. ~~Interconnection and h-~~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.

**R314.5 Interconnection.** Where 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 dwelling 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.

mm) from the ground or less than 2 inches (51 mm) measured vertically from concrete steps, porch slabs, patio slabs, and similar horizontal surfaces exposed to the weather.

6. Wood structural members supporting moisture-permeable floors or roofs that are exposed to the weather, such as concrete or masonry slabs, unless separated from such floors or roofs by an impervious moisture barrier.
7. Wood furring strips or other wood framing members attached directly to the interior of exterior masonry walls or concrete walls below *grade* except where an *approved* vapor retarder is applied between the wall and the furring strips or framing members.

**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 AWPA U1 for the species, product, preservative and end use. Preservatives shall be listed in Section 4 of AWPA U1.

1. Wood joists or the bottom of a wood structural floor when closer than 18 inches (457 mm) or wood girders when closer than 12 inches (305 mm) to the exposed ground in crawl spaces or unexcavated area located within the periphery of the building foundation.
2. All wood framing members and sill plates in contact with concrete or masonry foundation walls .
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- [such as 6-mil \(0.006 inch: 0.15 mm\) polyethylene sheeting or equivalent.](#)
4. The ends of wood girders entering exterior masonry or concrete walls having clearances of less than  $\frac{1}{2}$  inch (12.7 mm) on tops, sides and ends.
5. Wood siding, sheathing and wall framing on the exterior of a building having a clearance of less than 6 inches (152

**R317.1.4 Wood columns.** Wood columns shall be *approved* wood of natural decay resistance or *approved* pressure-preservative-treated wood.

**Exceptions:**

1. Columns exposed to the weather or in *basements* when supported by concrete piers or metal pedestals projecting 1 inch (25.4 mm) above a concrete floor or 6 inches (152 mm) above exposed earth and the earth is covered by an *approved* impervious moisture barrier- [such as 6-mil \(0.006 inch: 0.15 mm\) polyethylene sheeting or equivalent.](#)
2. Columns in enclosed crawl spaces or unexcavated areas located within the periphery of the building when supported by a concrete pier or metal pedestal at a height more than 8 inches (203mm) from exposed earth and the earth is covered by an impervious moisture barrier.



## SECTION R322 FLOOD-RESISTANT CONSTRUCTION

**R322.1 General.** Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as identified by the local jurisdiction [Flood Plain Administrator](#) shall be designed and constructed in accordance with the provisions contained in this section.

**Exception:** Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

**R322.1.1 Alternative provisions.** As an alternative to the requirements in Section R322.3 for buildings and structures located in whole or in part in coastal high-hazard areas (V Zones), ASCE 24 is permitted subject to the limitations of this code and the limitations therein.

**R322.1.2 Structural systems.** All structural systems of all buildings and structures shall be designed, connected and anchored to resist flotation, collapse or permanent lateral movement resulting from hydrodynamic and hydrostatic loads and stresses, including the effects of buoyancy.

**R322.1.3 Flood-resistant construction.** All buildings and structures erected in areas prone to flooding shall be constructed by methods and practices that minimize flood damage.

**R322.1.4 Establishing the design flood elevation.** The design flood elevation shall be [established by the Flood Plain Administrator](#), ~~used to define areas prone to flooding.~~ At a minimum, the design flood elevation is the higher of:

1. ~~The base flood elevation at the depth of peak elevation of flooding (including wave height) which has a 1 percent (100 year flood) or greater chance of being equaled or exceeded in any given year, or~~
2. ~~The elevation of the design flood associated with the area designated on a flood hazard map adopted by the local jurisdiction, or otherwise legally designated.~~

**R322.1.4.1 Determination of design flood elevations.** [\(Not adopted by the State of Oregon Building Codes Division as part of the State Building Code\)](#) ~~If design flood elevations are not specified, the building official is authorized to require the applicant to:~~

1. ~~Obtain and reasonably use data available from a federal, state or other source; or~~
2. ~~Determine the design flood elevation in accordance with accepted hydrologic and hydraulic engineering practices used to define special flood hazard areas. Determinations shall be undertaken by a registered design professional who shall document that the technical methods used reflect currently accepted engineering practice. Studies, analyses and computations shall be submitted in sufficient detail to allow thorough review and approval.~~

**R322.1.4.2 Determination of impacts.** [\(Not adopted by the State of Oregon Building Codes Division as part of the State Building Code\)](#) ~~In riverine flood hazard areas where design flood elevations are specified but floodways have not been designated, the applicant shall demonstrate that the effect of the proposed buildings and structures on design flood elevations, including fill, when combined with all other existing and anticipated flood hazard area encroachments, will not increase the design flood elevation more than 1 foot (305 mm) at any point within the jurisdiction.~~

**R322.1.5 Lowest floor.** The lowest floor shall be the floor of the lowest enclosed area, including *basement*, but excluding any unfinished flood-resistant enclosure that is useable solely for vehicle parking, building access or limited storage provided that such enclosure is not built so as to render the building or structure in violation of this section.

**R322.1.6 Protection of mechanical and electrical systems.** Electrical systems, *equipment* and components; heating, ventilating, air conditioning; plumbing *appliances* and plumbing fixtures; *duct systems*; and other service *equipment* shall be located at or above the elevation required [by the Flood Plain Administrator](#) in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones). ~~If replaced as part of a substantial improvement [as determined by the Flood Plain Administrator](#),~~ electrical systems, *equipment* and components; heating, ventilating, air conditioning and plumbing *appliances* and plumbing fixtures; *duct systems*; and other service *equipment* shall meet the requirements of this section. Systems, fixtures, and *equipment* and components shall not be mounted on or penetrate through walls intended to break away under flood loads.

**Exception:** Locating electrical systems, *equipment* and components; heating, ventilating, air conditioning; plumbing *appliances* and plumbing fixtures; *duct systems*; and other service *equipment* is permitted below the elevation required [by the Flood Plain Administrator](#) in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones) provided that they are designed and installed to prevent water from entering or accumulating

within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the design flood elevation in accordance with ASCE 24. Electrical wiring systems are permitted to be located below the required elevation provided they conform to the provisions of the *Electrical Code* for wet locations.

**R322.1.7 Protection of water supply and sanitary sewage systems.** New and replacement water supply systems shall minimize or eliminate infiltration of flood waters into the systems in accordance with the plumbing provisions of this code. New and replacement sanitary sewage systems shall minimize or eliminate infiltration of floodwaters into systems and discharges from systems into floodwaters in accordance with the plumbing provisions of this code.

**R322.1.8 Flood-resistant materials.** Building materials used below the elevation required [by the Flood Plain Administrator](#) in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high hazard areas including V Zones) shall comply with the following:

1. All wood, including floor sheathing, shall be pressure- preservative-treated in accordance with AWP A U1 for the species, product, preservative and end use or be the decay-resistant heartwood of redwood, black locust or cedars. Preservatives shall be listed in Section 4 of AWP A U1.
2. Materials and installation methods used for flooring and interior and *exterior walls* and wall coverings shall conform to the provisions of FEMA/FIA-TB-2.

**R322.1.9 Manufactured homes.** ~~(Not adopted by the State of Oregon Building Codes Division as part of the State Building Code) New or replacement manufactured homes shall be elevated in accordance with Section R322.2 or Section R322.3 in coastal high hazard areas (V Zones). The anchor and tie down requirements of Sections AE101 and AE102 of Appendix E shall apply. The foundation and anchorage of manufactured homes to be located in identified floodways shall be designed by a registered design professional and constructed in accordance with ASCE 24.~~

**R322.1.10 As-built elevation documentation.** A registered *design professional* shall prepare and seal documentation of the elevations specified in Section R322.2 or R322.3.

**R322.2 Flood hazard areas (including A Zones).** All areas that have been determined [by the Flood Plain Administrator](#) to be prone to flooding but not subject to high velocity wave action shall be designated as flood hazard areas. Flood hazard areas that have been delineated as subject to wave heights between 1 1/2 feet (457 mm) and 3 feet (914 mm) shall be designated as Coastal A Zones. All building and structures constructed in whole or in part in flood hazard areas shall be designed and constructed in accordance with Sections R322.2.1 through R322.2.3.

**R322.2.1 Elevation requirements.** For the purposes of Section R322, required elevations shall be [determined by the Flood Plain Administrator](#). ~~a minimum of 1 foot (305 mm) above the design flood elevation unless increased by~~

~~the local jurisdiction under the authority of National Flood Insurance Program (NFIP) incorporated in 423 U.S.C. 40001-4128.~~

- ~~1. Buildings and structures in flood hazard areas not designated as Coastal A Zones shall have the lowest floors elevated at least 1 foot above the design flood elevation.~~
- ~~2. Buildings and structures in flood hazard areas designated as Coastal A Zones shall have the lowest floors elevated to or above the base flood elevation plus 1 foot (305 mm), or to the design flood elevation, whichever is higher.~~
- ~~3. In areas of shallow flooding (AO Zones), buildings and structures shall have the lowest floor (including basement) elevated at least as high above the highest adjacent grade 1 foot above as the depth number specified in feet on the FIRM, or at least 3 feet (915 mm) if a depth number is not specified.~~
- ~~4. Basement floors that are below grade on all sides shall be elevated at least 1 foot above the design flood elevation.~~
- ~~5. The finished ground level of an under floor space such as a crawl space shall be equal to or higher than the outside finished ground level.~~

~~**Exception:** Enclosed areas below the design flood elevation, including basements whose floors are not below grade on all sides, shall meet the requirements of Section R322.2.2.~~

~~**Exception:** Under floor spaces that meet the requirements of FEMA/FIA TB-11.~~

**R322.2.2 Enclosed area below design flood elevation.** Enclosed areas, including crawl spaces, that are below the design flood elevation shall:

1. Be used solely for parking of vehicles, building access or storage.
2. Be provided with flood openings that meet the following criteria:
  - 2.1. There shall be a minimum of two openings on different sides of each enclosed area; if a building has more than one enclosed area below the design flood elevation, each area shall have openings on exterior walls.
  - 2.2. The total net area of all openings shall be at least 1 square inch (645 mm<sup>2</sup>) for each square foot (0.093 m<sup>2</sup>) of enclosed area, or the openings shall be designed and the *construction documents* shall include a statement by a registered *design professional* that the design of the openings will provide for equalization of hydrostatic flood forces on exterior walls by allowing for the automatic entry and exit of floodwaters as specified in Section 2.6.2.2 of ASCE 24.
  - 2.3. The bottom of each opening shall be 1 foot (305 mm) or less above the adjacent ground level.

- 2.4. Openings shall be not less than 3 inches (76 mm) in any direction in the plane of the wall.
- 2.5. Any louvers, screens or other opening covers shall allow the automatic flow of floodwaters into and out of the enclosed area.
- 2.6. Openings installed in doors and windows, that meet requirements 2.1 through 2.5, are acceptable; however, doors and windows without installed openings do not meet the requirements of this section.

**R322.2.3 Foundation design and construction.** Foundation walls for all buildings and structures erected in flood hazard areas shall meet the requirements of Chapter 4.

**Exception:** Unless designed in accordance with Section R404:

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

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

**R322.3 Coastal high-hazard areas (including V Zones).** Areas that have been determined [by the Flood Plain Administrator](#) to be subject to wave heights in excess of 3 feet (914 mm) or subject to high-velocity wave action or wave-induced erosion shall be designated as coastal high-hazard areas. Buildings and structures constructed in whole or in part in coastal high-hazard areas shall be designed and constructed in accordance with Sections R322.3.1 through R322.3.6.

#### **R322.3.1 Location and site preparation.**

1. New buildings and buildings that are determined [by the Flood Plain Administrator](#) to be substantially improved pursuant to Section R105.3.1.1, shall be located landward of the reach of mean high tide.
2. For any alteration of sand dunes and mangrove stands the ~~building official~~ [by the Flood Plain Administrator](#) shall require submission of an engineering analysis which demonstrates that the proposed *alteration* will not increase the potential for flood damage.

#### **R322.3.2 Elevation requirements.**

1. All buildings and structures erected within coastal high hazard areas [as established by the Flood Plain Administrator](#) shall be elevated so that the lowest portion of all structural members supporting the lowest floor, with the exception of mat or raft foundations, piling, pile caps, columns, grade beams and bracing, is:
  - 1.1. Located at least 1 foot (305 mm) above the design flood elevation, if the lowest horizontal structural member is oriented parallel to the

direction of wave approach, where parallel shall mean less than or equal to 20 degrees (0.35 rad) from the direction of approach, or

- 1.2. Located at the base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher, if the lowest horizontal structural member is oriented perpendicular to the direction of wave approach, where perpendicular shall mean greater than 20 degrees (0.35 rad) from the direction of approach.
2. Basement floors that are below *grade* on all sides are prohibited.
3. The use of fill for structural support is prohibited.
4. Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings and for support of parking slabs, pool decks, patios and walkways.

**Exception:** Walls and partitions enclosing areas below the design flood elevation shall meet the requirements of Sections R322.3.4 and R322.3.5.

**R322.3.3 Foundations.** Buildings and structures erected in coastal high-hazard areas [as established by the Flood Plain Administrator](#) shall be supported on pilings or columns and shall be adequately anchored to those pilings or columns. Pilings shall have adequate soil penetrations to resist the combined wave and wind loads (lateral and uplift). Water loading values used shall be those associated with the design flood. Wind loading values shall be those required by this code. Pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling. Pile systems design and installation shall be certified in accordance with Section R322.3.6. Mat, raft or other foundations that support columns shall not be permitted where soil investigations that are required in accordance with Section R401.4 indicate that soil material under the mat, raft or other foundation is subject to scour or erosion from wave-velocity flow conditions. Slabs, pools, pool decks and walkways shall be located and constructed to be structurally independent of buildings and structures and their foundations to prevent transfer of flood loads to the buildings and structures during conditions of flooding, scour or erosion from wave-velocity flow conditions, unless the buildings and structures and their foundation are designed to resist the additional flood load.

**R322.3.4 Walls below design flood elevation.** Walls and partitions are permitted below the elevated floor, provided that such walls and partitions are not part of the structural support of the building or structure and:

1. Electrical, mechanical, and plumbing system components are not to be mounted on or penetrate through walls that are designed to break away under flood loads; and
2. Are constructed with insect screening or open lattice; or
3. Are designed to break away or collapse without causing collapse, displacement or other structural damage

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to the elevated portion of the building or supporting foundation system. Such walls, framing and connections shall have a design safe loading resistance of not less than 10 (479 Pa) and no more than 20 pounds per square foot (958 Pa); or

4. Where wind loading values of this code exceed 20 pounds per square foot (958 Pa), the *construction documents* shall include documentation prepared and sealed by a registered *design professional* that:
  - 4.1. The walls and partitions below the design flood elevation have been designed to collapse from a water load less than that which would occur during the design flood.
  - 4.2. The elevated portion of the building and supporting foundation system have been designed to withstand the effects of wind and flood loads acting simultaneously on all building components (structural and nonstructural). Water loading values used shall be those associated with the design flood. Wind loading values shall be those required by this code.

**R322.3.5 Enclosed areas below design flood elevation.** Enclosed areas less than 1 foot (305 mm) above the design flood elevation [as determined by the Flood Plain Administrator](#) shall be used solely for parking of vehicles, building access or storage.

**R322.3.6 Construction documents.** The *construction documents* shall include documentation that is prepared and sealed by a registered *design professional* that the design and methods of construction to be used meet the applicable criteria of this section.



## CHAPTER 4

# FOUNDATIONS

**R401.1 Application.** The provisions of this chapter shall control the design and construction of the foundation and foundation spaces for all buildings. In addition to the provisions of this chapter, the design and construction of foundations in areas prone to flooding as established by the ~~local jurisdiction~~ [the Flood Plain Administrator](#) shall meet the provisions of Section R322. Wood foundations shall be designed and installed in accordance with AF&PA PWF.

**Exception:** The provisions of this chapter shall be permitted to be used for wood foundations only in the following situations:

1. In buildings that have no more than two floors and a roof.
2. When interior *basement* and foundation walls are constructed at intervals not exceeding 50 feet (15 240 mm).

Wood foundations in Seismic Design Category D1 or D2 shall be designed in accordance with accepted engineering practice.

