



## 2014 Oregon Structural Specialty Code Compilation of All Oregon Amendments

This document provides all current Oregon Amendments contained in the 2014 Oregon Structural Specialty Code (OSSC), based on the 2012 International Building Code (IBC). This list contains the Oregon Amendments in their entirety, both the new amendments from the 2014 OSSC and the existing amendments from the 2010 OSSC, and may be useful for those having access to the model IBC, but not the OSSC.

### CHAPTER 1 ADMINISTRATION

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### CHAPTER 2 DEFINITIONS

#### 201.3 Terms defined in other codes.

Where terms are not defined in this code and are defined in the ~~International Energy Conservation Code~~, ~~International Fuel Gas Code~~, ~~International Fire Code~~, ~~International Mechanical & Fuel Gas Code~~ or ~~International Plumbing Code~~, such terms shall have the meanings ascribed to them as in those codes.

#### 201.4 Terms not defined.

Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies. **Words of common usage are given their plain, natural, and ordinary meanings. Words that have well-defined legal meanings are given those meanings.**

**ACCESSIBLE SPACE. A space that complies with this code.**

**ADHERED MASONRY VENEER.** Veneer secured and supported through the adhesion of an *approved* bonding material applied to an *approved backing*. **Type and spacing of fasteners shall be noted on construction documents.**

**ADULT FOSTER HOME.** See Section 310.2 and ORS 443.705(1).

**AFFECTED BUILDINGS.** Section 1102 and ORS 447.210(1).

**AGRICULTURAL BUILDING.** See ORS 455.315 and Appendix C. ~~A structure designed and constructed to house farm implements, hay, grain, poultry, livestock or other horticultural products. This structure shall not be a place of human habitation or a place of employment where~~  
This section is incomplete. Does it also need changes to match change to ORS 455.315??

**AMERICANS WITH DISABILITIES ACT.** See Section 1102 and ORS 447.210(2).

**ARCHITECTURAL BARRIER.** See Section 1102 and ORS 447.210(3).



**BASEMENT.** A story that is not a story above grade plane (see “Story above grade plane”).~~-This definition of “Basement” does not apply to the provisions of Section 1612 for flood loads.~~

**BRACED WALL LINE.** A series of braced wall panels in a single story that meets the requirements of Section ~~2308.6.1~~ ~~2308.3~~ or 2308.12.4. A straight line through the building plan that represents the location of the lateral resistance provided by the wall bracing.

**BRACED WALL PANEL.** A section of wall braced in accordance with Section 2308.6.2 ~~2308.9.3~~ or 2308.12.4. A full-height section of wall constructed to resist in-plane shear loads through interaction of framing members, sheathing material and anchors. The panel’s length meets the requirements of its particular bracing method, and contributes toward the total amount of bracing required along its braced wall line.

**BUILDING CODE.** For the purposes of the Oregon Structural Specialty Code, building code shall mean the Oregon Structural Specialty Code (OSSC) as adopted by OAR 918-460-0010.

**BUTT JOINT.** A non-bonded plain, square joint a keyed joint or a doweled joint between two members, where primarily movement is at right angles to the plane of the joint. Sealant in a butt joint will generally be in tension or compression, but not shear.

~~**CELL (Group I-3 occupancy).** A room within a housing unit in a detention or correctional facility used to confine inmates or prisoners.~~

**CELL.** A housing unit in a detention or correctional facility for the confinement of not more than two residents.

**CELL (masonry).** A void space having a gross cross-sectional *area* greater than 1 ½ square inches (967 mm<sup>2</sup>).

**CELL COMPLEX.** A cluster or group of cells in a jail, prison or other detention facility, together with rooms used for accessory purposes, all of which open into the cell complex, and are used for functions such as dining, counseling, exercise, classrooms, sick call, visiting, storage, staff offices, control rooms or similar functions, and interconnecting corridors all within the cell complex.

**CELL, DORMITORY.** A housing area in a detention or correctional facility designated to house three or more residents.

**CELL TIERS.** Cells, dormitories and accessory spaces. Cell tiers are located one level above the other, and do not exceed two levels per floor. A cell tier shall not be considered a story or mezzanine.

~~**CELL TIER.** Levels of *cells* vertically stacked above one another within a *housing unit*.~~

**CLUSTERED MAILBOXES.** Clustered mailbox units, which are also known as Centralized Box Units or CBU’s, are free-standing mailbox units with multiple locked mailboxes, along with parcel lockers and a slot for mail collection.

**COLUMBARIUM.** A permanent structure consisting of niches.

**COMPANION CRYPT.** A permanent chamber for containment of human remains of not more than four individuals.

**CONSTRUCTION JOINT.** The surface where two successive placements of concrete meet and are to be bonded; reinforcement is not interrupted and tie bars are used as required.

**CONTRACTION JOINT.** A formed or sawed groove in a concrete structure, extending normal to the surface and to a depth of at least one-fourth the thickness of a concrete element, for the purpose of creating a weakened plane that induces a crack as internal stresses develop due to drying shrinkage.

**COVERED MULTIFAMILY DWELLINGS.** See Sections 1102 and ~~1110~~ 1107 and ORS 447.210(5). As part of this code, Covered Multifamily Dwellings, are only applicable to covered multifamily dwellings designed and constructed for first occupancy after March 13, 1991, or where the last building permit or renewal thereof was issued on or before June 15, 1990. For the purposes of this section, “first occupancy” means “a building that has never before been used for any purpose.”

**CRYPT.** A permanent chamber for containment of human remains.

**CURING.** For concrete, the maintenance of a satisfactory moisture content and temperature during its early stages so that desired properties may develop. For sealants, the maintenance of a satisfactory moisture content and temperature while the physical properties of the sealant are changed by chemical reaction.

**CURING COMPOUND.** A liquid that can be applied as a coating to the surface of newly placed concrete to retard the loss of water, or in the case of pigmented compounds, also to reflect heat so as to provide an opportunity for the concrete to develop its properties in a favorable temperature and moisture environment.

**DAYROOM.** A room which is adjacent to a cell, or cell tier, or dormitory and which is used as a dining, exercise or other activity room for residents.

**DETERIORATION.** The physical manifestation of failure of a material or assembly (e.g. cracking, delamination, flaking, pitting, scaling) caused by environmental or internal autogenous influences during testing or service.

**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. ~~In areas designated as Zone AO, the design flood elevation shall be the elevation of the highest existing grade of the building’s perimeter plus the depth number (in feet) specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).~~

**DIAPHRAGM.** A horizontal or sloped system acting to transmit lateral forces to the vertical-resisting elements. When the term “diaphragm” is used, it shall include horizontal bracing systems.

~~**Diaphragm flexible.** A diaphragm is flexible for the purpose of distribution of story shear and torsional moment where so indicated in Section 12.3.1 of ASCE 7.~~

~~**Diaphragm, rigid.** A diaphragm is rigid for the purpose of distribution of story shear and torsional moment when the lateral deformation of the diaphragm is less than or equal to two times the average story drift.~~

**DRAIN TILE LOOP.** A continuous length of drain tile or perforated pipe extending around all or part of the internal or external perimeter of a basement or crawl space footing.

**ELASTOMERIC SEALANT.** A sealant whose macromolecular material returns rapidly to approximately its initial dimensions and shape after substantial deformation by a weak stress and release of the stress.

**ELECTRICAL CODE.** For the purpose of the Oregon Structural Specialty Code, electrical code shall mean the Oregon Electrical Specialty Code (OESC) as adopted by OAR 918-305-0100.

**ELEMENT.** An architectural or mechanical component of a building, facility, space or site such as a telephone, curb ramp, door, drinking fountain, seating, clustered mailboxes or water closet.

**ELEVATOR CODE.** For the purpose of the Oregon Structural Specialty Code, elevator code shall mean the Oregon Elevator Specialty Code (OESC) as adopted by OAR 918-400-0455.

**ENERGY CODE.** For the purpose of the Oregon Structural Specialty Code, energy code shall mean the Oregon Energy Efficiency Specialty Code (OEESC) as adopted by OAR 918-460-0500.

**ESSENTIAL FACILITIES.** Buildings and other structures that are intended to remain operational in the event of extreme environmental loading from flood, wind, snow or earthquakes.

**FAMILY.** An individual or two or more persons related by blood or marriage or a group of not more than five persons (excluding servants) who need not be related by blood or marriage living together in a dwelling unit.

**FAMILY CHILD CARE HOME.** (In a private residence). (Licensed by Oregon Child Care Division under ORS 657A) Includes certified family child care homes (located in homes licensed for 16 or fewer children) and registered family child care homes (located in homes licensed for 10 or fewer children).

**FIELD-MOLDED SEALANT.** A liquid or semi-solid material molded into the desired shape in the joint into which it is installed.

**FIRE CODE.** For the purpose of the *Oregon Structural 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*.

**FLOOD HAZARD AREA.** The area designated as a flood hazard area by the Flood Plain Administrator. The greater of the following two areas:

1. The area within a flood plain subject to a 1 percent or greater chance of flooding in any year.
2. The area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.

**FLOOD HAZARD AREA SUBJECT TO HIGH-VELOCITY WAVE ACTION.** Area within the flood hazard area that is subject to high-velocity wave action, as determined by the Flood Plain Administrator, and shown on a Flood Insurance Rate Map (FIRM) or other flood hazard map as Zone V, VO, VE or V1-30.

**FUEL GAS CODE.** For the purpose of the Oregon Structural Specialty Code, fuel gas code shall mean the Oregon Mechanical Specialty Code (OMSC) as adopted by OAR 918-440-0010.

**HAZARDOUS FACILITY.** See Section 1803.2 and ORS 455.447.

**HIGH-RANGE WATER REDUCER.** A chemical admixture capable of reducing the water content of concrete at least 12%. This admixture shall conform to ASTM C494 Type F and/or Type 0.

**HISTORIC BUILDINGS.** Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law (see Sections 3409 and 3411.9).

**HISTORIC BUILDING.** A structure, in whole or in part, that is listed on or is eligible for listing on the National Register of Historic Places, established and maintained under the National Historic Preservation Act of 1966 (P.L. 89-665), or if the National Register of Historic Places ceases accepting nominations, is approved for listing on an Oregon register of historic places, or is a locally designated landmark protected by ordinance (see Sections 3409 and 3411.9).

**HONEYCOMB.** Voids left in concrete due to failure of the mortar to effectively fill the spaces among course aggregate particles.

**HOUSING UNIT.** ~~A dormitory or a group of cells with a common dayroom in Group I-3.~~

**HOUSING UNIT.** A dormitory or a group of cells with a common dayroom in Group I-3. An area intended to lodge residents on a 24-hour basis where accommodations are provided for sleeping.

**ISOLATION JOINT.** A non-bonded separation between adjoining parts of a structure, usually in a vertical plane, designed to allow relative movement in three directions in order to accommodate differential horizontal or vertical movement without the development of cracks elsewhere in the structure. May be either a butt joint or a lap joint, used to structurally separate the floor slab from other building elements.

**LAITANCE.** A layer of weak and nondurable material containing cement and fines from aggregates, brought by bleeding water to the outer surface of concrete.

**LAP.** The length by which one material overlays another at a lap joint.

**LAP JOINT.** A non-bonded joint in which the materials being joined override each other so that any movement of the materials is primarily parallel to the plane of the joint, putting sealants in shear rather than tension or compression. Formed slab joints that are not attached with a keyway are considered to be lap joints.

**LOCKUP FACILITY.** See Section 304.2 and ORS 169.005(4).

**LODGINGHOUSE.** Any building or portion thereof containing not more than five guest rooms where rent is paid in money, goods, labor or otherwise. The total number of guests shall not exceed 16.

**MAJOR STRUCTURE.** See Section 1803.2 and ORS 455.447.

**MANUFACTURED SANDS.** Sands resulting from the crushing of rock, gravel or slag.

**MASTIC.** A sealant with putty-like properties.

**MAUSOLEUM.** A permanent structure consisting of crypts.

**MECHANICAL CODE.** For the purpose of the Oregon Structural Specialty Code, mechanical code shall mean the Oregon Mechanical Specialty Code (OMSC) as adopted by OAR 918-440-0010.

**MEMBRANE.** A flexible, continuous sheet. See also: membrane-forming curing compound; soil-gas-retarder membrane; waterproofing membrane.

**MEMBRANE-FORMING CURING COMPOUND.** A liquid material that, when applied over the surface of freshly placed concrete, forms a solid, impervious layer which holds the mixing water in the concrete.

**MID-RANGE WATER REDUCER.** A chemical admixture capable of reducing the water content of concrete from 6 - 15%. This admixture shall conform to ASTM C494 Type A and/or Type F.

**NATURAL SANDS.** Sands resulting from the natural disintegration and abrasion of rock.

**NICHE.** A permanent chamber for containment of cremated human remains of one or more individuals.  
**OVERHEAD FINISH OF A BUILDING.** The lowest point of the interior finished ceiling surface on the uppermost floor level required to be accessible, but in no case shall this point be lower than the highest point used to measure the clear height for an accessible route on that level.

**PIER.** A structure, usually of greater length than width and projecting from the shore into a body of water with direct access from land that can be either open deck or provided with a superstructure.

**PLUMBING CODE.** For the purpose of the Oregon Structural Specialty Code, plumbing code shall mean the Oregon Plumbing Specialty Code (OPSC) as adopted by OAR 918-750-0110.

**POLYETHYLENE.** A thermo-plastic high-molecular-weight organic compound often used in sheet form as a water-vapor retarder.

**POLYVINYL CHLORIDE.** A synthetic resin used in the manufacture of pipes and nonmetallic waterstops.

**PREFABRICATED CONSTRUCTION.** See OAR Chapter 918, Division 674.

**PREFORMED SEALANT.** A sealant functionally preshaped by the manufacturer so that only a minimum of field fabrication is required prior to installation.

**PRESSURE SENSITIVE.** Capable of adhering to a surface without the application of additional adhesives, when pressed against it.

**PRIVATE ENTITIES.** See ORS 447.210(10).

**PUBLIC ACCOMODATIONS.** See ORS 447.210(11).

**PUBLIC BUILDING.** Any building or structure which is publically owned.

**PUBLIC USE.** Interior or exterior rooms or spaces that are made available to the general public. Public use may be provided at a building or facility that is privately or publicly owned.

**PUBLIC USE AREAS.** Interior or exterior rooms or spaces that are made available to the general public.

**RADON GAS.** A naturally-occurring, chemically inert, radioactive gas that is not detectable by human senses. As a gas(soil gas), it can move readily through particles of soil and rock and can accumulate under the slabs and foundations of buildings where it can easily enter into the living space through construction cracks and openings.

**RESIDENT HOUSING AREA.** Includes any cell, cell complex, cell dormitory, cell tier, day room or housing unit.

**RESIDENTIAL CODE.** For the purpose of the Oregon Structural Specialty Code, residential code shall mean the Oregon Residential Specialty Code (ORSC) as adopted by OAR 918-480-0005.

**RESTRAINT.** Shall mean the physical retention of a person within a room, cell or holding facility by any means, or within a building by means of locked doors.

**SEALANT.** Any material used to seal joints or openings against passage of solids, liquids, or gases.

**SEISMIC HAZARD.** See Section 1803 and ORS 455.447.

**SIGNAGE.** Displayed verbal, symbolic, tactile or pictorial information.

**SOLAR CODE.** For the purpose of the Oregon Structural Specialty Code, solar code shall mean the Oregon Solar Installation Specialty Code (OSISC) as adopted by ORS 455.020.

**SOIL-GAS-RETARDER (Residential).** A continuous membrane of 6-mil (0.15 mm) polyethylene or other equivalent material used to retard the flow of soil gases into a building.

**SOIL-GAS-RETARDER MEMBRANE.** A durable, flexible and non-deteriorating material, installed in a continuous sheet to retard the pressure-driven flow of soil gas through elements of a structure.

**SOLID REINFORCED MASONRY.** Masonry construction in which mortar, grout or concrete completely fills all joints and voids and in which steel reinforcement is embedded in such a manner that the materials act together in resisting forces.

**SPACE.** A definable area; e.g., room, toilet room, hall, assembly area, entry, storage room, alcove, courtyard or lobby.

**SPECIAL FLOOD HAZARD AREA.** The land area subject to flood hazards and shown on a Flood Insurance Rate Map or other flood hazard map as established by the Flood Plain Administrator ~~Zone A, AE, A1-30, A99, AR, AO, AH, V, VO, VE or V1-30.~~

**SPECIAL OCCUPANCY STRUCTURE.** See Section 1803 and ORS 455.447.

**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.

**STRUCTURE.** That which is built or constructed. A structure may contain one or more buildings separated by fire-rated construction elements in accordance with prevailing building codes.

~~[A] STRUCTURE.~~ That which is built or constructed.

**SUBGRADE.** The soil prepared and compacted to support a structure.

**SUBMEMBRANE DEPRESSURIZATION SYSTEM.** A system designed to achieve lower-sub-membrane air pressure relative to crawl space air pressure by use of a vent drawing air from beneath the soil-gas-retarder membrane.

**SUBSLAB DEPRESSURIZATION SYSTEM (Active).** A system designed to achieve lower sub-slab air pressure relative to indoor air pressure by use of a fan-powered vent drawing air from beneath the slab.

**SUBSLAB DEPRESSURIZATION SYSTEM (Passive).** A system designed to achieve lower sub-slab air pressure relative to indoor air pressure by use of a vent pipe routed through the conditioned space of a building and connecting the sub-slab area with outdoor air, thereby relying on the convective flow of air upward in the vent to draw air from beneath the slab.

**SUBSTANTIAL ALTERATION.** Any alteration where the total cost of all alterations (including, but not limited to, electrical, mechanical, plumbing or structural changes) for a building or facility within any 12-month period amounts to 25 percent or more of the assessed value of the structure before the building alteration occurred. For the purpose of this chapter, standard building maintenance, rewiring, residing or reroofing as not considered an alteration.

~~**SUBSTANTIAL DAMAGE.** Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.~~

**SUBSTANTIAL DAMAGE.** Any damage of any origin to a structure, whereby the cost of restoring the structure to its original condition would be equal to or exceed 25 percent of the assessed value of the structure before the alteration occurred.

**SUBSTANTIAL IMPROVEMENT.** Any *repair*, reconstruction, rehabilitation, *addition* or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the improvement or *repair* is started ~~as determined by the local governing authority~~. If the structure has sustained *substantial damage*, any repairs are considered substantial improvement regardless of the actual *repair* work performed. **The Flood Plain Administrator shall make all final determinations in the application of this definition.** The term does not, however, include either:

1. Any project for improvement of a building required to correct existing health, sanitary or safety code violations identified by the *building official* and that are the minimum necessary to assure safe living conditions.
2. Any alteration of a historic structure provided that the alteration will not preclude the structure's continued designation as a historic structure.

**SUPERPLASTICIZER.** See **high-range water reducer.**

**SUPERSTRUCTURE. (Radon Control Methods Public Buildings)** All of that part of a structure that is above grade, see Section 1811.

**SUPERSTRUCTURE. (Piers and Wharves)** That portion of the construction of a pier or wharf above the deck, see Section 424.

~~**TECHNICALLY INFEASIBLE.** An *alteration* of a building or a *facility* that has little likelihood of being accomplished because the existing structural conditions require the removal or *alteration* of a load-bearing member that is an essential part of the structural frame, or because other existing physical or site constraints prohibit modification or addition of elements, spaces or features which are in full and strict compliance with the minimum requirements for new construction and which are necessary to provide accessibility.~~

**TECHNICALLY INFEASIBLE.** An alteration that has little likelihood of being accomplished because existing structural conditions would require removing or altering a load-bearing member that is an essential part of the structural frame, or because site constraints prohibit modification or addition of elements, spaces or features that are in full and strict compliance with the minimum requirements for new construction and are necessary to provide accessibility.

**TEMPORARY STRUCTURE.** A structure which is erected, occupied, and disassembled or otherwise removed from the site within a total time period of 90 calendar days or less.

**TSUNAMI INUNDATION ZONE.** See Section 1803 and OAR Chapter 632, Division 5.

**WATERPROOFING MEMBRANE.** A liquid sealing compound (e.g., bituminous and paraffinic emulsions, coal tar cut-backs, etc.) or non-liquid protective coatings (e.g., sheet plastics, etc.) used separately or together in a manner which renders the structural surface to which they are applied essentially impervious to water in either the liquid or vapor state.

**WATER-REDUCING ADMIXTURE.** A chemical additive to concrete conforming to ASTM C94 capable of producing a reduction in mixing water or increase in flowability without causing undue set retardation or entrainment of air in the mortar or concrete.

**WATERSTOP.** A diaphragm used across a joint as a sealant, usually manufactured specifically to prevent the passage of water through joints in concrete structures.

**WHARF.** A structure at the shoreline having a platform built along side and parallel to a body of water that may have an open deck or be provided with a superstructure.

**WINERY.** A facility used for the primary commercial purpose of processing grapes or other fruit products to produce wine or cider having a 16 percent or less alcohol content by volume, including all areas used for the production, storage, distribution and sale of such wine or cider, including crushing, fermenting in wood or steel barrels, blending, aging, bottling, warehousing, shipping, and tasting rooms



with an occupant load of 299 or less and retailing of wine, cider, and incidental items related to wine and cider and all associated administrative functions.

WORKING LEVEL (WL). A measure of radioactive exposure equal to the total quantity of radon decay products in one liter of air that will result in the ultimate emission of  $1.3 \times 10^5$  MeV (million electron volts) of energy from alpha particles. In perfect equilibrium, 1 WL equals 100 pCi/L (picoCuries per liter). It is often assumed that the air inside buildings is not in equilibrium, and that only half the radon daughters are moving freely in the air, while half are attached to dust or building surfaces. When this condition exists, an equilibrium ratio of 0.5 is said to exist. At an equilibrium ratio of 0.5, 1 WL = 200 pCi/L. For purposes of this standard, 1 WL is defined as equal to 200 pCi/L.

## CHAPTER 3 USE AND OCCUPANCY CLASSIFICATION

**304.2 Lockup facilities. Buildings containing lockup facilities, as defined in ORS 169.005(4), shall comply with the following provisions:**

- 1. Areas containing lockup facilities shall be separated from other rooms, spaces or areas by an approved smoke barrier (see Section 909.5).**
- 2. The smoke control zone in which the lockup cells are located shall be provided with an automatic fire sprinkler system complying with Chapter 9 requirements for Group I-3 occupancies.**
- 3. The smoke control zone in which the lockup area is located shall be provided with an automatic smoke detection system installed in accordance with the Fire Code Group I-3 occupancies.**
- 4. The combined occupant load of the holding cells shall not exceed five.**

### **306.3 Low-hazard factory industrial, Group F-2.**

Factory industrial uses that involve the fabrication or manufacturing of noncombustible materials which during finishing, packing or processing do not involve a significant fire hazard shall be classified as F-2 occupancies and shall include, but not be limited to, the following:

Beverages: up to and including 16-percent alcohol content  
Brick and masonry  
Ceramic products  
Foundries  
Glass products  
Gypsum  
Ice  
Metal products (fabrication and assembly)  
**Wood barrel and bottled wine aging facilities in wineries**

**307.1.2 Storage of Class 1.4G (Class C Common) fireworks. A permanent building used for the temporary storage of 1.4G (Class C) fireworks as authorized by a retail sales permit under ORS 480.127 may be classified as either a Group M, Group S-1 or a detached Group U Occupancy provided:**

- 1. The total amount of 1.4G retail fireworks is less than 5,000 pounds (2268 kg) gross weight; or**
- 2. When the building is protected by an approved automatic sprinkler system and the amount of 1.4G retail fireworks is less than 10,000 pounds (4636 kg) gross weight.**

**308.3 Institutional Group I-1.** This occupancy shall include buildings, structures or portions thereof for more than 16 persons, **excluding staff**, who reside on a 24 hour basis in a supervised environment and receive ~~custodial care. the persons receiving care are capable of self preservation.~~ **Buildings of Group I-1 shall be classified as one of the occupancy conditions indicated in Sections 308.3.1 or 308.3.2.** ~~This group shall include, but not be limited to, the following:~~

~~Alcohol and drug centers  
Assisted living facilities  
Congregate care facilities  
Convalescent facilities  
Group homes  
Halfway houses  
Residential board and custodial care facilities  
Social rehabilitation facilities~~

#### **308.3.1 Five or fewer persons receiving care.**

~~A facility such as the above with five or fewer persons receiving such care shall be classified as Group R-3 or shall comply with the International Residential Code provided an automatic sprinkler system is installed in accordance with Section 903.3.1.3 or with Section P2904 of the International Residential Code.~~

**308.3.1 Condition 1. This occupancy condition shall include buildings in which all persons receiving custodial care who, without any assistance, are capable of responding to an emergency situation to complete building evacuation. This group shall include, but not be limited to, the following:**

**Congregate living facilities**  
**Halfway houses**  
**Social rehabilitation facilities**

**308.3.2 Six to sixteen persons receiving care.**

~~A facility such as above, housing not fewer than six and not more than 16 persons receiving such care, shall be classified as Group R-4.~~

**308.3.2 Condition 2. This occupancy condition shall include buildings subject to licensure by the Oregon Department of Human Services in which there are any persons receiving custodial care who require limited verbal or physical assistance while responding to an emergency situation to complete building evacuation. This group shall include, but not be limited to, the following:**

**Alcohol and drug centers**  
**Assisted living facilities with or without a Memory Care Endorsement**  
**Residential care facilities with or without a Memory Care Endorsement**  
**Residential treatment facilities**  
**Group homes and facilities**

~~308.3.2-~~**308.3.3** Six to sixteen persons receiving **custodial care**. A facility ~~such as above~~, housing not fewer than six and not more than 16 persons receiving ~~such~~ **custodial** care, shall be classified as Group R-4.

~~308.3.1~~**308.3.4** Five or fewer persons receiving **custodial care**. A facility ~~such as the above~~ **with five or fewer persons receiving such custodial care**, shall be classified as Group R-3 or shall comply with the ~~International Residential Code~~ **Residential Code** provided an *automatic sprinkler system* is installed in accordance with Section 903.3.1.3. ~~or with Section P2904 of the International Residential Code.~~ **or with Appendix T of the Residential Code.**

**308.4 Institutional Group I-2.** This occupancy shall include buildings and structures used for *medical care* on a 24-hour basis for more than five persons who are *incapable of self preservation*. This group shall include, but not be limited to, the following:

*Foster care facilities*  
*Detoxification facilities*  
*Hospitals*  
*Nursing homes*  
*Psychiatric hospitals*

**308.4.1** Five or fewer persons receiving **medical** care. A facility ~~such as the above~~ with five or fewer persons receiving ~~such~~ **medical** care shall be classified as Group R-3 or shall comply with the ~~International Residential Code~~ **Residential Code** provided an automatic sprinkler system is installed in accordance with Section 903.3.1.3. ~~or with Section P2904 of the International Residential Code.~~ **or with Appendix T of the Residential Code.**

**308.6.5 Family Childcare Homes. Family Child Care Homes (located in a private residence) as defined in Section 202 shall be classified as a Group R-3 or shall comply with the Residential Code in accordance with Section 101.2.**

**310.2 Definitions.** The following words and terms shall, for the purposes of this section and as used elsewhere in this code, have the meanings shown herein.

**ADULT FOSTER HOME.**

**FAMILY CHILD CARE HOME. (Licensed by Oregon Child Care Division under ORS 657A)**

**LODGINGHOUSE.**

**310.4 Residential Group R-2.**

Residential occupancies containing *sleeping units* or more than two *dwelling units* where the occupants are primarily permanent in nature, including:

Apartment houses  
*Boarding houses* (nontransient) with more than 16 occupants  
*Congregate living facilities* (nontransient) with more than 16 occupants  
Convents  
*Dormitories*  
Fraternities and sororities  
Hotels (nontransient)  
*Live/work units*  
Monasteries  
Motels (nontransient)  
Vacation timeshare properties

**Group R-2 occupancies providing 21 or more housing units for low-income elderly, which are financed in whole or in part by the federal or state fund, shall contain a multiservice room adequate in size to seat all the tenants (ORS 455.425). The multiservice room shall include adjacent toilet facilities for both sexes; a service area with a kitchen sink, countertop and upper and lower cabinets; and a storage room sized to store tables, chairs or benches and janitorial supplies and tools. The multiservice room and accessory rooms shall be accessible to disabled persons (see Chapter 11).**

**310.5 Residential Group R-3.** Residential occupancies where the occupants are primarily permanent in nature and not classified as group R-1, R-2, R-4, or I, including:

Buildings that do not contain more than two dwelling units.  
Boarding houses (nontransient) with 16 or fewer occupants.  
~~Boarding houses (transient) with 10 or fewer occupants~~  
~~Care facilities that provide accommodation for five or fewer persons receiving care.~~  
Congregate living facilities (nontransient) with 16 or fewer occupants.  
~~Congregate living facilities (transient) with 10 or fewer occupants.~~

**Adult care facilities that provide accommodations for six or fewer persons of any age for less than 24 hours.**

**Child care facilities that provide accommodations for six or fewer persons of any age for less than 24 hours.**

**Adult foster homes, as defined in ORS Chapter 443, or family child care homes (located in a private residence), as defined in Section 310.2.**

**Adult foster homes and family child care homes that are within a single-family dwelling are permitted to comply with the *Residential Code* in accordance with Section 101.2.**

**Lodging houses, as defined in this section, are permitted to comply with the *Residential Code* in accordance with Section 101.2.**

**310.5.1 Care facilities within a dwelling.** Care facilities for five or fewer persons receiving care that are within a single-family dwelling are permitted to comply with the ~~*International Residential Code*~~ ***Residential Code*** provided an automatic sprinkler system is installed in accordance with Section 903.3.1.3. ~~or with section P2904 of the *International Residential Code*.~~ **or with Appendix T of the *Residential Code*.**

**310.6 Residential Group R-4.** This occupancy shall include buildings, structures or portions thereof for more than five but not more than 16 persons, excluding staff, who reside on a 24-hour basis in a supervised residential environment and receive *custodial care*. ~~The persons receiving care are capable of self preservation.~~  
**Buildings of Group R-4 shall be classified as one of the occupancy conditions indicated in Sections 310.6.1 or 310.6.2 .** This group shall include, but not be limited to, the following:

- Alcohol and drug centers
- Assisted living facilities
- Congregate care facilities
- Convalescent facilities
- Group homes
- Halfway houses
- Residential board and custodial care facilities
- Social rehabilitation facilities

Group R-4 occupancies shall meet the requirements for construction as defined for Group R-3, except as otherwise provided for in this code.

**310.6.1 Condition 1. This occupancy condition shall include buildings in which all persons receiving custodial care, who without any assistance, are capable of responding to an emergency situation to complete building evacuation. This group shall include, but not be limited to, the following:**

- Congregate living facilities
- Halfway houses
- Social rehabilitation facilities

**310.6.2 Condition 2. This occupancy condition shall include buildings subject to licensure by the Oregon Department of Human Services in which there are any persons receiving custodial care who require limited verbal or physical assistance while responding to an emergency situation to complete building evacuation. This group shall include, but not be limited to, the following:**

- Alcohol and drug centers
- Assisted living facilities with or without a Memory Care Endorsement
- Residential care facilities with or without a Memory Care Endorsement
- Residential treatment facilities
- Group homes and facilities

### **311.3 Low-hazard storage, Group S-2.**

Includes, among others, buildings used for the storage of noncombustible materials such as products on wood pallets or in paper cartons with or without single thickness divisions; or in paper wrappings. Such products are permitted to have a negligible amount of plastic *trim*, such as knobs, handles or film wrapping. Group S-2 storage uses shall include, but not be limited to, storage of the following:

- Asbestos
- Beverages up to and including 16-percent alcohol in wood barrels, metal, glass or ceramic containers
- Cement in bags
- Chalk and crayons
- Dairy products in non-waxed coated paper containers
- Dry cell batteries
- Electrical coils
- Electrical motors
- Empty cans
- Food products
- Foods in noncombustible containers
- Fresh fruits and vegetables in non-plastic trays or containers
- Frozen foods
- Glass

Glass bottles, empty or filled with noncombustible liquids

Gypsum board

**311.4 Mausoleums and columbariums, Group S-3. The design life of structures in this occupancy are longer than other occupancies in this code. Except where specific provisions are made in Chapter 4, other requirements of this code shall apply.**

## CHAPTER 4 SPECIAL DETAILED REQUIREMENTS BASED ON USE AND OCCUPANCY

**407.10 Emergency and standby power. Automatic emergency power and/or standby power supplies shall be provided for all health care facilities, as defined in NFPA 99. The approved alternative power supply shall maintain operating energy to the facility for a period of not less than 90 minutes. Emergency and standby power supplies shall be installed as required in the Oregon Electrical Specialty Code and in accordance with NFPA 99.**

### **408.1 General.**

Occupancies in Group I-3 shall comply with the provisions of Sections 408.1 through 408.11 and other applicable provisions of this code (see Section 308.5).

#### **408.1.1 Definition.**

The following terms are defined in Chapter 2:

**CELL.**

**CELL COMPLEX.**

**CELL, DORMITORY.**

**CELL TIERS.**

**DAYROOM.**

**HOUSING UNIT.**

**RESIDENT HOUSING AREA.**

**RESTRAINT.**

### **408.2 Other occupancies.**

Buildings or portions of buildings in Group I-3 occupancies where security operations necessitate the locking of required *means of egress* shall be permitted to be classified as a different occupancy. Occupancies classified as other than Group I-3 shall meet the applicable requirements of this code for that occupancy provided provisions are made for the release of occupants at all times.