**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) [or Figure R403.1\(1\)\(A\), as applicable.](#) The footing width, W, shall be based on the load-bearing value of the soil in accordance with Table R401.4.1. Spread footings shall be at least 6 inches (152mm) in thickness for foundation walls supporting one floor, 7 inches (178 mm) thick for foundation walls supporting two floors and 8 inches (203 mm) thick for foundation walls supporting three floors. Footing projections, P, shall be at least 2 inches (51 mm). The size of footings supporting piers and columns shall be based on the tributary load and allowable soil pressure in accordance with Table R401.4.1. For isolated footings, see Section R403.1.2. Footings for wood foundations shall be in accordance with the details set forth in Section R403.2, and Figures R403.1(2) and R403.1(3).

**R403.1.4.1 Concrete stem walls with concrete footings.**

In Seismic Design Categories D<sub>1</sub> and D<sub>2</sub> where a construction joint is created between a concrete footing and a concrete stem wall, a minimum of one No. 4 vertical bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall have a standard hook and extend to 3 inches (76 mm) clear of the bottom of the footing, shall have support and cover as specified in Section R403.1.5.3.3. ~~a standard hook and~~ shall extend a minimum of 14 inches (357 mm) into the stem wall. Standard hooks shall comply with Section R611.5.4.5. A minimum of one No. 4 horizontal bar shall be installed within the 12 inches (305 mm) of the top of the stem wall and one No. 4 horizontal bar shall be located at the bottom of the footing.

**R403.1.4.2 Masonry stem walls with concrete footings.**

In Seismic Design Categories D<sub>1</sub> and D<sub>2</sub> where a ~~grouted~~ masonry stem wall is supported on a concrete footing ~~and stem wall~~, a minimum of one No. 4 vertical bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall have a standard hook and extend to 3 inches (76 mm) clear of the bottom of the footing, ~~and have a standard hook.~~ shall have support and cover as specified in Section R403.1.5.3.3, and extend a minimum of 14 inches (357 mm) into the stem wall. Standard hooks shall comply with Section R611.5.4.5. A minimum of No. 4 horizontal bar shall be installed within 12 inches (305 mm) of the top of the wall and one No.4 horizontal bar shall be at the bottom of the footing. Masonry stem walls shall be solid grouted. ~~In Seismic Design Categories D<sub>1</sub> and D<sub>2</sub> masonry stem walls without solid grout and vertical reinforcing are not permitted.~~

~~**R403.1.4.1 Foundations with stem walls.** Foundations with stem walls shall have installed a minimum of one No.4 bar within 12 inches (305mm) of the top of the wall and one No. 4 bar located 3 inches (76 mm) to 4 inches (102 mm) from the bottom of the footing.~~

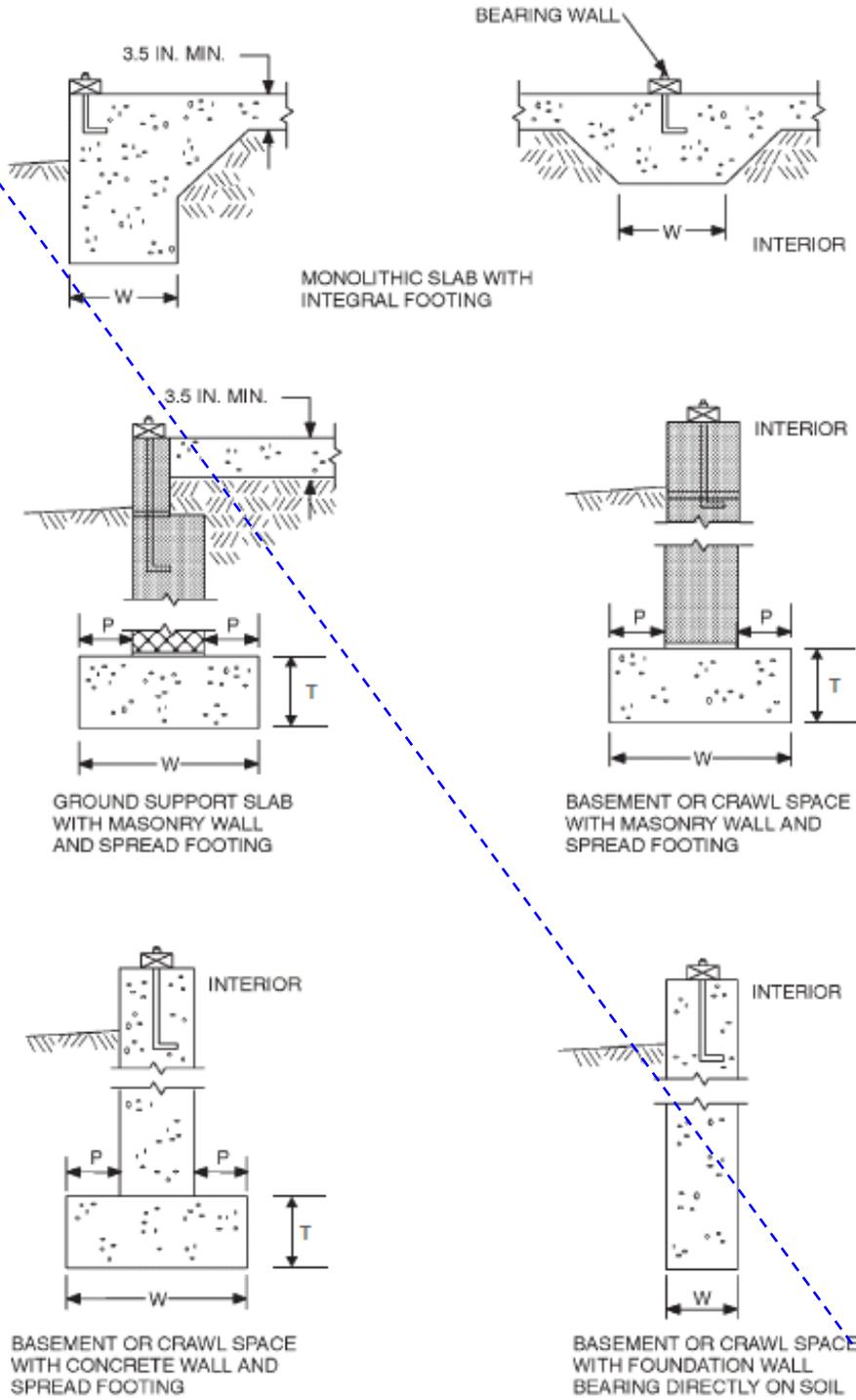
~~Exception: Foundations constructed monolithically shall be permitted to have a minimum of two No. 4 bars placed in the footing.~~

~~**R403.1.4.2**~~ **R403.1.4.3 Slabs-on-ground with turned-down footings.** In Seismic Design Categories D<sub>1</sub> and D<sub>2</sub>, S slabs on ground cast monolithically with turned down footings shall have a minimum of one No. 4 bar at the top and the bottom of the footing or one No. 5 or two No. 4 bars in the middle third of the footing depth.

~~Exception: For slabs on ground cast monolithically with the footing, locating one No. 5 bar or two No. 4 bars in the middle third of the footing depth shall be permitted as an alternative to placement at the footing top and bottom.~~

Where the slab is not cast monolithically with the footing, one No. 3 or larger vertical dowels with standard hooks on each end shall be provided installed at not more than 4 feet (1219 mm) on center in accordance with Figure ~~R403.1.3.2.~~ R403.1(1)(A) Standard hooks shall comply with Section R611.5.4.5.

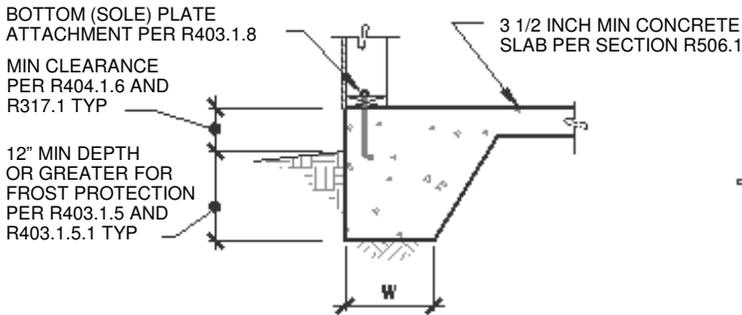
**R403.1.4 Seismic reinforcing- Footing and stem wall reinforcing in Seismic Design Categories D<sub>1</sub> and D<sub>2</sub>** Concrete footings located in Seismic Design Categories D<sub>1</sub> and D<sub>2</sub>, as established in Table R301.2(1), shall have minimum reinforcement in accordance with this Section and Figure R403.1(1)(A). ~~Bottom~~ Reinforcement shall be located a minimum of 3 inches (76 mm) clear from the bottom of the footing, installed with support and cover in accordance with Section R403.1.5.3.



For SI: 1 inch = 25.4 mm.

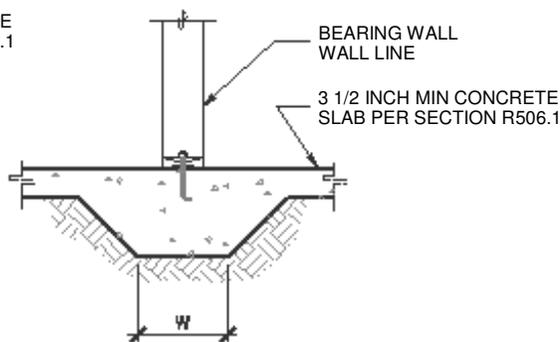
FIGURE R403.1(1)  
CONCRETE AND MASONRY FOUNDATION DETAILS

**FOUNDATIONS**



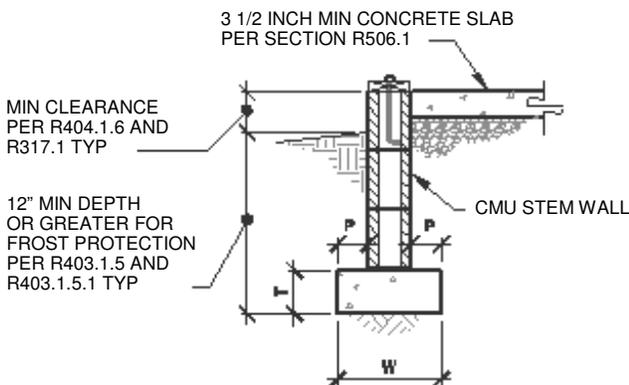
**1 MONOLITHIC SLAB GROUND WITH TURNED DOWN FOOTING**

SCALE NOT TO SCALE



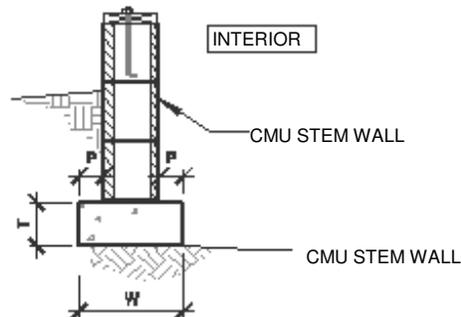
**2 THICKENED SLAB ON GROUND FOOTING AT BEARING WALLS OR BRACED WALL LINES**

SCALE NOT TO SCALE



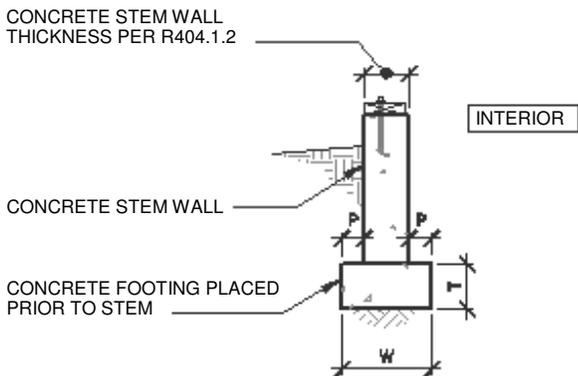
**3 SLAB ON GROUND WITH MASONRY STEM WALL AND SPREAD FOOTING**

SCALE NOT TO SCALE



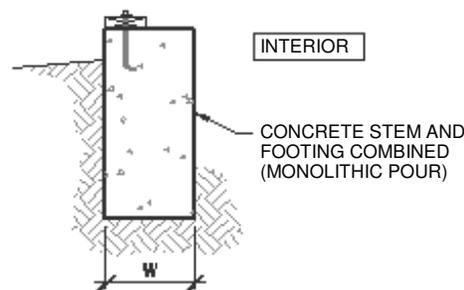
**4 BASEMENT OR CRAWLSPACE WITH MASONRY WALL AND SPREAD FOOTING**

SCALE NOT TO SCALE



**5 BASEMENT OR CRAWL SPACE CONCRETE WALL AND SPREAD FOOTING**

SCALE NOT TO SCALE



**6 MONOLITHIC SLAB GROUND WITH TURNED DOWN FOOTING**

SCALE NOT TO SCALE

**FIGURE R403.1(1)**

**PLAIN CONCRETE FOOTINGS WITH MASONRY AND CONCRETE STEMWALLS IN SDC A, B AND C<sup>a,b,c,d,e,f,g</sup>**

W = Width of footing and P = Projection per section R403.1.1

- a. See Section R404.3 for sill requirements.
- b. See Section R403.1.8 for sill attachment.
- c. See Section R506.2.3 for slab-on-grade ground cover, R408.1 for crawlspace vapor barrier.
- d. See Section R403.1 for base.
- e. See Figure R403.1(1)(A) for additional footing requirements for structures in SDC D<sup>1</sup> and D<sup>2</sup> and townhouses in SDC C.
- f. See Section R408 for underfloor ventilation and access requirements.
- g. See Section R403.1.4 for reinforcement requirements.

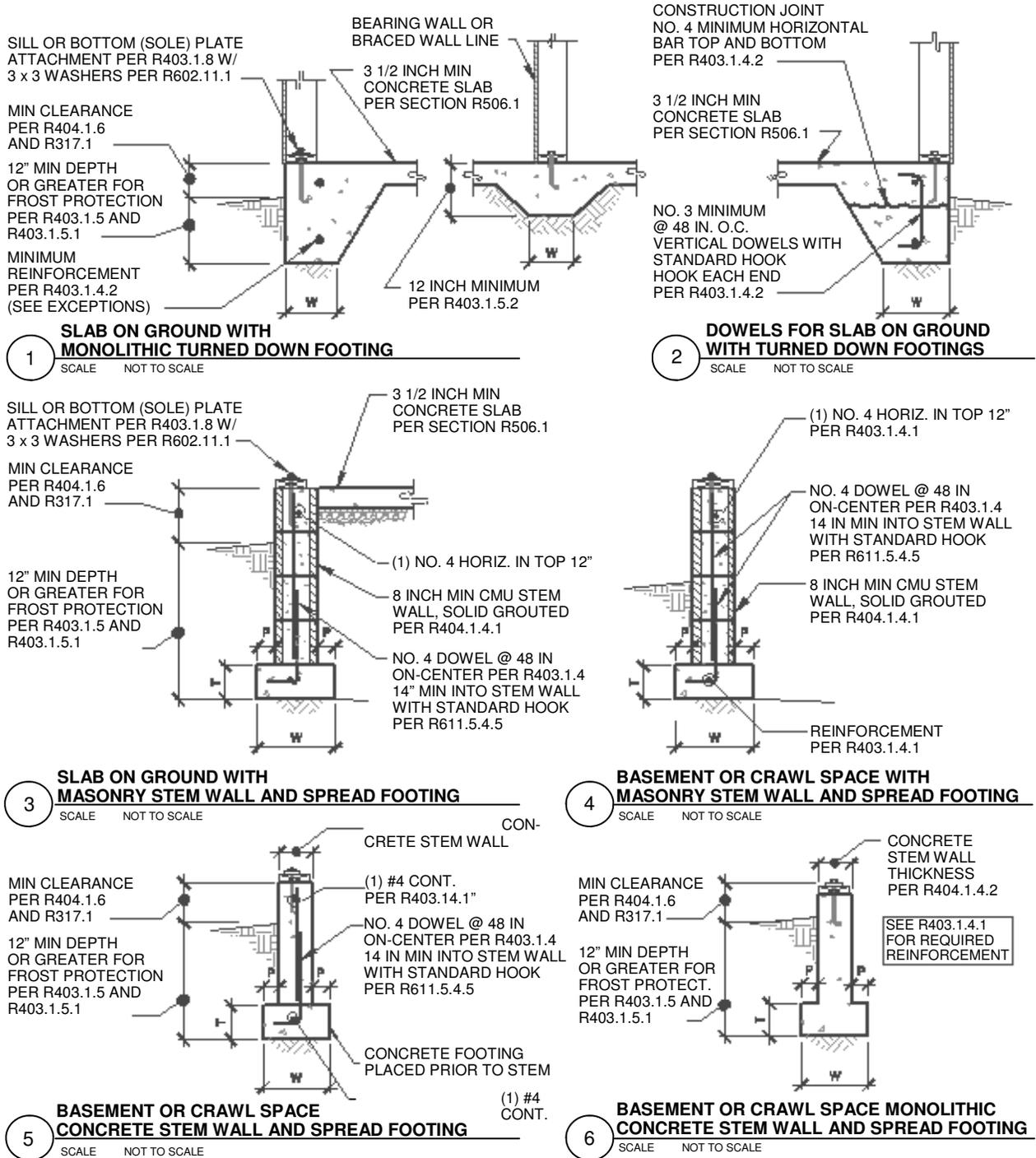


FIGURE R403.1(1)(A)  
 REINFORCED CONCRETE FOOTINGS AND MASONRY AND CONCRETE STEMWALLS IN SDC D<sup>1</sup> AND D<sup>2</sup> a,b,c,d,e,f

- W = Width of footing and P = Projection per section R403.1.1
- a. See Section R404.3 for sill requirements.
  - b. See Section R403.1.8 and R602.11 for sill attachment.
  - c. See Section R506.2.3 for slab-on-grade ground cover, R408.1 for crawlspace vapor barrier.
  - d. See Section R403.1 for base.
  - e. See Section R408 for underfloor ventilation and access requirements.
  - f. See Section R403.1.4 for reinforcement requirements.