**Where security operations necessitate the locking of required means of egress, as allowed in Occupancy Conditions 2, 3, 4 and 5, provisions shall be made for the release of occupants at all times.**

*Means of egress* from detention and correctional occupancies that traverse other use areas shall, as a minimum, conform to requirements for detention and correctional occupancies.

### **408.3.9 Cell tier exiting.**

**408.3.9.1 Two exits are required from the cell tier above the first level if the occupant load exceeds 10.**

**408.3.9.2 Two exits are required from the cell tiers above the second level.**

**408.3.9.3 Cell tier exit balconies may not have any dead end exceeding 20 feet (6096 mm) in length.**

### **408.9 Windowless buildings.**

~~For the purposes of this section, a windowless building or portion of a building is one with nonopenable windows, windows not readily breakable or without windows. Windowless buildings shall be provided with an engineered smoke control system to provide a tenable environment for exiting from the *smoke compartment* in the area of fire origin in accordance with Section 909 for each windowless *smoke compartment*.~~

### **408.109 Fire alarm system.**

A *fire alarm* system shall be provided in accordance with Section 907.2.6.3.

### **408.1110 Automatic sprinkler system.**

Group I-3 occupancies shall be equipped throughout with an *automatic sprinkler system* in accordance with

**408.1011 Emergency ventilation. Group I-3, resident housing areas shall be equipped with smoke and heat venting by one of the following:**

- 1. A manually operated mechanical system capable of at least six air changes per hour of exhaust with mechanical or natural makeup air.**
- 2. Roof vents capable of being manually operated, installed in accordance with their listing and Section 910.3.2. The maximum center-to-center spacing between vents shall be 100 feet (45 720 mm) and the venting ratio of effective area of vent openings to floor area shall be 1:150.**

**[F] 412.4.6 Fire suppression.**

Aircraft hangars shall be provided with a fire suppression system designed in accordance with NFPA 409, based upon the classification for the hangar given in Table 412.4.6.

**Exceptions:**

- 1. Where a *fixed base operator* has separate repair facilities on site, Group II hangars operated by a *fixed base operator* used for storage of *transient aircraft* only shall have a fire suppression system, but the system is exempt from foam requirements.**
- 2. Aircraft Hangars that have an aircraft access door height less than 28 feet (8534mm), and do not have provisions for housing aircraft with a tail height over 28 feet (8534 mm), are exempt from foam requirements provided the building complies with all of the following criteria:**
  - 2.1. The building is surrounded and adjoined by public ways or yards not less than 60 feet (18 288 mm) in width.**
  - 2.2. The building is provided with an automatic sprinkler system throughout with a design density of 0.25 gal/min.(0.016L/s).**
  - 2.3. The total fuel capacity of all aircraft located within a single fire area does not exceed 5,000 gallons (18,927 L).**
  - 2.4. No single fire area exceeds 65,000 square feet (3716 m<sup>2</sup>).**
  - 2.5. The gross building area does not exceed 75,000 square feet (4288 m<sup>2</sup>).**

**420.1 General.** Occupancies in Groups I-1, R-1, R-2, ~~and R-3~~ **and R-4** shall comply with the provisions of Sections 420.1 through ~~420.5~~ **420.6** and other applicable provisions of this code.

**420.4 Smoke barriers in Group I-1 Condition 2. Smoke barriers shall be provided in Group I-1 Condition 2 to subdivide every story used by persons receiving care, treatment or sleeping and to provide other stories with an occupant load of 50 or more persons, into no fewer than two smoke compartments. Such stories shall be divided into smoke compartments with an area of not more than 22,500 square feet (2092 m<sup>2</sup>) and the travel distance from any point in a smoke compartment to a smoke barrier door shall not exceed 200 feet (60 960 mm). The smoke barrier shall be in accordance with Section 709.**

**420.4.1 Refuge area. Refuge areas shall be provided within each smoke compartment. The size of the refuge area shall accommodate the occupants and care recipients from the adjoining smoke compartment. Where a smoke compartment is adjoined by two or more smoke compartments, the minimum area of the refuge area shall accommodate the largest occupant load of the adjoining compartments. The size of the refuge area shall provide the following:**

- 1. Not less than 15 net square feet (1.4 m<sup>2</sup>) for each care recipient.**
- 2. Not less than 6 net square feet (0.56 m<sup>2</sup>) for other occupants.**

**Areas or spaces permitted to be included in the calculation of the refuge area are corridors, lounge or dining areas and other low hazard areas.**

~~420.4~~ **420.5 Automatic sprinkler system.**



## SECTION 424 PIERS AND WHARVES

424.1 Scope. This section shall apply to piers and wharves constructed in whole or in part of combustible materials and to piers and wharves constructed of noncombustible material having less than 2-hour fire-resistive protection of the structural elements or pier deck.

424.2 Definitions. The following terms are defined in Chapter 2:

PIER.

SUPERSTRUCTURE.

WHARF.

424.3 Fire-extinguishing systems. Automatic fire-extinguishing systems shall be installed as specified in Section 903.

424.4 Physical protection. Where sprinkler piping and fire-extinguishing equipment are subject to damage by floating debris, barriers shall be provided to exclude or protect against such debris.

Protection from corrosion and freezing shall be provided where necessary.

424.5 Subdivision of substructures. All substructures of piers shall have the under-deck area subdivided by:

1. Transverse fire walls at intervals not exceeding 450 feet (137 169 mm) and a maximum area of 50,000 square feet (4625 square meters) extending from the low water line to the deck. Where superstructures bridge a required fire wall, the fire wall shall extend to the roof of the superstructure as required for an area separation wall.
2. Transverse fire stops located between fire walls, spacing between fire walls and fire stops shall not exceed 1550 feet (47 720 mm). Fire stops shall fit tightly against the pier deck and around any structural members of pipes that pass through the fire stop so that an effective barrier to fire and draft is maintained. Fire stops shall extend to the water line. Where aprons or platforms are built along the sides of a pier, fire stops shall extend to the outside edge of such aprons or platforms.

424.6 Detailed requirements. Fire walls shall be of reinforced concrete having a fire-resistance rating of four hours, or other materials of equivalent stability and fire resistance. Fire stops shall be constructed of wood planking built up to a thickness of 4 inches (102 mm) and securely fastened to the structural frame, or other construction having equivalent stability and fire resistance.

424.7 Superstructures. Except as provided in this section, superstructures located on piers and wharves shall be classified for occupancy and type of construction and constructed according to this code.

## SECTION 425 MAUSOLEUMS AND COLUMBARIUMS

425.1 Mausoleums and columbariums. The following terms are defined in Chapter 2:

COLUMBARIUM.

COMPANION CRYPT.

CRYPT.

MAUSOLEUM.

NICHE.

**425.1.1 Materials. Materials of construction of mausoleums and columbariums shall be as set forth in this code for Type I or II buildings without use of combustible materials.**

**Exception: Interior doors and frames and interior frames for glass screens may be constructed of wood.**

**425.1.1.1 Construction. All crypt walls and crypt floor slabs shall be constructed of poured-in-place reinforced concrete, without honeycombs.**

**Exception: Crypt opening slabs and the separation slabs between upper and lower spaces of a companion crypt may be installed after entombment and shall be of concrete or mineral-type material.**

**After entombment, the crypt opening shall be sealed in a manner to be odor tight. Crypt walls and floor slabs shall be not less than 3 inches (76 mm) thick.**

**425.1.1.2 Loading. Each crypt, including each crypt in companion crypts, shall be designed for a minimum total live load of 600 pounds (272 kg) for each individual human remains. No crypt shall contain more than four individual human remains.**

**425.1.1.3 Other methods and materials. Other methods and materials may be considered as set forth in Section 104.11, provided they have similar qualities of permanence, odor tightness and fire resistance as those identified in this subsection.**

**425.1.1.4 Other occupancies. Areas used for assembly shall be classified and constructed as required in this code.**

**Exception: Occupancy separations are not required between mausoleums/columbariums and other occupancies.**

**425.1.1.5 Pressure relief. A pressure-relief passage shall be provided leading from each crypt to the roof above the structure. This pressure-balancing shaft shall be located near the rear of each crypt and shall be sealed until the time of entombment and then opened before the crypt is sealed. The rooftop opening shall not be located less than 10 feet (3048 mm) from any cemetery property line. This pressure-relief passage shall be continued to a gravel sump below the lowest crypt slab.**

## **SECTION 424 426 CHILDREN'S PLAY STRUCTURES**

### **424.1 426.1 Children's play structures.**

Children's play structures installed inside all occupancies covered by this code that exceed 10 feet (3048 mm) in height and 150 square feet (14m<sup>2</sup>) in area shall comply with Sections 424.2 **426.2** through 424.5 **426.5**.

### **424.2 426.2 Materials.**

Children's play structures shall be constructed of noncombustible materials or of combustible materials that comply with the following:

### **424.3 426.3 Fire protection.**

Children's play structures shall be provided with the same level of *approved* fire suppression and detection devices required for other structures in the same occupancy.

### **424.4 426.4 Separation.**

Children's play structures shall have a horizontal separation from building walls, partitions and from elements of the *means of egress* of not less than 5 feet (1524 mm). Children's play ~~ground~~ structures shall have a horizontal

separation from other children's play structures of not less than 20 feet (6090 mm).

**~~424.5~~ 426.5 Area limits.**

Children's play structures shall be not greater than 300 square feet (28m<sup>2</sup>) in area, unless a special investigation, acceptable to the building official, has demonstrated adequate fire safety.

## CHAPTER 5 GENERAL BUILDING HEIGHTS AND AREAS

### [F] 501.2 Address identification.

New and existing buildings shall be provided with *approved* address numbers or letters. Each character shall be not less than 4 inches (102 mm) in height and not less than 0.5 inch (12.7 mm) in width. They shall be installed on a contrasting background and be plainly visible from the street or road fronting the property. When required by the fire code official, address numbers shall be provided in additional *approved* locations to facilitate emergency response. Where access is by means of a private road and the building address cannot be viewed from the *public way*, a monument, pole or other *approved* sign or means shall be used to identify the structure. ~~Address numbers shall be maintained.~~

**TABLE 503—continued**  
**ALLOWABLE BUILDING HEIGHTS AND AREAS<sup>a, b</sup>**

| GROUP                  |                  | TYPE OF CONSTRUCTION |        |         |        |          |        |         |        |        |
|------------------------|------------------|----------------------|--------|---------|--------|----------|--------|---------|--------|--------|
|                        |                  | TYPE I               |        | TYPE II |        | TYPE III |        | TYPE IV | TYPE V |        |
|                        |                  | A                    | B      | A       | B      | A        | B      | HT      | A      | B      |
|                        | HEIGHT<br>(feet) | UL                   | 160    | 65      | 55     | 65       | 55     | 65      | 50     | 40     |
| STORIES(S)<br>AREA (A) |                  |                      |        |         |        |          |        |         |        |        |
| M                      | S                | UL                   | 11     | 4       | 2      | 4        | 2      | 4       | 3      | 1      |
|                        | A                | UL                   | UL     | 21,500  | 12,500 | 18,500   | 12,500 | 20,500  | 14,000 | 9,000  |
| R-1                    | S                | UL                   | 11     | 4       | 4      | 4        | 4      | 4       | 3      | 2      |
|                        | A                | UL                   | UL     | 24,000  | 16,000 | 24,000   | 16,000 | 20,500  | 12,000 | 7,000  |
| R-2                    | S                | UL                   | 11     | 4       | 4      | 4        | 4      | 4       | 3      | 2      |
|                        | A                | UL                   | UL     | 24,000  | 16,000 | 24,000   | 16,000 | 20,500  | 12,000 | 7,000  |
| R-3                    | S                | UL                   | 11     | 4       | 4      | 4        | 4      | 4       | 3      | 3      |
|                        | A                | UL                   | UL     | UL      | UL     | UL       | UL     | UL      | UL     | UL     |
| R-4                    | S                | UL                   | 11     | 4       | 4      | 4        | 4      | 4       | 3      | 2      |
|                        | A                | UL                   | UL     | 24,000  | 16,000 | 24,000   | 16,000 | 20,500  | 12,000 | 7,000  |
| S-1                    | S                | UL                   | 11     | 4       | 2      | 3        | 2      | 4       | 3      | 1      |
|                        | A                | UL                   | 48,000 | 26,000  | 17,500 | 26,000   | 17,500 | 25,500  | 14,000 | 9,000  |
| S-2, S-3               | S                | UL                   | 11     | 5       | 3      | 4        | 3      | 5       | 4      | 2      |
|                        | A                | UL                   | 79,000 | 39,000  | 26,000 | 39,000   | 26,000 | 38,500  | 21,000 | 13,500 |
| U                      | S                | UL                   | 5      | 4       | 2      | 3        | 2      | 4       | 2      | 1      |
|                        | A                | UL                   | 35,500 | 19,000  | 8,500  | 14,000   | 8,500  | 18,000  | 9,000  | 5,500  |

**504.2 Automatic sprinkler system increase.** Where a building is equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1, the value specified in Table 503 for maximum *building height* is increased by 20 feet (6096 mm) and the maximum number of *stories* is increased by one. These increases are permitted in addition to the *building area* increase in accordance with Sections 506.2 and 506.3. For Group R buildings equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.2, the value specified in Table 503 for maximum *building height* is increased by 20 feet (6096 mm) and the maximum number of *stories* is increased by one, but shall not exceed 60 feet (18 288 mm) or four *stories*, respectively.

**Exception:** The use of an *automatic sprinkler system* to increase *building heights* shall not be permitted for the following conditions:

1. Buildings, or portions of buildings, classified as a **Group I-1 Condition 2, of Type IIB, III, IV or V construction or** Group I-2 ~~occupancy~~ **occupancies** of Type IIB, III, IV or V construction.
2. Buildings, or portions of buildings, classified as a Group H-1, H-2, H-3 or H-5 occupancy.
3. Buildings where an automatic sprinkler system is substituted for fire-resistance rated construction in accordance with Table 601, Note d.

### **506.3 Automatic sprinkler system increase.**

Where a building is equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1, the *building area* limitation in Table 503 is permitted to be increased by an additional 200 percent (*Is* = 2) for building with more than one story *above grade plane* and an additional 300 percent (*Is* = 3) for buildings with no more than one *story above grade plane*. These increases are permitted in addition to the height and *story* increases in accordance with Section 504.2.

**Exception:** The use of an *automatic sprinkler system* to increase the building area limitation shall not be permitted for the following conditions:

1. Buildings classified as a Group H-1 occupancy.
2. Buildings, or portions of buildings, classified as either a Group H-2 or H-3 occupancy. For buildings containing such occupancies, the allowable area shall be determined in accordance with Section 508.4.2, with the sprinkler system increase applicable only to the portions of the building not classified as Group H-2 or H-3.
3. Buildings where an *automatic sprinkler system* is substituted for fire-resistance rated construction in accordance with Table 601, Note d.
- 4. The allowable area for Group I-3 occupancies may be doubled in buildings of any height.**

**508.1 General.** Each portion of a building shall be individually classified in accordance with Section 302.1.

Where a building contains more than one occupancy group, the building or portion thereof shall comply with the applicable provisions of Section 508.2, 508.3 or 508.4, or a combination of these sections.

**Exceptions:**

1. Occupancies separated in accordance with Section 509.
2. Where required by Table 415.3.2, areas of Group H-1, H-2 and H-3 occupancies shall be located in a separate and detached building or structure.
3. Uses within live/work units, complying with Section 419, are not considered separate occupancies.
- 4. Uses within a winery as defined in Section 202 of this code are exempt from occupancy separation requirements where one of the following conditions exists:**

**4.1. An automatic sprinkler system is provided throughout the fire area.**

**4.2. Both an automatic fire alarm with manual pull stations and smoke detection system are installed throughout the building.**

**Boiler rooms, and areas over 750 square feet where wine is stored in wood or cardboard cases are not exempt from separation requirements.**

**TABLE 508.4**  
**REQUIRED SEPARATION OF OCCUPANCIES (HOURS)**

| OCCUPANCY                              | A, E |    | I-1, I-3,<br>I-4 |    | I-2 |    | R <sup>a</sup> |    | F-2, S-2<br><sup>b</sup> , <u>S-3</u> , U |                | B, F-1,<br>M,<br>S-1 |    | H-1 |    | H-2 |    | H-3, H-4 |    | H-5 |    |
|--|------|----|------------------|----|-----|----|----------------|----|---|----------------|----------------------|----|-----|----|-----|----|----------|----|-----|----|
|  | S    | NS | S                | NS | S   | NS | S              | NS | S   | NS             | S                    | NS | S   | NS | S   | NS | S        | NS | S   | NS |
| A, E                                   | N    | N  | 1                | 2  | 2   | NP | 1              | 2  | N   | 1              | 1                    | 2  | NP  | NP | 3   | 4  | 2        | 3  | 2   | NP |
| I-1, I-3, I-4                          | —    | —  | N                | N  | 2   | NP | 1              | NP | 1   | 2              | 1                    | 2  | NP  | NP | 3   | NP | 2        | NP | 2   | NP |
| I-2                                    | —    | —  | —                | —  | N   | N  | 2              | NP | 2   | NP             | 2                    | NP | NP  | NP | 3   | NP | 2        | NP | 2   | NP |
| Ra                                     | —    | —  | —                | —  | —   | —  | N              | N  | 1 <sup>c</sup>                            | 2 <sup>c</sup> | 1                    | 2  | NP  | NP | 3   | NP | 2        | NP | 2   | NP |
| F-2, S-2 <sup>b</sup> , <u>S-3</u> , U | —    | —  | —                | —  | —   | —  | —              | —  | N   | N              | 1                    | 2  | NP  | NP | 3   | 4  | 2        | 3  | 2   | NP |
| B, F-1, M, S-1                         | —    | —  | —                | —  | —   | —  | —              | —  | —   | —              | N                    | N  | NP  | NP | 2   | 3  | 1        | 2  | 1   | NP |
| H-1                                    | —    | —  | —                | —  | —   | —  | —              | —  | —   | —              | —                    | —  | N   | NP | NP  | NP | NP       | NP | NP  | NP |
| H-2                                    | —    | —  | —                | —  | —   | —  | —              | —  | —   | —              | —                    | —  | —   | —  | N   | NP | 1        | NP | 1   | NP |
| H-3, H-4                               | —    | —  | —                | —  | —   | —  | —              | —  | —   | —              | —                    | —  | —   | —  | —   | —  | 1d       | NP | 1   | NP |
| H-5                                    | —    | —  | —                | —  | —   | —  | —              | —  | —   | —              | —                    | —  | —   | —  | —   | —  | —        | —  | N   | NP |

## CHAPTER 6 TYPES OF CONSTRUCTION

**TABLE 601  
FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)**

| BUILDING ELEMENT<br><small>g (see Section 202)</small>                | TYPE I             |                   | TYPE II           |                | TYPE III          |   | TYPE IV             | TYPE V            |   |
|---|--------------------|-------------------|-------------------|----------------|-------------------|---|---------------------|-------------------|---|
|   | A <sup>a</sup>     | B <sup>a</sup>    | A <sup>d</sup>    | B              | A <sup>d</sup>    | B | HT                  | A <sup>d</sup>    | B |
| Primary structural frame  | 3 <sup>a</sup>     | 2 <sup>a</sup>    | 1                 | 0              | 1                 | 0 | HT                  | 1                 | 0 |
| Bearing walls   |                    |                   |                   |                |                   |   |                     |                   |   |
| Exterior <sup>f,g</sup>   | 3                  | 2                 | 1                 | 0              | 2                 | 2 | 2                   | 1                 | 0 |
| Interior  | 3 <sup>a</sup>     | 2 <sup>a</sup>    | 1                 | 0              | 1                 | 0 | 1/HT                | 1                 | 0 |
| Nonbearing walls and partitions<br>Exterior                           | See Table 602      |                   |                   |                |                   |   |                     |                   |   |
| Nonbearing walls and partitions<br>Interior <sup>e</sup>              | 0                  | 0                 | 0                 | 0              | 0                 | 0 | See Section 602.4.6 | 0                 | 0 |
| Floor construction and associated secondary members (see Section 202) | 2                  | 2                 | 1                 | 0              | 1                 | 0 | HT                  | 1                 | 0 |
| Roof construction and associated secondary members (see Section 202)  | 1 1/2 <sup>b</sup> | 1 <sup>b, c</sup> | 1 <sup>b, c</sup> | 0 <sup>c</sup> | 1 <sup>b, c</sup> | 0 | HT                  | 1 <sup>b, c</sup> | 0 |

For SI: 1 foot = 304.8 mm.

- a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only. **This reduction is not applicable to roofs supporting rooftop structures governed by Section 1509, roof gardens and landscaped roofs.**
- b. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members shall not be required, including protection of roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.
- c. In all occupancies, heavy timber shall be allowed where a 1-hour or less fire-resistance rating is required.
- d. An approved automatic sprinkler system in accordance with Section 903.3.1.1 shall be allowed to be substituted for 1-hour fire-resistance-rated construction, provided such system is not otherwise required by other provisions of the code or used for an allowable area increase in accordance with Section 506.3 or an allowable height increase in accordance with Section 504.2. The 1-hour substitution for the fire resistance of exterior walls shall not be permitted.
- e. Not less than the fire-resistance rating required by other sections of this code.
- f. Not less than the fire-resistance rating based on fire separation distance (see Table 602).
- g. Not less than the fire-resistance rating as referenced in Section 704.10

**TABLE 602  
FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE  
SEPARATION DISTANCE<sup>a, e, h</sup>**

| FIRE SEPARATION<br>DISTANCE =<br>X (feet) | TYPE OF<br>CONSTRUCTION | OCCUPANCY<br>GROUP H <sup>f</sup> | OCCUPANCY<br>GROUP F-1, M,<br>S-1 <sup>g</sup> | OCCUPANCY<br>GROUP A, B, E, F-2, I,<br>R, S-2, <u>S-3</u> <sup>g</sup> , U <sup>b</sup> |
|---|-------------------------|-----------------------------------|--|---|
| X < 5 <sup>c</sup>                        | All                     | 3                                 | 2  | 1   |
| 5 < X < 10                                | IA                      | 3                                 | 2  | 1   |
|   | Others                  | 2                                 | 1  | 1   |
| 10 < X < 30                               | IA, IB                  | 2                                 | 1  | 1 <sup>d</sup>  |
|   | IIB, VB                 | 1                                 | 0  | 0   |
|   | Others                  | 1                                 | 1  | 1 <sup>d</sup>  |
| X < 30                                    | All                     | 0                                 | 0  | 0   |

## CHAPTER 7 FIRE AND SMOKE PROTECTION FEATURES

### 705.2 Projections.

Cornices, eave overhangs, exterior balconies and similar projections extending beyond the exterior wall shall conform to the requirements of this section and Section 1406. Exterior egress balconies and exterior exit stairways

and ramps shall also comply with Sections 1019 and 1026, respectively. Projections shall not extend any closer to the line used to determine the fire separation distance than shown in Table 705.2.

**TABLE 705.2**  
**MINIMUM DISTANCE OF PROJECTION**

| FIRE SEPARATION DISTANCE (FSD)                                       | MINIMUM DISTANCE FROM LINE USED TO DETERMINE FSD   |
|--|--|
| 0 feet to <del>less than</del> 2 feet                                | Projections not permitted  |
| <u>Greater than</u> 2 feet to <del>less than</del> 5 feet            | 24 inches  |
| <del>5 feet or</del> <u>Greater than 3 feet to less than 30 feet</u> | <del>40 inches</del> <u>24" plus 8" for every foot of FSD beyond 3' or fraction thereof.</u> |
| <u>30 feet or greater</u>  | <u>20 feet</u>   |

**For SI: 1 foot = 304.8 mm; 1 inch = 25.4 mm.**

### 705.2.3 Combustible projections.

Combustible projections extending to within 5 feet (1524 mm) of the line used to determine the *fire separation distance*, ~~or located where openings are not permitted, or where protection of some openings is required~~ shall be of at least 1-hour fire-resistance-rated construction, Type IV construction, fire-retardant-treated wood or as required by Section 1406.3.

**Exception:** Type VB construction shall be allowed for combustible projections in Group R-3 and U occupancies with a fire separation distance greater than or equal to 5 feet (1524 mm).

## **705.8.6 Vertical exposure. Opening protectives of buildings shall comply with this section.**

### **705.8.6.1 Vertical exposure.**

For buildings on the same lot, opening protectives having a fire protection rating of not less than  $\frac{3}{4}$  hour shall be provided in every opening that is less than 15 feet (4572 mm) vertically above the roof of an adjacent building or structure based on assuming an imaginary line between them. The opening protectives are required where the fire separation distance between the ~~imaginary line and the adjacent buildings or structures~~ is less than 15 feet (4572 mm).

#### **Exceptions:**

1. Opening protectives are not required where the **lower** roof assembly of the adjacent building or structure has a *fire-resistance rating* of not less than 1 hour for a minimum distance of 10 feet (3048 mm) from the *exterior wall* facing the imaginary line and the entire length and span of the supporting elements for the fire-resistance-rated roof assembly has a *fire-resistance rating* of not less than 1 hour.
2. Buildings on the same lot and considered as portions of one building in accordance with Section 705.3 are not required to comply with Section 705.8.6.

**705.8.6.2 Vertical exposure for buildings on separate lots. When a new building is to be erected adjacent to an existing building, all openings in the exterior wall of the new building are required to be not less than  $\frac{3}{4}$  hour when these openings are less than 15 feet (4572 mm) vertically above the roof of the existing building or structure. The opening protections are required where the distance between the buildings or structures is less than 15 feet (4572 mm). When the roof of the new building is at lower elevation from the existing building, the roof construction of the new building shall have a fire-resistance rating of not less than 1 hour for a minimum distance of 10 feet (3048 mm) from the exterior wall facing the new building. The entire length and span of the supporting elements for the fire-resistance-rated roof assembly shall also have a fire-resistance rating of not less than 1 hour. The roof protections are required where the distance between the buildings or structures is less than 15 feet (4572 mm).**



**709.5 Openings.** Openings in a *smoke barrier* shall be protected in accordance with Section 716.

**Exceptions:**

1. In **Group I-1 Condition 2**, Group I-2 and ambulatory care facilities, where doors are installed across corridors, a pair of opposite- swinging doors without a center mullion shall be installed having vision panels with fire-protection- rated glazing materials in fire-protection-rated frames, the area of which shall not exceed that tested. The doors shall be close fitting within operational tolerances, and shall not have undercuts in excess of 3/4-inch, louvers or grilles. The doors shall have head and jamb stops, astragals or rabbets at meeting edges and shall be automatic-closing by smoke detection in accordance with Section 716.5.9.3. Where permitted by the door manufacturer's listing, positive-latching devices are not required.
2. In **Group I-1 Condition 2**, Group I-2 and ambulatory care facilities, horizontal sliding doors installed in accordance with Section 1008.1.4.3 and protected in accordance with Section 716.

## **CHAPTER 8**

### **INTERIOR FINISHES**

**801.5 Applicability.** For buildings in flood hazard areas as established by the Flood Plain Administrator ~~in~~ ~~Section 1612.3~~, interior finishes, trim and decorative materials below the elevation required by Section 1612 shall be flood-damage-resistant materials.

## CHAPTER 9 FIRE PROTECTION SYSTEMS

**901.1 Scope.** The provisions of this chapter shall specify where *fire protection systems* are required and shall apply to the design, installation, **repair** and operation of *fire protection systems*. Fire department access, fire-fighting water supply and fire hydrants ~~shall be according to the Fire Code.~~ **are not part of the State Building Code.**

**Any fire protection system or portion thereof not required by this code shall be permitted to be installed for partial or complete protection provided that such system meets the requirements of the State Building Code.**

**901.1.2 Fire protection system shop drawings.** Shop drawings, plans, specifications or sketches for the fire protection system(s) shall be submitted to the building official pursuant to the requirements of the State Building Code and ORS Chapter 455 or ORS 479.155 to determine compliance with the State Building Code, including but not limited to fire and life-safety standards which are part of the State Building Code. Shop drawings, plans, specifications or sketches shall be *approved* prior to the start of system installation and shall contain all information as required by the referenced installation standards in Chapter 9.

**901.2 Fire protection systems.** *Fire protection systems* shall be installed, repaired **and** operated ~~and maintained~~ in accordance with this code **including those areas under the State Building Code which are printed for convenience in** the *Fire Code*.

~~Any fire protection system for which an exception or reduction to the provisions of this code has been granted shall be considered to be a required system.~~

~~**Exception:** Any fire protection system or portion thereof not required by this code shall be permitted to be installed for partial or complete protection provided that such system meets the requirements of this code.~~

**[F] 903.1.1 Alternative protection.** Alternative automatic fire-extinguishing systems complying with Section 904 shall be permitted in lieu of automatic sprinkler protection where recognized by the applicable standard and *approved* by the ~~fire code~~ **building** official.

**903.2.6 Group I.** An automatic sprinkler system shall be provided throughout buildings with a Group I fire area.  
**Exceptions:**

1. An automatic sprinkler system installed in accordance with Section 903.3.1.2 shall be permitted in Group I-1 **Condition 1** facilities.
- ~~2. An automatic sprinkler system installed in accordance with Section 903.3.1.3 shall be allowed in Group I-1 facilities when in compliance with all of the following:~~
  - ~~2.1. A hydraulic design information sign is located on the system riser~~
  - ~~2.2. Exception 1 of Section 903.4 is not applied, and~~
  - ~~2.3. Systems shall be maintained in accordance with the requirements of Section 903.3.1.2.~~
- ~~2~~ 3. An automatic sprinkler system is not required where **Group I-4** day care facilities are at the level of exit discharge and where every room where care is provided has at least one exterior exit door.
- ~~3~~ 4. In buildings where Group I-4 day care is provided on levels other than the level of exit discharge, an automatic sprinkler system in accordance with 903.3.1.1 shall be installed on the entire floor where care is provided and all floors between the level of care and the level of exit discharge, all floors below the level of exit discharge, other than areas classified as an open parking garage.

**[F] 903.2.7 Group M.** An automatic sprinkler system shall be provided throughout buildings containing a Group M occupancy where one of the following conditions exists:

1. A Group M *fire area* exceeds 12,000 square feet (1115m<sup>2</sup>).
2. A Group M *fire area* is located more than three stories above *grade plane*.
3. The combined area of all Group M *fire areas* on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m<sup>2</sup>).

4. A Group M occupancy used for the display and sale of upholstered furniture or mattresses exceeds 5,000 square feet (464 m<sup>2</sup>)

**903.2.7.2 Display and sale of upholstered furniture or mattresses. An automatic sprinkler system shall be provided throughout the fire area of a Group M occupancy used for the display and sale of upholstered furniture or mattresses with an aggregate display area exceeding 5,000 square feet (464 m<sup>2</sup>).**

**[F] 903.2.8 Group R.** An automatic sprinkler system installed in accordance with Section 903.3 shall be provided throughout all buildings with a Group R fire area. **For distance requirements to access roads and fire hydrants, see the Fire Code.**

**903.2.8.1 Group R-3 or R-4 congregate residence.** An automatic sprinkler system installed in accordance with 903.3.1.3 shall be permitted in Group R-3. ~~or R-4 congregate residence with 16 or fewer residents.~~

**903.2.8.2 Group R-4 Condition 1. An automatic sprinkler system installed in accordance with 903.3.1.3 shall be permitted in Group R-4 Condition 1.**

**903.2.8.3 Group R-4 Condition 2. An automatic sprinkler system installed in accordance with 903.3.1.2 shall be permitted in Group R-4 Condition 2. Attics shall be protected in accordance with Sections 903.2.8.3.1 or 903.2.8.3.2.**

**903.2.8.3.1 Attics used for living purposes, storage or fuel fired equipment. Attics used for living purposes, storage or fuel fired equipment shall be protected throughout with automatic sprinkler system installed in accordance with 903.3.1.2.**

**903.2.8.3.2 Attics not used for living purposes, storage or fuel fired equipment . Attics not used for living purposes, storage or fuel fired equipment shall be protected in accordance with one of the following:**

- 1. Attics protected throughout by a heat detector system arranged to activate the building fire alarm system in accordance with Section 907.2.10.**
- 2. Attics constructed of non-combustible materials.**
- 3. Attics constructed of fire-retardant-treated wood framing complying with Section 2303.2.**
- 4. The automatic fire sprinkler system shall be extended to provide protection throughout the attic space.**

**903.2.8.2 903.2.8.4 Care facilities.** An automatic sprinkler system installed in accordance with 903.3.1.3 shall be permitted in care facilities with 5 or fewer individuals in a single-family dwelling.

**903.2.8.5 Requirements. Where substantial alterations are made or substantial damage occurs to an existing non-sprinkled Group R2 apartment house, designed and constructed under the provisions of this code, an approved automatic sprinkler system complying with NFPA 13R shall be installed only in the substantially altered or damaged dwelling units. When more than 50 percent of the dwelling units within a building are substantially altered or damaged, the entire apartment house occupancy shall be provided with an NFPA 13R sprinkler system or equivalent.**

**For the purposes of this section, when an NFPA 13R sprinkler system is installed, a fire department connection shall not be required.**

**The following terms are defined in Chapter 2:**

**SUBSTANTIAL ALTERATION.**

**SUBSTANTIAL DAMAGE.**

**903.2.11.7 Piers or wharves. An automatic sprinkler system shall be installed under piers or wharves regulated by Section 424 of this code, which exceed 200 feet (60 960 mm) in length or exceed 5,000 square feet (465 m<sup>2</sup>) in area. Such systems shall comply with NFPA 307, Standard for the Construction and Fire Protection of Marine Terminals, Piers and Wharves.**

**[F] 903.3.1.1.1 Exempt locations.** Automatic sprinklers shall not be required in the following rooms or areas where such rooms or areas are protected with an approved automatic fire detection system in accordance with Section 907.2 that will respond to visible or invisible particles of combustion. Sprinklers shall not be omitted from any room merely because it is damp, of fire-resistance-rated construction or contains electrical equipment.