**FOUNDATIONS**



**R403.1.5.2 Seismic conditions.** Interior bearing and braced wall panel footings in Seismic Design Categories D<sub>1</sub> and D<sub>2</sub>. In Seismic Design Categories D<sub>1</sub> and D<sub>2</sub>, interior footings supporting bearing walls or braced walls braced wall panels and cast monolithically with a slab on grade shall extend to a depth of not less than 12 inches (305 mm) below the top of the slab.

**R403.1.5.3 Reinforcement.** Footing and stem wall reinforcement shall comply with Sections R403.1.3.5.1 through R403.1.3.5.4.

**R403.1.5.3.1 Steel reinforcement.** Steel reinforcement shall comply with the requirements of ASTM A 615, A 706, or A 996. ASTM A 996 bars produced from rail steel shall be Type R. The minimum yield strength of reinforcing steel shall be 40,000 psi (Grade 40) (276 MPa).

**R403.1.5.3.2 Location of reinforcement in wall.** The center of vertical reinforcement in stem walls shall be located at the centerline of the wall. Horizontal and vertical reinforcement shall be located in footings and stem walls to provide the minimum cover required by Section R403.1.5.3.3.

**R403.1.5.3.3 Support and cover.** Reinforcement shall be secured in the proper location in the forms with tie wire or other bar support system to prevent displacement during the concrete placement operation. Steel reinforcement in concrete cast against the earth shall have a minimum cover of 3 inches (75 mm). Minimum cover for reinforcement in concrete cast in removable forms that will be exposed to the earth or weather shall be 1-1/2 inches (38 mm) for No. 5 bars and smaller, and 2 inches (50 mm) for No. 6 bars and larger. For concrete cast in removable forms that will not be exposed to the earth or weather, and for concrete cast in stay-in-place forms, minimum cover shall be 3/4 inch (19 mm).

**R403.1.5.3.4 Lap splices.** Vertical and horizontal reinforcement shall be the longest lengths practical. Where splices are necessary in reinforcement, the length and lap splice shall be in accordance with Table R611.5.4.(1) and Figure R611.5.4.(1). The maximum gap between noncontact parallel bars at a lap splice shall not exceed the smaller of one-fifth the required lap length and 6 inches (152 mm). See Figure R611.5.4(1)

**R403.1.5.4 Isolated concrete footings.** In detached one- and two-family dwellings which are three stories or less in height and constructed with stud bearing walls, isolated plain concrete footings, supporting columns or pedestals are permitted.

**TABLE R404.1.1(1)  
PLAIN MASONRY FOUNDATION WALLS<sup>f</sup>**

MAXIMUM WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT <sup>c</sup> (feet)	PLAIN MASONRY <sup>a</sup> MINIMUM NOMINAL WALL THICKNESS (inches)		
		Soil classes <sup>b</sup>		
		GW, GP, SW and SP	GM, GC, SM, SM-SC and ML	SC, MH, ML-CL and inorganic CL
5	4	6 solid <sup>d</sup> or 8	6 solid <sup>d</sup> or 8	6 solid <sup>d</sup> or 8
	5	6 solid <sup>d</sup> or 8	8	10
6	4	6 solid <sup>d</sup> or 8	6 solid <sup>d</sup> or 8	6 solid <sup>d</sup> or 8
	5	6 solid <sup>d</sup> or 8	8	10
	6	8	10	12
7	4	6 solid <sup>d</sup> or 8	8	8
	5	6 solid <sup>d</sup> or 8	10	10
	6	10	12	10 solid <sup>d</sup>
	7	12	10 solid <sup>d</sup>	12 solid <sup>d</sup>
8	4	6 solid <sup>d</sup> or 8	6 solid <sup>d</sup> or 8	8
	5	6 solid <sup>d</sup> or 8	10	12
	6	10	12	12 solid <sup>d</sup>
	7	12	12 solid <sup>d</sup>	Footnote e
	8	10 solid <sup>d</sup>	12 solid <sup>d</sup>	Footnote e
9	4	6 solid <sup>d</sup> or 8	6 solid <sup>d</sup> or 8	8
	5	8	10	12
	6	10	12	12 solid <sup>d</sup>
	7	12	12 solid <sup>d</sup>	Footnote e
	8	12 solid <sup>d</sup>	Footnote e	Footnote e
	9	Footnote e	Footnote e	Footnote e

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 Pa.

- a. Mortar shall be Type M or S and masonry shall be laid in running bond. UngROUTED hollow masonry units are permitted except where otherwise indicated.
- b. Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1.
- c. Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab-on-grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.
- d. Solid grouted hollow units or solid masonry units.
- e. Wall construction shall be in accordance with either Table R404.1.1(2), Table R404.1.1(3), Table R404.1.1(4), or a design shall be provided.
- f. [Minimum thickness of walls shall be 6 inches for walls supporting one floor, 8 inches for walls supporting two floors and 10 inches for walls supporting three floors.](#)

FOUNDATIONS

**TABLE R404.1.1(2)**  
**8-INCH MASONRY FOUNDATION WALLS WITH REINFORCING**  
**WHERE d > 5 INCHES<sup>a, c, f</sup>**

WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL <sup>e</sup>	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES) <sup>b, c</sup>		
		Soil classes and lateral soil load <sup>d</sup> (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, ML-CL and inorganic CL soils 60
6 feet 8 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#4 at 48
	6 feet 8 inches	#4 at 48	#5 at 48	#6 at 48
7 feet 4 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#4 at 48
	6 feet	#4 at 48	#5 at 48	#5 at 48
	7 feet 4 inches	#5 at 48	#6 at 48	#6 at 40
8 feet	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#4 at 48
	6 feet	#4 at 48	#5 at 48	#5 at 48
	7 feet	#5 at 48	#6 at 48	#6 at 40
	8 feet	#5 at 48	#6 at 48	#6 at 32
8 feet 8 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#5 at 48
	6 feet	#4 at 48	#5 at 48	#6 at 48
	7 feet	#5 at 48	#6 at 48	#6 at 40
	8 feet 8 inches	#6 at 48	#6 at 32	#6 at 24
9 feet 4 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#5 at 48
	6 feet	#4 at 48	#5 at 48	#6 at 48
	7 feet	#5 at 48	#6 at 48	#6 at 40
	8 feet	#6 at 48	#6 at 40	#6 at 24
	9 feet 4 inches	#6 at 40	#6 at 24	#6 at 16
10 feet	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#5 at 48
	6 feet	#4 at 48	#5 at 48	#6 at 48
	7 feet	#5 at 48	#6 at 48	#6 at 32
	8 feet	#6 at 48	#6 at 32	#6 at 24
	9 feet	#6 at 40	#6 at 24	#6 at 16
	10 feet	#6 at 32	#6 at 16	#6 at 16

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/mm.

- a. Mortar shall be Type M or S and masonry shall be laid in running bond.
- b. Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per lineal foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches.
- c. Vertical reinforcement shall be Grade 60 minimum. The distance, d, from the face of the soil side of the wall to the center of vertical reinforcement shall be at least 5 inches.
- d. Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for moist conditions without hydrostatic pressure. Refer to Table R405.1.
- e. Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab-on-grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.
- f. [Minimum thickness of walls shall be 6 inches for walls supporting one floor, 8 inches for walls supporting two floors and 10 inches for walls supporting three floors.](#)

**TABLE R404.1.1(3)**  
**10-INCH FOUNDATION WALLS WITH REINFORCING**  
**WHERE d > 6.75 INCHES<sup>a, c, d</sup>**

WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL <sup>e</sup>	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES) <sup>b, c</sup>		
		Soil classes and later soil load <sup>d</sup> (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, ML-CL and inorganic CL soils 60
6 feet 8 inches	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet 8 inches	#4 at 56	#5 at 56	#5 at 56
7 feet 4 inches	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#4 at 56	#5 at 56
	7 feet 4 inches	#4 at 56	#5 at 56	#6 at 56
8 feet	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#4 at 56	#5 at 56
	7 feet	#4 at 56	#5 at 56	#6 at 56
	8 feet	#5 at 56	#6 at 56	#6 at 48
8 feet 8 inches	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#4 at 56	#5 at 56
	7 feet	#4 at 56	#5 at 56	#6 at 56
	8 feet 8 inches	#5 at 56	#6 at 48	#6 at 32
9 feet 4 inches	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#5 at 56	#5 at 56
	7 feet	#4 at 56	#5 at 56	#6 at 56
	8 feet	#5 at 56	#6 at 56	#6 at 40
	9 feet 4 inches	#6 at 56	#6 at 40	#6 at 24
10 feet	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#5 at 56	#5 at 56
	7 feet	#5 at 56	#6 at 56	#6 at 48
	8 feet	#5 at 56	#6 at 48	#6 at 40
	9 feet	#6 at 56	#6 at 40	#6 at 24
	10 feet	#6 at 48	#6 at 32	#6 at 24

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/mm.

- a. Mortar shall be Type M or S and masonry shall be laid in running bond.
- b. Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per lineal foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches.
- c. Vertical reinforcement shall be Grade 60 minimum. The distance, d, from the face of the soil side of the wall to the center of vertical reinforcement shall be at least 6.75 inches.
- d. Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for moist conditions without hydrostatic pressure. Refer to Table R405.1.
- e. Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab-on-grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.
- f. [Minimum thickness of walls shall be 6 inches for walls supporting one floor, 8 inches for walls supporting two floors and 10 inches for walls supporting three floors.](#)

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**TABLE R404.1.1(4)**  
**12-INCH MASONRY FOUNDATION WALLS WITH REINFORCING**  
**WHERE  $d > 8.75$  INCHES<sup>a, c, d</sup>**

WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL <sup>e</sup>	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES) <sup>b, c</sup>		
		Soil classes and lateral soil load <sup>d</sup> (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, ML-CL and inorganic CL soils 60
6 feet 8 inches	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet 8 inches	#4 at 72	#4 at 72	#5 at 72
7 feet 4 inches	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#4 at 72	#5 at 72
	7 feet 4 inches	#4 at 72	#5 at 72	#6 at 72
8 feet	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#4 at 72	#5 at 72
	7 feet	#4 at 72	#5 at 72	#6 at 72
	8 feet	#5 at 72	#6 at 72	#6 at 64
8 feet 8 inches	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#4 at 72	#5 at 72
	7 feet	#4 at 72	#5 at 72	#6 at 72
	8 feet 8 inches	#5 at 72	#7 at 72	#6 at 48
9 feet 4 inches	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#5 at 72	#5 at 72
	7 feet	#4 at 72	#5 at 72	#6 at 72
	8 feet	#5 at 72	#6 at 72	#6 at 56
	9 feet 4 inches	#6 at 72	#6 at 48	#6 at 40
10 feet	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#5 at 72	#5 at 72
	7 feet	#4 at 72	#6 at 72	#6 at 72
	8 feet	#5 at 72	#6 at 72	#6 at 48
	9 feet	#6 at 72	#6 at 56	#6 at 40
	10 feet	#6 at 64	#6 at 40	#6 at 32

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/mm.

- a. Mortar shall be Type M or S and masonry shall be laid in running bond.
- b. Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per lineal foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches.
- c. Vertical reinforcement shall be Grade 60 minimum. The distance, d, from the face of the soil side of the wall to the center of vertical reinforcement shall be at least 8.75 inches.
- d. Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for moist conditions without hydrostatic pressure. Refer to Table R405.1.
- e. Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground levels. Where an interior concrete slab-on-grade is provided and in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height is permitted to be measured from the exterior finish ground level to the top of the interior concrete slab is permitted.
- f. [Minimum thickness of walls shall be 6 inches for walls supporting one floor, 8 inches for walls supporting two floors and 10 inches for walls supporting three floors.](#)

**TABLE R404.1.2(8)**  
**MINIMUM VERTICAL REINFORCEMENT FOR 6-, 8-, 10-INCH AND 12-INCH NOMINAL FLAT BASEMENT WALLS<sup>b, c, d, e, f, h, i, k, n, o</sup>**

MAXIMUM WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT <sup>g</sup> (feet)	MINIMUM VERTICAL REINFORCEMENT—BAR SIZE AND SPACING (inches)											
		Soil classes <sup>a</sup> and design lateral soil (psf per foot of depth)											
		GW, GP, SW, SP 30				GM, GC, SM, SM-SC and ML 45				SC, ML-CL and inorganic CL 60			
		Minimum nominal wall thickness (inches)											
		6	8	10	12	6	8	10	12	6	8	10	12
5	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
6	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR <sup>1</sup>	NR	NR	NR	4 @ 35	NR <sup>1</sup>	NR
7	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 47	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	NR	6 @ 43	5 @ 48	NR <sup>1</sup>
	7	5 @ 46	NR	NR	NR	NR	NR	NR	NR	NR	6 @ 34	6 @ 48	NR
8	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	6	4 @ 37	NR <sup>1</sup>	NR	NR	NR	NR	NR	NR	NR	6 @ 37	5 @ 43	NR <sup>1</sup>
	7	5 @ 40	NR	NR	NR	NR	NR	NR	NR	NR	6 @ 34	6 @ 43	NR
	8	6 @ 43	5 @ 47	NR <sup>1</sup>	NR	NR	NR	NR	NR	NR	6 @ 27	6 @ 32	6 @ 44
9	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	6	4 @ 34	NR <sup>1</sup>	NR	NR	NR	NR	NR	NR	NR	6 @ 36	6 @ 39	NR <sup>1</sup>
	7	5 @ 36	NR	NR	NR	NR	NR	NR	NR	NR	6 @ 33	6 @ 38	5 @ 37
	8	6 @ 38	5 @ 41	NR <sup>1</sup>	NR	NR	NR	NR	NR	NR	6 @ 24	6 @ 29	6 @ 39
	9	6 @ 34	6 @ 46	NR	NR	NR	NR	NR	NR	NR	6 @ 19	6 @ 23	6 @ 30
10	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	6	5 @ 48	NR <sup>1</sup>	NR	NR	NR	NR	NR	NR	NR	6 @ 34	5 @ 37	NR
	7	6 @ 47	NR	NR	NR	NR	NR	NR	NR	NR	6 @ 30	6 @ 35	6 @ 48
	8	6 @ 34	5 @ 38	NR	NR	NR	NR	NR	NR	NR	6 @ 22	6 @ 26	6 @ 35
	9	6 @ 34	6 @ 41	4 @ 48	NR <sup>1</sup>	NR	NR	NR	NR	NR	4 @ 48 <sup>m</sup>	DR	6 @ 22
	10	6 @ 28	6 @ 33	6 @ 45	NR	NR	NR	NR	NR	NR	DR <sup>j</sup>	6 @ 23	6 @ 29

For SI: 1 foot = 304.8 mm; 1 inch = 25.4 mm; 1 pound per square foot per foot = 0.157 kPa<sup>2</sup>/m, 1 pound per square inch = 6.895 kPa.