2. Any room or space where sprinklers are considered undesirable because of the nature of the contents, when approved by the ~~fire code~~ **building official**.

**[F] 903.3.1.2.1 Balconies and decks.** Sprinkler protection shall be provided for exterior balconies, decks and ground floor patios of dwelling units where the building is of type V construction ~~provided there is a roof or deck above~~. Sidewall sprinklers that are used to protect such areas shall be permitted to be located such that their deflectors are within 1 inch (25 mm) to 6 inches (152 mm) below the structural members and a maximum distance of 14 inches (356 mm) below the deck of the exterior balconies and decks that are constructed of open wood joist construction.

**903.3.1.3 NFPA 13D sprinkler systems.** Automatic sprinkler systems installed in one and two-family dwellings, Group R-3, and R-4 ~~congregate residences~~ **Condition 1** and townhouses shall be permitted to be installed throughout in accordance with NFPA 13D.

**[F] 903.4.1 Monitoring.** Alarm, supervisory and trouble signals shall be distinctly different and shall be automatically transmitted to an approved supervising station or, when approved by the ~~fire~~ **building** official, shall sound an audible signal at a constantly attended location.

**[F] 904.2 Where required.** Automatic fire-extinguishing systems installed as an alternative to the required *automatic sprinkler systems* of Section 903 shall be *approved* by the ~~fire~~-**building** official. Automatic fire-extinguishing systems shall not be considered alternatives for the purposes of exceptions or reductions allowed by other requirements of this code.

**[F] 905.4 Location of Class I Standpipe Hose Connections.** Class I standpipe hose connections shall be provided in all of the following locations:

6. Where the most remote portion of a non-sprinklered floor or *story* is more than 150 feet (45 720 mm) from a hose connection or the most remote portion of a sprinklered floor or *story* is 200 feet (60 960 mm) from a hose connection, the ~~fire~~ **building** official is authorized to require that additional hose connections be provided in approved locations.

**[F] 905.5.3 Class II system 1-inch hose.** A minimum 1-inch (25 mm) hose shall be permitted to be used for hose stations in light-hazard occupancies where investigated and listed for this service and where approved by the ~~fire~~ **building** official.

**[F] 906.1 Where required.** Portable fire extinguishers shall be ~~installed in the following locations~~ **provided in occupancies and locations as required by the Fire Code.**

**NOTE: The remainder of Section 906 has been deleted in its entirety**

**907.2.3 Group E.** A manual fire alarm system that initiates the occupant notification signal utilizing an emergency voice/alarm communication system meeting the requirements of section 907.5.2.2 and installed in accordance with Section 907.6 shall be installed in Group E occupancies. When *automatic sprinkler systems* or smoke detectors are installed, such systems or detectors shall be connected to the building fire alarm system.

**Exceptions:**

1. A manual fire alarm system is not required in Group E occupancies with an *occupant load* of ~~less than 50~~ **or less.**
2. **Emergency voice/alarm communication systems meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall not be required in Group E occupancies**

**with occupant loads of 100 or less, provided that activation of the manual fire alarm system initiates an approved occupant notification signal in accordance with Section 907.5.**

3. Manual fire alarm boxes are not required in Group E occupancies where all of the following apply:
  - 3.1. Interior *corridors* are protected by smoke detectors.
  - 3.2. Auditoriums, cafeterias, gymnasiums and similar areas are protected by *heat detectors* or other *approved* detection devices.
  - 3.3. Shops and laboratories involving dusts or vapors are protected by *heat detectors* or other *approved* detection devices.
4. Manual fire alarm boxes shall not be required in Group E occupancies where the building is equipped throughout with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1, **and where** the emergency voice/alarm communication system ~~will~~ **activates** on sprinkler water flow and manual activation is provided from a normally occupied location.

**907.2.6.1 Group I-1.** In Group I-1 occupancies, an automatic smoke detection system shall be installed in *corridors*, waiting areas open to *corridors* and *habitable spaces* other than *sleeping units* and kitchens. The system shall be activated in accordance with Section 907.5.

**Exceptions:**

- 1.** **For Group I-1 Condition 1 smoke** ~~Smoke~~ detection in habitable spaces is not required where the facility is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
- 2.** Smoke detection is not required for exterior balconies.

**[F] 907.5.2.3.3 Groups I-1, and R-1 and R-4.** Group I-1, ~~and R-1~~ **and R-4** *dwelling units* or *sleeping units* ~~in accordance with Table 907.5.2.3.3~~ shall be provided with a visible alarm notification appliance, activated by both the in-room smoke alarm and the building fire alarm system **in accordance with Table 907.5.2.3.3 and the accessibility requirements of ICC A117.1.**

**[F] 907.5.2.3.4 Group R-2.** In Group R-2 occupancies required by Section 907 to have a fire alarm system, ~~all dwelling units and sleeping units shall be provided with the capability to support visible alarm notification appliances in accordance with ICC A117.1. Such capability shall be permitted to include the potential for future interconnection of the building fire alarm system with the unit smoke alarms, replacement of audible appliances with combination audible/visible appliances, or future extension of the existing wiring from the unit smoke alarm locations to required locations for visible appliances.~~ **visual alarms shall be provided within common and public areas, but are not required within individual dwelling units.**

**908.7 Carbon monoxide alarms. Approved carbon monoxide alarms in new buildings and structures shall be provided in the locations described in Sections 908.7.1 and 908.7.2.**

**908.7.1 Carbon Monoxide Alarms Group I.** Group I ~~or R~~ occupancies located in a building containing a fuel-burning appliance or a building which has an attached garage shall be equipped with single station carbon monoxide alarms. The carbon monoxide alarms shall be listed as complying with UL 2034 and be installed and maintained in accordance with NFPA 720 and the manufacturer's instructions. An open parking garage, as defined in Chapter 2, or enclosed parking garage ventilated in accordance with Section 404 of the International Mechanical Code shall not be considered an attached garage.

**Exception:** Sleeping units ~~or dwelling units~~ which do not themselves contain a fuel-burning appliance or have an attached garage, but which are located in a building with a fuel-burning appliance or an attached garage, need not be equipped with single-station carbon monoxide alarms provided that:

1. The sleeping unit ~~or dwelling units~~ is located more than one story above or below any story that contains a fuel-burning appliance or an attached garage.
2. The sleeping unit ~~or dwelling units~~ is not connected by ductwork or ventilation shafts to any room containing a fuel-burning appliance or to an attached garage.
3. The building is equipped with a common-area carbon monoxide alarm system.

**908.7.1.1 Carbon Monoxide Detection Systems.** Carbon monoxide detection systems, that include carbon monoxide detectors and audible notification appliances installed and maintained in accordance with this section for carbon monoxide alarms and NFPA 720 shall be permitted. The carbon monoxide detectors shall be listed as complying with UL 2075.

**908.7.2 Group R. Carbon monoxide alarms or a household carbon monoxide detection system shall be installed in Group R Occupancies.**

**908.7.2.1 Installation Location.** Carbon monoxide alarms shall be located in each bedroom or within 15 feet outside of each bedroom door. Bedrooms on separate floor levels in a structure consisting of two or more stories shall have separate carbon monoxide alarms serving each story.

**908.7.2.1.2 Three or More Dwelling Units.** In addition to the locations required by section 908.7.2.1, a carbon monoxide alarm shall be installed in any enclosed common areas within buildings containing three or more dwelling units.

**908.7.2.2 Alarm requirements.**

**908.7.2.2.1 Single station alarm requirements.** Single station carbon monoxide alarms shall be listed as complying with ANSI/UL 2034 and shall be installed in accordance with this code and the manufacturer's installation instructions.

**908.7.2.2.2 Household carbon monoxide detection systems.** Household carbon monoxide detection systems, that include carbon monoxide detectors and audible notification appliances, installed and maintained in accordance with this section for carbon monoxide alarms and NFPA 720 shall be permitted. The carbon monoxide detectors shall be listed as complying with ANSI/UL 2075.

**908.7.2.2.3 Combination smoke/carbon monoxide alarm/detector requirements.** Combination smoke/carbon monoxide alarms shall be listed as complying with ANSI/UL 2034 and ANSI/UL 217. Combination smoke/carbon monoxide detectors shall be listed as complying with ANSI/UL 2075 and ANSI/UL 268. See section 907.2.11 of this code for additional requirements specific to the installation of smoke alarms.

**908.7.2.3 Power Source.**

**908.7.2.3.1 Carbon Monoxide Alarms.** Single station carbon monoxide alarms shall be battery operated, or may receive their primary power from the building wiring system. Plug in devices securely fastened to the structure and installed in accordance with the manufacturer's installation instructions are deemed to satisfy this requirement. Hard wired and plug in carbon monoxide alarms shall be equipped with battery back up.

**908.7.2.3.2 Household carbon monoxide detection systems.** Required power supply sources for household carbon monoxide detection systems shall be in accordance with NFPA 720.

**908.7.2.3.3 Combination smoke/carbon monoxide alarms/detectors.** Combination smoke/carbon monoxide alarms/detectors shall receive their power source in accordance with Section 907.2.11.4 and NFPA 72. Smoke alarm features of combination smoke/carbon monoxide alarms shall be interconnected.

**Exception:** Interconnection and hard-wiring of combination smoke/carbon monoxide alarms/detectors 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.

**908.7.2.4 Where required in existing affected occupancies. Where a new carbon monoxide source is introduced or work requiring a structural permit occurs in existing Group R occupancies, carbon monoxide alarms shall be provided in accordance with Sections 908.7.2.1 through 908.7.2.3 of this code.**

**Exception: Work involving the exterior surfaces of affected occupancies, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, are exempt from the requirements of this section.**

[F] **909.5.1 Leakage area.** The total leakage of the area of the barrier is the product of the *smoke barrier* gross area multiplied by the allowable leakage area ratio, plus the area of other openings such as gaps and operable windows. Compliance shall be determined by achieving the minimum air pressure difference across the barrier with the system in the smoke control mode for mechanical smoke control systems. Passive smoke control systems tested using other *approved* means such as door fan testing shall be as *approved* by the ~~fire~~ **building** official.

[F] **909.7 Airflow design method.** When *approved* by the ~~fire~~ **building** official, smoke migration through openings fixed in a permanently open position, which are located between smoke control zones by the use of the airflow method, shall be permitted. The design airflow shall be in accordance with this section. Airflow shall be directed to limit smoke migration from the fire zone. The geometry of openings shall be considered to prevent flow reversal from turbulent effects.

[F] **909.8 Exhaust method.** When approved by the ~~fire~~ **building** official, mechanical smoke control for large enclosed volumes, such as in atriums or malls, shall be permitted to utilize the exhaust method. Smoke control systems using the exhaust method shall be designed in accordance with NFPA 92B.

[F] **909.9 Design fire.** The design fire shall be based on a rational analysis performed by the *registered design professional* and *approved* by the ~~fire~~ **building** official. The design fire shall be based on the analysis in accordance with Section 909.4 and this section.

[F] **909.10 Equipment.** Equipment including, but not limited to, fans, ducts, automatic *dampers* and balance *dampers*, shall be suitable for the intended use, suitable for the probable exposure temperatures that the rational analysis indicates and as *approved* by the ~~fire~~ **building** official.

[F] **909.15 Control diagrams.** Identical control diagrams showing all devices in the system and identifying their location and function shall be maintained current and kept on file with the ~~fire~~ **building** official, the fire department and in the fire command center in a format and manner approved by the fire chief.

[F] **909.18.8.3.1 Report filing.** A copy of the final report shall be filed with the ~~fire~~ **building** official and an identical copy shall be maintained in an approved location at the building.

[F] **909.19 System acceptance.** Buildings, or portions thereof, required by this code to comply with this section shall not be issued a certificate of occupancy until such time that the ~~fire~~ **building** official determines that the provisions of this section have been fully complied with and that the fire department has received satisfactory instruction on the operation, both automatic and manual, of the system.

**Exception:** In buildings of phased construction, a temporary certificate of occupancy, as *approved* by the ~~fire~~ **building** official, shall be allowed provided that those portions of the building to be occupied meet the requirements of this section and that the remainder does not pose significant hazard to the safety of the proposed occupants or adjacent buildings.

[F] **910.4 Mechanical smoke exhaust.** Where approved by the ~~fire~~ **building** official, engineered mechanical smoke exhaust shall be an acceptable alternate to smoke and heat vents.

[F] **915.1 General. When required by the fire code official,** Emergency responder radio coverage shall be provided in all new buildings in accordance with Section 510 of the *International Fire Code*.



## CHAPTER 10 MEANS OF EGRESS

### **1001.2 ~~Minimum requirements~~ Alterations to existing means of egress.**

It shall be unlawful to alter a building or structure in a manner that will reduce the number of *exits* or the capacity of the *means of egress* to less than required by this code.

[F] **1001.3 Maintenance.** *Means of egress* shall be maintained in accordance with the ~~International Fire Code~~.

### **[F] 1001.4 Fire safety and evacuation plans.**

Fire safety and evacuation plans shall be provided for all occupancies and buildings where required by the ~~International Fire Code~~. Such fire safety and evacuation plans shall comply with the applicable provisions of Sections 401.2 and 404 of the ~~International Fire Code~~ as approved by the Fire Code Official.

### **1003.2 Ceiling height.**

The *means of egress* shall have a ceiling height of not less than 7 feet 6 inches (2286 mm).

#### **Exceptions:**

1. Sloped ceilings in accordance with Section 1208.2.
2. Ceilings of *dwelling units* and *sleeping units* within residential occupancies in accordance with Section 1208.2.
3. Allowable projections in accordance with Section 1003.3.
4. *Stair* headroom in accordance with Section 1009.5.
5. Door height in accordance with Section 1008.1.1.
6. *Ramp* headroom in accordance with Section 1010.6.2.
7. The clear height of floor levels in vehicular and pedestrian traffic areas in parking garages in accordance with Section 406.4.1.
8. Areas above and below *mezzanine* floors in accordance with Section 505.2.
- 9. Hallways and corridors shall be permitted to be not less than 7 feet (2134 mm) in height.**

**1008.1.9.6 Special locking arrangements in doors in Groups I-1, and I-2, R-4, and R-3 facilities providing care. In facilities subject to licensure by the State,** ~~Approved~~ special egress locks shall be permitted in a Group **I-1, I-2, R-4 or R-3 facilities providing care** ~~occupancy~~ where the clinical needs of persons receiving care require such locking. Special egress locks shall be permitted in such occupancies where the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1. **1 in Groups I-1 and I-2, 903.3.1.2 in Group R-4 and 903.3.1.3 in Group R-3 facilities providing care,** or an *approved* automatic smoke or heat detection system installed in accordance with Section 907, provided that the doors are installed and operate in accordance with Items 1 through 7 below.

1. The doors unlock upon actuation of the *automatic sprinkler system* or automatic fire detection system.
2. The doors unlock upon loss of power controlling the lock or lock mechanism.
3. The door locks shall have the capability of being unlocked by a signal from the *fire command center*, a nursing station or other *approved* location.
4. A building occupant shall not be required to pass through more than ~~one~~ **two** doors equipped with a special egress lock before entering an *exit*.
5. The procedures for the operation(s) of the unlocking system shall be described and approved as part of the emergency planning and preparedness required by Chapter 4 of the ~~International Fire Code~~.
6. All clinical staff shall have the keys, codes or other means necessary to operate the locking devices.
7. Emergency lighting shall be provided at the door.

#### **Exceptions:**

- 1.** Items 1 through 4 shall not apply to doors to areas where persons, which because of clinical needs, require restraint or containment as part of the function of a psychiatric treatment area.
- 2. In Groups I-1 Condition 2, Group R-4 Condition 2 and Group R-3 facilities providing care, where the refuge area is located in a fenced or walled yard, special egress locks located on doors**

**or gates in the fence or wall need not automatically deactivate when the refuge area is exterior to and not less than 50 feet (15 240 mm) away from the building and access to the public way is provided. Except where provided in a public way, each refuge area shall have a minimum of 15 square feet (1.41 m<sup>2</sup>) of net clear area for each occupant.**

#### **1009.15 Handrails.**

Stairways shall have *handrails* on each side and shall comply with Section 1012. Where glass is used to provide the *handrail*, the *handrail* shall also comply with Section 2407.

##### **Exceptions:**

1. *Handrails* for *aisle stairs* provided in accordance with Section 1028.13.
2. *Stairways* within dwelling units and *spiral stairways* are permitted to have a *handrail* on one side only.
3. Decks, patios and walkways that have a single change in elevation where the landing depth on each side of the change of elevation is greater than what is required for a landing do not require *handrails*.
4. **In Group R-3 occupancies, decks, patios and walkways that have a change in elevation consisting of a flight of stairs with three or fewer risers where the landing depth on each side of the change of elevation is greater than what is required for a landing do not require handrails.**
5. In Group R-3 occupancies, a change in elevation consisting of a single **flight of stairs with three or fewer risers** ~~riser~~ at an entrance or egress door does not require *handrails*.
6. Changes in room elevations of **consisting of a flight of stairs with** three or fewer risers within dwelling units and sleeping units in Groups R-2 and R-3 do not require *handrails*.

#### **1009.16 Stairway to roof.**

In buildings four or more stories above *grade plane*, one *stairway* shall extend to the roof surface, unless the roof has a slope steeper than four units vertical in 12 units horizontal (33-percent slope). In buildings without an occupied roof, access to the roof from the top story shall be permitted to be by an *alternating tread device*, **a ship stair or ladder that is constructed of steel and is a minimum of 30 inches (762 mm) between handrails; has a rise and run of the stair or ladder of 12 inches (305 mm) maximum and 4 inches (102 mm) minimum, respectively; and has handrails provided on both sides of the stair or ladder.**

##### **1009.16.1 Roof access.**

Where a *stairway* is provided to a roof, access to the roof shall be provided through a *penthouse* complying with Section 1509.2.

**Exception:** In buildings without an occupied roof, access to the roof shall be permitted to be a roof hatch or trap door not less than ~~16 square feet (1.5 m<sup>2</sup>) in area and having a minimum dimension of 2 feet (610 mm)~~ **30 inches (762 mm) wide and 8 feet (2438 mm) long.**

**1018.1 Construction.** *Corridors* shall be fire-resistance rated in accordance with Table 1018.1. The *corridor* walls required to be fire-resistance rated shall comply with Section 708 for *fire partitions*.

##### **Exceptions:**

1. A *fire-resistance rating* is not required for *corridors* in an occupancy in Group E where each room that is used for instruction has at least one door opening directly to the exterior and rooms for assembly purposes have at least one-half of the required *means of egress* doors opening directly to the exterior. Exterior doors specified in this exception are required to be at ground level.
2. A *fire-resistance rating* is not required for *corridors* contained within a dwelling or sleeping unit in an occupancy in **Group I-1 and** Group R.
3. A *fire-resistance rating* is not required for *corridors* in *open parking garages*.
4. A *fire-resistance rating* is not required for *corridors* in an occupancy in Group B which is a space requiring only a single *means of egress* complying with Section 1015.1.

## CHAPTER 11 ACCESSIBILITY

**1101.2.1 Alternate Methods.** The application of Section 104.11 to this chapter shall be limited to the extent that alternate methods of construction, designs or technologies shall provide substantially equivalent or greater accessibility. Where approved by the building official, the provisions of the Fair Housing Act Amendments of 1988 may be considered as an alternate method to the criteria outlined in ICC A117.1 as it relates to covered multifamily dwellings.

**1101.2.2 Amendments to ICC A117.1.** The provisions of this section shall be considered amendments to ICC A117.1.

**1101.2.2.1 Elevators - ICC A117.1 Section 407.** ICC A117.1 Section 407 is not adopted. Elevators are expressly regulated through the Oregon Elevator Specialty Code.

**1101.2.2.2 Limited-Use / Limited-Application Elevators (LULA) - ICC A117.1 Section 408.** ICC A117.1 Section 408 is not adopted. LULAs are expressly regulated through the Oregon Elevator Specialty Code.

**1101.2.2.3 Private Residence Elevators - ICC A117.1 Section 409.** ICC A117.1 Section 409 is not adopted. Private Residence Elevators are expressly regulated through the Oregon Elevator Specialty Code.

**1101.2.2.4 Platform Lifts - ICC A117.1 Section 410.** ICC A117.1 Section 410 is not adopted. Platform lifts are expressly regulated through the Oregon Elevator Specialty Code.

**1101.2.2.5 Door Opening Force – ICC A117.1 Section 404.2.8.** ICC A117.1 Section 404.2.8 is deleted in its entirety and replaced with the following: The opening force of doors along an accessible route shall be as follows:

- 1. Exterior doors: 8 1/2 pounds-force (lbf) (37.8 N).**
- 2. Interior doors: 5 pounds-force (lbf) (22.2 N).**
- 3. Stairway doors at pressurized stair enclosures: 15 pounds (6.8 kg) at exterior doors.**
- 4. Where environmental conditions require greater closing pressure, power-operated doors shall be used within the accessible route.**
- 5. Fire doors shall have the minimum force necessary to close and latch the door.**

**1101.2.2.6 Detectable Warnings at Raised marked Crossings - ICC A117.1 Section 406.12.** ICC A117.1 Section 406.12 is deleted in its entirety.

**1101.2.2.7 Vehicle Space Width – ICC A117.1 Section 502.2.** ICC A117.1 Section 502.2 is deleted in its entirety and replaced with the following: Car and van parking spaces shall be 108 inches (2743.2 mm) minimum in width.

**1101.2.2.8 Access Aisle Width – ICC A117.1 Section 502.4.2.** ICC A117.1 Section 502.4.2 is deleted in its entirety and replaced with the following: Access aisles serving car parking spaces shall be 72 inches (1828.8 mm) minimum in width. Access aisles serving van parking spaces shall be 96 inches (2438.39 mm) minimum in width

**1101.3 Waivers and Modifications.** Waivers and modifications shall be in accordance with ORS 447.250.

## SECTION 1102 DEFINITIONS

**1102.1 Definitions.** The following terms are defined in Chapter 2:

**ACCESSIBLE MEANS OF EGRESS.**

**ACCESSIBLE SPACE.**

**ADDITION.**

AFFECTED BUILDINGS.  
CLUSTERED MAILBOXES.  
COVERED MULTIFAMILY DWELLINGS.  
ELEMENT.  
HISTORIC BUILDING  
MEZZANINE OR MEZZANINE FLOOR.  
OVERHEAD FINISH OF A BUILDING.  
PRIMARY FUNCTION.  
PRIVATE ENTITIES.  
PUBLIC ACCOMODATIONS.  
PUBLIC USE.  
SIGNAGE.  
SPACE.  
TECHNICALLY INFEASIBLE.

1103.2.16 Private membership clubs and churches. Private membership clubs and churches that have more than one floor level and more than 4,000 square feet in ground area or more than one floor level and more than 20 feet in height, measured from the top surface of the lowest flooring to the highest interior overhead finish of the building, are not required to be accessible. (ORS 447.210[1]).

**1104.4 Multilevel buildings and facilities. At least one accessible route shall connect each story and mezzanine in multi-story buildings and facilities.**

**Exceptions:**

1. In private buildings or facilities that are less than three stories and that have less than 3000 square feet (279 m<sup>2</sup>) per story, an accessible route shall not be required to connect stories provided that the building or facility is not a shopping center, a shopping mall, the professional office of a health care provider, a terminal, depot or other station used for specified public transportation or airport passenger terminal.

At least one accessible route shall connect each accessible level, including mezzanines, in multilevel buildings and facilities:

- ~~1. An accessible route is not required to stories and mezzanines that have an aggregate area of not more than 3,000 square feet (278.7 m<sup>2</sup>) and are located above and below accessible levels. This exception shall not apply to:~~

**Exceptions:**

- ~~1.1. Multiple tenant facilities of Group M occupancies containing five or more tenant spaces;~~
- ~~1.2. Levels containing offices of health care providers (Group B or I); or~~
- ~~1.3. Passenger transportation facilities and airports (Group A-3 or B); or~~
- ~~Passenger transportation facilities and airports Group A-3 or B);~~
- ~~1.4. Government buildings covered by Title II of the Americans With Disabilities Act.~~
2. Levels that do not contain accessible elements or other spaces as determined by Section 1107 or 1108 are not required to be served by an accessible route from an accessible level.
3. In air traffic control towers, an accessible route is not required to serve the cab and the floor immediately below the cab.
4. Where a two-story **public** building or facility has one story with an occupant load of five or fewer persons that does not contain public use space, that story shall not be required to be connected by an accessible route to the story above or below.
5. Vertical access to elevated employee work stations within a courtroom is not required at the time of initial construction, provided a ramp, lift or elevator can be installed without requiring reconfiguration or extension of the courtroom or extension of the electrical system.
- 6. In a parking garage of fewer than three stories, an accessible route need not be provided to an upper or lower floor level provided that all of the accessible parking spaces are provided on a floor level with an accessible route to an accessible building entrance or to another building.**

7. In a building of fewer than three stories, an accessible route need not be provided in the portion of the building that is of the following occupancy classifications:
  - 7.1. Group F-1 and 2;
  - 7.2. Group H-1, 2, 3, 4 and 5;
  - 7.3. Group S-1 and 2; and
  - 7.4. Group U.
8. In a mixed-occupancy building of fewer than three stories, containing a Group B or M occupancy mixed with Group F-1 or 2; Group H-, 2, 3, 4 or 5; Group S-1, or 2; or Group U occupancies, an accessible route need not be provided, if the Group B or M occupancy is less than 3,000 square feet (279 m<sup>2</sup>) on any floor level without an accessible route.
9. In a building or occupancy of fewer than two stories, an elevator need not be provided to a mezzanine that is less than 3,000 square feet (279 m<sup>2</sup>).
10. In a building of fewer than three stories, an accessible route need not be provided where ramps, grade-level entries or accessible horizontal connections from adjacent buildings are provided to each floor level provided all facilities, elements and spaces are connected to an accessible route.

#### **1104.5 Elevators Required.**

Elevators shall be provided in all shopping centers, shopping malls, professional offices of health care providers (B or I occupancies), a terminal, depot or other station used for specified public transportation or airport passenger terminals and government buildings that are covered by Title II of the Americans with Disabilities Act.

#### **Exceptions:**

1. Elevators need not be provided in buildings and spaces listed in ORS 447.247(1)(a), which are exempt from the accessible route provisions identified Section 1104.4 exception 4.
2. Elevators need not be provided in buildings and spaces listed in ORS 447.247(1)(b), which are exempt from the accessible route provisions of Section 1104.4.
3. Elevators are not required where a terminal, depot or other station used for specified public transportation or airport passenger terminals are provided with an accessible route to all portions of the facilities.

#### **1104.56 Location.**

*Accessible routes* shall coincide with or be located in the same area as a general *circulation path*. Where the *circulation path* is interior, the *accessible route* shall also be interior. Where only one *accessible route* is provided, the *accessible route* shall not pass through kitchens, storage rooms, restrooms, closets or similar spaces.

#### **Exceptions:**

1. *Accessible routes* from parking garages contained within and serving *Type B units* are not required to be interior.
2. A single *accessible route* is permitted to pass through a kitchen or storage room in an *Accessible unit*, *Type A unit* or *Type B unit*.

**TABLE 1106.1**  
**ACCESSIBLE PARKING SPACES**

| <u>Total<br/>Parking in<br/>Lot</u> | <u>Minimum<br/>Number of<br/>Accessible<br/>Spaces</u> | <u>Number<br/>of Van<br/>Accessibl<br/>e Spaces</u> | <u>"Wheelchair<br/>User Only"<br/>Spaces</u> |
|-------------------------------------|--|---|--|
| <u>1 to 25</u>                      | <u>1</u>   | <u>1</u>  | <u>-</u>                                     |
| <u>26 to 50</u>                     | <u>2</u>   | <u>1</u>  | <u>-</u>                                     |
| <u>51 to 75</u>                     | <u>3</u>   | <u>1</u>  | <u>-</u>                                     |
| <u>76 to 100</u>                    | <u>4</u>   | <u>1</u>  | <u>-</u>                                     |
| <u>101 to 150</u>                   | <u>5</u>   |   | <u>1</u>                                     |
| <u>151 to 200</u>                   | <u>6</u>   |   | <u>1</u>                                     |
| <u>201 to 300</u>                   | <u>7</u>   |   | <u>2</u>                                     |
| <u>301 to 400</u>                   | <u>8</u>   |   | <u>2</u>                                     |

|                              |   |                 |   |
|------------------------------|---|-----------------|---|
| <b><u>401 to 500</u></b>     | <b><u>9</u></b>   |                 | <b><u>2</u></b>   |
| <b><u>501 to 1,000</u></b>   | <b><u>2% of total</u></b>   | <b><u>=</u></b> | <b><u>1 in every 6 accessible spaces or portion thereof</u></b> |
| <b><u>1,001 and over</u></b> | <b><u>20 plus 1 for each 100, or fraction thereof, over 1,000</u></b> | <b><u>=</u></b> | <b><u>1 in every 6 accessible spaces or portion thereof</u></b> |

#### **1106.5 Van spaces.**

For every six or fraction of six *accessible* parking spaces, at least one shall be a van-accessible parking space.

**Where five or more parking spaces are designated accessible, any space that is designated as van accessible shall be reserved for wheelchair users.**

**Exception:** In Group R-2 and R-3 occupancies, van-accessible spaces located within private garages shall be permitted to have vehicular routes, entrances, parking spaces and access aisles with a minimum vertical clearance of 7 feet (2134 mm).

**1106.6 Location.** *Accessible* parking spaces shall be located on the shortest **practical** *accessible route* of travel from adjacent parking to an *accessible* building entrance. In parking facilities that do not serve a particular building, *accessible* parking spaces shall be located on the shortest route to an *accessible* pedestrian entrance to the parking facility. Where buildings have multiple *accessible* entrances with adjacent parking, *accessible* parking spaces shall be dispersed and located near the *accessible* entrances.

#### **1106.7 Parking spaces**

**1106.7.1 General. Accessible car and van parking spaces shall comply with ICC ANSI A117.1 Section 502, Chapter 11 Figures 2 through 6 and Figure 10. The access aisle adjacent to the disabled parking space shall be on the passenger side of the vehicle unless the aisle serves two vehicles.**

**1106.7.2 Identification. In addition to the requirements of ANSI A117.1, Section 502.7, when the van accessible space meets the provisions of Section 1106.5 the space shall also have a sign designating “wheelchair user only”. Such signs shall be 60 inches (1525 mm) minimum above the floor of the parking space, measured to the bottom of the sign. See Chapter 11 Figures 1 through 10 for sign configurations.**

#### **1106.8 Passenger loading zones.**

Passenger loading zones shall be *accessible*.

##### **1106.8.1 Continuous loading zones.**

Where passenger loading zones are provided, one passenger loading zone in every continuous 100 linear feet (30.4 m) maximum of loading zone space shall be *accessible*.

##### **1106.8.2 Medical facilities.**

A passenger loading zone shall be provided at an *accessible* entrance to licensed medical and long-term care facilities where people receive physical or medical treatment or care and where the period of stay exceeds 24 hours.

**1106.8.2.1 Group I-2. In Group I-2 healthcare occupancies, at least one accessible entry shall be under shelter. Every such entry shall include a passenger loading zone.**

##### **1106.8.3 Valet parking.**

A passenger loading zone shall be provided at valet parking services.

##### **1106.8.4 Mechanical access parking garages.**

Mechanical access parking garages shall provide at least one passenger loading zone at vehicle drop-off and vehicle pick-up areas.

**1107.5 Group I.** *Accessible units, Type A units,* and *Type B units* shall be provided in Group I occupancies in accordance with Sections 1107.5.1 through 1107.5.5.

**1107.5.1 Group I-1.** *Accessible units, Type A units,* and *Type B units* shall be provided in Group I-1 occupancies in accordance with Sections 1107.5.1.1 through 1107.5.1.23. **All Group I-1 Condition 2 assisted living facilities and residential care facilities shall be provided with one standard roll-in-type shower compartment, in each dwelling or sleeping unit, where bathing facilities are provided inside the dwelling or sleeping unit. All Group I-1 Condition 2 residential care facilities shall be provided with a standard roll-in-type shower compartment, in each bathing facility provided outside the dwelling or sleeping unit, except in a bathing room where an accessible tub is provided.**

**1107.5.1.1 Accessible units.** **In Group I-1, Condition 1, at least 4 percent, but not less than one, of the dwelling units and sleeping units shall be Accessible units. In Group I-1 Condition 2, At least 410** percent, but not less than one, of the *dwelling units* and *sleeping units* shall be *Accessible units*.

**1107.5.1.2 Type A units.** **In Group I-1 Condition 2 assisted living facilities and residential care facilities, every dwelling unit or sleeping unit shall be a Type A unit.**

**1107.5.1.2 3 Type B units.** In structures with four or more *dwelling units* or *sleeping units* intended to be occupied as a residence, every *dwelling unit* or *sleeping unit* intended to be occupied as a residence shall be a *Type B unit*.