- a. Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1.
- b. Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi.
- c. Vertical reinforcement with a yield strength of less than 60,000 psi and/or bars of a different size than specified in the table are permitted in accordance with Section R404.1.2.3.7.6 and Table R404.1.2(9).
- d. NR indicates no vertical wall reinforcement is required, except for 6-inch nominal walls formed with stay-in-place forming systems in which case vertical reinforcement shall be #4@48 inches on center.
- e. Allowable deflection criterion is  $L/240$ , where  $L$  is the unsupported height of the basement wall in inches.
- f. Interpolation is not permitted.
- g. Where walls will retain 4 feet or more of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.
- h. Vertical reinforcement shall be located to provide a cover of 1.25 inches measured from the inside face of the wall. The center of the steel shall not vary from the specified location by more than the greater of 10 percent of the wall thickness or  $3/8$ -inch.
- i. Concrete cover for reinforcement measured from the inside face of the wall shall not be less than  $3/4$ -inch. Concrete cover for reinforcement measured from the outside face of the wall shall not be less than  $1\frac{1}{2}$  inches for No. 5 bars and smaller, and not less than 2 inches for larger bars.
- j. DR means design is required in accordance with the applicable building code, or where there is no code in accordance with ACI 318.
- k. Concrete shall have a specified compressive strength,  $f'_c$ , of not less than 2,500 psi at 28 days, unless a higher strength is required by footnote l or m.
- l. The minimum thickness is permitted to be reduced 2 inches, provided the minimum specified compressive strength of concrete,  $f'_c$ , is 4,000 psi.
- m. A plain concrete wall with a minimum nominal thickness of 12 inches is permitted, provided minimum specified compressive strength of concrete,  $f'_c$ , is 3,500 psi.
- n. See Table R61 1.3 for tolerance from nominal thickness permitted for flat walls.
- o. Minimum thickness of walls shall be 6 inches for walls supporting one floor, 8 inches for walls supporting two floors and 10 inches for walls supporting three floors.

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**R404.4 Retaining walls.** Retaining walls that are not laterally supported at the top and that retain in excess of 48 inches (1220 mm) of unbalanced fill or retaining walls exceeding 24 inches (610 mm) in height that resist lateral loads in addition to soil shall be designed in accordance with accepted engineering practice 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. This section shall not apply to foundation walls supporting buildings.

**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. The minimum net area of ventilation openings shall not be less than 1 square foot (0.0929 m<sup>2</sup>) for each 150 square feet (14 m<sup>2</sup>) of under-floor space area.

The minimum net area of ventilation openings may be reduced to 1 square foot (0.0929 m<sup>2</sup>) for each 1,500 square feet (140 m<sup>2</sup>) of under-floor space area when the ground surface is covered by a 6-mil (0.006 inch; 0.15 mm), black polyethylene sheeting or other approved materials, with joints lapped 12 inches (305 mm) at seams and extending up the foundation walls 12 inches (305 mm). [The reduction in ventilation area is not allowed for naturally ventilated crawlspaces in new construction in Baker, Clackamas, Hood River, Multnomah, Polk, Washington and Yamhill counties where radon-mitigating construction is required.](#)

The required ventilation openings shall be placed so as to provide cross ventilation of the space with one such ventilating opening shall be within 3 feet (914 mm) of each corner of the building.

**Exceptions:**

1. Ventilation openings shall be permitted to be omitted on one side.
2. Ventilation openings are not required in the foundation when a continuously operated mechanical ventilation system is installed. The system shall be designed to have the capacity to exhaust a minimum of 1.0 cfm (0.5 L/s) for each 50 square feet (4.6 L/s) of under-floor area. The ground surface shall be covered with an approved ground cover material.
3. Ventilation openings in townhouses shall be permitted to be omitted on two sides when adjoining adjacent dwellings.

**R408.6 Flood resistance.** For buildings located in areas prone to flooding as established by the ~~local jurisdiction~~ [Flood Plain Administrator](#):

1. Walls enclosing the under-floor space shall be provided with flood openings in accordance with Section R322.2.2.
2. The finished ground level of the under-floor space shall be equal to or higher than the outside finished ground level on at least one side.

Exception: Under-floor spaces that meet the requirements of FEMA/FIA TB 11-1.



## CHAPTER 5

# FLOORS

**R502.2 Design and construction.** Floors shall be designed and constructed in accordance with the provisions of this chapter, Figure R502.2 and Sections R317 and [R318](#) or in accordance with AF&PA/NDS.

**R502.2.1 Framing at braced wall lines.** 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. 10.6. [In all structures or portions of structures in Seismic Design Category D<sub>1</sub> and D<sub>2</sub> and in townhouses in Seismic Design Category C, vertical offsets in floor diaphragms and braced wall support shall comply with the requirements of Section R301.2.2.2.5.](#)



## FLOORS

~~**R502.2.2 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 as applicable. 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.~~

~~**R502.2.2.1 Deck ledger connection to band joist.** For decks supporting a total design load of 50 pounds per square foot (2394 Pa) [40 pounds per square foot (1915 Pa) live load plus 10 pounds per square foot (479 Pa) dead load], the connection between a deck ledger of pressure-preservative treated or *approved* decay-resistant species, and a 2 inch (51 mm) nominal lumber or approved engineered wood band joist bearing on a sill plate or wall plate shall be constructed with  $\frac{1}{2}$  inch (12.7 mm) lag screws or bolts with washers in accordance with Table R502.2.2.1. Lag screws, bolts and washers shall be hot dipped galvanized or stainless steel.~~

~~**R502.2.2.1.1 Placement of lag screws or bolts in deck ledgers.** The lag screws or bolts shall be placed 2 inches (51 mm) in from the bottom or top of the deck ledgers and between 2 and 5 inches (51 and 127 mm) in from the ends. The lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger.~~

~~**R502.2.2.2 Alternate deck ledger connections.** Deck ledger connections not conforming to Table R502.2.2.1 shall be designed in accordance with accepted engineering practice.~~

~~**R502.2.2.3 Deck lateral load connection.** The lateral load connection required by Section R502.2.2 shall be permitted to be in accordance with Figure R502.2.2.3. Hold down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N).~~

~~**R502.2.2.4 Exterior wood/plastic composite deck boards.** Wood/plastic composite deck boards shall be installed in accordance with the manufacturer's instructions.~~

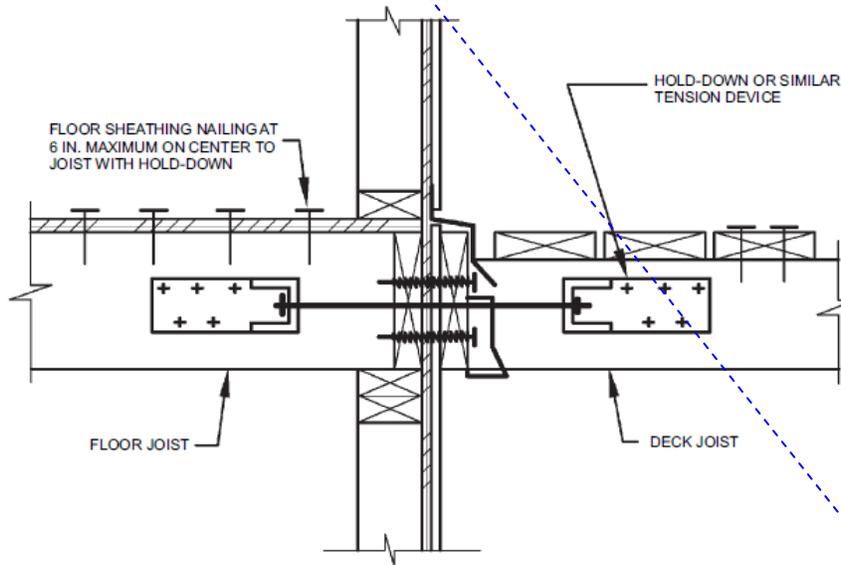
**R502.3.3 Floor cantilevers.** Floor cantilever spans shall not exceed the nominal depth of the wood floor joist. Floor cantilevers constructed in accordance with Table R502.3.3(1) shall be permitted when supporting a light frame bearing wall and roof only. Floor cantilevers supporting an exterior balcony are permitted to be constructed in accordance with Table R502.3.3(2). [Floor cantilevers supporting braced wall panels in all structures in Seismic Design Category D<sub>1</sub> and D<sub>2</sub> and in townhouses in Seismic Design Category C shall be constructed in accordance with Section R301.2.2.2.5, Item 1.](#)

**TABLE R502.2.2.1**  
**FASTENER SPACING FOR A DECK LEDGER AND A 2-INCH NOMINAL SOLID-SAWN BAND JOIST<sup>a, b</sup>**  
 (Deck live load = 40 psf, deck dead load = 10 psf)

JOIST SPAN	6' and less	6'1" to 8'	8'1" to 10'	10'1" to 12'	12'1" to 14'	14'1" to 16'	16'1" to 18'
Connection details	On-center spacing of fasteners <sup>c, e</sup>						
1/2 inch diameter lag screw with 15/32 inch maximum sheathing <sup>a</sup>	30	23	18	15	13	11	10
1/2 inch diameter bolt with 15/32 inch maximum sheathing	36	36	34	29	24	21	19
1/2 inch diameter bolt with 15/32 inch maximum sheathing and 1/2 inch stacked washers <sup>b, h</sup>	36	36	29	24	21	18	16

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

- a. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
- b. The maximum gap between the face of the ledger board and face of the wall sheathing shall be 1/2".
- c. Ledgers shall be flashed to prevent water from contacting the house band joist.
- d. Lag screws and bolts shall be staggered in accordance with Section R502.2.2.1.1.
- e. Deck ledger shall be minimum 2 x 8 pressure-preservative-treated No. 2 grade lumber, or other approved materials as established by standard engineering practice.
- f. When solid-sawn pressure-preservative-treated deck ledgers are attached to a minimum 1 inch thick engineered wood product (structural composite lumber, laminated veneer lumber or wood structural panel band joist), the ledger attachment shall be designed in accordance with accepted engineering practice.
- g. A minimum 1 x 9 1/2 Douglas Fir laminated veneer lumber rimboard shall be permitted in lieu of the 2-inch nominal band joist.
- h. Wood structural panel sheathing, gypsum board sheathing or foam sheathing not exceeding 1 inch in thickness shall be permitted. The maximum distance between the face of the ledger board and the face of the band joist shall be 1 inch.



For SI: 1 inch = 25.4 mm.

**FIGURE R502.2.2.3**  
**DECK ATTACHMENT FOR LATERAL LOADS**

**FLOORS**



FLOORS

**TABLE R502.3.3(1)**  
**CANTILEVER SPANS FOR FLOOR JOISTS SUPPORTING LIGHT-FRAME EXTERIOR BEARING WALL AND ROOF ONLY<sup>a,b,c,f,g,h</sup>**  
**(Floor Live Load ≤ 40 psf, Roof Live Load ≤ 20 psf)**

Member & Spacing	Maximum Cantilever Span (Uplift Force at Backspan Support in Lbs.) <sup>d, e</sup>											
	Ground Snow Load											
	≤ 20 psf			30 psf			50 psf			70 psf		
	Roof Width			Roof Width			Roof Width			Roof Width		
	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft
2 × 8 @ 12"	20" (177)	15" (227)	—	18" (209)	—	—	—	—	—	—	—	—
2 × 10 @ 16"	29" (228)	21" (297)	16" (364)	26" (271)	18" (354)	—	20" (375)	—	—	—	—	—
2 × 10 @ 12"	36" (166)	26" (219)	20" (270)	34" (198)	22" (263)	16" (324)	26" (277)	—	—	19" (356)	—	—
2 × 12 @ 16"	—	32" (287)	25" (356)	36" (263)	29" (345)	21" (428)	29" (367)	20" (484)	—	23" (471)	—	—
2 × 12 @ 12"	—	42" (209)	31" (263)	—	37" (253)	27" (317)	36" (271)	27" (358)	17" (447)	31" (348)	19" (462)	—
2 × 12 @ 8"	—	48" (136)	45" (169)	—	48" (164)	38" (206)	—	40" (233)	26" (294)	36" (230)	29" (304)	18" (379)

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

- a. Tabulated values are for clear-span roof supported solely by exterior bearing walls.
- b. Spans are based on No. 2 Grade lumber of Douglas fir-larch, hem-fir, southern pine, and spruce-pine-fir for repetitive (3 or more) members.
- c. Ratio of backspan to cantilever span shall be at least 3:1.
- d. Connections capable of resisting the indicated uplift force shall be provided at the backspan support.
- e. Uplift force is for a backspan to cantilever span ratio of 3:1. Tabulated uplift values are permitted to be reduced by multiplying by a factor equal to 3 divided by the actual backspan ratio provided (3/backspan ratio).
- f. See Section R301.2.2.2.5, Item 1, for additional limitations on cantilevered floor joists for ~~detached one- and two-family dwellings all structures~~ all structures in Seismic Design Category D<sub>1</sub>, or D<sub>2</sub> and townhouses in Seismic Design Category C, D<sub>1</sub>, or D<sub>2</sub>.
- g. A full-depth rim joist shall be provided at the unsupported end of the cantilever joists. Solid blocking shall be provided at the supported end.
- h. Linear interpolation shall be permitted for building widths and ground snow loads other than shown.



**R502.10 Framing of openings.** Openings in floor framing shall be framed with a header and trimmer joists. When the header joist span does not exceed 4 feet (1219 mm), the header joist may be a single member the same size as the floor joist. Single trimmer joists may be used to carry a single header joist that is located within 3 feet (914mm) of the trimmer joist bearing. When the header joist span exceeds 4 feet (1219mm), the trimmer joists and the header joist shall be doubled and of sufficient cross section to support the floor joists framing into the header. *Approved* hangers shall be used for the header joist to trimmer joist connections when the header joist span exceeds 6 feet (1829mm). Tail joists over 12 feet (3658mm) long shall be supported at the header by framing anchors or on ledger strips not less than 2 inches by 2 inches (51 mm by 51 mm). [In all structures in Seismic Design Category D<sub>1</sub> and D<sub>2</sub> and in townhouses in Seismic Design Category C, construction shall comply with the requirements of Section R301.2.2.2.5, Item 4.](#)

**R505.1.1 Applicability limits.** The provisions of this section shall control the construction of cold-formed steel floor framing for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist span, not greater than 40 feet (12 192mm) in width parallel to the joist span, and less than or equal to three stories above *grade* plane. Cold-formed steel floor framing constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s), Exposure B or C, and a maximum ground snow load of 70 pounds per square foot (3.35 kPa) In all structures or portions of structures in Seismic Design Category D<sub>1</sub> and D<sub>2</sub> and in townhouses in Seismic Design Category C, construction shall comply with the requirements of Section R301.2.2.2.5.