**Exception:** The number of *Type B units* is permitted to be reduced in accordance with Section 1107.7.

**1107.6.4 Group R-4.** *Accessible units, Type A units,* and *Type B units* shall be provided in Group R-4 occupancies in accordance with Sections 1107.6.4.1 through 1107.6.4.2-3. **All Group R-4 Condition 2 assisted living facilities and residential care facilities shall be provided with one standard roll-in-type shower compartment, in each dwelling or sleeping unit, where bathing facilities are provided inside the dwelling or sleeping unit. All Group R-4 Condition 2 residential care facilities shall be provided with a standard roll-in-type shower compartment, in each bathing facility provided outside the dwelling or sleeping unit, except in a bathing room where an accessible tub is provided.**

**1107.6.4.1 Accessible units.** **In Group R-4, Condition 1, At least one of the dwelling or sleeping units shall be an Accessible unit. In Group R-4 Condition 2, at least 10 percent, but not less than one, of the dwelling units and sleeping units shall be Accessible units.**

**1107.6.4.2 Type A units.** **In Group R-4 Condition 2 assisted living facilities and residential care facilities, every dwelling unit or sleeping unit shall be a Type A unit.**

**1107.6.4.2 3 Type B units.** In structures with four or more *dwelling units* or *sleeping units* intended to be occupied as a residence, every *dwelling unit* or *sleeping unit* intended to be occupied as a residence shall be a *Type B unit*.

**Exception:** The number of *Type B units* is permitted to be reduced in accordance with Section 1107.7.

## **1108.2 Assembly area seating.**

A building, room or space used for assembly purposes with *fixed seating* shall comply with Sections 1108.2.1 through 1108.2.5. Lawn seating **which is provided accessory to an affected building** shall comply with Section 1108.2.6. Assistive listening systems shall comply with Section 1108.2.7. Performance areas viewed from assembly seating areas shall comply with Section 1108.2.8. Dining areas shall comply with Section 1108.2.9.

### **1108.2.9 Dining and drinking areas.**

In dining and drinking areas, all interior and exterior floor areas shall be *accessible*.

**Exceptions:**

1. An *accessible route* between *accessible* levels and stories above or below is not required where permitted by Section 1104.4, Exception 1.
2. In buildings or facilities not required to provide an *accessible route* between stories, an *accessible route* to a *mezzanine* is not required, provided that the *mezzanine* contains less than 25 percent of the total area and the same services, decor and amenities are provided in the *accessible* area.
3. In sports facilities, tiered dining areas providing seating required to be *accessible* shall be required to have *accessible routes* serving at least 25 percent of the dining area, provided that *accessible routes* serve *accessible* seating and where each tier is provided with the same services.
4. Employee-only work areas shall comply with Sections 1103.2.3 and 1104.3.1.

**1108.2.9.1 Dining surfaces.**

Where dining surfaces for the consumption of food or drink are provided, at least 5 percent, but not less than one, of the dining surfaces for the seating and standing spaces shall be *accessible* and be distributed throughout the facility and located on a level accessed by an *accessible route*. **Where a bar or counter is provided for consumption of food or drink exceeding 34 inches in height, a structurally integrated portion of the main bar or counter shall be provided, a minimum 60 inches long or 5 percent of the length, whichever is greater, and 28 to 34 inches high. Clear floor space for forward approach and Knee and toe clearance shall be provided.**

**Flip-up counters, adjacent tables and similar devices shall not be permitted to satisfy this requirement.**

**1109.8 Lifts.**

Platform (wheelchair) lifts are permitted to be a part of a required *accessible route* in new construction where indicated in Items 1 through 10. Platform (wheelchair) lifts shall be installed in accordance with *the Oregon Elevator Specialty Code*.

**1109.14 Reserved**

~~**1109.14 Fuel dispensing systems.** Fuel dispensing systems shall be accessible.~~

**SECTION 1111**  
**CLUSTERED MAILBOXES**

**1111.1 Accessible Routes.** Clustered mailboxes on a site with an affected building shall be located on an accessible route in conformance with ANSI A117.1 Sections 402 and 403.

**1111.2 Within a Site.** At least one accessible route shall connect accessible buildings, accessible facilities, accessible elements and accessible spaces that are on the same site.

**1111.3 Site Arrival Points.** Accessible routes within the site shall be provided from public transportation stops; accessible parking; accessible passenger loading zones; and public streets or sidewalks to the accessible facilities served.

**1111.3.1 Location.** Location of clustered mailboxes shall be coordinated with the postal authority having jurisdiction.

**1111.3.2 Access to Pedestrian Circulation.** Where an improved walking surface such as a sidewalk is located within 50 feet of the pad on which a clustered mailbox unit is located, at least one accessible route shall connect the improved walking surface to the clustered mailbox pad. At least one pedestrian access route shall be provided within 50' from the vehicular way to the pad on which a clustered mailbox unit is located

**1111.4 Ramps, Curb Ramps and Barriers.** Ramps along an accessible route to clustered mailboxes



shall be in conformance with ANSI Sections 405 and 406.

1111.4.1 Curb ramps. Where the accessible route to clustered mailboxes is obstructed by curbs, curb ramps shall be provided within 50 feet of the clustered mailbox location.

1111.4.2 Other barriers. Where barriers such as grass median, landscaping or loose gravel between the edge of the traveled surface and clustered mailbox pads occur a solid surfaced access shall be provided within 50 feet of the clustered mailbox location.

1111.4.3 Landings. All landings along an accessible route to clustered mailboxes shall conform to ANSI A117.1 Section 405.7.

1111.4.4 Edge Protection. Edge protection along an accessible route to clustered mailboxes shall comply with ANSI A117.1 Section 405.9.

1111.5 Changes in Level. Changes in level in the traveled surface on an accessible route to clustered mailboxes shall comply with ANSI A117.1 Section 303.

1111.6 Surfaces. Traveled surfaces shall be stable, firm, and slip resistant, and shall comply with ANSI A117.1 Sections 302.1 and 302.3. Changes in level in floor surfaces shall comply with ANSI A117.1 Section 303.

1111.7 Turning Space at Clustered Mailbox Units. At least one turning space shall be provided at the front of each clustered mailbox unit. The turning space shall conform to ANSI A117.1 Section 304 and shall be either:

- (a) A circular space having a 72-inch (1829 mm) minimum diameter; or
- (b) A T-shaped space within a 72 inch (1829 mm) minimum square, with arms and base 48 inches minimum (1219 mm) in width. Each arm of the T shall be clear of obstructions 24 inches (610 mm) minimum in each direction, and the base shall be clear of obstructions 36 inches (914 mm) minimum. The turning space shall be permitted to include knee and toe clearance complying with Section 306 only at the end of either the base or one arm.

1111.8 Protruding Objects. Protruding objects along the accessible route to clustered mailboxes shall conform to section 307 of ANSI A117.1

1111.9 Clear Access Space. Clear access space conforming to ANSI A117.1 section 305 shall be provided to each of the mailboxes at the clustered mailbox location. The clear access space and the turning space may overlap.

## CHAPTER 12 INTERIOR ENVIRONMENT

### 1203.1 General.

Buildings shall be provided with natural ventilation in accordance with Section 1203.4, or mechanical ventilation in accordance with the *International Mechanical Code*.

Where the air infiltration rate in a *dwelling unit* is less than 5 air changes per hour when tested with a blower door at a pressure 0.2 inch w.c. (50 Pa) ~~in accordance with Section 402.4.1.2 of the International Energy Conservation Code~~, the *dwelling unit* shall be ventilated by mechanical means in accordance with Section 403 of the *International Mechanical Code*.

### 1203.3.2 Exceptions. The following are exceptions to Sections 1203.3 and 1203.3.1:

1. Where warranted by climatic conditions, ventilation openings to the outdoors are not required if ventilation openings to the interior are provided.
2. The total area of ventilation openings is permitted to be reduced to 1/1,500 of the under-floor area where the ground surface is covered with a Class I vapor retarder material and the required openings are placed so as to provide cross ventilation of the space. The installation of operable louvers shall not be prohibited.
3. Ventilation openings are not required where continuously operated mechanical ventilation is provided at a rate of 1.0 cubic foot per minute (cfm) for each 50 square feet (1.02 L/s for each 10 m<sup>2</sup>) of crawl space floor area and the ground surface is covered with a Class I vapor retarder.
4. Ventilation openings are not required where the ground surface is covered with a Class I vapor retarder, the perimeter walls are insulated and the space is conditioned in accordance with the International Energy Conservation Code.
5. For buildings in flood hazard areas as established by the Flood Plain Administrator ~~in Section 1612.3~~, the openings for under-floor ventilation shall be deemed as meeting the flood opening requirements of ASCE 24 provided that the ventilation openings are designed and installed in accordance with ASCE 24.

### ~~[P]~~ 1210.1 Required fixtures.

The number and type of plumbing fixtures provided in any occupancy shall comply with Chapter 29. See Chapter 11 for accessibility requirements.

### 1210.2 Finish materials.

Walls, floors and partitions in toilet and bathrooms shall comply with Sections 1210.2.1 through 1210.2.4.

### ~~[P]~~ 1210.3 Privacy.

Privacy at water closets and urinals shall be provided in accordance with Sections 1210.3.1 and 1210.3.2.

### ~~[P]~~ ~~2903.1~~ 1210.3.1 Water closet compartment.

Each water closet utilized by the public or employees shall occupy a separate compartment with walls or partitions and a door enclosing the fixtures to ensure privacy.

#### Exceptions:

1. Water closet compartments shall not be required in a single-occupant toilet room with a lockable door.
2. Toilet rooms located in child day care facilities and containing two or more water closets shall be permitted to have one water closet without an enclosing compartment.
3. This provision is not applicable to toilet areas located within Group I-3 occupancy housing areas.

### ~~[P]~~~~2903.2~~ 1210.3.2 Urinal partitions.

Each urinal utilized by the public or employees shall occupy a separate area with walls or partitions to provide privacy. The walls or partitions shall begin at a height not more than 12 inches (305 mm) from and extend not less than 60 inches (1524 mm) above the finished floor surface. The walls or partitions shall extend from the wall surface at each side of the urinal not less than 18 inches (457 mm) or to a point not less than 6 inches (152 mm) beyond the outermost front lip of the urinal measured from the finished backwall surface,

whichever is greater.

**Exceptions:**

1. Urinal partitions shall not be required in a single-occupant or family or assisted-use toilet room with a lockable door.
2. Toilet rooms located in child day care facilities and containing two or more urinals shall be permitted to have one urinal without partitions.

**1210.4 Fixture Clearances.**

**The centerline of water closets or bidets shall be 15 inches (381 mm) minimum to any side wall or obstruction, and at a spacing of 30 inches (762 mm) minimum from center to center of any fixture. The clear space in front of water closets and bidets in residential structures shall be 21 inches (533 mm) minimum. For all other occupancies, the clear space in front of water closets and bidets shall be 24 inches (610 mm) minimum. The centerline of urinals shall be 12 inches (305 mm) minimum from any side wall or partition and at a spacing of 24 inches (610 mm) minimum center to center of other urinals. The clear space from the front of urinals shall be 24 inches (610 mm) minimum. Where plumbing fixtures are required to meet the accessibility provisions of this code, the installation shall comply with the requirements of Chapter 11 and ICC/ANSI A117.1.**

## CHAPTER 13 ENERGY EFFICIENCY

### ~~[E]~~ 1301.1 Scope.

This chapter governs the design and construction of buildings for energy efficiency.

#### ~~[E]~~ 1301.1.1 Criteria.

Buildings shall be designed and constructed in accordance with the ~~International Energy Conservation Code~~.

## CHAPTER 14 EXTERIOR WALLS

**ADHERED MASONRY VENEER** Veneer secured with approved mechanical fasteners to an approved backing. Type and spacing of fasteners shall be noted on construction documents.

### **1403.5 Vertical and lateral flame propagation.**

Exterior walls on buildings of Type I, II, III or IV construction that are greater than 40 feet (12 192 mm) in height above grade plane and contain a combustible water-resistive barrier shall be tested in accordance with and comply with the acceptance criteria of NFPA 285. For the purpose of this section, fenestration products and flashing of fenestrations shall not be considered part of the water resistive barrier.

#### Exceptions:

1. Walls in which the water-resistive barrier is the only combustible component and the exterior wall has a wall covering of brick, concrete, stone, terra cotta, stucco or steel with minimum thicknesses in accordance with Table 1405.2.
2. Walls in which the water-resistive barrier is the only combustible component and the water-resistive barrier has a Peak Heat Release Rate of less than 150 kW/m<sup>2</sup>, a Total Heat Release of less than 20 MJ/m<sup>2</sup> and an Effective Heat of Combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354 and has a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m<sup>2</sup>.

**1403.6 Flood resistance.** For buildings in flood hazard areas as established by the Flood Plain Administrator ~~in Section 1612.3~~, exterior walls extending below the elevation required by Section 1612 shall be constructed with flood-damage-resistant materials. Wood shall be pressure-preservative treated in accordance with AWP A U1 for the species, product and end use using a preservative listed in Section 4 of AWP A U1 or decay-resistant heartwood of redwood, black locust or cedar.

**1403.7 Flood resistance for high-velocity wave action areas.** For buildings in flood hazard areas subject to high-velocity wave action as established by the Flood Plain Administrator ~~in Section 1612.3~~, electrical, mechanical and plumbing system components shall not be mounted on or penetrate through exterior walls that are designed to break away under flood loads.

### **1405.3 Vapor retarders.**

Class I or II vapor retarders shall be provided on the interior side of frame walls in Zone 5 and ~~6, 7, 8~~ Marine 4. ~~The appropriate zone shall be selected in accordance with Chapter 3 of the International Energy Conservation Code.~~

#### Exceptions:

1. Basement walls.
2. Below-grade portion of any wall.
3. Masonry walls with exposed interior surfaces.
4. Where exterior continuous rigid insulation is at least 50 percent of required R-value for that wall assembly, a class I or Class II vapor retarder may be installed on the interior surface of rigid insulation.
5. Construction where moisture or its freezing will not damage the materials.

#### **1405.3.1 Class III vapor retarders.**

Class III vapor retarders shall be permitted where any one of the conditions in Table 1405.3.1 is met.

**TABLE 1405.3.1  
CLASS III VAPOR RETARDERS**

| <b>ZONE</b>                 | <b>CLASS III VAPOR RETARDERS PERMITTED FOR:<sup>a</sup></b>  |
|-----------------------------|--|
| <b>Marine 4<sub>b</sub></b> | Vented cladding over wood structural panels<br>Vented cladding over fiberboard<br>Vented cladding over gypsum<br>Insulated sheathing with <i>R</i> -value <input type="checkbox"/> R2.5 over 2 × 4 wall<br>Insulated sheathing with <i>R</i> -value <input type="checkbox"/> R3.75 over 2 × 6 wall |
| <b>5<sub>c</sub></b>        | Vented cladding over wood structural panels<br>Vented cladding over fiberboard<br>Vented cladding over gypsum<br>Insulated sheathing with <i>R</i> -value <input type="checkbox"/> R5 over 2 × 4 wall<br>Insulated sheathing with <i>R</i> -value <input type="checkbox"/> R7.5 over 2 × 6 wall    |
| <b>6</b>                    | <del>Vented cladding over fiberboard</del><br><del>Vented cladding over gypsum</del><br>Insulated sheathing with <i>R</i> -value <input type="checkbox"/> R7.5 over 2 × 4 wall<br>Insulated sheathing with <i>R</i> -value <input type="checkbox"/> R11.25 over 2 × 6 wall                         |
| <b>7 and 8</b>              | Insulated sheathing with <i>R</i> -value <input type="checkbox"/> R10 over 2 × 4 wall<br>Insulated sheathing with <i>R</i> -value <input type="checkbox"/> R15 over 2 × 6 wall   |

For SI: 1 pound per cubic foot = 16 kg/m<sup>3</sup>.

- a. Spray foam with a minimum density of 2 lbs/ft<sup>3</sup> applied to the interior cavity side of wood structural panels, fiberboard, insulating sheathing or gypsum is deemed to meet the insulating sheathing requirement where the spray foam *R*-value meets or exceeds the specified insulating sheathing *R*-value.
- b. **Zone Marine 4 includes the following counties: Benton, Clackamas, Clatsop, Columbia, Coos, Curry, Douglas, Jackson, Josephine, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Washington and Yamhill.**
- c. **Zone 5 are the counties not included in Zone Marine 4.**

#### **1405.6 Anchored masonry veneer.**

Anchored masonry veneer shall comply with the provisions of Sections 1405.6, 1405.7, 1405.8 and 1405.9 and Sections 6.1 and 6.2 of TMS 402/ACI 530/ASCE 5.

##### **1405.6.1 Tolerances.**

Anchored masonry veneers in accordance with Chapter 14 are not required to meet the tolerances in Article 3.3 F1 of TMS 602/ACI 530.1/ASCE 6.

**1405.6.2 Seismic requirements.** Anchored masonry veneer located in Seismic Design Category C, D, E or F shall conform to the requirements of Section 6.2.2.10, **except Section 6.2.2.10.3.3, of ACI 530/ASCE 5/TMS 402. Mechanically attached anchors to the joint reinforcement, as required in ACI 530/ASCE 5/TMS 402 Section 6.2.2.10.3.3 with clips and hooks, shall be required in Seismic Design Category D, Section 6.2.2.10.2, for Occupancy Categories III and IV.**

##### **1405.10.3 Interior adhered masonry veneers.**

Interior adhered masonry veneers shall have a maximum weight of 20 psf (0.958 kg/m<sup>2</sup>) and shall be installed in accordance with Section 1405.10. Where the interior adhered masonry veneer is supported by wood construction, the supporting members shall be designed to limit deflection to 1/600 of the span of the supporting members.

**Exception: Where interior adhered masonry veneer can be demonstrated to support its own weight and the lateral load for the interior adhered masonry veneer is provided through the use of an engineered system, the 20 psf (0.958 kg/m<sup>2</sup>) limitation does not apply.**

**1405.11.4 Grounding.** Grounding of metal veneers on buildings shall comply with the **Electrical Code.**

#### **1408.4 Weather resistance.**

EIFS shall comply with Section 1403 and shall be designed and constructed to resist wind and rain in accordance with this section and the manufacturer's application instructions.

##### **1408.4.1 EIFS with drainage required. All EIFS systems must incorporate a drainage system.**

**Exception: EIFS systems without drainage (barrier systems) may be used in the following applications:**

- 1. Repairs and replacement to existing barrier systems.**
- 2. Architectural features not protecting an interior space.**
- 3. Installation on concrete and concrete masonry unit(CMU) block surfaces.**

##### **1408.4.1 EIFS with drainage.**

EIFS with drainage shall have an average minimum drainage efficiency of 90 percent when tested in accordance the requirements of ASTM E 2273 and is required on framed walls of Type V construction, Group R1, R2, R3 and R4 occupancies.

##### **1408.4.1.1 Water resistive barrier.**

For EIFS with drainage, the *water resistive barrier* shall comply with Section 1404.2 or ASTM E 2570.

#### **1408.5 Installation.**

~~Installation of the EIFS and~~ EIFS with drainage shall be in accordance with the EIFS manufacturer's instructions.

## CHAPTER 15 ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

### 1501.1 Scope.

The provisions of this chapter shall govern the design, materials, construction and quality of roof assemblies, and rooftop structures.

### SECTION 1503 WEATHER PROTECTION

[P] **1503.4 Roof drainage.** Design and installation of roof drainage systems shall comply with Section 1503 of this code. and Sections 1106 and 1108, as applicable, of and the *International Plumbing Code*.

~~[P] **1503.4.1 Secondary (emergency overflow) drains or scuppers.**~~

~~Where roof drains are required, secondary (emergency overflow) roof drains or scuppers shall be provided where the roof perimeter construction extends above the roof in such a manner that water will be entrapped if the primary drains allow buildup for any reason. The installation and sizing of secondary emergency overflow drains, leaders and conductors shall comply with Sections 1106 and 1108, as applicable, of the *International Plumbing Code*.~~

~~[P] **1503.4.1 Secondary (emergency overflow) drains or scuppers.**~~

~~Where roof drains are required, secondary (emergency overflow) roof drains or scuppers shall be provided where the roof perimeter construction extends above the roof in such a manner that water will be entrapped if the primary drains allow buildup for any reason. The installation and sizing of secondary emergency overflow drains, leaders and conductors shall comply with Sections 1106 and 1108, as applicable, of the *International Plumbing Code*.~~

#### **1503.4.2 Scuppers.**

When scuppers are used for secondary (emergency overflow) roof drainage, the quantity, size, location and inlet elevation of the scuppers shall be sized to prevent the depth of ponding water from exceeding that for which the roof was designed as determined by Section 1611.1. Scuppers shall not have an opening dimension of less than 4 inches (102 mm). The flow through the primary system shall not be considered when locating and sizing scuppers.

#### **1503.4.3 Gutters.**

Gutters and leaders placed on the outside of buildings, other than Group R-3, private garages and buildings of Type V construction, shall be of noncombustible material or a minimum of Schedule 40 plastic pipe.

**1503.4.1 General.** When required by the building official, a drainage system which may include gutters, drains or necessary associated piping shall be installed. Roofs shall be sloped a minimum of 1 unit vertical in 48 units horizontal (2% slope) for drainage unless designed for water accumulation in accordance with Section 1611.2 and approved by the building official.

**1503.4.2 Roof drains.** Unless roofs are sloped to drain over roof edges, roof drains shall be installed at each low point of the roof.

**Roof drains shall be sized and discharged in accordance with the *Plumbing Code*.**

**1503.4.3 Overflow drains and scuppers.** Where roof drains are required, overflow drains shall be installed per Section 1101.11 of the *Oregon Plumbing Specialty Code*.

**1503.4.4 Concealed piping.** Roof drains and overflow drains, where concealed within the construction of the building, shall be installed in accordance with the *Plumbing Code*.

**1503.4.5 Over public property.** Roof drainage water from a building shall not be permitted to flow over public property.



**Exception: Group R-3 and Group U occupancies.**

**TABLE 1505.1<sup>a, b</sup>**  
**MINIMUM ROOF COVERING CLASSIFICATION**  
**FOR TYPES OF CONSTRUCTION**

| IA | IB | IIA | IIB            | IIIA | IIIB           | IV | VA | VB             |
|----|----|-----|----------------|------|----------------|----|----|----------------|
| B  | B  | B   | C <sup>c</sup> | B    | C <sup>c</sup> | B  | B  | C <sup>c</sup> |

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m<sup>2</sup>.

- a. Unless otherwise required ~~in accordance with the *International Wildland-Urban Interface Code* or~~ due to the location of the building within a fire district in accordance with Appendix D.
- b. Nonclassified roof coverings shall be permitted on buildings of Group R-3 and Group U occupancies, where there is a minimum fire-separation distance of 6 feet measured from the leading edge of the roof.
- c. Buildings that are not more than two stories above grade plane and having not more than 6,000 square feet of projected roof area and where there is a minimum 10-foot fire-separation distance from the leading edge of the roof to a lot line on all sides of the building, except for street fronts or public ways, shall be permitted to have roofs of No. 1 cedar or redwood shakes and No. 1 shingles.

**1507.16 Roof gardens and landscaped roofs.**

Roof gardens and landscaped roofs shall comply with the requirements of this chapter and Sections 1607.12.3 and 1607.12.3.1 and the ~~*International Fire Code*~~.

**1507.17 Photovoltaic modules/shingles.**

The installation of photovoltaic modules/shingles shall comply with the provisions of this section **and the Oregon Solar Installation Specialty Code.**

~~1507.17.1 Material standards.~~

~~Photovoltaic modules/shingles shall be listed and labeled in accordance with UL 1703.~~

~~1507.17.2 Attachment.~~

~~Photovoltaic modules/shingles shall be attached in accordance with the manufacturer's installation instructions.~~

**1507.17.3 Wind resistance.**

Photovoltaic modules/shingles shall be tested in accordance with procedures and acceptance criteria in ASTM D 3161. Photovoltaic modules/shingles shall comply with the classification requirements of Table 1507.2.7.1(2) for the appropriate maximum nominal design wind speed **V<sub>asd</sub> of Chapter 16.** Photovoltaic modules/shingle packaging shall bear a label to indicate compliance with the procedures in ASTM D 3161 and the required classification from Table 1507.2.7.1(2).

**1509.7 Photovoltaic systems.**

Rooftop mounted photovoltaic systems shall be designed in accordance with this section **and the Oregon Solar Installation Specialty Code.**

**1509.7.1 Wind resistance.**

Rooftop mounted photovoltaic systems shall be designed for wind loads for component and cladding in accordance with Chapter 16 using an effective wind area ~~based on the dimensions of a single unit frame determined~~ **in accordance with Chapter 16 and ASCE 7 Section 26.2.**

**EXCEPTION: Installations meeting the prescriptive requirements of Section 305.4 of the Oregon Solar Installation Specialty Code.**

**1509.7.2 Structural Fire Resistance.** ~~Fire classification. Rooftop mounted photovoltaic systems shall have the same fire classification as the roof assembly required by Section 1505.~~ **The structural frame and roof**

**construction supporting the load imposed upon the roof by the photovoltaic panels/modules shall comply with the requirements of Table 601.**

**~~1509.7.3 Installation.~~**

~~Rooftop mounted photovoltaic systems shall be installed in accordance with the manufacturer's installation instructions.~~

**~~1509.7.4 Photovoltaic panels and modules.~~**

~~Photovoltaic panels and modules mounted on top of a roof shall be listed and labeled in accordance with UL 1703 and shall be installed in accordance with the manufacturer's installation instructions.~~

**1510.1 General.**

Materials and methods of application used for recovering or replacing an existing roof covering shall comply with the requirements of Chapter 15 **and the *Energy Code*.**

**1510.3.1 Reroofing inspection. When required by the building official, an inspection prior to the installation of new roofing shall be performed to verify the existing roofing meets the conditions of Section 1510.3. The building official may accept an inspection report of the above listed conditions prepared by an approved special inspector.**

**1510.3.2 Final inspection. A final inspection and approval shall be obtained from the building official when the reroofing is complete.**

**~~1511.1 Solar photovoltaic panels/modules.~~**

~~Solar photovoltaic panels/modules installed upon a roof or as an integral part of a roof assembly shall comply with the requirements of this code and the *International Fire Code*.~~

**~~1511.1.1 Structural fire resistance.~~**

~~The structural frame and roof construction supporting the load imposed upon the roof by the photovoltaic panels/modules shall comply with the requirements of Table 601.~~

## CHAPTER 16 STRUCTURAL DESIGN

**1602.1 Definitions.** The following terms are defined in Chapter 2:

**BRACED WALL LINE.**

**BRACED WALL PANEL.**

**DIAPHRAGM.**

- Diaphragm, blocked.
- Diaphragm boundary.
- Diaphragm chord.
- ~~Diaphragm flexible.~~
- Diaphragm, rigid

### NOTATIONS.

$E$  = Combined effect of horizontal and vertical earthquake induced forces as defined in Section 12.4.2 of ASCE 7, **including seismically induced lateral earth pressure.**

~~$F_a$  = Flood load in accordance with Chapter 5 of ASCE 7.~~

**1603.1 General.** Construction documents shall show the size, section and relative locations of structural members with floor levels, column centers and offsets dimensioned. The design loads and other information pertinent to the structural design required by Sections 1603.1.1 through 1603.1.9 shall be indicated on the construction documents.

**Exception:** Construction documents for buildings constructed in accordance with the conventional light-frame construction provisions of Section 2308 shall indicate the following structural design information:

1. Floor and roof live loads.
2. Ground snow load,  $P_g$ .
3. Ultimate design wind speed,  $V_{ult}$ , (3-second gust), miles per hour (mph) (km/hr) and nominal design wind speed,  $V_{asd}$ , as determined in accordance with Section 1609.3.1 and wind exposure.
4. Seismic design category and site class.
- ~~5. Flood design data, if located in flood hazard areas established in Section 1612.3.~~
- 6 **5.** Design load-bearing values of soils.

**1603.1.7 Reserved. Flood design data.** ~~For buildings located in whole or in part in flood hazard areas as established in Section 1612.3, the documentation pertaining to design, if required in Section 1612.5, shall be included and the following information, referenced to the datum on the community's Flood Insurance Rate Map (FIRM), shall be shown, regardless of whether flood loads govern the design of the building:~~

- ~~1. In flood hazard areas not subject to high velocity wave action, the elevation of the proposed lowest floor, including the basement.~~
- ~~2. In flood hazard areas not subject to high velocity wave action, the elevation to which any nonresidential building will be dry flood proofed.~~
- ~~3. In flood hazard areas subject to high velocity wave action, the proposed elevation of the bottom of the lowest horizontal structural member of the lowest floor, including the basement.~~

**1604.4 Analysis.** Load effects on structural members and their connections shall be determined by methods of structural analysis that take into account equilibrium, general stability, geometric compatibility and both short- and long-term material properties.

Members that tend to accumulate residual deformations under repeated service loads shall have included in their analysis the added eccentricities expected to occur during their service life.

Any system or method of construction to be used shall be based on a rational analysis in accordance with well-established principles of mechanics. Such analysis shall result in a system that provides a complete load path capable of transferring loads from their point of origin to the load-resisting elements.

The total lateral force shall be distributed to the various vertical elements of the lateral force-resisting system in

proportion to their rigidities, considering the rigidity of the horizontal bracing system or diaphragm. Rigid elements assumed not to be a part of the lateral force-resisting system are permitted to be incorporated into buildings provided their effect on the action of the system is considered and provided for in the design. ~~Except where diaphragms are flexible, or are permitted to be analyzed as flexible,~~ **A diaphragm is rigid for the purpose of distribution of story shear and torsional moment when the lateral deformation of the diaphragm is less than or equal to two times the average story drift. Where required by ASCE 7,** provisions shall be made for the increased forces induced on resisting elements of the structural system resulting from torsion due to eccentricity between the center of application of the lateral forces and the center of rigidity of the lateral force-resisting system.

Every structure shall be designed to resist the overturning effects caused by the lateral forces specified in this chapter. See Section 1609 for wind loads, Section 1610 for lateral soil loads and Section 1613 for earthquake loads

**1605.2.1 Other loads.** ~~Where flood loads,  $F_a$ , are to be considered in the design, the load combinations of Section 2.3.3 of ASCE 7 shall be used.~~ Where self-straining loads,  $T$ , are considered in design, their structural effects in combination with other loads shall be determined in accordance with Section 2.3.5 of ASCE 7. Where an ice-sensitive structure is subjected to loads due to atmospheric icing, the load combinations of Section 2.3.4 of ASCE 7 shall be considered.

**1605.3.1.2 Other loads.** ~~Where flood loads,  $F_a$ , are to be considered in design, the load combinations of Section 2.4.2 of ASCE 7 shall be used.~~ Where self-straining loads,  $T$ , are considered in design, their structural effects in combination with other loads shall be determined in accordance with Section 2.4.4 of ASCE 7. Where an ice-sensitive structure is subjected to loads due to atmospheric icing, the load combinations of Section 2.4.3 of ASCE 7 shall be considered.

**1605.3.2.1 Other loads.**

Where  $F$ ,  $H$  or  $T$  are to be considered in the design, each applicable load shall be added to the combinations specified in Section 1605.3.2. Where self-straining loads,  $T$ , are considered in design, their structural effects in combination with other loads shall be determined in accordance with Section 2.4.4 of ASCE 7. **Where an ice-sensitive structure is subjected to loads due to atmospheric icing,  $D_i$  and  $W_i$ , the alternate basic load combinations of Section 1605.3.2 shall not be used.**

**TABLE 1607.1—continued**  
**MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS,  $L_o$ , AND MINIMUM CONCENTRATED LIVE LOADS<sub>g</sub>**

| OCCUPANCY OR USE   | UNIFORM (psf)    | CONCENTRATED (lbs.) |
|--|------------------|---------------------|
| 30.Stairs and exits  |                  |                     |
| One- and two-family dwellings  | 40               | 300 <sup>f</sup>    |
| All other  | 100              | 300 <sup>f</sup>    |
| 31.Storage warehouses <del>except for one and two-family dwellings</del> (shall be designed for heavier loads if required for anticipated storage) |                  |                     |
| Heavy  | 250 <sup>m</sup> | —                   |
| Light  | 125 <sup>m</sup> |                     |
| 32.Stores  |                  |                     |
| Retail   |                  |                     |

|   |                      |                    |
|---|----------------------|--------------------|
| First floor   | 100                  | 1,000              |
| Upper floors  | 75                   | 1,000              |
| Wholesale, all floors   | 125 <sup>m</sup>     | 1,000              |
| 33. Vehicle barriers  | See Section 1607.8.3 |                    |
| 34. Walkways and elevated platforms (other than exitways)   | 60                   | —                  |
| 35. Yards and terraces, pedestrians   | 100 <sup>m</sup>     | —                  |
| <b><u>41 36. Exterior foot bridge (when part of the means of egress or an accessible route)</u></b> | <b><u>100</u></b>    | <b><u>1000</u></b> |

### 1608.1 General.

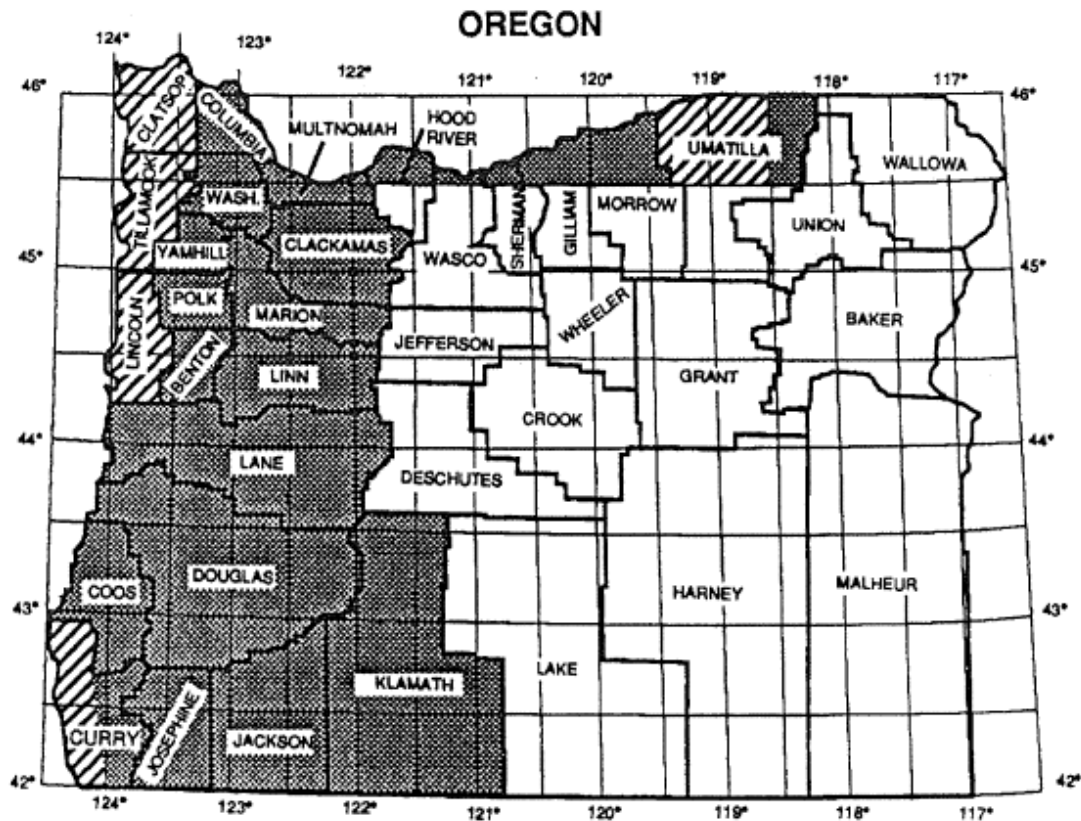
Design snow loads shall be determined in accordance with Chapter 7 of ASCE 7, ~~but the design roof load shall not be less than that determined by Section 1607.~~ **and the Snow Load Analysis for Oregon, published by the Structural Engineers of Oregon, December 2007, sections:**

- **The Oregon map contained in the manual.**
- **Part I, section “Use of Map.”**
- **Part II, section, “Minimum roof snow load.”**
- **Part II, section, “Rain on snow surcharge.”**
- **The design roof snow load shall not be less than 20 psf (960 N/m<sup>2</sup>).**

### 1608.2 Ground snow loads.

The ground snow loads to be used in determining the design snow loads for roofs ~~shall be determined in accordance with ASCE 7 or Figure 1608.2 for the contiguous United States and Table 1608.2 for Alaska. Site-specific case studies shall be made in areas designated “CS” in Figure 1608.2. Ground snow loads for sites at elevations above the limits indicated in Figure 1608.2 and for all sites within the CS areas shall be approved. Ground snow load determination for such sites shall be based on an extreme value statistical analysis of data available in the vicinity of the site using a value with a 2 percent annual probability of being exceeded (50-year mean recurrence interval). Snow loads are zero for Hawaii, except in mountainous regions as approved by the building official.~~ **buildings and other structures shall be as shown in the Snow Load Analysis for Oregon, as published by the Structural Engineers Association of Oregon, December 2007, sections:**

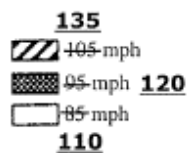
- **The Oregon map contained in the manual.**
  - **Part I, Section, “Use of Map.”**
- Exception: The ground snow load may be adjusted by the building official when a registered engineer or architect submits data substantiating the adjustments. The data shall be adjusted for a 50-year recurrence and shall include measured water equivalent of snow. This snow load data may then be used in potential accumulation calculations, however in this case the basic ground snow load used for design shall not be less than 20 psf (1200 N/m<sup>2</sup>).**



**135**

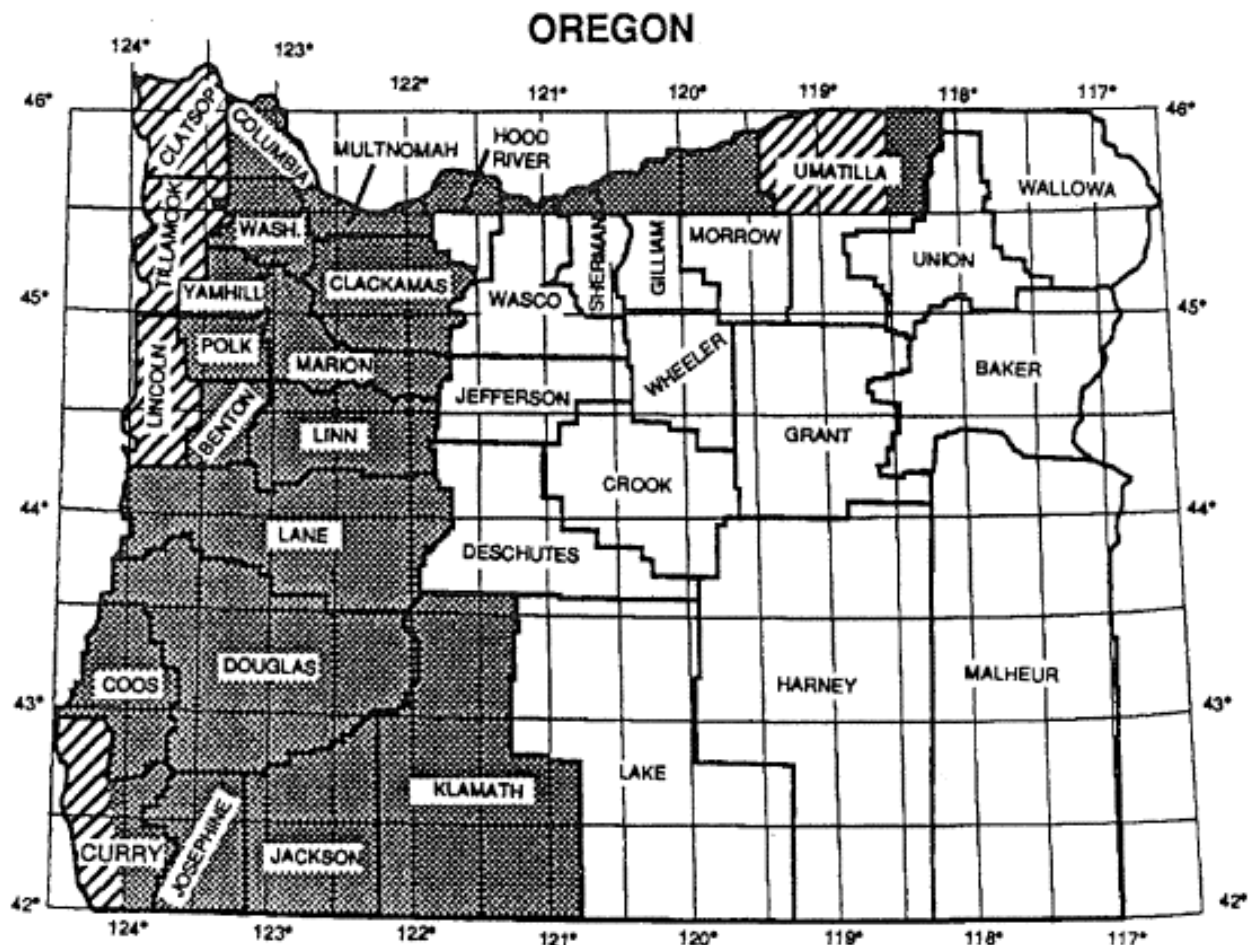
1. All areas with full exposure to ocean winds shall be designed ~~105~~ mph areas.
2. Areas in Multnomah and Hood River Counties with full exposure to Columbia River Gorge winds shall be designed ~~105~~ mph areas.

**135**



For SI: 1 mile per hour = 0.44 m/s

FIGURE 1609 **A**  
 —BASIC WIND SPEED (3-SECOND GUST) IN MILES PER HOUR (×1.61 for km/h)—  
**ULTIMATE DESIGN WIND SPEED,  $V_{ULT}$  FOR RISK CATEGORY II BUILDINGS AND OTHER STRUCTURES**

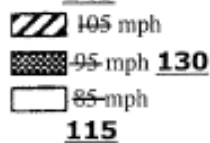


**145**

1. All areas with full exposure to ocean winds shall be designed 105 mph areas.
2. Areas in Multnomah and Hood River Counties with full exposure to Columbia River Gorge winds shall be designed 105 mph areas.

**145**

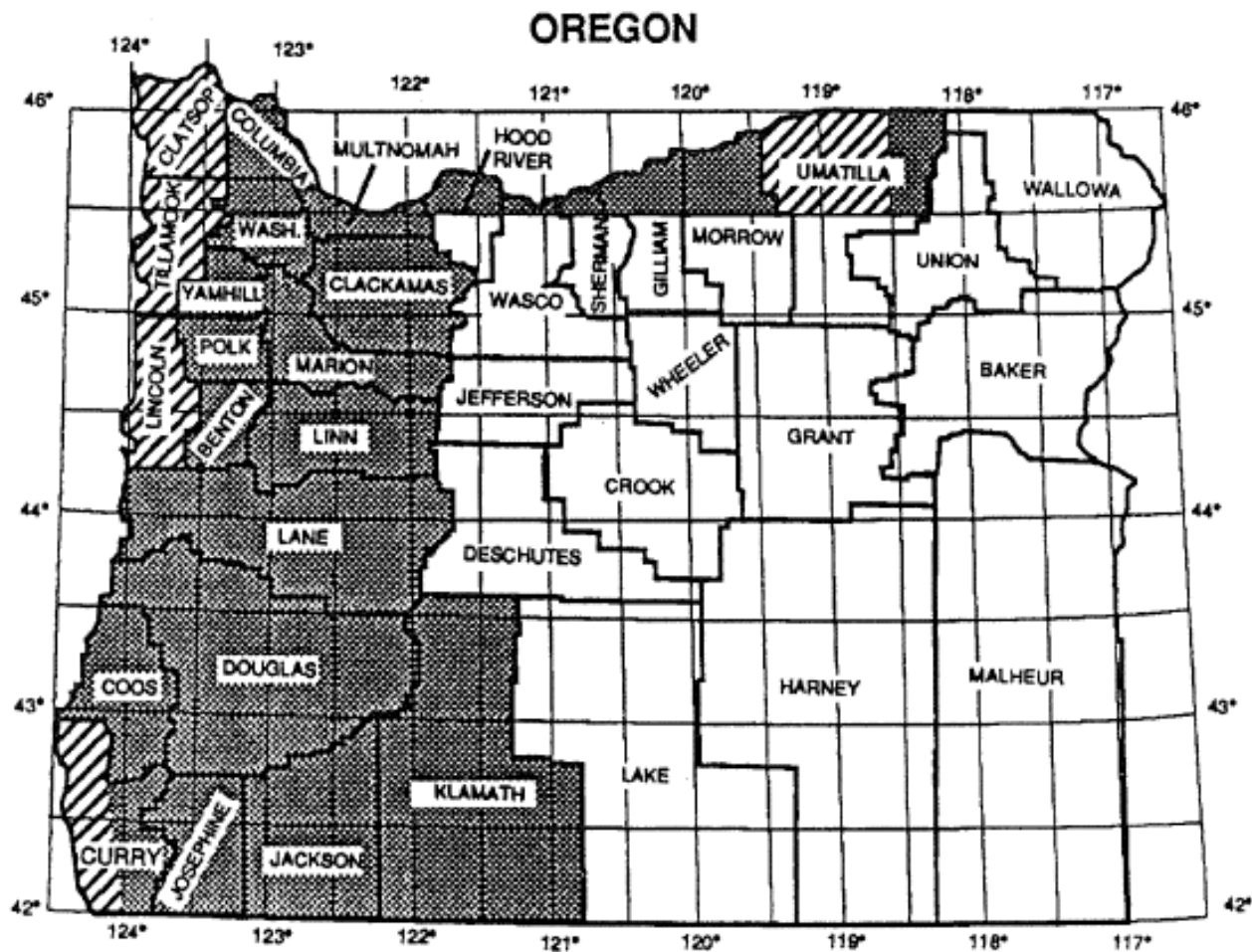
**145**



**115**

For SI: 1 mile per hour = 0.44 m/s

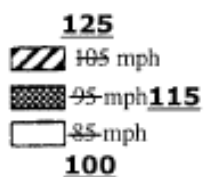
FIGURE 1609B  
 —BASIC WIND SPEED (3-SECOND GUST) IN MILES PER HOUR ( $\times 1.61$  for km/h)—  
**ULTIMATE DESIGN WIND SPEED,  $V_{ULT}$  FOR RISK CATEGORY III  
 AND IV BUILDINGS AND OTHER STRUCTURES**



### 125

1. All areas with full exposure to ocean winds shall be designed 105 mph areas.
2. Areas in Multnomah and Hood River Counties with full exposure to Columbia River Gorge winds shall be designed 105 mph areas.

### 125



For SI: 1 mile per hour = 0.44 m/s

FIGURE 1609C  
 BASIC WIND SPEED (3-SECOND GUST) IN MILES PER HOUR ( $\times 1.61$  for km/h)  
**ULTIMATE DESIGN WIND SPEED,  $V_{ULT}$  FOR RISK CATEGORY I BUILDINGS AND OTHER STRUCTURES**

### 1610.1 General.

Foundation walls and retaining walls shall be designed to resist lateral soil loads. Soil loads specified in Table 1610.1 shall be used as the minimum design lateral soil loads unless determined otherwise by a geotechnical investigation in accordance with Section 1803. Foundation walls and other walls in which horizontal movement is restricted at the top shall be designed for at-rest pressure. Retaining walls free to move and rotate at the top shall be permitted to be designed for active pressure. Design lateral pressure from surcharge loads shall be added to the



lateral earth pressure load. Design lateral pressure shall be increased if soils at the site are expansive **or the retaining wall will support an ascending backfill slope**. Foundation walls shall be designed to support the weight of the full hydrostatic pressure of un-drained backfill unless a drainage system is installed in accordance with Sections 1805.4.2 and 1805.4.3.

**Exception:** Foundation walls extending not more than 8 feet (2438 mm) below grade and laterally supported at the top by flexible diaphragms shall be permitted to be designed for active pressure.

#### **1612.1 General.**

Within *flood hazard areas* as established in Section 1612.3, all new construction of buildings, structures ~~and portions of buildings and structures~~, including substantial improvement and restoration of substantial damage to buildings and structures, shall be designed and constructed to resist the effects of flood hazards and flood loads. For buildings that are located in more than one *flood hazard area*, the provisions associated with the most restrictive *flood hazard area* shall apply. **For prohibitions against siting new essential facilities and new special occupancy structures in tsunami inundation zones, see Section 1803.2.**

**1612.2 Definitions.** The following terms are defined in Chapter 2:

**BASE FLOOD.**

**BASE FLOOD ELEVATION.**

**BASEMENT.**

**DESIGN FLOOD.**

**DESIGN FLOOD ELEVATION.**

**DRY FLOODPROOFING.**

**EXISTING CONSTRUCTION.**

**EXISTING STRUCTURE.**

**FLOOD or FLOODING.**

**FLOOD DAMAGE-RESISTANT MATERIALS.**

**FLOOD HAZARD AREA.**

**FLOOD HAZARD AREA SUBJECT TO HIGHVELOCITY WAVE ACTION.**

**FLOOD INSURANCE RATE MAP (FIRM).**

**FLOOD INSURANCE STUDY.**

**FLOODWAY.**

**LOWEST FLOOR.**

**SPECIAL FLOOD HAZARD AREA.**

**START OF CONSTRUCTION.**

**SUBSTANTIAL DAMAGE.**

**SUBSTANTIAL IMPROVEMENT.**

#### **1612.3 Establishment of flood hazard areas.**

To establish *flood hazard areas*, the applicable **Where the local** governing authority shall **has adopted** a flood hazard map and supporting data **the structure design and construction shall be in conformance with Section 1612.4.** The flood hazard map shall include, at a minimum, areas of special flood hazard as identified by the Federal Emergency Management Agency 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.

**1612.3.1 Design flood elevations.** Where design flood elevations are not included in the flood hazard areas established in Section 1612.3, or where floodways are not designated, the building official is authorized to require the applicant to:

1. Obtain and reasonably utilize any design flood elevation and floodway data available from a federal, state or other source; or
2. Determine the design flood elevation and/or floodway in accordance with accepted hydrologic and hydraulic

**1612.3.2 Determination of impacts.** In riverine flood hazard areas where design flood elevations are specified but floodways have not been designated, the applicant shall provide a floodway analysis that demonstrates that the proposed work will not increase the design flood elevation more than 1 foot (305 mm) at any point within the jurisdiction of the applicable governing authority.

### 1613.1 Scope.

San Juan Mountains

Topographic map of the San Juan Mountains region in Colorado, showing contour lines, peaks, and a network of roads. The map is oriented with North at the top. The title 'San Juan Mountains' is at the top center. The map shows a complex terrain with numerous peaks and valleys. A network of roads is shown, including a major road running north-south through the center. The map is labeled with various place names and elevations. The scale is 1:50,000.

20° 30' N

108° 30' W

109° 00' W

109° 30' W

110° 00' W

110° 30' W

111° 00' W

111° 30' W

112° 00' W

112° 30' W

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227° 30' W

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229° 00' W

229° 30' W

230° 00' W

230° 30' W

231° 00' W

231° 30' W

232° 00' W

232° 30' W

233° 00' W

233° 30' W

234° 00' W

234° 30' W

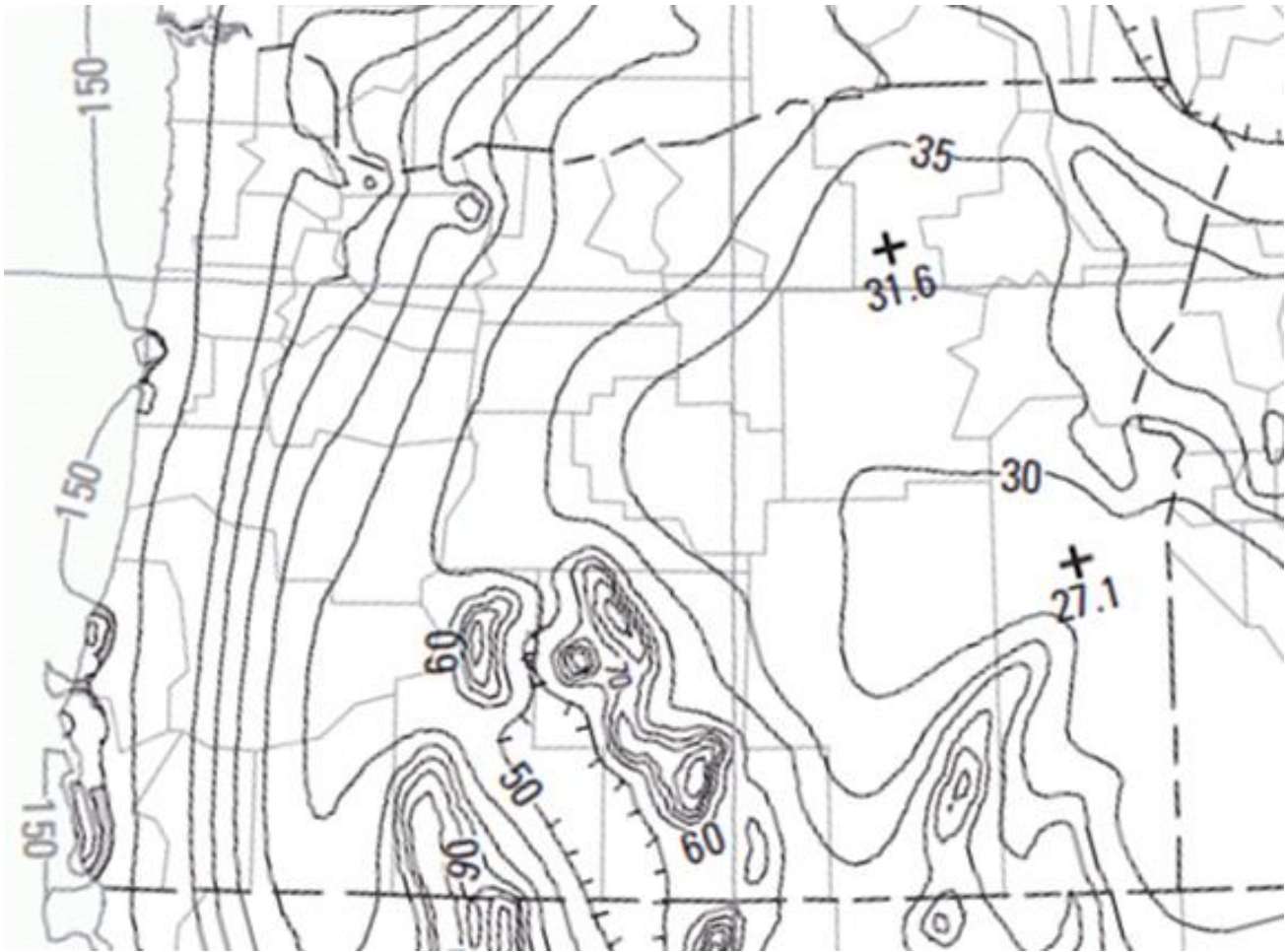
235° 00' W

235° 30' W

236° 00' W

236° 30' W

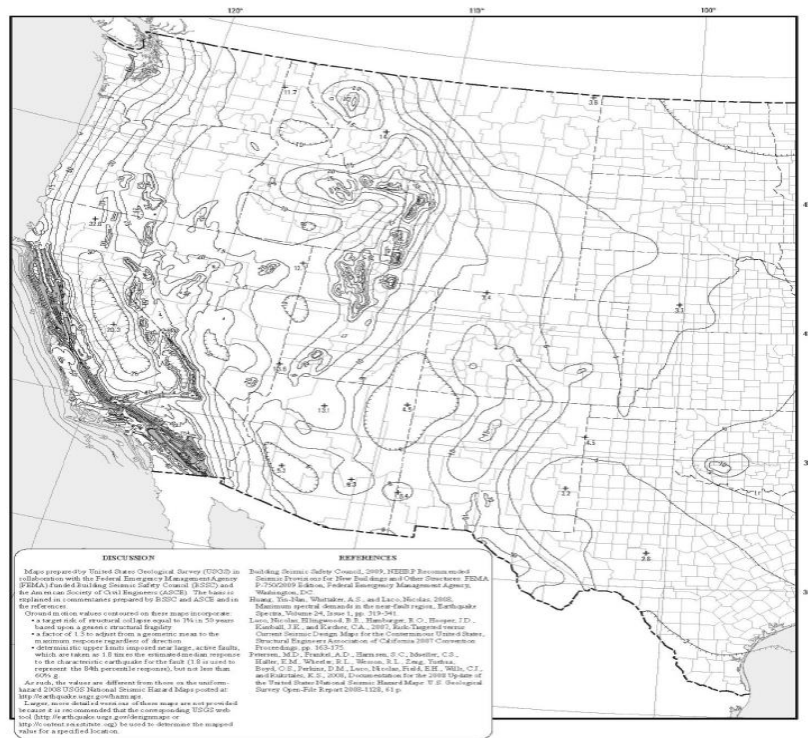
58



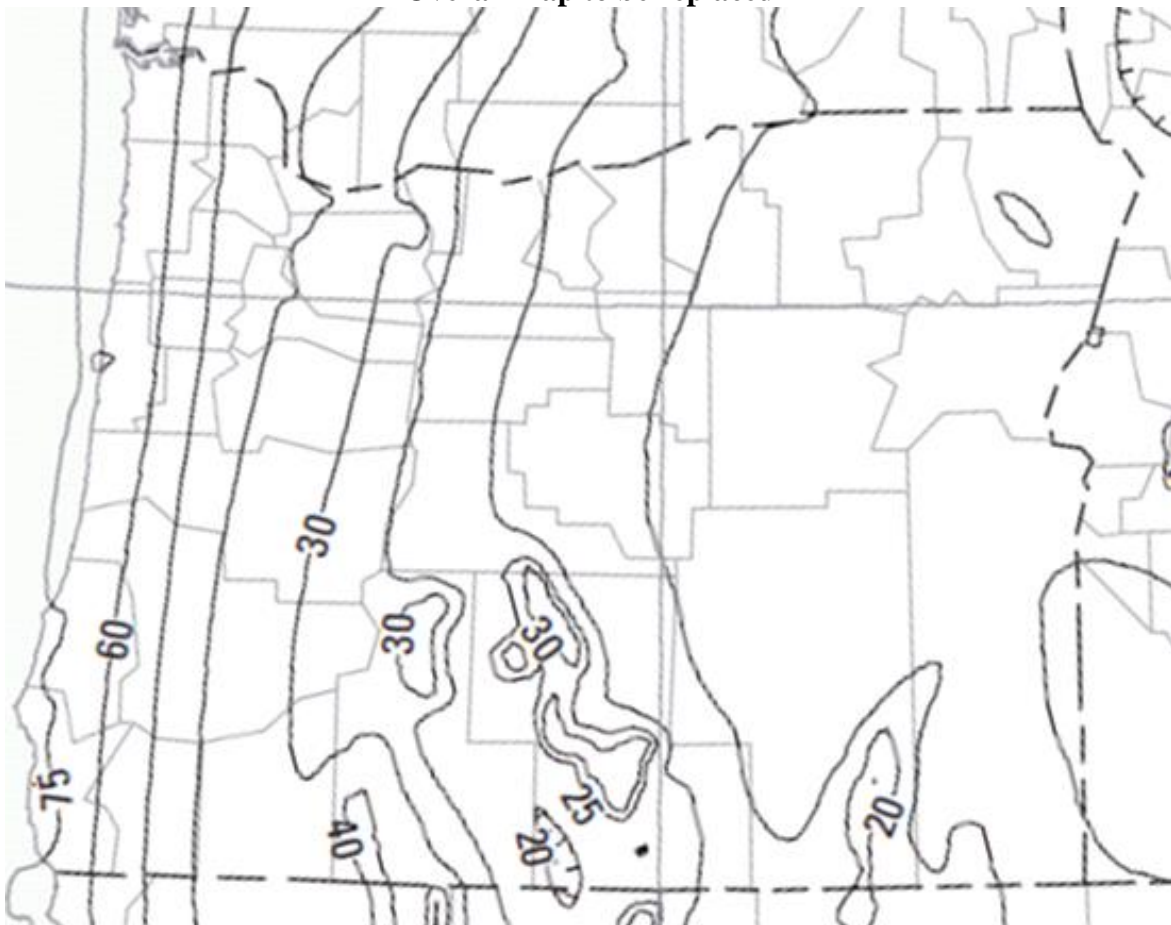
**Enlarged map to replace overall map**

**FIGURE 1613.3.1(1)**

**RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE<sub>R</sub>) GROUND MOTION  
RESPONSE ACCELERATIONS  
FOR THE CONTERMINOUS UNITED STATES OF 0.2-SECOND SPECTRAL RESPONSE  
ACCELERATION  
(5% OF CRITICAL DAMPING), SITE CLASS B**



~~Overall map to be replaced~~



### Enlarged map to replace overall map

**FIGURE 1613.3.1(2)**  
**RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE<sub>R</sub>) GROUND MOTION**  
**RESPONSE ACCELERATIONS**  
**FOR THE CONTERMINOUS UNITED STATES OF 1-SECOND SPECTRAL RESPONSE**  
**ACCELERATION**  
**(5% OF CRITICAL DAMPING), SITE CLASS B**

**1613.3.1 Mapped acceleration parameters.** The parameters  $S_s$  and  $S_i$  shall be determined from the 0.2 and 1-second spectral response accelerations shown on Figures 1613.3.1(1) ~~through and~~ 1613.3.1(62) by using the USGS U.S. Seismic Design Maps Web Application (<http://geohazards.usgs.gov/designmaps/us/application.php>) and selecting 2012 IBC as the Design Code Reference Document. Where  $S_i$  is less than or equal to 0.04 and  $S_s$  is less than 0.15, the structure is permitted to be assigned to Seismic Design Category A. ~~The parameters  $S_s$  and  $S_i$  shall be, respectively, 1.5 and 0.6 for Guam and 1.0 and 0.4 for American Samoa.~~

**1613.3.5.1 Alternative seismic design category determination.** Where  $S_1$  is less than 0.75, the seismic design category is permitted to be determined from Table 1613.3.5(1) alone when all of the following apply:

1. In each of the two orthogonal directions, the approximate fundamental period of the structure,  $T_a$ , in each of the two orthogonal directions determined in accordance with Section 12.8.2.1 of ASCE 7, is less than  $0.8 T_s$  determined in accordance with Section 11.4.5 of ASCE 7.
2. In each of the two orthogonal directions, the fundamental period of the structure used to calculate the story drift is less than  $T_s$ .
3. Equation 12.8-2 of ASCE 7 is used to determine the seismic response coefficient,  $C_s$ .
4. The diaphragms are rigid or are permitted to be idealized as rigid in accordance with as defined in Section 12.3.1 of ASCE 7 or, for diaphragms ~~that are flexible,~~ permitted to be idealized as flexible in accordance with Section 12.3.1 of ASCE 7, the distances between vertical elements of the seismic force-resisting system do not exceed 40 feet (12 192 mm).

**1613. 5 Modifications to ASCE 7-10.**

**1613.5.1 ASCE 7-10, Section 12.2.3.2, Item e. Modify ASCE 7-10, Section 12.2.3.2, Item e to read as follows:**

**e. The upper portion is analyzed with the equivalent lateral force or modal response spectrum procedure, and the lower portion is analyzed with the equivalent lateral force procedure. The lower rigid portion, analyzed independently, need not comply with the structural characteristic limitations of ASCE 7, Table 12.6-1.**

**1613.5.2 ASCE 7-10, Table 12.2-1. Modify Note j as follows:**

**Steel ordinary concentrically braced frames are permitted in penthouse structures not exceeding 20 feet in height (6.07 m), and in single story buildings up to a height of 60 feet (18.3 m), provided the total seismic mass tributary to the roof, including the mass of the walls, does not exceed 20 psf (0.96 kN/m<sup>2</sup>). The mass of the wall included in the 20 psf (0.96 kN/m<sup>2</sup>) noted above shall be the seismic mass of the wall tributary to the roof divided by the roof area. Additionally, the weight of the exterior wall more than 35 feet (10.6 m) above the base and tributary to the braced frame shall not exceed 20 psf (0.96 kN/m<sup>2</sup>).**

**1613.5.3 ASCE 7-10, Section 12.2.5.6. Modify ASCE 7, Section 12.2.5.6 to read as follows:**

**12.2.5.6 Single story steel ordinary and intermediate moment frames in structures assigned to Seismic Design Category D or E. Single story steel ordinary moment frames and intermediate moment frame in structures assigned to Seismic Design Category D or E are permitted up to a height of 65 feet (20 m) provided the total seismic mass tributary to the roof including the mass of walls does not exceed 20 psf (0.96 kN/m<sup>2</sup>). The mass of the wall included in the 20 psf (0.96 kN/m<sup>2</sup>) noted above shall be the seismic mass of the wall tributary to the roof divided by the roof area. Additionally, the weight of the exterior wall more than 35 feet (10.6 m) above the base and tributary to the moment frame shall not exceed 20 psf (0.96 kN/m<sup>2</sup>).**

**1613.5. 4 ASCE7-10 Section 12.2.5.7. Modify ASCE 7, Section 12.2.5.7 to read as follows:**

**12.2.5.7 Other steel ordinary and intermediate moment frames in structures assigned to Seismic Design Category D or E. Steel ordinary moment frames in structures assigned to Seismic Design Category D or E not meeting the limitations set forth in Section 12.2.5.6 are permitted in penthouse structures not exceeding 20 feet (6.07 m) in height and within light-frame construction up to 35 feet (10.6 m) provided neither the roof nor the floor dead load supported by and tributary to the moment frames exceeds 35 psf (1.68 kN/m<sup>2</sup>). Additionally, tributary to the moment frame shall not exceed 20 psf (0.96kN/m<sup>2</sup>). Steel intermediate moment frames in structures assigned to Seismic Design Category D or E not meeting the limitations set forth in Section 12.2.5.6 are permitted as follows:**

- 1. In Seismic Design Category D, intermediate moment frames are permitted to a height of 35 feet (10.6m).**
- 2. In Seismic Decsign Category E, intermediate moment frames are permitted to a height of 35 feet (10.6 m), provided neither the roof nor the floor dead load supported by and tributary to the moment frames exceeds 35 psf (1.68 kN/m<sup>2</sup>). Additionally, the dead load of the exterior walls tributary to the moment frame shall not exceed 20 psf (0.96 kN/m<sup>2</sup>).**

**1613.5.5 Clarification of component anchorage requirements. Modify Exception 6 of ASCE 7-10, Section 13.1.4 to read as follows:**

**6. Mechanical and electrical components in Seismic Design Categories D, E and F where all the following conditions apply:**

- a. The component importance factor,  $I_p$ , is equal to 1.0 and both of**
- b. Flexible connections between the components and associated ductwork, piping and conduit are provided; and either**
  - i. Components are mounted at 4 feet (1.22 m) or less above a floor or roof level and weigh 400 pounds (1780 N) or less.**
  - ii. The components weigh 75 pounds (333 N) or less or, for distribution systems, weighing 5lb/ft (73 N/ft) or less.**

**1613.5.6 Delete ASCE 7-10, Table 12.2-1 Item C.12 and delete footnotes o and p:**

|  |      |     |    |     |    |    |    |    |    |
|--|------|-----|----|-----|----|----|----|----|----|
| 12. Cold Formed steel special belted moment frame <sup>p</sup> | 14.1 | 3 ½ | 3° | 3 ½ | 35 | 35 | 35 | 35 | 35 |
|--|------|-----|----|-----|----|----|----|----|----|

~~o. Alternatively, the seismic load effect with overstrength,  $E_{mh}$ , is permitted to be based on the expected strength determined in accordance with AISI S110~~

~~p. Cold formed steel special bolted moment frames shall be limited to one story in height in accordance with AISI S110.~~

**1613.5.7 ASCE 7-10, Section 12.2.3.2, Item e. Modify ASCE 7-10, Section 12.2.3.2, Item e to read as follows:**

- e. The upper portion is analyzed with the equivalent lateral force or modal response spectrum procedure, and the lower portion is analyzed with the equivalent lateral force procedure. The lower rigid portion, analyzed independently, need not comply with the structural characteristic limitations of ASCE 7, Table 12.6-1.**

**1613.5.8 ASCE 7-10, Modify Table 12.2-1 Item G.2 and add footnote q as follows:**

|   |                    |                   |                   |                   |                  |                  |                               |                               |                               |
|---|--------------------|-------------------|-------------------|-------------------|------------------|------------------|-------------------------------|-------------------------------|-------------------------------|
| <b><u>2. Steel Ordinary Cantilever Column Systems</u></b> | <b><u>14.1</u></b> | <b><u>1 ¼</u></b> | <b><u>1 ¼</u></b> | <b><u>1 ¼</u></b> | <b><u>35</u></b> | <b><u>35</u></b> | <b><u>NP<sup>iq</sup></u></b> | <b><u>NP<sup>iq</sup></u></b> | <b><u>NP<sup>iq</sup></u></b> |
|---|--------------------|-------------------|-------------------|-------------------|------------------|------------------|-------------------------------|-------------------------------|-------------------------------|

**q. Single-story steel ordinary cantilever column systems in structures assigned to Seismic Design Category D, E or F are permitted in penthouse structures not exceeding 20 feet (6.07 m) in height and in single story buildings up to a structural height  $h_n$ , of 35ft (10.67m) provided the total effective seismic weight tributary to the roof including the weight of walls does not exceed 20psf (0.96 kN/m<sup>2</sup>). The weight**

of the wall included in the 20psf (0.96 kN/m<sup>2</sup>) noted above shall be the seismic weight of the wall tributary to the roof divided by the roof area.