**FLOORS**



## FLOORS

**R505.3.8 Framing of floor openings.** Openings in floors shall be framed with header and trimmer joists. Header joist spans shall not exceed 6 feet (1829mm) or 8 feet (2438mm) in length in accordance with Figure R505.3.8(1) or R505.3.8(2), respectively. Header and trimmer joists shall be fabricated from joist and track members, having a minimum size and thickness at least equivalent to the adjacent floor joists and shall be installed in accordance with Figures R505.3.8(1), R505.3.8(2), R505.3.8(3), and R505.3.8(4). Each header joist shall be connected to trimmer joists with four 2-inch-by-2-inch (51mm by 51 mm) clip angles. Each clip angle shall be fastened to both the header and trimmer joists with four No. 8 screws, evenly spaced, through each leg of the clip angle. The clip angles shall have a thickness not less than that of the floor joist. Each track section for a built-up header or trimmer joist shall extend the full length of the joist (continuous). [In all structures in Seismic Design Category D<sub>1</sub> and D<sub>2</sub> and in townhouses in Seismic Design Category C, openings are subject to the limitations of Section R301.2.2.2.5.](#)

**SECTION R507  
DECKS**

**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 Deck ledger connection to band joist.** For decks supporting a total design load of 50 pounds per square foot (2394 Pa) [40 pounds per square foot (1915 Pa) live load plus 10 pounds per square foot (479 Pa) dead load], the connection between a deck ledger of pressure-preservative-treated Southern Pine, incised pressure-preservative-treated Hem-Fir or approved decay-resistant species, and a 2-inch (51 mm) nominal lumber band joist bearing on a sill plate or wall plate shall be constructed with 1/2-inch (12.7 mm) lag screws or bolts with washers in accordance with Table R507.2. Lag screws, bolts and washers shall be hot-dipped, galvanized or stainless steel.

**R507.2.1 Placement of lag screws or bolts in deck ledgers and band joists.** The lag screws or bolts in deck ledgers and band joists shall be placed in accordance with Table R507.2.1 and Figures R507.2.1(1) and R507.2.1(2).

**R507.2.2 Alternate deck ledger connections.** Deck ledger connections not conforming to Table R507.2 shall be designed in accordance with accepted engineering practice. Girders supporting deck joists shall not be supported on deck ledgers or band joists. Deck ledgers shall not be supported on stone or masonry veneer.

**R507.2.3 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. Where the lateral load connection is provided in accordance with Figure R507.2.3, hold-down tension devices shall be installed in not less than two locations per deck as close as practical to each end of the deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N).

**R507.3 Wood/plastic composites.** Wood/plastic composites used in exterior deck boards, stair treads, handrails and guardrail systems shall bear a label indicating the required performance levels and demonstrating compliance with the provisions of ASTM D 7032.

**R507.3.1 Installation of wood/plastic composites.** Wood/plastic composites shall be installed in accordance with the manufacturer's instructions.

**TABLE R507.2  
FASTENER SPACING FOR A SOUTHERN PINE OR HEM-FIR DECK LEDGER AND  
A 2-INCH-NOMINAL SOLIS-SAWN SPRUCE-PINE-FIR BAND JOIST<sup>C,F,G</sup>**  
(Deck live load = 40 psf, deck dead load = 10 psf)

JOIST SPAN	6' and less	6' 1" to 8'	8' 1" to 10'	10' 1" to 12'	12' 1" to 14'	14' 1" to 16'	16' 1" to 18'
Connection details	On-center spacing of fasteners <sup>d,e</sup>						
1/2 inch diameter lag screw with 15/32 inch maximum sheathing <sup>a</sup>	30	23	18	15	13	11	10
1/2 inch diameter bolt with 15/32 inch maximum sheathing	36	36	34	29	24	21	19
1/2 inch diameter bolt with 15/32 inch maximum sheathing and 1/2 inch stacked washers <sup>b,h</sup>	36	36	29	24	21	18	16

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

- a. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
- b. The maximum gap between the face of the ledger board and face of the wall sheathing shall be 1/2 inch.
- c. Ledgers shall be flashed to prevent water from contacting the house band joist.
- d. Lag screws and bolts shall be staggered in accordance with Section R507.2.1.
- e. Deck ledger shall be minimum 2 x 8 pressure-preservative-treated No. 2 grade lumber, or other approved materials as established by standard engineering practice.
- f. When solid-sawn pressure-preservative-treated deck ledgers are attached to a minimum 1-inch-thick engineered wood product (structural composite lumber, laminated veneer lumber or wood structural panel band joist), the ledger attachment shall be designed in accordance with accepted engineering practice.
- g. A minimum 1 x 9 1/2 Douglas Fir laminated veneer lumber rimboard shall be permitted in lieu of the 2-inch nominal band joist.
- h. Wood structural panel sheathing, gypsum board sheathing or foam sheathing not exceeding 1 inch in thickness shall be permitted. The maximum distance between the face of the ledger board and the face of the band joist shall be 1 inch.

**TABLE R507.2.1  
PLACEMENT OF LAG SCREWS AND BOLTS IN DECK LEDGERS AND BAND JOISTS**

MINIMUM END AND EDGE DISTANCES AND SPACING BETWEEN ROWS				
	TOP LEDGE	BOTTOM EDGE	ENDS	ROW SPACING
Ledger <sup>a</sup>	2 inches <sup>d</sup>	¾ inch	2 inches <sup>b</sup>	1 5/8 inches <sup>b</sup>
Band Joist <sup>c</sup>	¾ inch	2 inches	2 inches <sup>b</sup>	1 5/8 inches <sup>b</sup>

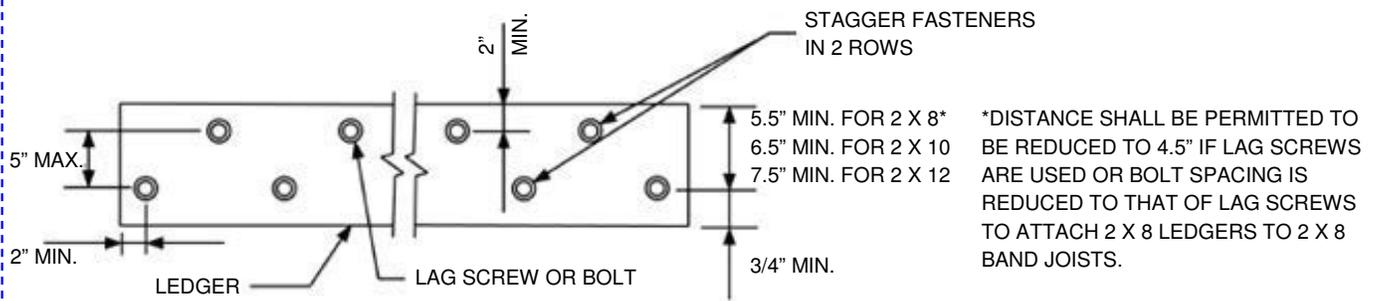
For SI: 1 inch = 25.4 mm

a.Lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger in accordance with Figure R507.2.1(1).

b.Maximum 5 inches.

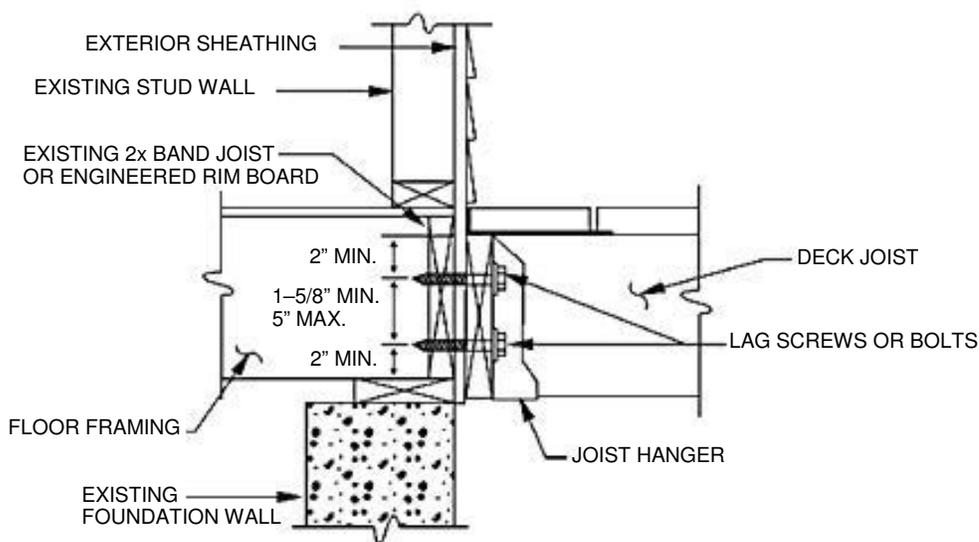
c.For engineered rim joists, the manufacturer’s recommendations shall govern.

d.The minimum distance from bottom row of lag screws or bolts to the top edge of the ledger shall be in accordance with Figure R507.2.1(1).



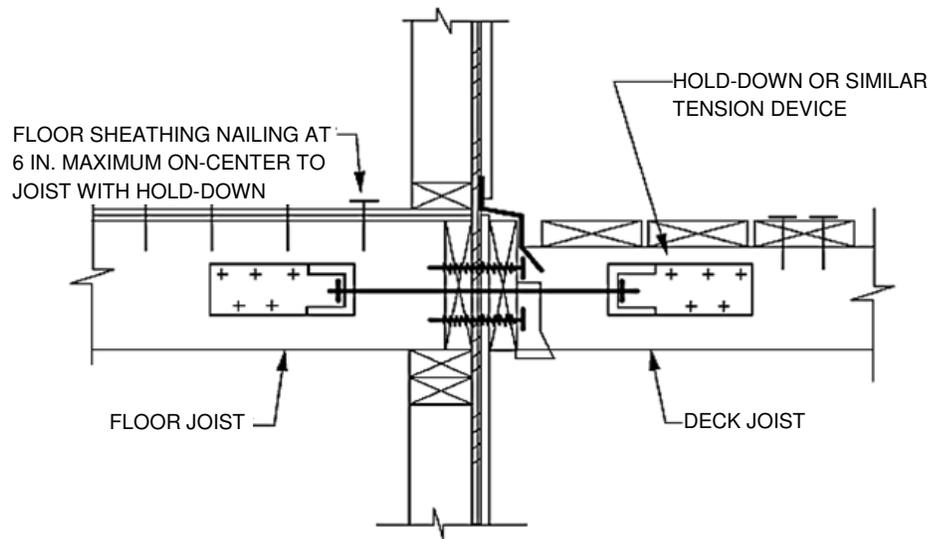
For SI: 1 inch = 25.4 mm.

**FIGURE R507.1.1(1)  
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGERS**



For SI: 1 inch = 25.4 mm.

**FIGURE R507.2.1(2)  
PLACEMENT OF LAG SCREWS AND BOLTS IN BAND JOISTS**



For SI: 1 inch = 25.4 mm.

**FIGURE R507.2.3  
DECK ATTACHMENT FOR LATERAL LOADS**

**FLOORS**

**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. In all structures in Seismic Design Category D<sub>1</sub> and D<sub>2</sub> and in townhouses in Seismic Design Category C, openings are subject to the limitations of Section R301.2.2.2.5.

**Exception:** Detached one- and two-family *dwelling*s located in Seismic Design Category C are exempt from the seismic bracing requirements of this section. Wind speed provisions for bracing shall be applicable to detached one- and two-family *dwelling*s.

**WALL CONSTRUCTION**

**R602.10.2 Intermittent braced wall panel construction methods.** The construction of intermittent *braced wall panels* shall be in accordance with one of the methods listed in Table R602.10.2.

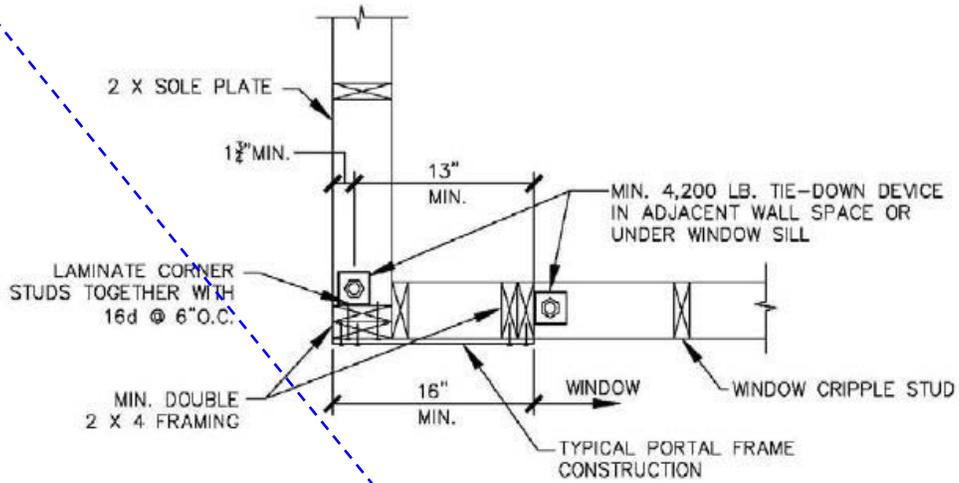
**R602.10.2.1 Intermittent braced wall panel interior finish material.** Intermittent *braced wall panels* shall have gypsum wall board installed on the side of the wall opposite the bracing material. Gypsum wall board shall be not less than  $\frac{1}{2}$  inch (12.7 mm) in thickness and be fastened in accordance with Table R702.3.5 for interior gypsum wall board.

**Exceptions:**

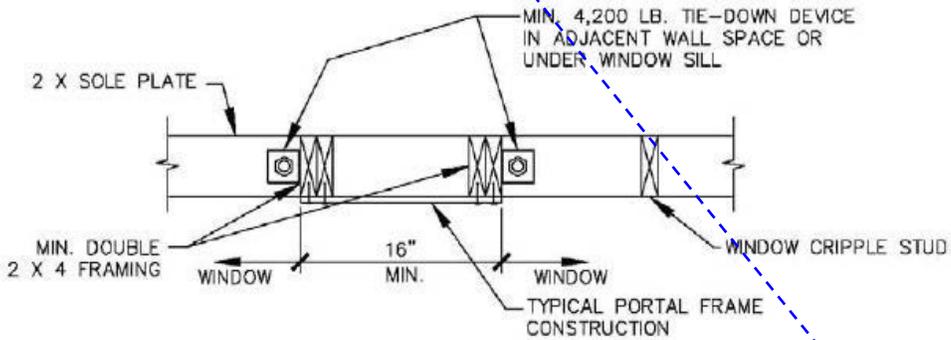
1. Wall panels that are braced in accordance with Methods GB, ABW, PFG and PFH.
2. When an *approved* interior finish material with an in-plane shear resistance equivalent to gypsum board is installed.
3. For Methods DWB, WSP, SFB, PBS, PCP and HPS, omitting gypsum wall board is permitted provided the length of bracing in Tables ~~R602.10.1.2(1)~~ and ~~R602.10.1.2(2)~~ is multiplied by a factor of 1.5.

**WALL CONSTRUCTION**



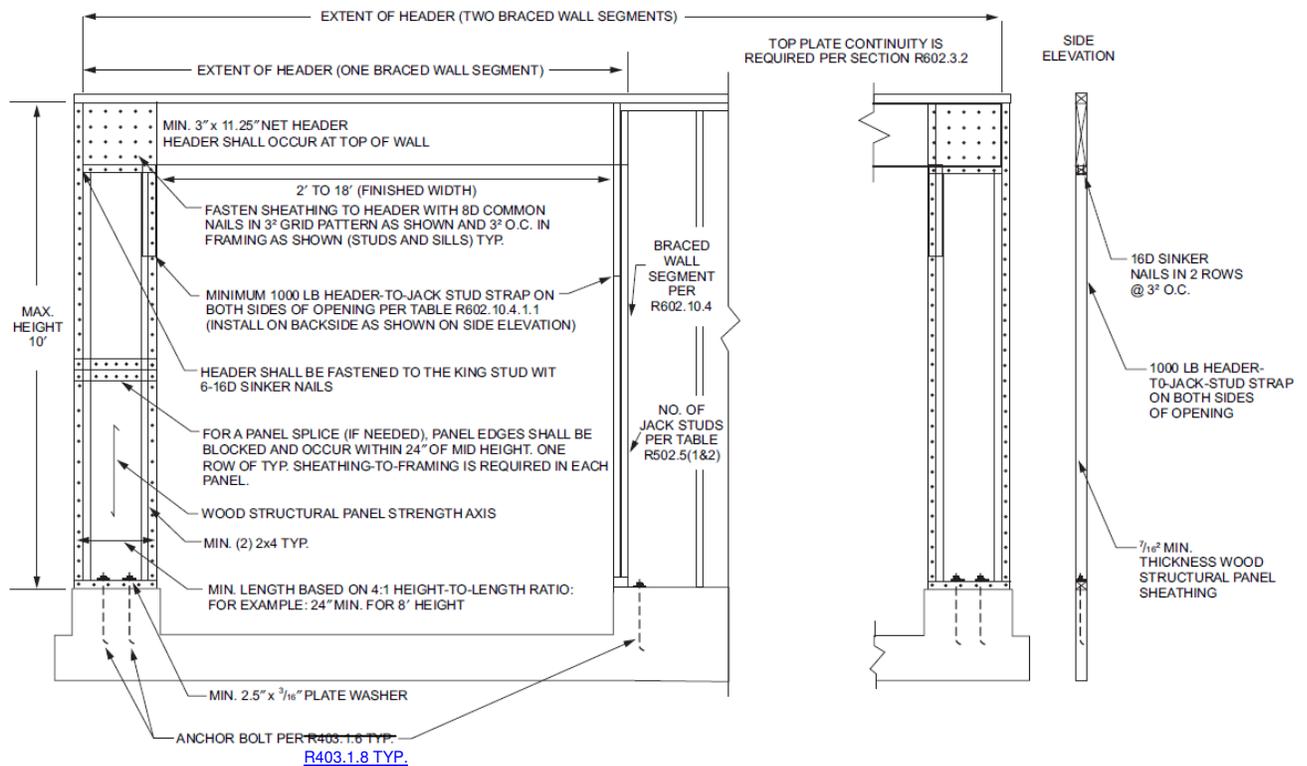


**PORTAL FRAME WITH HOLD-DOWNS AT CORNER CONDITION**



**PORTAL FRAME WITH HOLD-DOWNS AT INTERIOR CONDITION**

**FIGURE R602.10.3.3(1)  
METHOD PFH: PORTAL FRAME WITH HOLD-DOWNS ADJACENT TO WINDOW OPENING**



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound force = 4.448 N.