#### 1613.5.9 Modify ASCE 7-10, Section 12.2.5.6 Steel Ordinary Moment Frames

##### Sub-section 12.2.5.6.1

##### 12.2.5.6.1 Seismic Design Category D or E

a. Single-story steel ordinary moment frames in structures assigned to Seismic Design Category D or E are permitted in penthouses not exceeding 20ft (6.07m) in height and in buildings up to a structural height  $h_n$  of 65ft (20m) provided the total effective seismic weight tributary to the roof including the weight of walls does not exceed 20 psf (0.96 kN/m<sup>2</sup>). The weight of the wall included in the 20 psf (0.96 kN/m<sup>2</sup>) noted above shall be the seismic weight of the wall tributary to the roof divided by the roof area. In addition the weight of the exterior wall more than 35ft (10.6m) above the base and tributary to the moment frame shall not exceed 20 psf (0.96 kN/m<sup>2</sup>). Exception : Single-story structures with steel ordinary moment frames whose purpose is to enclose equipment or machinery (including cranes) and whose occupants are engaged in maintenance or monitoring of that equipment, machinery, or their associated processes shall be permitted to be of unlimited height provided the total effective seismic weight tributary to the roof, including contribution from walls, equipment or machinery, does not exceed 20 psf (0.96 kN/m<sup>2</sup>) over the area of the roof. In addition, the dead load of the exterior wall system including exterior columns more than 35ft (10.6m) above the base shall not exceed 20 psf (0.96 kN/m<sup>2</sup>). For determining compliance with effective seismic weight limitations of the roof and exterior walls, equipment and machinery, including cranes, not self supporting for all loads, shall be treated as fully tributary to either the roof or adjacent exterior wall (but not both) when located in an exterior bay, or as fully tributary to the adjacent roof when located in an interior bay. The tributary area used for weight distribution of equipment and machinery shall not exceed 600 ft<sup>2</sup> (55.8m<sup>2</sup>).

#### 1613.5.10 Modify ASCE 7-10, Section 12.2.5.6 Steel Ordinary Moment Frames

##### Sub-section 12.2.5.6.2

12.2.5.6.2 Seismic Design Category F. Single-story steel ordinary moment frames in structures assigned to Seismic Design category F are permitted in penthouses not exceeding 20ft (6.07m) in height and in buildings up to a structural height  $h_n$  of 65ft (20m) provided the total effective seismic weight tributary to the roof including the weight of walls does not exceed 20psf (0.96kN/m<sup>2</sup>). The weight of the wall included in the 20psf (0.96 kN/m<sup>2</sup>) noted above shall be the seismic weight of the wall tributary to the roof divided by the roof area. In addition the weight of the exterior wall more than 35ft (10.6m) above the base and tributary to the moment frame shall not exceed 20 psf (0.96 kN/m<sup>2</sup>).

#### 1613.5.11 Modifications to ASCE 7-10, ASCE 7-10 Table 12.2-1 footnote (j). Modify ASCE 7-10, Table 12.2-1 footnote (j) to read as follows:

j. Steel ordinary concentrically braced frames are permitted in penthouses not exceeding 20ft (6.07m) in height and in single-story buildings up to a structural height  $h_n$  of 60ft (18.3m) provided the total effective seismic weight tributary to the roof including the weight of walls does not exceed 20psf (0.96kN/m<sup>2</sup>). The weight of the wall included in the 20psf (0.96 kN/m<sup>2</sup>) noted above shall be the seismic weight of the wall tributary to the roof divided by the roof area. In addition the weight of the exterior wall more than 35ft (10.6m) above the base and tributary to the braced frame shall not exceed 20 psf (0.96 kN/m<sup>2</sup>).

#### 1613.5.12 Modifications to ASCE 7-10, 12.2.5.7 Steel Intermediate Moment Frames

##### Section 12.2.5.7.1, 12.2.5.7.2 and 12.2.5.7.3:

##### Modify ASCE 7, Section 12.2.5.7.1

##### 12.2.5.7.1 Seismic Design Category D



a. Single-story steel intermediate moment frames in structures assigned to Seismic Design Category D or E are permitted in penthouses not exceeding 20ft (6.07m) in height and in buildings up to a structural height  $h_n$ , of 65ft (20m) provided the total effective seismic weight tributary to the roof including the weight of walls does not exceed 20psf (0.96 kN/m<sup>2</sup>). The weight of the wall included in the 20psf (0.96 kN/m<sup>2</sup>) noted above shall be the seismic weight of the wall tributary to the roof divided by the roof area. In addition the weight of the exterior wall more than 35ft (10.6m) above the base and tributary to the moment frame shall not exceed 20psf (0.96 kN/m<sup>2</sup>).

Exception : Single-story structures with steel intermediate moment frames whose purpose is to enclose equipment or machinery (including cranes) and whose occupants are engaged in maintenance or monitoring of that equipment, machinery, or their associated processes shall be permitted to be of unlimited height provided the total effective seismic weight tributary to the roof, including contribution from walls, equipment or machinery, does not exceed 20 psf (0.96 kN/m<sup>2</sup>) over the area of the roof. In addition, the dead load of the exterior wall system including exterior columns more than 35ft (10.6 m) above the base shall not exceed 20 psf (0.96 kN/m<sup>2</sup>). For determining compliance with effective seismic weight limitations of the roof and exterior walls, equipment and machinery, including cranes, not self supporting for all loads, shall be treated as fully tributary to either the roof or adjacent exterior wall (but not both) when located in an exterior bay, or as fully tributary to the adjacent roof when located in an interior bay. The tributary area used for weight distribution of equipment and machinery shall not exceed 600 ft<sup>2</sup>(55.8m<sup>2</sup>).

Modify ASCE 7, Section 12.2.5.7.2

12.2.5.7.2 Seismic Design Category E.

Single-story steel intermediate moment frames in structures assigned to Seismic Design Category E are permitted in penthouses not exceeding 20ft (6.07m) in height and in buildings up to a structural height  $h_n$ , of 65ft (20m) provided the total effective seismic weight tributary to the roof including the weight of walls does not exceed 20 psf (0.96kN/m<sup>2</sup>). The weight of the wall included in the 20 psf (0.96 kN/m<sup>2</sup>) noted above shall be the seismic weight of the wall tributary to the roof divided by the roof area. In addition the weight of the exterior wall more than 35ft (10.6m) above the base and tributary to the moment frame shall not exceed 20 psf(0.96 kN/m<sup>2</sup>)

Exception: Single-story structures with steel intermediate moment frames whose purpose is to enclose equipment or machinery (including cranes) and whose occupants are engaged in maintenance or monitoring of that equipment, machinery, or their associated processes shall be permitted to be of unlimited height provided the total effective seismic weight tributary to the roof, including contribution from walls, equipment or machinery, does not exceed 20 psf (0.96 kN/m<sup>2</sup>) over the area of the roof. In addition, the dead load of the exterior wall system including exterior columns more than 35ft (10.6 m) above the base shall not exceed 20 psf (0.96 kN/m<sup>2</sup>). For determining compliance with effective seismic weight limitations of the roof and exterior walls, equipment and machinery, including cranes, not self supporting for all loads, shall be treated as fully tributary to either the roof or adjacent exterior wall (but not both) when located in an exterior bay, or as fully tributary to the adjacent roof when located in an interior bay. The tributary area used for weight distribution of equipment and machinery shall not exceed 600 ft<sup>2</sup>(55.8m<sup>2</sup>).

Modify ASCE 7, Section 12.2.5.7.3

12.2.5.7.3 Seismic Design Category F.

Single-story steel intermediate moment frames in structures assigned to Seismic Design Category F are permitted in penthouses not exceeding 20ft (6.07m) in height and in buildings up to a structural height  $h_n$ , of 65ft ( 20m) provided the total effective seismic weight tributary to the roof including the weight of walls does not exceed 20psf (0.96kN/m<sup>2</sup>). The weight of the wall included in the 20 psf (0.96 kN/m<sup>2</sup>) noted above shall be the seismic weight of the wall tributary to the roof divided by the roof area. In addition the weight of the exterior wall more than 35ft (10.6m) above the base and tributary to the moment frame shall not exceed 20 psf (0.96 kN/m<sup>2</sup>)

1613.5.13 ASCE 7-10, Modify ASCE 7-10, Section 12.7.2 Item 1



1. In areas used for storage, or in library stack rooms, a minimum of 25 percent of the floor live load shall be included.

Exceptions:

- a. Where the inclusion of storage loads or library stack loads adds no more than 5% to the effective seismic weight at that level, it need not be included in the effective seismic weight.
- b. Floor live load in public garages and open parking structures need not be included.

1613.5.14 ASCE 7-10, Modify ASCE 7-10, Section 12.14.8.1 Item 1

1. In areas used for storage, or in library stack rooms, a minimum of 25 percent of the floor live load shall be included.

Exceptions:

- a. Where the inclusion of storage loads or library stack loads adds no more than 5% to the effective seismic weight at that level, it need not be included in the effective seismic weight.
- b. Floor live load in public garages and open parking structures need not be included.

1613.5.15 ASCE 7-10, Section 13.4

Modify ASCE 7-10, Section 13.4 NONSTRUCTURAL COMPONENT ANCHORAGE

Nonstructural components and their supports shall be attached (or anchored) to the structure in accordance with the requirements of this section and the attachment shall satisfy the requirements for the parent material as set forth elsewhere in this standard.

Component attachments shall be bolted, welded, or otherwise positively fastened without consideration of frictional resistance produced by the effects of gravity. A continuous load path of sufficient strength and stiffness between the component and the supporting structure shall be provided. Local elements of the structure including connections shall be designed and constructed for the component forces where they control the design of the elements or their connections. The component forces shall be those determined in section 13.3.1, except that modifications to  $F_p$  and  $R_p$  due to anchorage conditions need not be considered. The design documents shall include sufficient information relating to the attachments to verify compliance with the requirements of this section.

Exception : Solar PV panels or modules installed on a roof as a ballasted system need not be rigidly attached to the roof or supporting structure . Ballasted systems shall be designed to resist sliding and uplift resulting from lateral and vertical forces using a coefficient of friction determined by acceptable engineering practices. In sites where the seismic design category is C or above, the system shall be designed to accommodate seismic displacement determined by approved analysis or shake-table testing, using input motions consistent with ASCE 7 lateral and vertical seismic forces for non-structural components on roofs.

1613.5.16 ASCE 7-10, Section 15.4.3, Modify ASCE 7-10, Section 15.4.3

The seismic effective weight W for non-building structures shall include the dead load and other loads as defined for structures in Section 12.7.2. For purposes of calculating design seismic forces in non-building structures, W also shall include all normal operating contents for items such as tanks, vessels, bins, hoppers, and the contents of piping. W shall include 20 percent of snow or ice loads where the flat roof snow load,  $P_f$ , or weight of ice,  $D_i$ , exceeds 30 psf (1.44 kN/m<sup>2</sup>), regardless of actual roof or top of structure slope.

1613.5.17 ASCE 7, Section 15.6.1, Modify ASCE 7, Section 15.6.1 Paragraph 2

The risk category shall be determined by the proximity of the earth-retaining structure to other buildings and structures. If failure of the earth-retaining structure would affect the adjacent building or structure, the risk category shall not be less than that of the adjacent building or structure. Earth-retaining walls are permitted to be designed for seismic loads as either yielding or non-yielding walls. Cantilevered reinforced concrete or masonry retaining walls shall be assumed to be yielding walls and shall be designed as simple flexural wall elements.

**1613.7.8 Amendment to ASCE 7-05, Section 13.5.6.2.2, Item c, “suspended ceilings” in Seismic Design Categories D through F. Amend as follows:**

**c. For ceiling areas exceeding 1,000 ft<sup>2</sup> (13.4 m<sup>2</sup>), horizontal restraint of the ceiling to the structural system shall be provided.**

**1613.8 Earthquake recording instrumentation.**

**In Seismic Design Category D, every new building over six stories above grade in height with an aggregate floor area of 60,000 square feet (5574 m<sup>2</sup>) or more, and every new building over 10 stories in height regardless of the floor area, shall be provided with an approved system with not less than three approved recording accelerographs. The accelerographs shall be interconnected for common start and common timing.**

**Exception: In lieu of installing accelerographs, the applicant may deposit an amount equivalent to the cost of the accelerograph to the Earthquake Recording Instrument Fund in the Orego Department of Geology and Mineral Industries (DOGAMI). Proof of the alternate payment shall be provided by the DOGAMI to the building official with the jurisdiction.**

**1613.8.1 Location. The instruments shall be located in the lowest floor level, midportion, and near the top of the building. (Upper-level instruments shall be positioned to record earthquake motions at mutually orthogonal directions; for example, N-S and E-W directions.) Each instrument shall be located so that access is maintained at all times and is unobstructed by room contents. A sign stating “MAINTAIN CLEAR ACCESS TO THIS INSTRUMENT” shall be posted in a conspicuous location. Agents of DOGAMI are considered deputies of the building official with jurisdiction and shall have access to accelerographs. If access to accelerographs is denied, DOGAMI shall have recourse to remedies provided by law.**

**1613.8.2 Maintenance. Maintenance and service of the instruments shall be provided by the owner of the building, subject to the approval of the building official and DOGAMI. Data produced by the instruments shall be made available to the building official on request. 1613.8.3 Records. Noninterpretive seismic data recorded by the accelerographs shall be filed with DOGAMI. Copies of individual records shall be made available by DOGAMI to the public on request and the payment of an appropriate fee. Note: When strong motion accelerographs are required and installed in a building, the building official shall notify DOGAMI and indicate the address and location of the accelerographs within the building. DOGAMI can be reached at: 800 N.E. Oregon St., #28, Portland, OR 97232.**

## CHAPTER 17 STRUCTURAL TESTS AND SPECIAL INSPECTIONS

### 1704.2.5.2 Fabricator approval.

*Special inspections* required by Section 1705 are not required where the work is done on the premises of a fabricator registered and *approved* to perform such work without *special inspection*. Approval shall be based upon review of the fabricator's written procedural and quality control manuals and periodic auditing of fabrication practices by ~~an approved special inspection agency~~ **by a nationally recognized accrediting authority**. At completion of fabrication, the *approved* fabricator shall submit a *certificate of compliance* to the *building official* stating that the work was performed in accordance with the *approved construction documents*.

### 1705.2 Steel construction.

The *special inspections* for steel elements of buildings and structures shall be as required in this section.

**Exception:** *Special inspection* of the steel fabrication process shall not be required where the fabricator does not perform any welding, thermal cutting or heating operation of any kind as part of the fabrication process. In such cases, the fabricator shall be required to submit a detailed procedure for material control that demonstrates the fabricator's ability to maintain suitable records and procedures such that, at any time during the fabrication process, the material specification, and grade for the main stress-carrying elements are capable of being determined. Mill test reports shall be identifiable to the main stress-carrying elements when required by the approved construction documents.

#### 1705.2.1 Structural steel.

Special inspection for structural steel shall be in accordance with the quality assurance inspection requirements of AISC 360.

#### 1705.2.2 Steel construction other than structural steel.

Special inspection for steel construction other than structural steel shall be in accordance with Table 1705.2.2 and this section.

**TABLE 1705.2.2  
REQUIRED VERIFICATION AND INSPECTION OF STEEL CONSTRUCTION OTHER THAN  
STRUCTURAL STEEL**

| VERIFICATION AND INSPECTION  | CONTINUOUS |   | PERIODIC | REFERENCED STANDARD <sup>a</sup>      |
|--|------------|---|----------|---------------------------------------|
| 1. Material verification of cold formed steel deck:  |            |   |          |                                       |
| a. Identification markings to conform to ASTM standards specified in the approved construction documents.  | —          |   | X        | Applicable ASTM material standards    |
| b. Manufacturer's certified test reports.  | —          |   | X        | -                                     |
| 2. Inspection of welding:  |            |   |          |                                       |
| a. Cold formed steel deck:   |            |   |          |                                       |
| 1) Floor and roof deck welds.  | —          |   | X        | AWS D1.3                              |
| b. Reinforcing steel:  | -          |   | -        | -                                     |
| 1) Verification of weldability of reinforcing steel other than ASTM A 706.   | —          |   | X        | AWS D1.4<br>ACI 318:<br>Section 3.5.2 |
| 2) Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames, and boundary elements of special structural walls of concrete and shear reinforcement. |            | X | —        |                                       |
| 3) Shear reinforcement.  |            | X | —        |                                       |
| 4) Other reinforcing steel.  |            | — | X        |                                       |

For SI: 1 inch = 25.4 mm.

a. Where applicable, see also Section 1705.11, Special inspections for seismic resistance.

#### **1705.2.2.1 Welding.**

~~Welding inspection and welding inspector qualification shall be in accordance with this section.~~

##### **1705.2.2.1.1 Cold-formed steel.**

~~Welding inspection and welding inspector qualification for cold-formed steel floor and roof decks shall be in accordance with AWS D1.3.~~

##### **1705.2.2.1.2 Reinforcing steel.**

~~Welding inspection and welding inspector qualification for reinforcing steel shall be in accordance with AWS D1.4 and ACI 318.~~

#### **1705.2.2.2 Cold-formed steel trusses spanning 60 feet or greater.**

Where a cold-formed steel truss clear span is 60 feet (18 288 mm) or greater, the special inspector shall verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the *approved* truss submittal package.

**1705.2 Steel construction. The *special inspections* for steel elements of buildings and structures shall be as required by Section 1705.2 and Table 1705.2.**

#### **Exceptions:**

- 1. Special inspection of the steel fabrication process shall not be required where the fabricator does not perform any welding, thermal cutting or heating operation of any kind as part of the fabrication process. In such cases, the fabricator shall be required to submit a detailed procedure for material control that demonstrates the fabricator's ability to maintain suitable records and procedures such that, at any time during the fabrication process, the material specification, grade and mill test reports for the main stress-carrying elements are capable of being determined.**
- 2. The special inspector need not be continuously present during welding of the following items, provided the materials, welding procedures and qualifications of welders are verified prior to the start of the work; periodic inspections are made of the work in progress and a visual inspection of all welds is made prior to completion or prior to shipment of shop welding.**
  - 2.1. Single-pass fillet welds not exceeding 5/16 inch (7.9 mm) in size.**
  - 2.2. Floor and roof deck welding.**
  - 2.3. Welded studs when not installed with an automatically timed stud welding machine in accordance with Section 7 of AWS D1.1.**
  - 2.4. Welded sheet steel for cold-formed steel members.**
  - 2.5. Welding of stairs and railing systems.**
- 3. For welded studs installed with an automatically timed stud welding machine and in accordance with Section 7 of AWS D1.1; the special inspector need not be continuously present during installation of welded studs subject to the following provisions:**
  - 3.1. The special inspector shall perform a visual inspection of all welded studs in accordance with Sections 7 and 7.8.1 of AWS D1.1. Visual inspection of welded studs installed with an automatically timed stud welding machine may take place either in the fabrication shop prior to completion or prior to shipment, or on-site prior to coverage.**
  - 3.2. The fabricator shall submit a certificate of compliance to the building official stating that the work was performed in accordance with the approved construction documents.**

**1705.2.1 Structural steel. Special inspection for structural steel shall be in accordance with the quality assurance inspection requirements of AISC 360.**

**Exception: The following provisions in AISC 360, Chapter N, are not adopted:**

**N4, Item 2. (Quality Assurance Inspector Qualifications)**

**N5, Item 2. (Quality Assurance)**

**N5, Item 3. (Coordinated Inspection)**

**N5, Item 4. (Inspection of Welding)**

**N7 (Approved Fabricators and Erectors)**

**N8 (Nonconforming Material and Workmanship)**

**1705.2.1.1 High strength bolting.**

**In addition to the quality assurance inspection requirements contained in AISC 360, Section N5, Item 6 (Inspection of High Strength Bolting), the requirements of Table 1705.2 of the Oregon Structural Specialty Code shall apply.**

**1705.2.1.2 Composite construction.**

**In addition to the quality assurance requirements contained in AISC 360, Section N6 (Minimum Requirements for Inspection of Composite Construction), the requirements of Table 1705.2 of the Oregon Structural Specialty Code shall apply.**

**1705.2.2 Steel construction other than structural steel.**

**Special inspection for steel construction other than structural steel shall be in accordance with Table 1705.2 and this section.**

**1705.2.2.1 Welding. Welding inspection and welding inspector qualification shall be in accordance with this section.**

**1705.2.2.1.1 Cold-formed steel. Welding inspection and welding inspector qualification for cold-formed steel floor and roof decks shall be in accordance with AWS D1.3.**

**1705.2.2.1.2 Reinforcing steel. Welding inspection and welding inspector qualification for reinforcing steel shall be in accordance with AWS D1.4 and ACI 318.**

**1705.2.2.2 Cold-formed steel trusses spanning 60 feet or greater. Where a cold-formed steel truss clear span is 60 feet (18 288 mm) or greater, the special inspector shall verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the *approved* truss submittal package.**

**TABLE 1705.2  
REQUIRED VERIFICATION AND INSPECTION OF STEEL CONSTRUCTION**

| <u>VERIFICATION AND</u>   | <u>CONTINUOUS</u> | <u>PERIODIC</u> | <u>REFERENCED</u>  |
|---|-------------------|-----------------|--|
|   |                   |                 | <u>STANDARD</u>  |
| <u>1. Material verification of high-strength bolts, nuts and washers:</u>   |                   |                 |  |
| <u>a. Identification markings to conform to ASTM standards and specified in the approved construction documents.</u>                                    | =                 | <u>X</u>        | <u>AISC 360, Section A3.3 and Applicable ASTM material standards</u> |
| <u>b. Manufacturer’s certificate of compliance required.</u>  | =                 | <u>X</u>        | =  |
| <u>2. Inspection of high-strength bolting:</u>  |                   |                 |  |
| <u>a. Snug-tight joints.</u>  | =                 | <u>X</u>        | <u>AISC 360, Section M2.5</u>  |
| <u>b. Pretensioned and slip-critical joints using turn-of-nut with matchmarking, twist-off bolt or direct tension indicator methods of installation</u> | =                 | <u>X</u>        |  |
| <u>c. Pretensioned and slip-critical joints using turn-of-nut without matchmarking or calibrated wrench methods of installation.</u>                    | <u>X</u>          | =               |  |
| <u>3. Material verification of structural steel</u>   |                   |                 |  |
| <u>a. For structural steel, identification markings to conform to AISC 360.</u>   | =                 | <u>X</u>        | <u>AISC 360, Section M5.5</u>  |
| <u>b. For other steel, identification markings to conform to ASTM standards specified in the approved construction documents.</u>                       | =                 | <u>X</u>        | <u>Applicable ASTM material standards</u>                            |

|   |          |          |   |
|---|----------|----------|---|
| <u>c. Manufacturer's certified test reports.</u>  | <u>=</u> | <u>X</u> |   |
| <b>4. Material verification of cold-formed steel deck:</b>  |          |          |   |
| <u>a. Manufacturer's certified test reports.</u>  | <u>=</u> | <u>X</u> | <u>=</u>  |
| <b>5. Material verification of weld filler materials:</b>   |          |          |   |
| <u>a. Identification markings to conform to AWS specification in the approved construction documents.</u>   | <u>=</u> | <u>X</u> | <u>AISC 360, Section A3.5 and applicable AWS A5 documents</u> |
| <u>b. Manufacturer's certificate of compliance required.</u>  | <u>=</u> | <u>X</u> | <u>=</u>  |
| <b>6. Inspection of welding:</b>  |          |          |   |
| <b>a. Structural steel and cold-formed steel deck:</b>  |          |          |   |
| <u>1) Complete and partial joint penetration groove welds.</u>  | <u>X</u> | <u>=</u> | <u>AWS D1.1</u>   |
| <u>2) Multipass fillet welds.</u>   | <u>X</u> | <u>=</u> |   |
| <u>3) Single-pass fillet welds&gt;5/16"</u>   | <u>X</u> | <u>=</u> |   |
| <u>4) Plug and slot welds.</u>  | <u>X</u> | <u>=</u> |   |
| <u>5) Single-pass fillet welds ≤ 5/16"</u>  | <u>=</u> | <u>X</u> |   |
| <u>6) Floor and roof deck welds.</u>  | <u>=</u> | <u>X</u> | <u>AWS D1.3</u>   |
| <b>b. Reinforcing steel:</b>  |          |          |   |
| <u>1) Verification of weldability of reinforcing steel other than ASTM A 7 06.</u>  | <u>=</u> | <u>X</u> | <u>AWS D1.4 ACI318: Section3.5.2</u>                          |
| <u>2) Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames, and boundary elements of special structural walls of concrete and shear reinforcement.</u> | <u>X</u> | <u>=</u> |   |
| <u>3) Shear reinforcement.</u>  | <u>X</u> | <u>=</u> |   |
| <u>4) Other reinforcing steel.</u>  | <u>=</u> | <u>X</u> |   |
| <b>7. Inspection of steel frame joint details for compliance:</b>   |          |          |   |
| <u>a. Details such as bracing and stiffening.</u>   | <u>=</u> | <u>X</u> | <u>=</u>  |
| <u>b. Member locations.</u>   | <u>=</u> | <u>X</u> |   |
| <u>c. Application of joint details at each connection.</u>  | <u>=</u> | <u>X</u> |   |
|   |          |          |   |

**For SI: 1 inch = 25.4 mm.**

**a. Where applicable, see also Section 1705.11, Special inspections for seismic resistance.**

### **1705.11 Special inspections for seismic resistance.**

*Special inspections for structures in Occupancy Risk Categories III and IV* itemized in Sections 1705.11.1 through 1705.11.8, unless exempted by the exceptions of Section 1704.2, are required for the following:

1. The seismic force-resisting systems in structures assigned to *Seismic Design Category C, D, E or F* in accordance with Sections 1705.11.1 through 1705.11.3, as applicable.
2. Designated seismic systems in structures assigned to *Seismic Design Category C, D, E or F* in accordance with Section 1705.11.4.
3. Architectural, mechanical and electrical components in accordance with Sections 1705.11.5 and

- 1705.11.6.
4. Storage racks in structures assigned to *Seismic Design Category* D, E or F in accordance with Section 1705.11.7.
  5. Seismic isolation systems in accordance with Section 1705.11.8.

**Exception:** Special inspections for structures in Occupancy Risk Categories III and IV itemized in Sections 1705.11.1 through 1705.11.8 are not required for structures designed and constructed in accordance with one of the following:

1. The structure consists of light-frame construction; the design spectral response acceleration at short periods,  $S_{DS}$ , as determined in Section 1613.3.1 does not exceed 0.5; and the building height of the structure does not exceed 35 feet (10 668 mm).
2. The seismic force-resisting system of the structure consists of reinforce masonry or reinforced concrete, the design spectral response acceleration at short periods,  $S_{DS}$ , as determined in Section 1613.3.4, does not exceed 0.5, and the building height of the structure does not exceed 25 feet (7620 mm).
3. ~~The structure is a detached one- or two- family dwelling not exceeding two stories above grade plane and does not have any of the following horizontal or vertical irregularities in accordance with Section 12.3 of ASCE 7:~~
  - 3.1. ~~Torsional or extreme torsional irregularity.~~
  - 3.2. ~~Nonparallel systems irregularity.~~
  - 3.3. ~~Stiffness soft story or stiffness extreme soft story irregularity.~~
  - 3.4. ~~Discontinuity in lateral strength weak story irregularity.~~

**1705.11.1 Structural steel.** *Special inspection* for structural steel shall be in accordance with the quality assurance plan requirements of AISC 341. In addition to the quality assurance requirements contained in AISC 341, Chapter J, Section J5 (Inspection Tasks), the requirements of Section 1705.2 and Table 1705.2 of the Building Code shall apply.

**Exceptions:**

1. *Special inspections* of structural steel in structures assigned to *Seismic Design Category* C that are not specifically detailed for seismic resistance, with a response modification coefficient,  $R$ , of 3 or less, excluding cantilever column systems.
2. For ordinary moment frames, ultrasonic and magnetic particle testing of complete joint penetration groove welds are only required for demand critical welds.

**1705.18 Radon Mitigation Inspections:** Where radon mitigation systems are required by Section 1811 of this code, special inspections shall be provided per the methods and frequency prescribed in this section.

**1705.18.1 Soil-Gas-Retarder Membrane.** After the subfloor preparation inspection and prior to the placement of concrete, a special inspector shall verify that conformance with all of the performance measures identified in Section 1811.2.2 for maintaining the efficacy of the soil-gas-retarder membrane have been achieved.

**1705.18.2 Sealing of Construction Joints, Penetrations, Cracks, and Other Connections.** After the placement of concrete, a special inspector shall verify that conformance with all of the performance measures identified in Section 1811.2.3.2 for maintaining the efficacy of the slab have been achieved.

## CHAPTER 18 SOILS AND FOUNDATIONS

### 1803.2 Investigations required.

Geotechnical investigations shall be conducted in accordance with Sections 1803.3 through 1803.5.

**Exception:** The *building official* shall be permitted to waive the requirement for a geotechnical investigation where satisfactory data from adjacent areas is available that demonstrates an investigation is not necessary for any of the conditions in Sections 1803.5.1 through 1803.5.6 and Sections 1803.5.10 and 1803.5.14-2.

**Building sites for new structures and facilities defined by ORS 455.447 as essential facilities, hazardous facilities, major structures [parking structures are classified as major structures when they are over three stories and 30,000 square feet (2787m<sup>2</sup>) of aggregate floor area] and special occupancy structures shall be evaluated on the site-specific basis for vulnerability to seismic geologic hazards. This evaluation shall be done by an especially qualified engineer or engineering geologist registered by the state to practice as such. Such an evaluation and report may require the services of persons especially qualified in fields of engineering seismology, earthquake geology or geotechnical engineering.**

1803.2.1 Tsunami inundation zone. Some new “essential facilities” and some new “special occupancy structures” as defined in ORS 455.447 shall not be constructed in tsunami inundation zones established by the Department of Geology and Mineral Industries (DOGAMI), unless specifically exempted by ORS 455.446 or given an exception by the DOGAMI governing board. See OAR Chapter 632, Division 5, adopted by DOGAMI for specific provisions. Some other new “essential facilities,” other “special occupancy structures” and all new “hazardous facilities” and “major structures” defined in ORS 455.447 that are constructed in a tsunami inundation zone are mandated to seek advice from DOGAMI, but are not necessarily prohibited from tsunami inundation zones. See OAR Chapter 632, Division 5, adopted by DOGAMI for specific provisions. See Table 1803.1 for a summary of statute requirements.