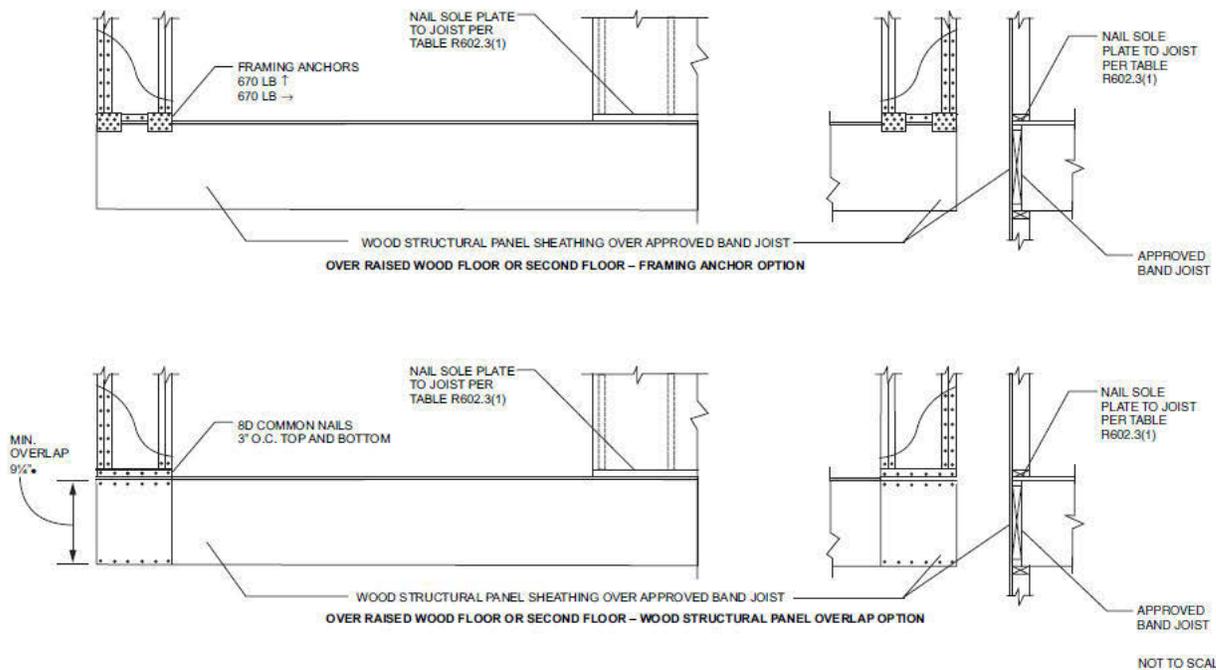
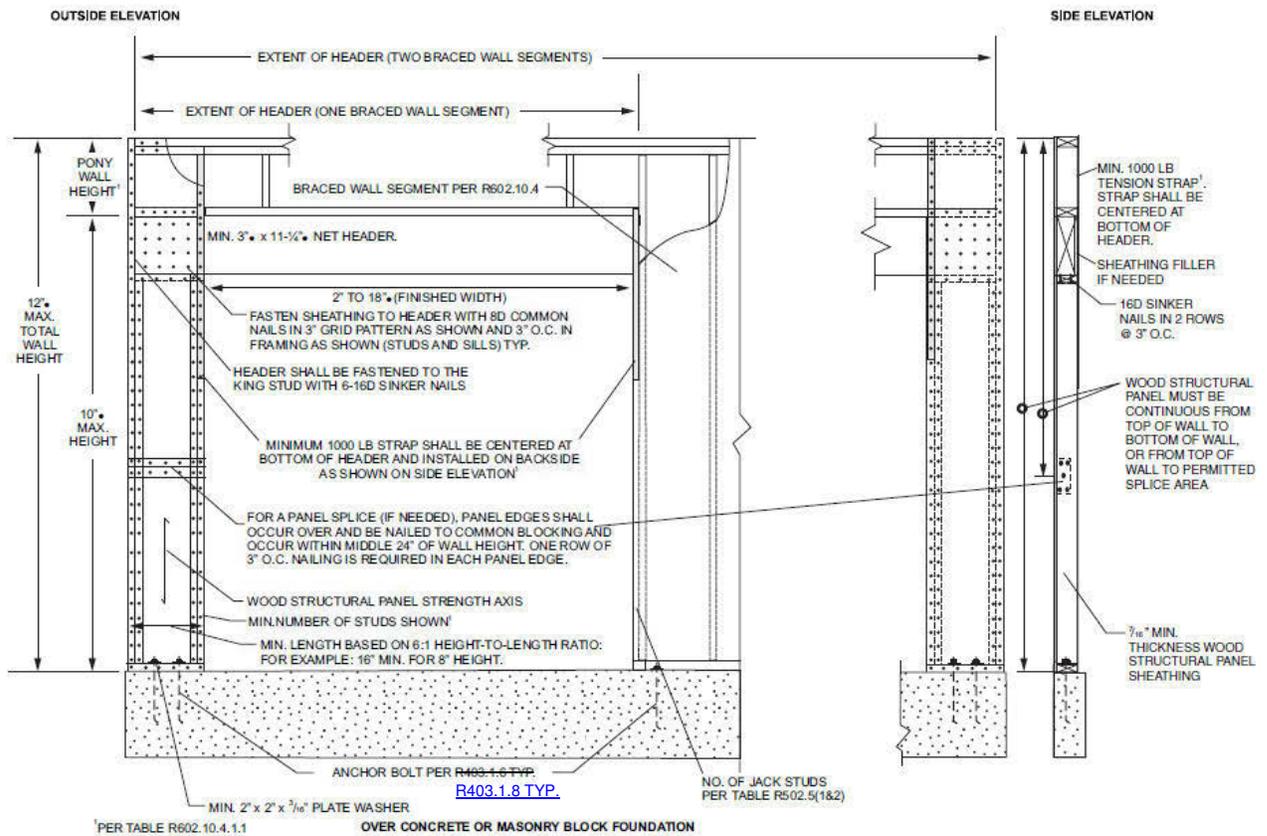
FIGURE R602.10.3.4  
METHOD PFG PORTAL FRAME AT GARAGE DOOR OPENINGS IN SEISMIC DESIGN CATEGORIES A, B AND C

## WALL CONSTRUCTION

**R602.10.4 Continuous sheathing.** *Braced wall lines* with continuous sheathing shall be constructed in accordance with this section. All *braced wall lines* along exterior walls on the same *story* shall be continuously sheathed.

**Exception:** Within Seismic Design Categories A, B and C ~~or~~ [and](#) in regions where the basic wind speed is less than or equal to 100mph (45 m/s), other bracing methods prescribed by this code shall be permitted on other *braced wall lines* on the same *story* level or on any *braced wall line* on different *story* levels of the building.

**R602.10.4.1 Continuous sheathing braced wall panels.** Continuous sheathing methods require structural panel sheathing to be used on all sheathable surfaces on one side of a *braced wall line* including areas above and below openings and gable end walls. *Braced wall panels* shall be constructed in accordance with one of the methods listed in Table R602.10.4.1. [Continuous sheathing braced wall panels shall be blocked and nailed at all panel edges.](#) Different bracing methods, other than those listed in Table R602.10.4.1, shall not be permitted along a *braced wall line* with continuous sheathing.



NOT TO SCALE

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound force = 4.448 N.

FIGURE R602.10.4.1.1  
METHOD CS-PF: CONTINUOUS PORTAL FRAME PANEL CONSTRUCTION

**WALL CONSTRUCTION**



**R602.10.7 Braced wall panel support.** *Braced wall panel* support shall be provided as follows:

1. Cantilevered floor joists supporting *braced wall lines*, shall comply with Section R502.3.3. Cantilevered floor joists complying with Section R502.3.3 shall be permitted to support *braced wall panels*. In all structures in Seismic Design Category  $D_1$  and  $D_2$  and in townhouses in Seismic Design Category C, cantilevered floor joists supporting *braced wall panels* shall comply with the requirements of Section R301.2.2.2.5, item 1. Solid blocking shall be provided at the nearest bearing wall location. In Seismic Design Categories A, B and C, where the cantilever is not more than 24 inches (610 mm), a full height rim joist instead of solid blocking shall be provided.
2. Elevated post or pier foundations supporting *braced wall panels* shall be designed in accordance with accepted engineering practice.
3. Masonry stem walls with a length of 48 inches (1220 mm) or less supporting *braced wall panels* shall be reinforced in accordance with Figure R602.10.7. Masonry stem walls with a length greater than 48 inches (1220 mm) supporting *braced wall panels* shall be constructed in accordance with Section R403.1 *Braced wall panels* constructed in accordance with Sections R602.10.3.2 and R602.10.3.3 shall not be attached to masonry stem walls.
4. Concrete stem walls with a length of 48 inches (1219mm) or less, greater than 12 inches (305 mm) tall and less than 6 inches (152 mm) thick shall have reinforcement sized and located in accordance with Figure R602.10.7.
5. In all structures in Seismic Design Category  $D_1$  and  $D_2$  and in townhouses in Seismic Design Category C, the end of a *braced wall panel* over an opening in the wall below are subject shall comply with the requirements of Section R301.2.2.2.5, item 3.

*plane.* All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Cold-formed steel walls constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s) Exposure B or C and a maximum ground snow load of 70 pounds per square foot (3.35 kPa). [In all structures in Seismic Design Category D<sub>1</sub> and D<sub>2</sub> and in townhouses in Seismic Design category C, wall bracing shall comply with the requirements of Section R301.2.2.2.5.](#)

**R603.1.1 Applicability limits.** The provisions of this section shall control the construction of exterior cold-formed steel wall framing and interior load-bearing cold-formed steel wall framing for buildings not more than 60 feet (18 288 mm) long perpendicular to the joist or truss span, not more than 40 feet (12 192 mm) wide parallel to the joist or truss span, and less than or equal to three stories above *grade*

**WALL CONSTRUCTION**

**TABLE R702.3.5  
MINIMUM THICKNESS AND APPLICATION OF GYPSUM BOARD**

THICKNESS OF GYPSUM BOARD (inches)	APPLICATION	ORIENTATION OF GYPSUM BOARD TO FRAMING	MAXIMUM SPACING OF FRAMING MEMBERS (inches o.c.)	MAXIMUM SPACING OF FASTENERS (inches)		SIZE OF NAILS FOR APPLICATION TO WOOD FRAMING <sup>c</sup>
				Nails <sup>a</sup>	Screws <sup>b</sup>	
<b>Application without adhesive</b>						
3/8	Ceiling <sup>d</sup>	Perpendicular	16	7	12	13 gage, 1 1/4" long, 19/64" head; 0.098" diameter, 1 1/4" long, annular-ringed; or 4d cooler nail, 0.080" diameter, 1 3/8" long, 7/23" head.
	Wall	Either direction	16	8	16	
1/2	Ceiling	Either direction	16	7	12	13 gage, 1 3/8" long, 19/64" head; 0.098" diameter, 1 1/4" long, annular-ringed; 5d cooler nail, 0.086" diameter, 1 5/8" long, 15/64" head; or gypsum board nail, 0.086" diameter, 1 5/8" long, 9/32" head.
	Ceiling <sup>d</sup>	Perpendicular	24	7	12	
	Wall	Either direction	24	8	12	
5/8	Wall	Either direction	16	8	16	13 gage, 1 5/8" long, 19/64" head; 0.098" diameter, 1 3/8" long, annular-ringed; 6d cooler nail, 0.092" diameter, 1 7/8" long, 1/4" head; or gypsum board nail, 0.09 15" diameter, 1 7/8" long, 19/64" head.
	Ceiling	Either direction	16	7	12	
	Ceiling <sup>d</sup>	Perpendicular	24	7	12	
	Wall	Either direction	24	8	12	
	Type X at garage ceiling beneath habitable room(s)	Perpendicular	24	6	6	1 7/8 inches 6d coated nails or equivalent drywall screws.
<b>Application with adhesive</b>						
3/8	Ceiling <sup>d</sup>	Perpendicular	16	16	16	Same as above for 3/8" gypsum board
	Wall	Either direction	16	16	24	
1/2 or 5/8	Ceiling	Either direction	16	16	16	Same as above for 1/2" and 5/8" gypsum board, respectively
	Ceiling <sup>d</sup>	Perpendicular	24	12	16	
	Wall	Either direction	24	16	24	
Two 3/8 layers	Ceiling	Perpendicular	16	16	16	Base ply nailed as above for 1/2" gypsum board;
	Wall	Either direction	24	24	24	

For SI: 1 inch = 25.4 mm.

- a. For application without adhesive, a pair of nails spaced not less than 2 inches apart or more than 2 1/2 inches apart may be used with the pair of nails spaced 12 inches on center.
- b. Screws shall be in accordance with Section R702.3.6. Screws for attaching gypsum board to structural insulated panels shall penetrate the wood structural panel facing not less than 7/16 inch.
- c. Where cold-formed steel framing is used with a clinching design to receive nails by two edges of metal, the nails shall be not less than 5/8 inch longer than the gypsum board thickness and shall have ringed shanks. Where the cold-formed steel framing has a nailing groove formed to receive the nails, the nails shall have barbed shanks or be 5d, 13 1/2 gage, 1 5/8 inches long, 15/64-inch head for 1/2-inch gypsum board; and 6d, 13 gage, 1 7/8 inches long, 15/64-inch head for 3/8-inch gypsum board.
- d. Three-eighths-inch-thick single-ply gypsum board shall not be used on a ceiling where a water-based textured finish is to be applied, or where it will be required to support insulation above a ceiling. On ceiling applications to receive a water-based texture material, either hand or spray applied, the gypsum board shall be applied perpendicular to framing. When applying a water-based texture material, the minimum gypsum board thickness shall be increased from 3/8 inch to 1/2 inch for 16-inch on center framing, and from 1/2 inch to 5/8 inch for 24-inch on center framing or 1/2-inch sag-resistant gypsum ceiling board shall be used.
- e. Type X gypsum board for garage ceilings beneath habitable rooms shall be installed perpendicular to the ceiling framing and shall be fastened at maximum 6 inches o.c. by minimum 1 7/8 inches 6d coated nails or equivalent drywall screws.