**The Oregon Department of Geology and Mineral Industries, 800NE Oregon Street, Suite 965, Portland, OR 97232. Telephone (971) 673-1555. Fax (971) 673-1562.**

**TABLE 1803.1  
REQUIREMENTS FOR CONSTRUCTION IN TSUNAMI ZONE**

| <b><u>BUILDING<br/>CATEGORY<br/>PER ORS 455.447</u></b>                                 | <b><u>NEW<br/>CONSTRUCTION<br/>PROHIBITED IN<br/>TSUNAMI<br/>INUNDATION<br/>ZONE UNLESS<br/>GRANTED AN<br/>EXCEPTION<br/>THROUGH<br/>PROCESS<br/>ADMINISTERED<br/>BY DOGAMI<sup>1</sup></u></b> | <b><u>NEW<br/>CONSTRUCTION<br/>PROHIBITED IN<br/>TSUNAMI<br/>INUNDATION<br/>ZONE, UNLESS<br/>STRATEGIC<br/>LOCATION<br/>CONFLICT EXISTS<br/>OR GRANTED AN<br/>EXCEPTION<br/>THROUGH<br/>PROCESS<br/>ADMINISTERED BY<br/>DOGAMI<sup>1</sup></u></b> | <b><u>PRIOR TO<br/>NEW<br/>CONSTRU<br/>CTION IN<br/>TSUNAMI<br/>INUNDATI<br/>ON ZONE,<br/>MUST<br/>REQUEST<br/>ADVICE<br/>FROM<br/>DOGAMI</u></b> | <b><u>MAY<br/>BE<br/>CONST<br/>RUCTE<br/>D IN<br/>TSUNA<br/>MI<br/>INUND<br/>ATION<br/>ZONE<br/>WITHO<br/>UT<br/>ADVICE<br/>FROM<br/>DOGAM<br/>I</u></b> |
|---|---|--|---|--|
| <b><u>ORS 455.447<br/>SECTION<br/>REFERENC<br/>E IS IN<br/>[BRACKETS<br/>1</u></b>      |   |  |   |  |
| <b><u>[1(a)] Essential<br/>Facilities</u></b>   |   |  |   |  |
| <b><u>[1(a)(A)] Hospitals<br/>and other medical<br/>facilities with<br/>surgery</u></b> | <b><u>X</u></b>   |  |   |  |
| <b><u>[1(a)(b)] Fire and<br/>police stations</u></b>                                    |   | <b><u>X</u></b>  |   |  |



|  |          |          |          |          |
|--|----------|----------|----------|----------|
| <u>[1(a)(C)] Tanks and similar structures</u>  |          |          |          | <u>X</u> |
| <u>[1(a)(D)] Emergency vehicle shelters</u>  |          |          |          | <u>X</u> |
| <u>[1(a)(E)] Structures and equipment in emergency preparedness centers</u>  |          |          | <u>X</u> |          |
| <u>[1(a)(F)] Standby power generating equipment</u>  |          |          |          | <u>X</u> |
| <u>[1(a)(G)] Structures and equipment in government communication centers and other emergency response facilities</u>                            | <u>X</u> |          |          |          |
| <u>[1(b)] Hazardous facilities</u>   |          |          | <u>X</u> |          |
| <u>[1(c)] Major Structures</u>   |          |          | <u>X</u> |          |
| <u>[1(e)] Special Occupancies</u>  |          |          |          |          |
| <u>[1(e)(A)] Covered Structures with assembly greater than 300 persons</u>   |          |          | <u>X</u> |          |
| <u>[1(e)(B)] (Part) Buildings with capacity greater than 50<sup>2</sup> for non public schools through secondary level or child care centers</u> | <u>X</u> |          |          |          |
| <u>[1(e)(B)] (Part) Buildings with capacity greater than 50<sup>2</sup> for public schools through secondary level</u>                           |          | <u>X</u> |          |          |
| <u>[1(e)(C)] Buildings for colleges or adult education with capacity greater than 500</u>  | <u>X</u> |          |          |          |
| <u>[1(e)(D)] Medical facilities with 50 or more resident, incapacitated patients</u>   |          |          | <u>X</u> |          |
| <u>[1(e)(E)] Jails and detention facilities</u>  | <u>X</u> |          |          |          |

|   |  |  |                 |  |
|---|--|--|-----------------|--|
| <u><b>1(e)(F)<br/>Structures and<br/>occupancies with a<br/>capacity greater<br/>than 5,000</b></u> |  |  | <u><b>X</b></u> |  |
|---|--|--|-----------------|--|

1. **These facilities and structures may be granted an exception by DOGAMI Governing Board to allow new construction in the tsunami inundation zone. If the exception is granted, then advice must be sought from DOGAMI. See OAR 632-05.**
2. **ORS 455.446 specifies an occupancy load of 50 for this category.**

**NOTE: Reference Table 1803.1 is not a part of this code but is provided here for the reader's convenience. This table summarizes the requirements of ORS 455.446 and 455.447.**

**1803.3.2 Seismic site hazard investigation. Sites for structures and facilities defined by ORS 455.447 as essential facilities, hazardous facilities, major structures and special occupancy structures shall be evaluated on a site-specific basis for vulnerability to seismic-induced geologic hazards as required in Section 1803.7. The degree of detail of investigation shall be compatible with the type of development and geologic complexity, and the structural system required by other parts of this code.**

**1803.3.2.1 Design earthquake. Building sites required to be investigated as provided in Section 1803.3.2 shall, at a minimum, address earthquakes from:**

1. **A shallow crustal earthquake on real or assumed faults near the site subject to evaluation. The minimum design earthquake shall in no case be considered less than a Moment Magnitude 6.0 or the design earthquake ground motion acceleration determined in accordance with Section 1613.**
2. **A deep earthquake with a Moment Magnitude greater than 7 on the seismogenic part of the subducting plate of the Cascadia Subduction Zone.**
3. **An earthquake on the seismogenic part of the interface between the Juan de Fuca Plate and the North American Plate on the Cascadia Subduction Zone with a minimum magnitude of 8.5**

#### **1803.5.12 Seismic Design Categories D through F.**

For structures assigned to *Seismic Design Category* D, E or F, the geotechnical investigation required by Section 1803.5.11 shall also include all of the following as applicable:

1. The determination of dynamic seismic lateral earth pressures on foundation walls and retaining walls supporting more than 6 feet (1.83 m) of backfill height due to design earthquake ground motions.  
**When the Mononobe-Okabe method is used to calculate the active dynamic seismic lateral earth pressure, a horizontal acceleration coefficient equal to or greater than one-half (0.5) the design peak horizontal ground acceleration shall be used.**
2. The potential for liquefaction and soil strength loss evaluated for site peak ground acceleration, earthquake magnitude, and source characteristics consistent with the maximum considered earthquake ground motions. Peak ground acceleration shall be determined based on:
  - 2.1. A site-specific study in accordance with Section 21.5 of ASCE 7; or
  - 2.2. In accordance with Section 11.8.3 of ASCE 7.
3. An assessment of potential consequences of liquefaction and soil strength loss, including, but not limited to:
  - 3.1. Estimation of total and differential settlement;
  - 3.2. Lateral soil movement;
  - 3.3. Lateral soil loads on foundations;
  - 3.4. Reduction in foundation soil-bearing capacity and lateral soil reaction;
  - 3.5. Soil down drag and reduction in axial and lateral soil reaction for pile foundations;

- 3.6. Increases in soil lateral pressures on retaining walls; and
  - 3.7. Flotation of buried structures.
4. Discussion of mitigation measures such as, but not limited to:
- 4.1. Selection of appropriate foundation type and depths;
  - 4.2. Selection of appropriate structural systems to accommodate anticipated displacements and forces;
  - 4.3. Ground stabilization; or
  - 4.4. Any combination of these measures and how they shall be considered in the design of the structure.

**1803.7 Seismic site hazard report. The seismic site hazard report shall include, but not be limited to, the following:**

- 1. A plot showing the location of test boring or sample excavations;**
- 2. Descriptions and classification of the materials encountered;**
- 3. Elevation of the water table, either measured or estimated;**
- 4. A geologic profile of the site extending to bedrock, either measured or estimated;**
- 5. An explanation of the regional geologic, tectonic and seismic setting;**
- 6. A literature review of the regional seismic or earthquake history (i.e. potential seismic source, maximum credible earthquakes, recurrence intervals, etc.);**
- 7. Selection criteria for seismic sources and recommendations for a design earthquake;**
- 8. Selection criteria and recommended ground response, including local amplification effects;**
- 9. An evaluation of the site-specific seismic hazards, including earthquake-induced landslide, liquefaction, settlement including subsidence, fault rupture, sciche, tsunami inundation, and other seismic hazard at the site including the effects of local geology and topography;**
- 10. Recommendations for foundation type and design criteria, including expected total and differential settlement, bearing capacity, provisions to mitigate the effects of expansive soils, and the effects of adjacent load; and**
- 11. Other criteria as required for structures not defined by ORS 455.447.**

**In addition, other reports and calculations may be required to be provided by seismologists, geophysicists or professional engineers to evaluate the seismic hazards in order to comply with Section 1803. Such additional investigation may include a study of aerial photographs, review of local groundwater data, exploratory borings, penetrometer results, geophysical surveys, trenching across faults or suspicious zones, and laboratory soil and rock testing.**

**1803.8 Seismic site hazard report review. Provision shall be made by the agency with jurisdiction for qualified review of the seismic site hazard report for conformance with Section 1803. Persons qualified to do such review shall have qualifications deemed equivalent to the person who prepared the report. This review may be by the jurisdiction's staff, a consultant firm or a committee established by the jurisdiction. With the approval of the building official, the owner may provide a peer review.**

**1803.8.1 Report review criteria. Where the review is provided by a party other than the jurisdiction's staff, review shall consist of a written summary of the reviewer's assessment of the overall adequacy of the site report and a listing of additional questions or factors that need to be addressed.**

**1803.9 Seismic site hazard report submittal. Two copies of the seismic site hazard report shall be submitted. One copy shall be submitted to the building permit issuing agency and retained on file with its permit record. One copy shall be submitted by the applicant to the Department of Geology and Mineral Industries (DOGAMI).**

**1804.4 Grading and fill in flood hazard areas.**

**Grading and/or fill shall be approved by the Flood Plain Administrator.**

~~In flood hazard areas established by the local jurisdiction in Section 1612.3, grading and/or fill shall not be approved by the local governing authority.~~

- ~~1. Unless such fill is placed, compacted and sloped to minimize shifting, slumping and erosion during the rise and fall of flood water and, as applicable, wave action.~~
- ~~2. In floodways, unless it has been demonstrated through hydrologic and hydraulic analyses performed by a registered design professional in accordance with standard engineering practice that the proposed grading or fill, or both, will not result in any increase in flood levels during the occurrence of the design flood.~~
- ~~3. In flood hazard areas subject to high velocity wave action, unless such fill is conducted and/or placed to avoid diversion of water and waves toward any building or structure.~~
- ~~4. Where design flood elevations are specified but floodways have not been designated, unless it has been demonstrated that the cumulative effect of the proposed flood hazard area encroachment, when combined with all other existing and anticipated flood hazard area encroachment, will not increase the design flood elevation more than 1 foot (305 mm) at any point.~~

**1804.7 Under-floor drainage. When required by the building official, the ground under any building or portion thereof shall be sloped to a low point and drainage facilities shall be installed to provide positive drainage from the area under the building. The drainage facilities shall be in accordance with the Plumbing Code. If the premises abut a curbed street, or a storm sewer is available, and if the grade is favorable, a gravity drainage system from under the building shall extend to the gutter, storm sewer or other approved means. Crawl space drains may be connected to a footing drain.**

**1805.1.2.1 Flood hazard areas.** For buildings and structures in flood hazard areas as established in Section 1612.3, the finished ground level of an under floor space such as a crawlspace shall be equal to or higher than the outside finished ground level on at least one side.

**Exception:** Under floor spaces of Group R-3 buildings that meet the requirements of FEMA/FIA TB-11.

**1808.8.5.1 Grounding of foundation re-bars. When concrete reinforcing bars are installed in concrete footings, a grounding electrode system, for each building or structure provided with electrical service, shall be installed in accordance with the Oregon Electrical Specialty Code.**

**SECTION 1811**  
**Radon Control Methods**  
**Public Buildings**

**1811 Scope. The provisions of this section apply to new public buildings as defined in section 1811.1 which are built in Baker, Clackamas, Hood River, Multnomah, Polk, Washington and Yamhill Counties for which initial building permits are issued on or after April 1, 2013.**

**Exception: Public buildings of R-2 or R-3 occupancy classifications shall comply with section 1812.**

**Public buildings shall, at a minimum, incorporate a Passive Soil Depressurization (PSD) radon gas mitigation system complying with section 1811. PSD slab on grade construction shall comply with Section 1811.2. Active Soil Depressurization Systems (ASD) shall comply with section 1811.2 as modified by Section 1811.3. Public buildings using crawl space construction shall comply with crawl space provisions of section 1812 except that radon vent pipes shall not be less than 6 inches in diameter.**

**Exceptions: Public buildings described below in items (1) through (6) are exempt from compliance with this standard. Elevated buildings that comply with all provisions of item (7) are exempt from compliance with other portions of this standard.**

1. Temporary Structures
2. Free-standing greenhouses used exclusively for the cultivation of live plants
3. Open-air reviewing stands, grandstands and bleachers
4. Farm structures used only for storage or to shelter animals
5. Buildings of occupancy classification S, Storage, H, Hazardous, U, Utility/Miscellaneous or occupancies that meet the criteria of Section 503.1.1
6. Buildings provided with a mechanical ventilation system providing a ventilation rate of:
  - a. 6 air changes per hour, or
  - b. 1 cfm per square foot of floor area
7. Elevated buildings that satisfy all the following conditions:
  - a. The structure shall be separated from the ground by a vertical separation, measured between the final grade and the lower surface of the floor, of at least 18 inches,
  - b. All pilings, posts, piers or other supports shall be solid, or if hollow, shall be capped by a solid masonry unit or sealed at the surface of the soil with a construction complying with all applicable portions of section 1811.2.3.7,
  - c. Enclosures of any kind, including but not limited to chases, storage rooms, elevator shafts and stairwells, that connect between the soil and the structure, shall comply with all applicable provisions of section 1811.2 and shall have a soil contact area of less than five percent (5%) of the projected building floor area,
  - d. The perimeter of the structure, from the ground plane to the lower surface of the lowest floor shall be totally open for ventilation.

1811.1 Definitions: The following words and terms shall, for the purposes of this section have the meanings shown herein.

BUTT JOINT.

CONTRACTION JOINT.

CONSTRUCTION JOINT.

CURING.

CURING COMPOUND.

DETERIORATION.

ELASTOMERIC SEALANT. FIELD-MOLDED SEALANT.

HIGH-RANGE WATER REDUCER.

HONEYCOMB.

ISOLATION JOINT.

LAITANCE. LAP. LAP JOINT.

MEMBRANE-FORMING CURING COMPOUND.

MANUFACTURED SANDS. MASTIC. MEMBRANE.

MID-RANGE WATER REDUCER.

NATURAL SANDS. POLYETHYLENE.

POLYVINYL CHLORIDE.

PREFORMED SEALANT.

PRESSURE SENSITIVE.

PUBLIC BUILDING.

RADON GAS. SEALANT.

SOIL-GAS-RETARDER MEMBRANE.

SOLID REINFORCED MASONRY.

STORY.

STRUCTURE.

SUBGRADE.

SUPERPLASTICIZER.

SUPERSTRUCTURE.

TEMPORARY STRUCTURE.  
WATER-REDUCING ADMIXTURE.  
WATERPROOFING MEMBRANE.  
WATERSTOP. WORKING LEVEL (WL).  
ZONE.

1811.2 Slab on Grade. The design and installation of slab on grade PSD systems shall incorporate the five requirements as listed below. The design and construction requirements for each are detailed in the respective sections that follow.

1. Subfloor Preparation: Place a layer of gas-permeable material under all concrete slabs.
2. Soil-Gas-Retarder Membrane: The membrane shall be placed to minimize seams and to cover all of the soil below the building floor. Seal major radon entry routes including slab and foundation joints/cracks as well as utility and pipe penetrations.
3. Concrete Placement: Follow specifications to limit the uncontrolled cracking of floor slabs including; mix design, placing practices, and curing practices.
4. Subslab Barriers: Eliminate barriers to subslab airflow such as sub-slab walls or provide subslab soil exhaust systems for each area.
5. Subslab soil exhaust system ducts (vent pipes): Run a 6-inch diameter or equivalent area subslab soil exhaust system duct from the radon suction pit to the outdoors.

1811.2.1 Subfloor Preparation. To ensure the proper extension of the pressure field under the entire building, a layer of gas-permeable material shall be placed under all concrete slabs. The gas-permeable layer shall consist of one of the following:

1. A layer of aggregate complying with this section.
2. A uniform layer of sand (native or fill) a minimum of 4 inches thick, overlain by a layer or strips of geo-textile drainage matting designed to allow the lateral flow of soil gases.
3. Other materials, systems or floor designs with demonstrated capability to permit depressurization across the entire sub-floor area.

1811.2.1.1 Aggregate. A 4- to 6-inch layer of clean, coarse aggregate without fines shall be placed beneath the slab. Where approved by the building official, pressure field extension may be accomplished through the use of mats or a gas conveyance piping system in accordance with 1811.3.3.4.

1811.2.1.1.1 Aggregate Specifications. Crushed aggregate shall meet Size #5 specifications as defined in ASTM C33, "Standard Specification for Concrete Aggregates." Such aggregate is in the range of 1/2 to 1 in. diameter with less than 10 percent passing through a 1/2-inch sieve and has a free void space of approximately 50 percent.

1811.2.1.1.2 Aggregate Placement. Place a minimum of 4 to 6 inches of aggregate evenly under the entire slab, taking care not to introduce any fine material. If the aggregate is placed on top of a material with excessive fines and compaction of the aggregate is required for structural or other code considerations, a geo textile fabric or an additional reinforced vapor retarder may be placed beneath the aggregate. Where gas conveyance piping systems are installed, aggregate must extend a minimum of 2 inches over the top of the piping.

1811.2.2 Soil-Gas-Retarder Membrane. A soil-gas-retarder membrane shall be placed over the aggregate or other permeable material prior to placement of the slab in accordance with section 1811.2.2.

1811.2.2.1 Materials. Acceptable soil-gas-retarder membranes shall consist of a single layer of polyethylene, not less than 0.010-inch (10 mils) thick with a maximum perm rating of 0.3. Polyvinyl chloride (PVC), ethylene propylene diene monomer (EPDM), neoprene or other non-deteriorating, non-porous material may be used instead of polyethylene, provided the installed thickness of the alternate material has greater or equal tensile strength, resistance to water-vapor transmission, resistance to puncture, and resistance to deterioration determined in accordance with ASTM E 1745 and ASTM E 154. The membrane shall be placed to minimize seams and to cover all of the soil below the building floor.

1811.2.2.2 Tape. Tape used to install the soil-gas retarder shall have a minimum width of 2 inches and shall be pressure sensitive vinyl or other non-deteriorating pressure sensitive tape compatible with the surfaces being joined. Paper tape and/or cloth tape shall not be used for these purposes.

1811.2.2.3 Mastic. Mastic used to install the soil-gas retarder shall be compatible with the surfaces being joined, and shall be installed in accordance with the manufacturer's recommendations for the materials, surface conditions and temperatures involved. Mastic may be used to join sections of membrane to one another or to elements of the building foundation, or to seal penetrations in the membrane.

1811.2.2.4 Installation. The soil-gas retarder shall be placed under the entire soil-contact area of the floor in a manner that minimizes the required number of joints and seams. Care shall be taken to prevent damage to the membrane during the construction process.

*Informational note: In buildings incorporating the sub-slab portions of an active soil-depressurization system, the soil-gas retarder serves an important second purpose: to prevent mastic, cement or other materials from blocking the pressure distribution manifolds or pits.*

1811.2.2.5 Seams. Seams between portions of the soil-gas retarder shall maintain a minimum of 12 inches of lap when concrete is placed. This may be accomplished by securing the lapped edges of the membrane with tape or mastic or using larger unsecured overlaps prior to placing concrete.

1811.2.2.6 Slab Edges and Joints. The soil-gas retarder shall fully cover the soil beneath the building floor. Where the slab edge is cast against a foundation wall or grade beam, the soil-gas retarder shall contact the foundation element, and shall not extend vertically into the slab more than one half the slab thickness.

1811.2.2.7 Penetrations. At all points where pipes, conduits, reinforcing bars or other objects pass through the soil-gas-retarder membrane, the membrane shall be fitted to within ½ inch of the penetration and sealed with tape or mastic to the penetration. When penetrations occur within 24 inches of a soil-depressurization-system mat or pit, the gap between the penetrating object and the soil-gas-retarder shall be taped closed. When necessary to meet this requirement a second layer of the membrane, cut so as to provide a minimum 12-inch lap on all sides, shall be placed over the object and shall be sealed to the soil-gas retarder with a continuous band of tape.

1811.2.2.8 Punctures, Cuts and Tears. All damaged portions of the soil-gas-retarder membrane shall be sealed with tape or with a patch made from the same or compatible material, cut so as to provide a minimum 12-inch lap from any opening, and taped continuously about its perimeter.

1811.2.2.9 Mastics. Mastic may be used to join sections of soil-gas retarder to one another or to elements of the building foundation, or to seal penetrations in the soil-gas retarder, provided that mastic is kept at least 24 inches from any portion of a soil-depressurization-system mat or pit. Only tape may be used to seal the soil-gas-retarder membrane within 24 inches of a soil-depressurization-system mat or pit.

1811.2.2.10 Repairs. Where portions of an existing slab have been removed and are about to be replaced, a soil-gas-retarder membrane shall be carefully fitted to the opening, and all openings between the membrane and the soil closed with tape or mastic. Special care must be exercised to assure that mastic does not enter any portion of a soil-depressurization system located beneath the slab.

1811.2.3 Concrete Slabs - General. Concrete slabs shall be constructed in accordance with section 1811.2.3 and the provisions of Chapter 19

1811.2.3.1 Compressive Strength. Design strength for all concrete mixes used in the construction of slab-on-grade floors shall be a minimum of 3,000 psi at 28 days and shall be designed, delivered and placed in accordance with ASTM C 94.

1811.2.3.2 Sealing of Construction Joints, Penetrations, Cracks, and Other Connections

1811.2.3.2.1 Sealants. Sealants shall be selected and installed in compliance with ASTM C 920 "Standard Specification for Elastomeric Joint Sealants" and ASTM C 1193 "Standard Guide for Use of Joint Sealants."

1. Sealant materials shall be compatible with the materials they join, including curing compounds and admixtures, and with materials that will be applied over them, including floor finishing materials.
2. Field-molded sealants shall be installed in sealant reservoirs proportioned, cleaned of laitance and prepared in accordance with the manufacturer's recommendations.

*Informational note: For elastomeric sealants, this generally requires the installation of a bond breaker.*

3. When the installed sealant is not protected by a finished floor or other protective surface, it shall be suitable to withstand the traffic to which it will be exposed.
4. Waterstops shall be preformed from polyvinyl chloride or other non-corrosive material.

1811.2.3.2.2 Joints. All joints between sections of concrete floor slabs, between the floor slab and a wall or other vertical surface, or between a section of floor and another object that passes through the slab, shall be sealed to prevent soil-gas entry in accordance with the provisions of this section. Joint design depends upon the amount and type of movement that the joint must withstand. No portion of any joint shall be covered or rendered inaccessible unless the seal has first been inspected and approved by the building official. All such joints shall be sealed prior to the issuance of a certificate of occupancy.

1. Butt joints. All non-bonded butt joints shall be sealed to prevent radon entry using an elastomeric sealant or a waterstop as specified above. The sealant reservoir shall be



- sufficiently large to prevent failure of the sealant or waterstop, but in no case shall the sealant reservoir be less than 1/4-inch by 1/4-inch in cross-section.
2. Lap joints. All non-bonded lap joints shall be sealed with either a field-molded or preformed elastomeric sealant or with a flexible waterstop as specified above. The lap joint shall be sufficiently large to prevent failure of the sealant or waterstop, but in no case shall the sealant reservoir be less than 1/2-inch by 1/2-inch in cross-section.
  3. Isolation joints. All non-bonded isolation joints shall be sealed with either a field-molded or preformed elastomeric sealant or with a flexible waterstop as specified above. Isolation joints shall be sufficiently large to prevent failure of the sealant or waterstop, but in no case shall the sealant reservoir be less than 1/2-inch by 1/2-inch in cross-section.
  4. Control or contraction joints. Control or contraction joints may be used to limit unplanned cracking of floor slabs. In locations where continued movement of the slab portions can be reasonably expected, flexible sealants must be installed in reservoirs complying with the requirements of above section on Butt Joints, or a flexible waterstop must be used.
  5. Construction joints. All bonded construction joints shall be sealed to prevent radon entry using either a rigid or an elastomeric sealant or a waterstop as specified above. Where movement of the joint is not prevented by continuous reinforcing and tie bars, flexible sealants must be installed in reservoirs complying with the requirements of above section on Lap Joints, or a flexible waterstop must be used.

1811.2.3.2.3 Cracks. All cracks in concrete slabs supported on soil or spanning over exposed soil, that are used as floors for conditioned space or enclosed spaces adjacent to or connected to conditioned spaces, shall be sealed against radon entry in accordance with the provisions of this section and Section 1811.2.3.7.1.

*Informational note: Sealing should occur as late in the construction process as possible.*

1. Cracks greater than 1/4-inch wide; all cracks that exhibit vertical displacement; all cracks that connect weakened zones in the slab such as vertical penetrations or re-entrant corners; and, all cracks that cross changes in materials or planes in the structure, shall be sealed with a flexible field-molded elastomeric sealant installed in accordance with above section on Isolation Joints.
2. Cracks greater than 1/16 inch in width, that do not meet any of the conditions described in Item (1) above, shall be enlarged to contain a sealant reservoir not less than 1/4-inch x 1/4-inch in cross-section along the entire length of the crack; and shall be sealed with a flexible, field-molded elastomeric sealant installed in accordance with above section on Butt Joints.
3. Cracks less than 1/16 inch in width, that do not meet any of the conditions described in item 1 above, may be left unsealed.

1811.2.3.2.4 Stakes, Pipe Penetrations and Other Small Objects. All objects that pass through the slab shall be sealed gas tight. A sealant reservoir, appropriately dimensioned to accommodate any differential movement between the object and the concrete, shall be formed continuously around the object, and the joint shall be sealed with a field molded elastomeric sealant as prescribed for Isolation Joints and in accordance with the provisions of Section 1811.2.3.7.1. Where pipes or other penetrations are separated from the concrete by flexible sleeves, the sleeve shall be removed to provide bonding of the sealant to the object. Where stakes are used to support plumbing, electrical conduits or other objects that will penetrate the slab, the stakes

shall be solid, non-porous and resistant to decay, corrosion and rust. Special care must be taken to avoid honeycombing between multiple or ganged penetrations.

1. Large utility service openings through the slab shall be sealed gas-tight. For slab-on-grade construction, this can be accomplished by fully covering the exposed soil with a vapor-retarder membrane, covered to a minimum depth of 1 inch with an elastomeric sealant. Alternatively, the opening may be closed with an expansive concrete or hydraulic cement to within ½ inch of the top of the slab, and the remaining ½ inch filled with an elastomeric sealant. When the opening connects to a crawlspace, the opening shall be closed with sheet metal or other rigid impermeable materials and sealed with an elastomeric sealant compatible with the materials and conditions.
2. For openings made through existing slabs, they must be sealed to meet the appropriate provisions of this Section. If the opening is partially repaired with concrete, any resulting crack shall be sealed in accordance with the Section 1811.2.3.7.3.
3. Any sump located in a habitable portion of a building and connecting to the soil, either directly or through drainage piping, shall be lined with a gasketed lid. The lid shall be attached so as to provide a gas-tight seal between the sump and the access space above. Where interior footing drainage systems extend out beneath the footing, the drain must be sealed airtight where it passes beneath the footing.

1811.2.4 Walls in Contact with Soil-Gas. Walls separating below-grade conditioned space from the surrounding earth or from a crawlspace or other enclosed volume with an exposed earth floor, shall be isolated from the soil as required by this section. Foundation walls consisting of cavity walls, or constructed of hollow masonry products or of any material in such a way as to create an air-space within the wall, shall be capped at the floor-level of the first finished floor they intersect. The cap shall be either at least 8 inches of solid concrete or concrete filled block, or a cap that provides air-flow resistance at least equal to the adjacent floor. No crack, honeycomb, duct joint, pipe, conduit chase or other opening in the wall shall be allowed to connect soil-gas to a conditioned space or to an enclosed space adjacent to or connected to a conditioned space.

1811.2.4.1 Materials. Walls governed by the provisions of this section shall be constructed of reinforced concrete, or solid reinforced masonry construction.

1811.2.4.2 Waterproofing. Walls governed by the provisions of this section shall be constructed with a continuous waterproofing membrane applied in accordance with Section 1805.3.2 of this code.

1811.2.4.2.1 Utility Penetrations. All below-grade utility penetrations through walls in partial or full contact with the soil shall be closed and sealed with an approved sealant material (see Section 1811.2.3.7.1). This seal shall be made on both faces of the wall. Where conduits or ducts do not provide a continuous and gas-tight separation from the soil, the end of the conduit or duct must be sealed in accordance with the provisions of Section 1811.2.3.7.1 to prevent soil-gas entry.

1811.2.4.3 Doors and Service Openings. Doors, hatches, or removable closures of any kind that can create an opening between the interior and a crawlspace shall be gasketed and installed with a latch or other permanent fastening device.

1811.2.5 Subslab soil exhaust system ducts (SSESD). SSESD's shall be provided in accordance with this section and shall run continuous from below the slab to the termination point described in section 1811.2.5.4. Each SSESD shall consist of one 6 inch diameter solid pipe.

Exception: For other than Active Soil Depressurization Systems, multiple pipes providing the same cross-sectional area may be used.

All annular openings between the SSES and the floor slab shall be sealed airtight. In addition, all SSES joints shall be sealed airtight. Penetrations of SSESs through fire resistive construction shall comply with the applicable sections of Chapter 7 of this code. SSESs shall be located within the building's insulated envelope and may be combined above the slab where the cross-sectional area of all combined SSESs is maintained to the required termination point.

1811.2.5.1 Location. One SSES shall be installed for every 2,000 square feet or portion thereof of building subslab area served. Subslab areas isolated by subslab walls shall be provided with separate SSESs in the number noted above.

1811.2.5.2 Materials. SSES material shall be air duct material listed and labeled to the requirements of UL 181 for Class 0 air ducts, or any of the following piping materials that comply with the Plumbing Code as building sanitary drainage and vent pipe: cast iron; galvanized steel; brass or copper pipe; copper tube of a weight not less than that of copper drainage tube, Type DWV; and plastic piping.

1811.2.5.3 Grade. SSESs shall not be trapped and shall have a minimum slope of one-eighth unit vertical in 12 units horizontal (1-percent slope).

1811.2.5.4 Subslab aperture. SSES's shall be embedded vertically into the sub-slab aggregate or other permeable material before the slab is cast. A "T" fitting or equivalent method shall be used to ensure that the SSES opening remains within the sub-slab permeable material. Alternatively, the SSES shall be inserted directly into an interior perimeter drain tile loop or through a sealed sump cover where the sump is exposed to the sub-slab aggregate or connected to it through a drainage system.

1811.2.5.5 Termination. SSESs shall extend through the roof and terminate at least 12 inches (304.8 mm) above the roof and at least 10 feet (3048 mm) from any operable openings or air intake.

1811.2.5.6 Identification. All exposed and visible interior SSESs shall be permanently identified with at least one label on each floor and in accessible attics. The label shall be by means of a tag, stencil or other approved marking which states: "Radon Reduction System."

1811.2.5.7 Combination foundations. Combination basement/crawl space or slab-on-grade/crawl space foundations shall have separate SSESs installed in each type of foundation area. Each SSES shall terminate above the roof or shall be connected to a single SSES that terminates above the roof.

1811.3 Active Soil Depressurization (ASD). ASD systems shall comply with section 1811.2 as modified by this section.

1811.3.1 Design. ASD systems shall comply with this section or may be designed by a licensed design professional in accordance with accepted engineering practices for the mitigation of radon.

1811.3.2 ASD SSES Location. One SSES shall be installed for every 4,000 square feet or portion thereof of building subslab area served by an ASD system. Subslab areas isolated by sub-slab wall footings shall be provided with separate SSESs in the number as required in this section.

Exception: One SSESD shall be installed for every 15,000 square feet or portion thereof of building sub-slab area served by an ASD system utilizing a gas conveyance piping system complying with 1811.3.3.4. Subslab areas isolated by subslab wall footings shall be provided with separate SSESDs.

1811.3.3 SSESD Blower Sizing. Each SSESD shall be equipped with a blower having a minimum capacity as follows:

1. 200 cubic feet per minute (CFM) for SSESDs connected to a gas conveyance piping system complying with 1811.3.3.4.
2. 100 CFM for all other ASD systems.

1811.3.3.1 Alarms: ASD SSESD blowers shall be equipped with an audible alarm located in a normally occupied location to indicate fan malfunction.

1811.3.3.4 Gas Conveyance Piping Systems (GCPS): GCPS shall incorporate a perforated pipe system connected to a centralized plenum box. The perforated pipe shall be installed in the center of the slab system no farther than 50 feet from an exterior wall footing or an interior wall cut-off footing. The pipe shall be embedded in the middle of a minimum 12" wide x 8" deep gravel trench with the perforation holes oriented to allow for both the free conveyance of gas into the pipe and the drainage of any condensation which may collect. The piping shall be a standard 3" diameter perforated pipe as used for typical subterranean drain systems. The piping system shall be installed such that it will intersect at a minimum 24" square x 8" deep centralized plenum box that will allow free flow of soil gas into an SSESD complying with section 1811.2.5 of this chapter.

When the exception for the installation of one SSESD for every 15,000 square feet is used the 24" square x 8" deep plenum box shall be eliminated. In lieu of the plenum box, all piping at intersections and at the transition to the SSESD shall be positively connected such that no air leakage occurs at the pipe joints

## **SECTION 1812**

### **Radon Control Methods**

### **R-2 and R-3 Occupancies**

1812.1 Scope. The provisions of this section apply to new R-2 and R-3 occupancies constructed in Baker, Clackamas, Hood River, Multnomah, Polk, Washington and Yamhill Counties for which initial building permits are issued on or after April 1, 2011.