**WALL COVERING**

**ORS 701.555 prohibits Construction Contractors Board licenses from installing barrier-type exterior insulation and finish systems.**

ORS 701.555 is not part of this code but is reproduced here for the reader's convenience:

**701.555 Rulings on acceptability of material, design or installation of EIFS.**

(1) As used in this section, "barrier-type exterior insulation and finish system" means a foam insulation board inner layer, a polymer and cement base coat middle layer reinforced with glass fiber mesh and a textured finish coat exterior layer, in which:

- (a) The layers are bonded to the outside face of an exterior wall;
- (b) The middle or exterior layer, but not the inner layer, provides a water resistant barrier for the exterior of the building envelope;
- (c) The layers do not provide a means of drainage for water that accumulates behind the exterior surface; and
- (d) The layers insulate the building.

(2) A person licensed or required to be licensed under this chapter may not install a barrier-type exterior insulation and finish system on:

- (a) A new building; or
- (b) An existing building, except as necessary to repair or replace a previously installed barrier-type exterior insulation and finish system.

(3) Subsection (2) of this section does not apply to the application of a barrier-type exterior insulation and finish system:

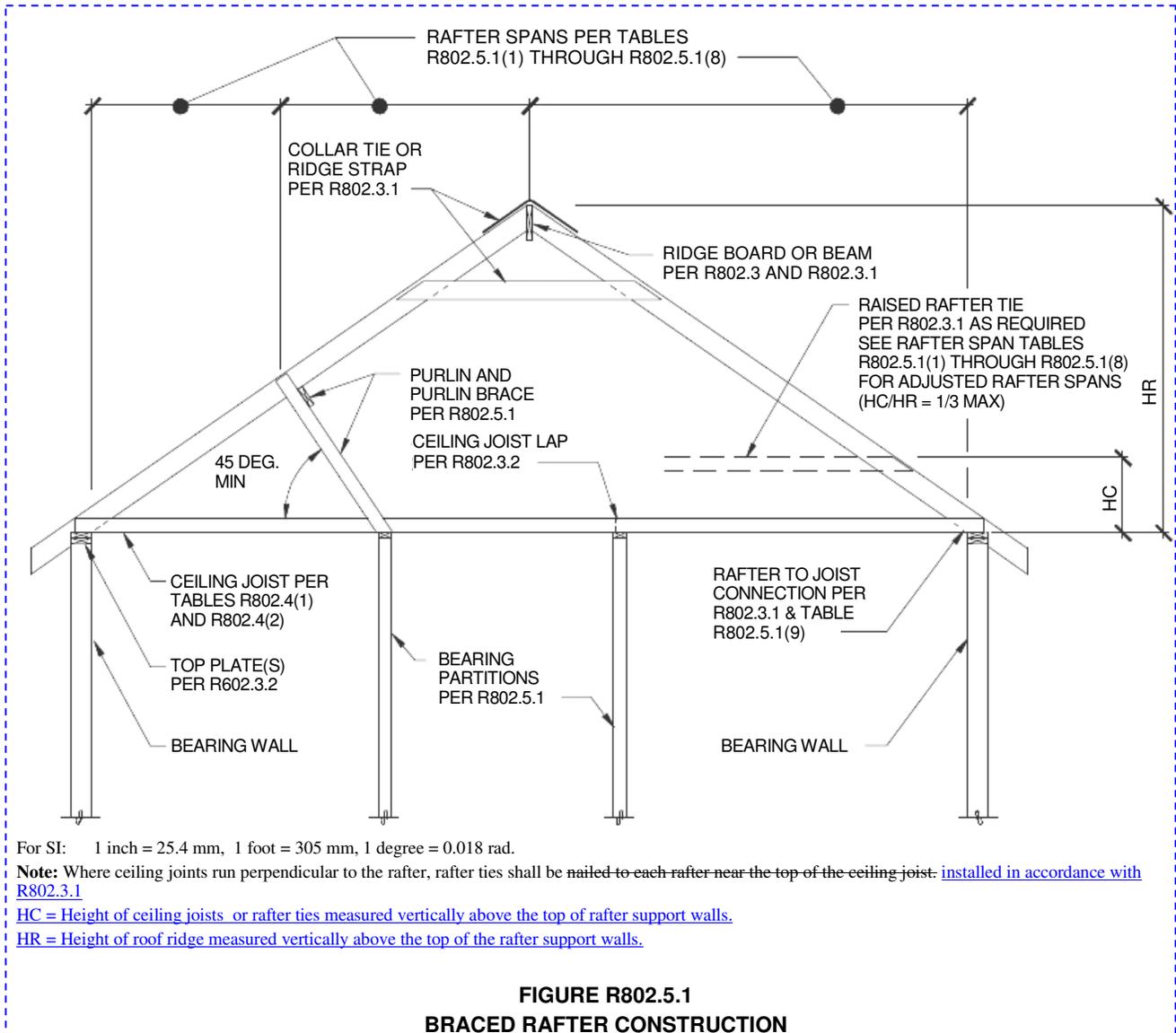
- (a) As an architectural feature that is not intended to protect an interior space of the building; or
- (b) To a concrete wall or a concrete masonry unit block wall.

[\[2007 c.851 §2\]](#)

**ROOF-CEILING CONSTRUCTION**



**R802.9 Framing of openings.** Openings in roof and ceiling framing shall be framed with header and trimmer joists. When the header joist span does not exceed 4 feet (1219 mm), the header joist may be a single member the same size as the ceiling joist or rafter. Single trimmer joists may be used to carry a single header joist that is located within 3 feet (914 mm) of the trimmer joist bearing. When the header joist span exceeds 4 feet (1219 mm), the trimmer joists and the header joist shall be doubled and of sufficient cross section to support the ceiling joists or rafter framing into the header. *Approved* hangers shall be used for the header joist to trimmer joist connections when the header joist span exceeds 6 feet (1829mm). Tail joists over 12 feet (3658 mm) long shall be supported at the header by framing anchors or on ledger strips not less than 2 inches by 2 inches (51 mm by 51 mm). In all structures or portions of structures in Seismic Design Category C, D<sub>1</sub> and D<sub>2</sub> and in townhouses in Seismic Design Category C, openings in a roof shall comply with the requirements of Section R301.2.2.2.5, item 4.



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

**Note:** Where ceiling joints run perpendicular to the rafter, rafter ties shall be nailed to each rafter near the top of the ceiling joist. [installed in accordance with R802.3.1](#)

[HC = Height of ceiling joists or rafter ties measured vertically above the top of rafter support walls.](#)

[HR = Height of roof ridge measured vertically above the top of the rafter support walls.](#)

**R804.1.1 Applicability limits.** The provisions of this section shall control the construction of cold-formed steel roof framing for buildings not greater than 60 feet (18 288 mm) perpendicular to the joist, rafter or truss span, not greater than 40 feet (12 192 mm) in width parallel to the joist span or truss, less than or equal to three stories above *grade* plane and with roof slopes not less than 3:12 (25-percent slope) or greater than 12:12 (100 percent slope). Cold-formed steel roof framing constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s), Exposure B or C, and a maximum ground snow load of 70 pounds per square foot (3350 Pa). In all structures in Seismic Design Category D<sub>1</sub> and D<sub>2</sub> and in townhouses in Seismic Design Category C, cold-formed steel roof framing shall comply with the requirements of Section R301.2.2.2.5.



shall be installed in accordance with Figures R804.3.6(1) and R804.3.6(2). Each header joist shall be connected to trimmer joists with a minimum of four 2-inch by 2-inch (51 by 51 mm) clip angles. Each clip angle shall be fastened to both the header and trimmer joists with four No. 8 screws, evenly spaced, through each leg of the clip angle. The steel thickness of the clip angles shall be not less than that of the ceiling joist or roof rafter. Each track section for a built-up header or trimmer joist shall extend the full length of the joist (continuous). [In all structures or portions of structures in Seismic Design category C, D<sub>1</sub> and D<sub>2</sub> and in townhouses in Seismic Design Category C, openings in a roof shall comply with the requirements of Section R301.2.2.2.5, item 4.](#)

**R804.3.6 Framing of openings in roofs and ceilings.** Openings in roofs and ceilings shall be framed with header and trimmer joists. Header joist spans shall not exceed 4 feet (1219 mm) in length. Header and trimmer joists shall be fabricated from joist and track members having a minimum size and thickness at least equivalent to the adjacent ceiling joists or roof rafters and



## CHAPTER 11

# ENERGY EFFICIENCY

**N1101.1 General.** The provisions of this chapter regulate the exterior envelope, as well as the design, construction and selection of heating, ventilating and air-conditioning systems, lighting and piping insulation required for the purpose of effective conservation of energy within a building or structure governed by this code.

All conditioned spaces within residential buildings shall comply with Table N1101.1(1) and two additional measure from Table N1101.1(2).

**Exceptions:**

1. Application to existing buildings shall comply with Section N1101.2.
2. Application to additions shall comply with Section N1101.3.
3. Heated or cooled detached accessory structures that are not habitable shall meet the following envelope requirements without any additional measures: Walls: R-21 / U-0.064; Roofs: R-38 / U-0.027 (attic) or R-20 continuous insulation / U-0.048 (above deck); Windows: U-0.35; Opaque doors: U-0.70; Roll-up doors: U-0.50.

this chapter, is required to comply with Table N1101.2 to the greatest extent practical. Changes of use that are greater than 30 percent of the existing building heated floor area or more than 400 square feet in area, whichever is less, shall be required to select one measure from Table N1101.3.

**N1101.2.3.2 Change of occupancy.** Alteration and repair of conditioned nonresidential buildings, such as a small church or school, that are changing occupancy to residential shall use Table N1 101.2 to the greatest extent practical and select one measure from Table N1101.1(2), or one measure from Table N1101.3.

**Exception:** The minimum component requirements shall be disregarded when thermal performance calculations are completed for change of use to Group R occupancy, when such calculations demonstrate similar performance to the requirements of Table N1101.2.

**N1101.2.3.1 Change of use.** A building that changes use, without any changes to the components regulated in



**TABLE N1101.1(2)  
ADDITIONAL MEASURES**

Envelope Enhancement Measure (Select One)	1	High efficiency walls & windows: Exterior walls—U-0.047/R-19+5 (insulation sheathing)/SIPS, and one of the following options: Windows—Max 15 percent of conditioned area; or Windows—U-0.30
	2	<b>High efficiency envelope:</b> Exterior walls—U-0.058/R-21 Intermediate framing, and Vaulted ceilings—U-0.033/R-30A <sup>d,e</sup> , and Flat ceilings—U-0.025/R-49, and Framed floors—U-0.025/R-38, and Windows—U-0.30; and Doors—All doors U-0.20, or Additional 15 percent of permanently installed lighting fixtures as high-efficacy lamps or Conservation Measure D and E
	3	<b>High efficiency ceiling, windows &amp; duct sealing:</b> (Cannot be used with Conservation Measure E) Vaulted ceilings—U-0.033/R-30A <sup>d,e</sup> , and Flat ceilings—U-0.025/R-49, and Windows—U-0.30, and Performance tested duct systems <sup>b</sup>
	4	<b>High efficiency thermal envelope UA:</b> Proposed UA is 15% lower than the Code UA when calculated in Table N1 104.1(1)
	5	<b>Building tightness testing, ventilation &amp; duct sealing:</b> (Cannot be used with Conservation Measure E) A mechanical exhaust, supply, or combination system providing whole-building ventilation rates specified in Table N1101.1(3), or ASHRAE 62.2, and The dwelling shall be tested with a blower door and found to exhibit no more than: 1. 6.0 air changes per hour <sup>f</sup> , <del>or</del> <u>and</u> 2. <del>5.0 air changes per hour<sup>f</sup> when used with Conservation Measure E, and</del> <u>2. Performance tested duct systems<sup>b</sup></u>
	6	<b>Ducted HVAC systems within conditioned space:</b> (Cannot be used with Conservation Measure B or C) All ducts and air handler are contained within building envelope <sup>i</sup>
Conservation Measure (Select One)	A	<b>High efficiency HVAC system:</b> Gas-fired furnace or boiler with minimum AFUE of 90% a, or Air-source heat pump with minimum HSPF of 8.5 or Closed-loop ground source heat pump with minimum COP of 3.0
	B	<b>Ducted HVAC systems within conditioned space:</b> All ducts and air handler are contained within building envelope <sup>i</sup>
	C	<b>Ductless heat pump:</b> Replace electric resistance heating in at least the primary zone of dwelling with at least one ductless mini-split heat pump having a minimum HSPF of 8.5. Unit shall not have integrated backup resistance heat, and the unit (or units, if more than one is installed in the dwelling) shall be sized to have capacity to meet the entire dwelling design heat loss rate at outdoor design temperature condition. Conventional electric resistance heating may be provided for any secondary zones in the dwelling. A packaged terminal heat pump (PTHP) with comparable efficiency ratings may be used when no supplemental zonal heaters are installed in the building and integrated backup resistant heat is allowed in a PTHP
	D	<b>High efficiency water heating &amp; lighting:</b> Natural gas/propane, on-demand water heating with min EF of 0.80, <u>or heat pump water heater with min EF of 1.8 (northern climate)</u> and a minimum 75 percent of permanently installed lighting fixtures as CFL or linear fluorescent or a min efficacy of 40 lumens per watt as specified in Section N1107.2 <sup>c</sup>
	E	<b>Energy management device &amp; duct sealing:</b> Whole building energy management device that is capable of monitoring or controlling energy consumption, and Performance tested duct systems <sup>b</sup> , and A minimum 75 percent of permanently installed lighting fixtures as high-efficacy lamps.
	F	<b>Solar photovoltaic:</b> Minimum 1 watt/sq ft conditioned floor space <sup>g</sup>
	G	<b>Solar water heating:</b> Minimum of 40 ft <sup>2</sup> of gross collector area <sup>h</sup>

For SI: 1 square foot = 0.093 m<sup>2</sup>, 1 watt per square foot = 10.8 W/m<sup>2</sup>.

- a. Furnaces located within the building envelope shall have sealed combustion air installed. Combustion air shall be ducted directly from the outdoors.
- b. Documentation of Performance Tested Ductwork shall be submitted to the building official upon completion of work. This work shall be performed by a ~~contractor~~ technician certified by the Oregon Department of Energy's (ODOE) Residential Energy Tax Credit program and Performance Tested Comfort Systems (PTCS) program administered by the Bonneville Power Administration (BPA), documentation shall be provided that work demonstrates conformance to ~~ODOE PTCS~~ PTCS duct performance standards.
- c. Section N1 107.2 requires 50 percent of permanently installed lighting fixtures to contain high efficacy lamps. Each of these additional measures adds an additional percent to the Section N1 107.2 requirement.
- d. A = advanced frame construction, which shall provide full required ceiling insulation value to the outside of exterior walls.
- e. The maximum vaulted ceiling surface area shall not be greater than 50 percent of the total heated space floor area unless vaulted area has a U-factor no greater than U-0.026.
- f. Building tightness test shall be conducted with a blower door depressurizing the dwelling 50 Pascal's from ambient conditions. Documentation of blower door test shall be submitted to the Building Official upon completion of work.
- g. Solar electric system size shall include documentation indicating that Total Solar Resource Fraction is not less than 75 percent.
- h. Solar water heating panels shall be Solar Rating and Certification Corporation (SRCC) Standard OG-300 certified and labeled, with documentation indicating that Total Solar Resource Fraction is not less than 75 percent.
- i. A total of 5 percent of an HVAC systems ductwork shall be permitted to be located outside of the conditioned space. Ducts located outside the conditioned space shall have insulation installed as required in this code.

**TABLE N1104.1(1)  
RESIDENTIAL THERMAL PERFORMANCE CALCULATIONS**

BUILDING COMPONENTS <sup>b</sup>	STANDARD BASE CASE <sup>a</sup>			PROPOSED ALTERNATIVE			
	Areas <sup>c</sup>	U-factor	Areas × U	R-value <sup>d</sup>	Areas <sup>c</sup>	U-factor <sup>e</sup>	Areas × U
Flat ceilings		0.031					
Vaulted ceilings <sup>f</sup>		0.042					
Conventional wood-framed walls		0.060					
Underfloor		0.028					
Slab edge		(perimeter ft =) F=0.52 <sup>g</sup>					
Windows		0.35					
Skylights < 2% <sup>h</sup>		0.75					
Skylights > 2% <sup>h</sup>		0.60					
Exterior doors <sup>i</sup>		0.20					
Doors with > 2.5 ft <sup>2</sup> glazing		0.40					
		CODE UA =				Proposed UA <sup>j</sup> =	

- a. Base path 1 represents Standard Base Case from Table N1101.1(1).
- b. Performance trade-offs are limited to those listed in column 1. Heat plant efficiency, duct insulation levels, passive and active solar heating, air infiltration and similar measures including those not regulated by code may not be considered in this method of calculation.
- c. Areas from plan take-offs. All areas must be the same for both Standard Base Case and Proposed Alternate. The vaulted ceiling surface area for Standard Base Case must be the actual surface area from the plan take-off not to exceed 50 percent of the total heated space floor area. Any areas in excess of 50 percent for Base Case must be entered at U-0.031 (R-38) with "Flat Ceilings" area.
- d. Minimum Component Requirements in so far as practicable: Walls R-15/U-0.080; Floors R-21/U-0.047; Flat Ceilings R-38/U-0.031; Vaults R-21/U-0.055; Below-Grade Wood, Concrete or Masonry Walls R-15/U-0.069; Slab Edge R-10/F-0.52; Duct Insulation R-8.R-values used in this table are nominal, for the insulation only and not for the entire assembly. Window and skylight U-values shall not exceed 0.65 (CL65). A single door not to exceed 28 square feet (2.6m<sup>2</sup>) per dwelling unit is permitted to be excluded from the thermal performance calculations. All other Door U-values shall not exceed 0.54 (Nominal R-2). A maximum of 28 square feet (2.6m<sup>2</sup>) of exterior door area per dwelling unit can have a U-factor of 0.54 or less and shall not be included in calculations.
- e. U-values factors for wood frame ceilings, walls and floor assemblies shall be as specified in Table N1104.1(2). U-values factors for other assemblies, which include steel framing, brick or other masonry, stucco, etc., shall be calculated using standard ASHRAE procedures.
- f. Vaulted area, unless insulated to R-38, U-0.031, may not exceed 50 percent of the total heated space floor area.
- g. F = The heat loss coefficient, Btu/h/ft<sup>2</sup>/°F per foot of perimeter.
- h. Whenever skylight area for Proposed Alternative exceeds 2 percent of the total heated space floor area, enter 2 percent of area under Standard Base Case at U-0.75, then the remaining area under Standard Base Case at U-0.60. For Proposed Alternative skylights, enter the actual skylight area and U-factor of those to be installed in residence.
- i. A maximum of 28 square feet (2.6 m<sup>2</sup>) of exterior door area per dwelling unit can have a U-factor of 0.54 or less. Default U-factor for an unglazed wood door is 0.54.
- j. Proposed UA must be less than or equal to CODE UA.

**ENERGY EFFICIENCY**

**N1104.2 Insulation materials.** Insulation materials shall be installed ~~per~~ in accordance with manufacturer's listing and specifications installation instructions and this section ~~code~~. Insulation R-values shall be specified as required in 16 CFR Ch. I(1-1-91 Edition) Part 460—Labeling and Advertising of Home Insulation. Cellulose insulation shall conform to Interim Safety Standard for Cellulose Insulation (16 CFR Part 1209) issued by the Consumer Product Safety Commission July 6, 1979 (44FR 39938). Foam plastic shall be as specified in Section R316. ~~Some general requirements for insulation are:~~

**N1104.2.1 ~~Loose-fill~~ i Insulation clearance restriction.** Blown, poured, batt and spray-on type insulation applied from above the ceiling level ~~complying with Section R320~~ may be used shall be limited in vented attic spaces where roof slope is 4 units vertical in 12 units horizontal (33.3-percent slope) or greater and there is at least 44 inches (1118 mm) of headroom at the roof ridge. (Clear headroom is defined as the distance from the top of the bottom chord of the truss or ceiling joists to the underside of the roof sheathing.) Netted or other applications that allow for verification of insulation application shall be allowed for low slope roofs. Adequate baffling of the vent opening shall be provided so as to deflect the incoming air above the surface of the blown or poured insulation. Baffles shall be of weather resistant, rigid material capable of retaining the insulation and shall be in place at the time of framing inspection.

**N1104.2.2 Batt-type insulation.** Batt-type insulation shall be installed flush against the warm side of the cavity insofar as practicable.

**N1104.2.3 Insulation protection.** Insulation exposed to the exterior shall be protected from physical and solar damage.

**N1104.2.4 Clearances.** Recessed light fixtures shall ~~not~~ be installed in cavities intended to be insulated IC labeled for direct insulation contact.

**Exception:** Fixtures designed and labeled as suitable for being installed in direct contact with insulation; i.e., insulation coverage (IC) rated.

Thermal insulation shall not be installed within 3 inches (76 mm) of any metal chimney or gas vent that is not listed for insulation clearances.

Thermal insulation shall not be installed in a manner that would obstruct openings required for attic ventilation.

A permanent sleeve of fine wire mesh screen, sheet metal or other noncombustible material shall be installed to maintain the required clearances.

Cellulose insulation shall conform to Interim Safety Standard for Cellulose Insulation (16 CFR Part 1209) issued by the Consumer Product Safety Commission July 6, 1979 (44FR 39938). For other insulation, see Section R320.

Foam plastic shall be as specified in Section R318.

**N1104.2.5 Baffles.** Baffles of a durable rigid material shall be provided to prevent obstruction of vent openings and to deflect incoming air above the surface of porous insulation so as to prevent wind-washing and blowing of loose material. Thermal insulation shall not be installed in a manner that would obstruct openings required for attic ventilation.

**N1104.2.6 Air Barriers.** An air barrier shall be provided on every vertical portion of air permeable insulation and on the warm side of horizontal, air permeable insulation.

**Exception:** Unvented attics, continuous insulation walls, and similar conditions where an air impermeable insulation layer forms an air barrier.

~~**N1104.2.5**~~ **N1104.2.7 Below grade exterior insulation.** Below grade exterior insulation shall meet the following conditions:

1. The insulation shall be a materials that is approved for below grade applications in wet environments
2. Insulation shall be installed from the top of the footing to the top of the concrete basement wall.
3. Insulation shall be adequately protected from the elements (ultraviolet and mechanical) per manufacturer' s specifications.
4. The top of the insulation shall be installed in a manner to allow water run-off and prevent pooling.

~~**N1104.2.6**~~ **N1104.2.8 Recessed lighting fixtures.** Recessed lighting fixtures installed within the building envelope shall meet one of the following requirements.

1. Type IC-rated, manufactured with no penetrations between the inside of the recessed fixture and ceiling cavity, and the annular space between the ceiling cut-out and lighting fixture shall be sealed.
2. Type IC-rated in accordance with ASTM E283-with no more than 2.0 cubic feet per minute (cfm) (0.944 L/s) air movement from the conditioned space to the ceiling cavity, at 1.57 psi pressure (75 Pa) difference and shall be labeled and the annular space between the ceiling cutout and lighting fixture shall be sealed.
3. Type IC-rated installed inside a sealed box constructed from a minimum 0.5-inch-thick (12.7 mm) gypsum wallboard or constructed from a preformed polymeric vapor barrier, or other air-tight assembly manufactured for this purpose.

~~**N1106.1 Heating and cooling systems.** All piping serving as part of a heating or cooling system shall be thermally insulated as shown in Table N1106.1. **Mechanical system piping insulation.** Mechanical system piping capable of carrying fluids above 105°F (40.5°C) or below 55°F (13°C) shall be insulated to a minimum of R-3.~~

~~**N1106.2 Domestic and service hot water systems.** **Domestic hot water piping located outside the building thermal envelope shall be insulated to a minimum of R-3.** All piping serving as part of a domestic or service hot water system shall be thermally insulated as shown in Table N1106.1.~~

~~**Exception:** One and two family dwellings.~~

~~**N1106.3 Minimum thickness.** Insulation thicknesses shall be no less than specified in Table N1106.1. However, a greater thickness insulation may be required for freeze protection where piping is exposed to subfreezing ambient temperatures.~~

~~**N1106.4 Water vapor transmission.** The minimum insulation thicknesses specified do not consider water vapor transmission and condensation. Additional insulation, vapor retarders, or both, may be required to limit water vapor transmission and condensation.~~

**Exception:** Piping insulation, except when needed to prevent condensation, is not required in any of the following cases:

- ~~1. Factory installed piping within HVAC equipment.~~
- ~~2. Piping that conveys fluids that have a design operating temperature range between 55°F and 105°F (13°C and 40.5°C).~~
- ~~3. Piping installed in basements, cellars or unventilated crawl spaces with insulated walls.~~

**TABLE N1106.1  
MINIMUM PIPE INSULATION (INCHES)<sup>a</sup>**

FLUID DESIGN OPERATING TEMPERATURE RANGE, °F	INSULATION CONDUCTIVITY		NOMINAL PIPE DIAMETER (IN.)				
	Conductivity range (Btu-in.)/(h · ft <sup>2</sup> · °F)	Mean rating temperature, °F	1 and less	1 1/4 to 2	2 1/2 to 4	5 & 6	8 & up
<b>Heating systems (steam, steam condensate and hot water)<sup>c</sup></b>							
<b>INSULATION THICKNESS (inches)</b>							
Above 350	0.32-0.34	250	2.5	3.0	3.0	4.0	4.0
251 - 350	0.29-0.31	200	2.0	2.5	3.0	3.5	3.5
201 - 250	0.27-0.30	150	1.5	1.5	2.0	2	3.5
141 - 200	0.25-0.29	125	1.5	1.5	1.5	1.5	1.5
105 - 140	0.24-0.28	100	1.0	1.0	1.0	1.5	1.5
<b>Domestic and Service Hot Water System<sup>d</sup></b>							
105 and greater	0.24-0.28	100	1 <sup>e</sup>	1	1.5	1.5	1.5
<b>Cooling systems (chilled water, brine and refrigerant)<sup>e</sup></b>							
40-55	0.23-0.27	75	0.5	0.75	1.0	1.0	1.0
Below 40	0.23-0.27	75	1.0	1.5	1.5	1.5	1.5

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, °F = 1.8 °C + 32.

a. For insulation outside the stated conductivity range, minimum thickness (T) shall be determined as follows:

$$T = r \left( \frac{K}{k} + \frac{t}{r} \right)^{0.8} - 1$$

Where T = minimum thickness (in.)

r = actual outside radius of pipe (in.),

t = insulation thickness in this table for applicable fluid temperature and pipe size

K = conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (Btu-in./h · ft<sup>2</sup> · °F) and

k = the upper value of the conductivity range listed in this table for the applicable fluid temperature.

- b. These thicknesses are based on energy efficiency considerations only. Issues such as water vapor permeability, surface condensation, or safety considerations sometimes require vapor retarders or additional insulation.
- c. Piping insulation is not required between the control valve and coil on run-outs when control valve is located within 4 feet (1220 mm) of the coil and pipe diameter is 1 inch (25.4 mm) or less.
- d. Applies to recirculating sections of service or domestic hot water systems and first 8 feet (2438 mm) from storage tank for noncirculating systems.
- e. Piping less than 1 inch (25 mm) in diameter and less than 12 feet (3658 mm) in length shall be insulated with 1/2 inch (12.7 mm) insulation with a minimum conductivity of 0.24 Btu-in/h · ft<sup>2</sup> · °F.



## CHAPTER 13

# GENERAL MECHANICAL SYSTEM REQUIREMENTS

**M1301.1.1 Flood-resistant installation.** In areas prone to flooding as established by the local jurisdiction [Flood Plain Administrator](#), mechanical *appliances, equipment* and systems shall be located or installed in accordance with Section R322.1.6.



## CHAPTER 14

# HEATING AND COOLING EQUIPMENT

**M1401.5 Flood hazard.** In areas prone to flooding as established by the local jurisdiction [Flood Plain Administrator](#), heating and cooling *equipment* and *appliances* shall be located or installed in accordance with Section R322.1.6.

**M1411.6 Locking access port caps.** Refrigerant circuit access ports located outdoors shall be fitted with locking-type tamper-resistant caps [or shall be otherwise secured to prevent unauthorized access.](#)

**HEATING AND COOLING EQUIPMENT**



## DUCT SYSTEMS

**M1601.4.10 Flood hazard areas.** In areas prone to flooding as established by the ~~local jurisdiction~~ [Flood Plain Administrator](#), duct systems shall be located or installed in accordance with Section R322.1.6.



## CHAPTER 17 COMBUSTION AIR

**M1701.2 Opening location.** In areas prone to flooding as established by the ~~local jurisdiction~~ [Flood Plain Administrator](#), *combustion air* openings shall be located at or above the elevation required in Section R322.2.1 or R322.3.2.



## CHAPTER 20

# BOILER AND WATER HEATERS

**M2001.4 Flood-resistant installation.** In areas prone to flooding as established in the ~~local jurisdiction~~ [Flood Plain Administrator](#), boilers, water heaters and their control systems shall be located or installed in accordance with Section R322.1.6.



## CHAPTER 22

# SPECIAL PIPING AND STORAGE SYSTEMS

**M2201.6 Flood-resistant installation.** In areas prone to flooding as established by the ~~local jurisdictions~~ [Flood Plain Administrator](#), tanks shall be installed at or above the elevation required in Section R322.2.1 or R322.3.2 or shall be anchored to prevent flotation, collapse and lateral movement under conditions of the design flood.

**G2404.6 Flood hazard.** For structures located in *flood hazard areas*, as established by the ~~local jurisdictions~~ [Flood Plain Administrator](#), the *appliance, equipment* and system installations regulated by this *code* shall be located at or above the *design flood elevation* and shall comply with the flood-resistant construction requirements of Section R322.

**Exception:** The *appliance, equipment* and system installations regulated by this *code* are permitted to be located below the *design flood elevation* provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the *design flood elevation* and shall comply with the flood-resistant construction requirements of Section R322.

**FUEL GAS**

**G2408.2 Elevation of ignition source.** Heating and/or cooling equipment *appliances* and water heaters covered by this code, located in a garage and which generate a glow, spark or flame capable of igniting flammable vapors shall be installed with sources of ignition at least 18 inches (457 mm) above the floor level.

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

**FUEL GAS**

## LOW-RISE APARTMENTS

Electrical and Plumbing Systems shall comply with the 2014 *Oregon Electrical Specialty Code* and the 2014 *Oregon Plumbing Specialty Code* respectively.

Low-rise apartments of the *Oregon Residential Specialty Code* shall be built to the Group R-2 apartment occupancy requirements of the 2014 *Oregon Structural Specialty Code* and the 2014 *Oregon Mechanical Specialty Code*.

Per ORS 455.010(4), Low-rise apartments are defined as having three stories or less above grade and have an exterior door for each dwelling.

**LOW-RISE APARTMENTS**



REFERENCED STANDARDS



National Fire Protection Association  
 1 Batterymarch Park  
 Quincy, MA 02269

Standard reference number	Title	Referenced in code section number
13— <del>07</del> <a href="#">13</a> <a href="#">13D</a> – 13	Installation of Sprinkler Systems . . . . . <a href="#">Standard for the Installation of Sprinkler Systems in One- and Two-family Dwellings and Manufactured Homes.</a> . . . . .	.R302.3 <a href="#">.R302.2, R302.3</a>
31—06	Installation of Oil-burning Equipment. . . . .	.M1801.3.1, M1805.3
37—98	Standard For Installation And Use of Stationary Combustion Engines and Gas Turbines . . . . .	.G2439.1
54—99	National Fuel Gas Code . . . . .	.G2417.4.1
58—08	Liquefied Petroleum Gas Code . . . . .	.G2412.2, G2414.6.2
72— <del>07</del> <a href="#">13</a>	National Fire Alarm Code. . . . .	.R314.1, R314.2
85—07	Boiler and Construction Systems Hazards Code . . . . .	.G2452.1
211—06	Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances. . . . .	.G2427.5.5.1, R1002.5
259—03	Test Method for Potential Heat of Building Materials . . . . .	.R316.5.7, 316.5 .8
286—06	Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth. . . . .	.R302.9.4, R316.4, R316.5.8, R316.6
501—05	Standard on Manufactured Housing. . . . .	R202, AE201
853—07	Standard for the Installation of Stationary Fuel Cell Power Systems . . . . .	.M1903.1