#### **1812.2 DEFINITIONS.**

The following terms are defined in Chapter 2:

**DRAIN TILE LOOP.**

**RADON GAS.**

**SOIL-GAS-RETARDER.**

**SUBMEMBRANE DEPRESSURIZATION SYSTEM.**

**SUBSLAB DEPRESSURIZATION SYSTEM (Active).**

**SUBSLAB DEPRESSURIZATION SYSTEM (Passive).**

#### **1812.3 REQUIREMENTS**

1812.3.1 General. The following construction techniques are intended to resist radon entry and prepare the building for post-construction radon mitigation. (see Figure 1812).

1812.3.2 Subfloor preparation. A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the living spaces of the building, to facilitate future installation of a sub-slab depressurization system, if needed. The gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate, a minimum of 4 inches (102mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.
2. A uniform layer of sand (native or fill), a minimum of 4 inches (102 mm) thick, overlain by a layer or strips of geotextile drainage matting designed to allow the lateral flow of soil gases.
3. Other materials, systems or floor designs with demonstrated capability to permit depressurization across the entire sub-floor area.

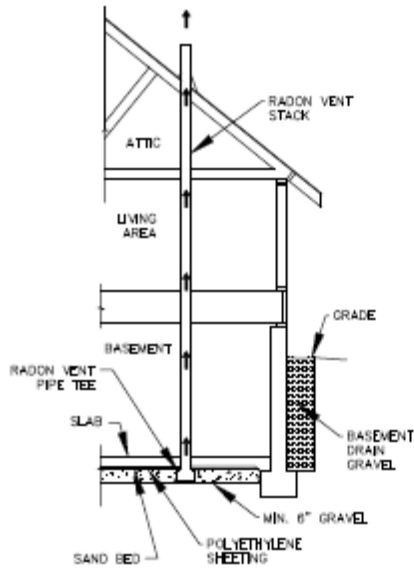
1812.3.3 Soil-gas-retarder. A minimum 6-mil (0.15 mm) [or 3-mil (0.075 mm) cross-laminated] polyethylene or equivalent flexible sheeting material shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly to serve as a soil-gas-retarder by bridging any cracks that develop in the slab or floor assembly and to prevent concrete from entering the void spaces in the aggregate base material. The sheeting shall cover the entire floor area with separate sections of sheeting lapped at least 12 inches (305 mm). The sheeting shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.

1812.3.4 Entry routes. Potential radon entry routes shall be closed in accordance with Sections 1812.3.4.1 through 1812.4.10.

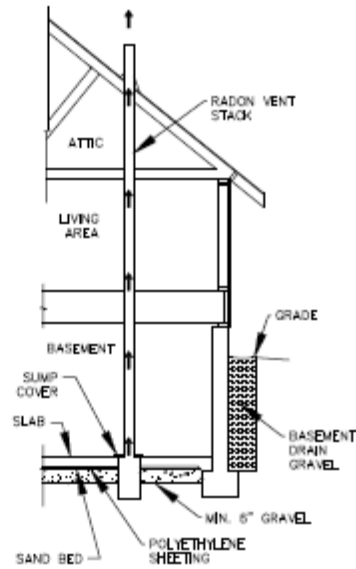
1812.3.4.1 Floor openings. Openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate concrete slabs or other floor assemblies shall be filled with a polyurethane caulk or equivalent sealant applied in accordance with the manufacturer's recommendations.

1812.3.4.2 Concrete joints. All control joints, isolation joints, construction joints and any other joints in concrete slabs or between slabs and foundation walls shall be sealed with a caulk or sealant. Gaps and joints shall be cleared of loose material and filled with polyurethane caulk or other elastomeric sealant applied in accordance with the manufacturer's recommendations.

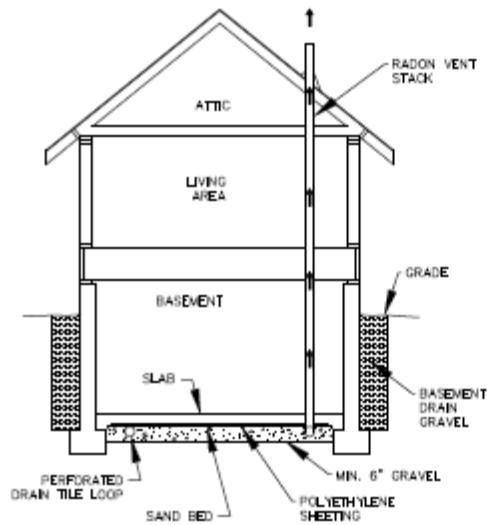
SUB-MEMBRANE DEPRESSURIZATION  
PASSIVE RADON SYSTEM



PASSIVE RADON SYSTEM VENTED  
THROUGH SUMP



PASSIVE RADON SYSTEM USING  
DRAIN TILE LOOP



SUB-MEMBRANE DEPRESSURIZATION  
SYSTEM FOR CRAWL SPACES

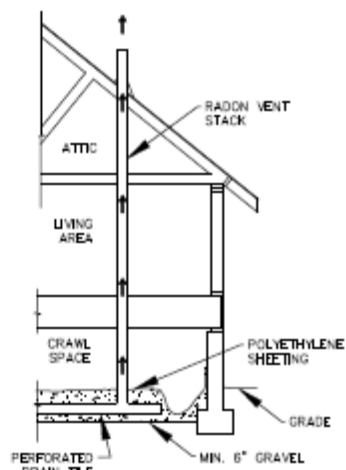


FIGURE 1812  
RADON-RESISTANT CONSTRUCTION DETAILS FOR FOUR FOUNDATION TYPES

**CHAPTER 19**  
**CONCRETE**

**\*\* NO OREGON AMENDMENTS \*\***

**CHAPTER 20**  
**ALUMINUM**

**\*\* NO OREGON AMENDMENTS \*\***



## CHAPTER 21 MASONRY

### 2104.1 Masonry construction.

Masonry construction shall comply with the requirements of Sections 2104.1.1 through 2104.6-5 and with TMS 602/ACI 530.1/ASCE 6 except as modified by Section 2104.5.

### 2104.5 TMS 602/ACI 530.1/ ASCE 6, Article 3.2F, cleanouts. Modify Article 3.2F and Article 3.2F.2 as follows:

#### 3.2F. Provide cleanouts in bottom course of masonry for each grout pour when the grout pour height exceeds 5.33 feet (1.63 m).

Exception: The grout pour height requiring cleanouts may be increased when special approved construction procedures are used to keep the bottom and sides of the grout spaces clean and clear prior to grouting.

#### 3.2F.2. Construct cleanouts with an opening of sufficient size to permit removal of debris. The minimum opening dimensions shall be 3 inches (76.2 mm).

Exception: The minimum cleanout dimensions shall be 11/8 inches (28.58 mm) in height plus 3/8-inch mortar bed joint by 41/4 inches (107.95 mm) in length.

### 2107.2 TMS 402/ACI 530/ASCE 5, Section ~~2.1.8.7.1.1~~ 2.1.7.7.1.1, lap splices.

In lieu of Section ~~2.1.8.7.1.1~~ 2.1.7.7.1.1, it shall be permitted to design lap splices in accordance with Section 2107.2.1.

#### 2107.2.1 Lap splices.

The minimum length of lap splices for reinforcing bars in tension or compression,  $l_d$ , shall be

|                      |                 |
|----------------------|-----------------|
| $l_d = 0.002d_b f_s$ | (Equation 21-1) |
|----------------------|-----------------|

For SI:  $l_d = 0.29d_b f_s$

but not less than 12 inches (305 mm) **and need not be greater than  $72d_b$** . In no case shall the length of the lapped splice be less than 40 bar diameters.

where:  $d_b$  = Diameter of reinforcement, inches (mm).

$f_s$  = Computed stress in reinforcement due to design loads, psi (MPa).

In regions of moment where the design tensile stresses in the reinforcement are greater than 80 percent of the allowable steel tension stress,  $F_s$ , the lap length of splices shall be increased not less than 50 percent of the minimum required length. Other equivalent means of stress transfer to accomplish the same 50 percent increase shall be permitted. Where epoxy coated bars are used, lap length shall be increased by 50 percent.

### 2108.1 General.

The design of masonry structures using strength design shall comply with Section 2106 and the requirements of Chapters 1 and 3 of TMS 402/ACI 530/ASCE 5, except as modified by Sections 2108.2 through 2108.34.

**2108.4 TMS 402/ACI 530/ASCE 5, Section 1.16.1, Anchor bolts. Modify the second paragraph of Section 1.16.1 as follows:**

**Anchor bolts placed in the top of grouted cells and bond beams shall be positioned to maintain a minimum of 1/4 inch (6.4 mm) of fine grout between the bolts and the masonry unit or 1/2 inch (12.7 mm) of coarse grout between the bolts and masonry unit. Anchor bolts placed in drilled holes in the face shells of hollow masonry units shall be permitted to contact the masonry unit where the bolt passes through the face shell, but the portion of the bolt that is within the grouted cell shall be positioned to maintain a minimum of 1/4 inch (6.4 mm) of fine grout between the head or bent leg of the bolt and the masonry unit or 1/2 inch (12.7 mm) of coarse grout between the head or bent leg of the bolt and the masonry unit.**

## **SECTION 2111 MASONRY FIREPLACES**

### **2111.1 Definition.**

A masonry fireplace is a fireplace constructed of concrete or masonry. Masonry fireplaces shall be constructed in accordance with this section.

**2111.1 General. The construction of masonry fireplaces consisting of concrete or masonry shall be in accordance with this section.**

### **2111.3 Seismic reinforcing.**

In structures assigned to *Seismic Design Category A* or *B*, reinforcement and seismic anchorage are not required. Masonry or concrete fireplaces shall be constructed, anchored, supported and reinforced as required in this chapter. In structures assigned to *Seismic Design Category C* or *D*, masonry and concrete fireplaces shall be reinforced and anchored as detailed in Sections 2111.3.1, 2111.3.2, 2111.4 and 2111.4.1 for chimneys serving fireplaces. In structures assigned to *Seismic Design Category E* or *F*, masonry and concrete chimneys shall be reinforced in accordance with the requirements of Sections 2101 through 2108.

**2111.3 Seismic reinforcing. In structures assigned to *Seismic Design Category A* or *B*, seismic reinforcement is not required. In structures assigned to *Seismic Design Category C* or *D*, masonry fireplaces shall be reinforced and anchored as detailed in Sections 2111.3.1, 2111.3.2, 2111.4 and 2111.4.1. In structures assigned to *Seismic Design Category E* or *F*, masonry fireplaces shall be reinforced in accordance with the requirements of Sections 2101 through 2108.**

### **2111.4 Seismic anchorage.**

Masonry and concrete chimneys in structures assigned to *Seismic Design Category C* or *D* shall be anchored at each floor, ceiling or roof line more than 6 feet (1829 mm) above grade, except where constructed completely within the exterior walls. Anchorage shall conform to the following requirements.

#### **2111.4.1 Anchorage.**

Two 3/16-inch by 1-inch (4.8 mm by 25.4 mm) straps shall be embedded a minimum of 12 inches (305 mm) into the chimney. Straps shall be hooked around the outer bars and extend 6 inches (152 mm) beyond the bend. Each strap shall be fastened to a minimum of four floor joists with two 1/2-inch (12.7 mm) bolts.

**2111.4 Seismic anchorage. Masonry fireplaces and foundations shall be anchored at each floor, ceiling or roof line more than 6 feet (1829 mm) above grade with two 3/16-inch by 1-inch (4.8 mm by 25 mm) straps embedded a minimum of 12 inches (305 mm) into the chimney. Straps shall be hooked around the outer bars and extend 6 inches (152 mm) beyond the bend. Each strap shall be fastened to a minimum of four floor joists with two 1/2-inch (12.7 mm) bolts.**

**Exception: Seismic anchorage is not required for the following:**

- 1. In structures assigned to *Seismic Design Category A* or *B*.**
- 2. Where the masonry fireplace is constructed completely within the *exterior walls*.**

**2113.1 Definition.**

A masonry chimney is a chimney constructed of solid masonry units, hollow masonry units grouted solid, stone or concrete, hereinafter referred to as "masonry." Masonry chimneys shall be constructed, anchored, supported and reinforced as required in this chapter.

**2113.1 General. The construction of masonry chimneys consisting of solid masonry units, hollow masonry units grouted solid, stone or concrete shall be in accordance with this section.**

**2113.3 Seismic reinforcing.**

Masonry or concrete chimneys shall be constructed, anchored, supported and reinforced as required in this chapter. In structures assigned to *Seismic Design Category C* or *D*, masonry and concrete chimneys shall be reinforced and anchored as detailed in Sections 2113.3.1, 2113.3.2 and 2113.4. In structures assigned to *Seismic Design Category A* or *B*, reinforcement and seismic anchorage is not required. In structures assigned to *Seismic Design Category E* or *F*, masonry and concrete chimneys shall be reinforced in accordance with the requirements of Sections 2101 through 2108.

**2113.3 Seismic reinforcing. In structures assigned to *Seismic Design Category A* or *B*, seismic reinforcement is not required. In structures assigned to *Seismic Design Category C* or *D*, masonry chimneys shall be reinforced and anchored as detailed in Sections 2113.3.1, 2113.3.2 and 2113.4. In structures assigned to *Seismic Design Category E* or *F*, masonry chimneys shall be reinforced in accordance with the requirements of Sections 2101 through 2108 and anchored as detailed in Section 2113.4.**

**2113.4 Seismic anchorage.**

Masonry and concrete chimneys and foundations in structures assigned to *Seismic Design Category C* or *D* shall be anchored at each floor, ceiling or roof line more than 6 feet (1829 mm) above grade, except where constructed completely within the *exterior walls*. Anchorage shall conform to the following requirements:

**2113.4.1 Anchorage.**

Two 3/16 inch by 1 inch (4.8 mm by 25 mm) straps shall be embedded a minimum of 12 inches (305 mm) into the chimney. Straps shall be hooked around the outer bars and extend 6 inches (152 mm) beyond the bend. Each strap shall be fastened to a minimum of four floor joists with two 1/2 inch (12.7 mm) bolts.

**2113.4 Seismic anchorage. Masonry chimneys and foundations shall be anchored at each floor, ceiling or roof line more than 6 feet (1829 mm) above grade with two 3/16-inch by 1-inch (4.8 mm by 25 mm) straps embedded a minimum of 12 inches (305 mm) into the chimney. Straps shall be hooked around the outer bars and extend 6 inches (152 mm) beyond the bend. Each strap shall be fastened to a minimum of four floor joists with two 1/2-inch (12.7 mm) bolts.**

**Exception: Seismic anchorage is not required for the following:**

- 1. In structures assigned to *Seismic Design Category A* or *B*.**
- 2. Where the masonry fireplace is constructed completely within the *exterior walls*.**

## CHAPTER 22

### STEEL

~~2208.2 Seismic requirements for steel cable.~~ The design strength of steel cables shall be determined by the provisions of ASCE 19 except as modified by these provisions.

~~1.~~ A load factor of 1.1 shall be applied to the prestress force included in  $T_d$  and  $T_d$  as defined in Section 3.12.

~~2.~~ In Section 3.2.1, Item (c) shall be replaced with "1.5  $T_d$ " and Item (d) shall be replaced with "1.5  $T_d$ ".<sup>2+</sup>

## CHAPTER 23 WOOD

Delete Table 2304.9.1 and replace as follows:

**TABLE 2304.9.1  
FASTENING SCHEDULE**

| DESCRIPTION OF BUILDING ELEMENTS |  | NUMBER AND TYPE OF FASTENER <sup>a, b, c</sup>   | SPACING AND                  |
|----------------------------------|--|--|------------------------------|
| <b>ROOF</b>                      |  |  |                              |
| <b>1</b>                         | <u>Blocking between ceiling joists or rafters to top plate or other framing below</u>  | <u>3-8d common (2 1/2" x 0.131"); or</u><br><u>3-10d box (3" x 0.128"); or</u><br><u>3-3" x 0.131" nails; or</u><br><u>3-3" 14 gage staples, 7/16" crown</u>   | <u>at each end, toe nail</u> |
|                                  | <u>Flat blocking to truss and web filler</u>   | <u>16d common (3 1/2" x 0.162") @ 6" o.c.; or</u><br><u>3" x 0.131" nails @ 6" o.c.; or</u><br><u>3" x 14 gage staples, 7/16" crown @ 6" o.c.</u>  | <u>Face nail</u>             |
| <b>2</b>                         | <u>Ceiling joists to top plate</u>   | <u>3-8d common (2 1/2" x 0.131"); or</u><br><u>3-10d box (3" x 0.128"); or</u><br><u>3-3" x 0.131" nails; or</u><br><u>3-3" 14 gage staples, 7/16" crown</u>   | <u>per joist, toe nail</u>   |
| <b>3</b>                         | <u>Ceiling joist not attached to parallel rafter (no thrust), laps over partitions, (see Section 2308.10.4.1, Table 2308.10.4.1)</u> | <u>3-16d common (3 1/2" x 0.162"); or</u><br><u>4-10d box (3" x 0.128"); or</u><br><u>4-3" x 0.131" nails; or</u><br><u>4-3" 14 gage staples, 7/16" crown</u>  | <u>Face nail</u>             |
| <b>4</b>                         | <u>Ceiling joist attached to parallel rafter (heel joint) (Section 2308.10.4.1, Table 2308.10.4.1)</u>                               | <u>Per Table 2308.10.4.1</u>   | <u>Face nail</u>             |
| <b>5</b>                         | <u>Collar tie to rafter</u>  | <u>3-10d common (3" x 0.148"); or</u><br><u>4-10d box (3" x 0.128"); or</u><br><u>4-3" x 0.131" nails; or</u><br><u>4-3" 14 gage staples, 7/16" crown</u>  | <u>Face nail</u>             |
| <b>6</b>                         | <u>Rafter or roof truss to plate or other framing below (See Section 2308.10.1, Table 2308.10.1)</u>                                 | <u>3-10d common (3" x 0.148"); or</u><br><u>3-16d box (3 1/2" x 0.135"); or</u><br><u>4-10d box (3" x 0.128"); or</u><br><u>4-3" x 0.131" nails; or</u><br><u>4-3" 14 gage staples, 7/16" crown</u>            | <u>Toenail<sup>c</sup></u>   |
| <b>7</b>                         | <u>Roof rafters to ridge, valley or hip rafters; or, roof rafter to 2-inch ridge board</u>   | <u>2-16d common (3 1/2" x 0.162"); or</u><br><u>3-10d box (3" x 0.128"); or</u><br><u>3-3" x 0.131" nails; or</u><br><u>3-3" 14 gage staples, 7/16"; crown; or</u><br><u>2-16d common (3 1/2" x 0.135") or</u> | <u>End nail</u>              |
|                                  |  | <u>3-10d common (3" x 0.148"); or 3-16d box (3 1/2" x 0.135")</u><br><u>4-10d box (3" x 0.128"); or</u><br><u>4-3" x 0.131" nails; or</u><br><u>4-3" 14 gage staples, 7/16" crown</u>                          | <u>Toe nail</u>              |

| <u>Wall</u> |   |  |   |
|-------------|---|--|---|
| <u>8</u>    | <u>Stud to stud (not at braced wall panels)</u>   | <u>16d common (3 1/2" x 0.162"); or</u>  | <u>24" o.c. face nail</u>   |
|             |   | <u>10d box (3" x 0.128"); or</u><br><u>3"x 0.13 1" nails; or</u><br><u>3-3" 14 gage staples, 7/16" crown</u>   | <u>16" o.c. face nail</u>   |
| <u>9</u>    | <u>Stud to stud and abutting studs at intersecting wall corners (at braced wall panels)</u> | <u>16d common (3 1/2" x 0.162")</u>  | <u>16" o.c. face nail</u>   |
|             |   | <u>16d box (3 1/2" x 0.135"); or</u><br><u>3" x 0.13 1" nails; or</u><br><u>3-3" 14 gage staples, 7/16" crown</u>  | <u>12" o.c. face nail</u>   |
| <u>10</u>   | <u>Built-up header (2-inch to 2-inch header)</u>  | <u>16d common (31/2" x 0.162")</u>   | <u>16" o.c. each edge face nail</u>   |
|             |   | <u>16d box (3 1/2" x 0.135")</u>   | <u>12" o.c. each edge, face nail</u>  |
| <u>11</u>   | <u>Continuous header to stud</u>  | <u>4-8d common (2 1/2" x 0.131"); or</u><br><u>4-10d box (3" x 0.128")</u>   | <u>Toe nail</u>   |
| <u>12</u>   | <u>Top plate to top plate</u>   | <u>16d common (3.5" x 0.162"); or</u>  | <u>16" o.c. face nail</u>   |
|             |   | <u>10d box (3" x 0.128"); or</u><br><u>3" x 0.13 1" nails; or</u><br><u>3" 14 gage staples, 7/16" crown</u>  | <u>12" o.c. face nail</u>   |
| <u>13</u>   | <u>Top plate to top plate, at end joints</u>  | <u>8-16d common (3 1A" x 0.162"); or</u><br><u>12-10d box (3" x 0.128"); or</u><br><u>12-3" x 0.131" nails; or</u><br><u>12-3" 14 gage staples, 7/16" crown</u>    | <u>Face nail on each side of end joint (minimum 24" lap splice length each side of end joint)</u> |
| <u>14</u>   | <u>Bottom plate to joist, rim joist, band joist, blocking (not at braced wall panels)</u>   | <u>16d common (3 1A" x 0.162")</u>   | <u>16" o.c. face nail</u>   |
|             |   | <u>16d box (3 1/2" x 0.135"); or 3" x 0.13 1" nails; or</u><br><u>3" 14 gage staples, 7/16" crown</u>  | <u>12" o.c. face nail</u>   |
| <u>15</u>   | <u>Bottom plate to joist, rim joist, band joist or blocking at braced wall panels</u>       | <u>2-16d common (3 1/2" x 0.162"); or</u><br><u>3-16d box (31/2" x 0.135"); or</u><br><u>4-3" x 0.13 1" nails; or</u><br><u>4- 3" 14 gage staples, 7/16" crown</u> | <u>16" o.c. face nail</u>   |
| <u>16</u>   | <u>Stud to bottom plate</u>   | <u>4-8d common (2 1/2" x 0.131"); or</u><br><u>4-10d box (3" x 0.128"); or</u><br><u>4-3" x 0.13 1" nails; or</u><br><u>4-3" 14 gage staples, 7/16" crown; or</u>  | <u>Toe nail</u>   |
|             |   | <u>2-16d common (3 1/2" x 0.162"); or</u><br><u>3-10d box (3" x 0.128"); or</u><br><u>3-3" x 0.13 1" nails; or</u><br><u>3-3" 14 gage staples, 7/16" crown</u>     | <u>End nail</u>   |
| <u>17</u>   | <u>Top or bottom plate to stud</u>  | <u>2-16d common (3 1/2" x 0.162"); or</u><br><u>3-10d box (3" x 0.128"); or</u><br><u>3-3" x 0.13 1" nails; or</u><br><u>3-3" 14 gage staples, 7/16" crown</u>     | <u>End nail</u>   |
| <u>18</u>   | <u>Top plates, laps at corners and intersections</u>  | <u>2-16d common (3 1/2" x 0.162"); or</u><br><u>3-10d box (3" x 0.128"); or</u><br><u>3-3" x 0.13 1" nails; or</u><br><u>3-3" 14 gage staples, 7/16" crown</u>     | <u>Face nail</u>  |

|  |   |   |   |                                       |
|--|---|---|---|---------------------------------------|
| <u>19</u>  | <u>1" brace to each stud and plate</u>  | <u>2-8d common (2 1/2" x 0.131"); or</u><br><u>2-10d box (3" x 0.128"); or</u><br><u>2-3" x 0.13 1" nails; or</u><br><u>2-3" 14 gage staples, 7/16" crown</u>             | <u>Face nail</u>  |                                       |
| <u>20</u>  | <u>1" x 6" sheathing to each bearing</u>  | <u>2-8d common (2 1/2" x 0.131"); or</u><br><u>2-10d box (3" x 0.128")</u>  | <u>Face nail</u>  |                                       |
| <u>21</u>  | <u>1" x 8" and wider sheathing to each bearing</u>                                  | <u>3-8d common (2 1/2" x 0.13 1"); or</u><br><u>3-10d box (3" x 0.128")</u>   | <u>Face nail</u>  |                                       |
| <b>Floor</b>   |   |   |   |                                       |
| <u>22</u>  | <u>Joist to sill, top plate, or girder</u>  | <u>3-8d common (2 1/2" x 0.13 1"); or</u><br><u>3-10d box (3" x 0.128"); or</u><br><u>3-3" x 0.13 1" nails; or</u><br><u>3-3" 14 gage staples, 7/16" crown</u>            | <u>Toe nail</u>   |                                       |
| <u>23</u>  | <u>Rim joist, band joist, or blocking to sill, top plate or other framing below</u> | <u>8d common (2 1/2" x 0.131"); or</u><br><u>10d box (3" x 0.128"); or</u><br><u>3" x 0.13 1" nails; or</u><br><u>3" 14 gage staples, 7/16" crown</u>                     | <u>6" o.c. toe nail</u>   |                                       |
| <u>24</u>  | <u>1" x 6" subfloor or less to each joist</u>                                       | <u>2-8d common (2 1/2" x 0.131"); or</u><br><u>2-10d box (3" x 0.128")</u>  | <u>Face nail</u>  |                                       |
| <u>25</u>  | <u>2" subfloor to joist or girder</u>   | <u>2-16d common (3 1/2" x 0.162")</u>   | <u>Blind and face nail</u>  |                                       |
| <u>26</u>  | <u>2" planks (plank &amp; beam - floor &amp; roof)</u>                              | <u>2-16d common (3 1/2" x 0.162")</u>   | <u>At each bearing, face nail</u>                                       |                                       |
| <u>27</u>  | <u>Built-up girders and beams, 2-inch lumber lavers</u>                             | <u>20d common (4" x 0.192")</u>   | <u>32" o.c. face nail at top and bottom staggered on opposite sides</u> |                                       |
|  |   | <u>10d box (3" x 0.128"); or</u><br><u>3" x 0.13 1" nails; or</u><br><u>3" 14 gage staples, 7/16" crown</u>   | <u>24" o.c. face nail at top and bottom staggered on opposite sides</u> |                                       |
|  |   | <u>And:</u><br><u>2-20d common (4" x 0.192"); or</u><br><u>3-10d box (3" x 0.128"); or</u><br><u>3-3" x 0.13 1" nails; or</u><br><u>3-3" 14 gage staples, 7/16" crown</u> | <u>Face nail at ends and at each splice</u>                             |                                       |
| <u>28</u>  | <u>Ledger strip supporting joists or rafters</u>                                    | <u>3-16d common (3 1/2" x 0.162"); or</u><br><u>4-10d box (3" x 0.128"); or</u><br><u>4-3" x 0.13 1" nails; or</u><br><u>4-3" 14 gage staples, 7/16" crown</u>            | <u>At each joist or rafter, face nail</u>                               |                                       |
| <u>29</u>  | <u>Joist to band joist or rim joist</u>   | <u>3-16d common (3 1/2" x 0.162"); or</u><br><u>4-10d box (3" x 0.128"); or</u><br><u>4-3" x 0.13 1" nails; or</u><br><u>4-3" 14 gage staples, 7/16" crown</u>            | <u>End nail</u>   |                                       |
| <u>30</u>  | <u>Bridging to joist</u>  | <u>2-8d common (2 1/2" x 0.13 1"); or</u><br><u>2-10d box (3" x 0.128"); or</u><br><u>2-3" x 0.13 1" nails; or</u><br><u>2-3" 14 gage staples, 7/16" crown</u>            | <u>Each end, toenail</u>  |                                       |
| <u>ITEM</u>  | <u>DESCRIPTION OF BUILDING MATERIALS</u>  | <u>DESCRIPTION OF FASTENER<sup>b, c, e</sup></u>  | <u>SPACING OF FASTENERS</u>   |                                       |
|  |   |   | <u>Edges (inches)</u>   | <u>Intermediate supports (inches)</u> |
| <u>Wood structural panels, subfloor, roof and interior wall sheathing to framing and particleboard wall sheathing to framing</u> |   |   |   |                                       |
| <u>31</u>  | <u>3/8" - 1/2"</u>  | <u>6d common or deformed (2" x 0.113") (subfloor and wall)</u>  | <u>6</u>  | <u>12</u>                             |
|  |   | <u>8d box or deformed (2 1/2" x 0.113") (roof)</u>  | <u>6</u>  | <u>12</u>                             |
|  |   | <u>2 3/8" x 0.113" nail (subfloor and wall)</u>   | <u>6</u>  | <u>12</u>                             |
|  |   | <u>1 3/4" 16 gage staple, 7/16" crown (subfloor and wall)</u>   | <u>4</u>  | <u>8</u>                              |

|   |  |   |          |                      |
|---|--|---|----------|----------------------|
|   |  | <u>2 3/8" x 0.113" nail (roof)</u>  | <u>4</u> | <u>8</u>             |
|   |  | <u>1 3/4" 16 gage staple, 7/16" crown (roof)</u>  | <u>3</u> | <u>6</u>             |
| <u>32</u>   | <u>19/32" - 3/4"</u>                           | <u>8d common (2 1/2" x 0.131"); or</u><br><u>6d deformed (2" x 0.113")</u>  | <u>6</u> | <u>12</u>            |
|   |  | <u>2 3/8" x 0.113" nail; or</u><br><u>2" 16 gage staple, 7/16" crown</u>  | <u>4</u> | <u>8</u>             |
| <u>33</u>   | <u>7/8" - 1 1/4"</u>                           | <u>10d common (3" x 0.148") nail; or</u><br><u>8d (2 1/2" x 0.131") deformed nail</u>                                       | <u>6</u> | <u>12</u>            |
| <b>Other exterior wall sheathing<sup>b</sup></b>                            |  |   |          |                      |
| <u>34</u>   | <u>1/2" fiberboard sheathing<sup>b</sup></u>   | <u>1 1/2" galvanized roofing nail, 7/16" head</u><br><u>diameter; or</u><br><u>1 1/4" 16 gage staple, 7/16" or 1" crown</u> | <u>3</u> | <u>6</u>             |
| <u>35</u>   | <u>25/32" fiberboard sheathing<sup>b</sup></u> | <u>13/4" galvanized roofing nail, 7/16" head</u><br><u>diameter; or</u><br><u>1 1/2" 16 gage staple, 7/16" or 1" crown</u>  | <u>3</u> | <u>6</u>             |
| <b>Wood structural panels, combination subfloor underlayment to framing</b> |  |   |          |                      |
| <u>36</u>   | <u>3/4" and less</u>                           | <u>8d common (2 1/2" x 0.131"); or</u><br><u>6d deformed (2" x 0.113")</u>  | <u>6</u> | <u>1</u><br><u>2</u> |
| <u>37</u>   | <u>7/8" - 1"</u>                               | <u>8d common (2 1/2" x 0.131"); or</u><br><u>8d deformed (2 1/2" x 0.120") nail</u>   | <u>6</u> | <u>1</u><br><u>2</u> |
| <u>38</u>   | <u>1 1/8" - 1 1/4"</u>                         | <u>10d common (3" x 0.148") nail; or</u><br><u>8d deformed (2 1/2" x 0.131") nail</u>                                       | <u>6</u> | <u>1</u><br><u>2</u> |
| <b>Panel Siding to Framing</b>  |  |   |          |                      |
| <u>39</u>   | <u>1/2" or less</u>                            | <u>6d corrosion-resistant siding (1 7/8" x</u><br><u>0.106"); or 6d corrosion-resistant casing (2"</u>                      | <u>6</u> | <u>1</u><br><u>2</u> |
| <u>40</u>   | <u>5/8"</u>                                    | <u>8d corrosion-resistant siding (2 3/8" x</u><br><u>0.128"); or 8d corrosion-resistant casing (2</u>                       | <u>6</u> | <u>1</u><br><u>2</u> |
| <b>Interior Paneling</b>  |  |   |          |                      |
| <u>41</u>   | <u>1/4"</u>                                    | <u>4d casing (1 1/2" x 0.080"); or</u><br><u>4d finish (1 1/2" x 0.072")</u>  | <u>6</u> | <u>1</u><br><u>2</u> |
| <u>42</u>   | <u>3/8"</u>                                    | <u>6d casing (2" x 0.099"); or</u><br><u>6d finish (Panel supports at 24")</u>  | <u>6</u> | <u>1</u><br><u>2</u> |

**For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s; 1 Ksi = 6.895 MPa.**

- Nails spaced at 6 inches at intermediate supports where spans are 48 inches or more. For nailing of wood structural panel and particleboard diaphragms and shear walls, refer to Section 2305. Nails for wall sheathing are permitted to be common, box, or casing.
- Spacing shall be 6 inches on center on the edges and 12 inches on center at intermediate supports for nonstructural applications. Panel supports at 16 inches (20 inches if strength axis in the long direction of the panel, unless otherwise marked).
- Where a rafter is fastened to an adjacent parallel ceiling joist in accordance with this schedule and the ceiling joist is fastened to the top plate in accordance with this schedule, the number of toenails in the rafter shall be permitted to be reduced by one nail.

## **SECTION 2308**

### **CONVENTIONAL LIGHT-FRAME CONSTRUCTION**

*The provisions of Section 2308 have been replaced in their entirety as per the underlined text below.*

**2308.1 General.** The requirements of this section are intended for conventional light-frame construction. Other construction methods are permitted to be used, provided a satisfactory design is submitted showing compliance with other provisions of this code. Interior non-load-bearing partitions, ceilings and curtain walls of conventional light-frame construction are not subject to the limitations of section 2308.2. Alternatively, compliance with AF&PA WFCM shall be permitted subject to the limitations therein and the limitations of this code. Detached one- and two-family dwellings and multiple single-family dwellings



(townhouses) not more than three stories above grade plane in height with a separate means of egress and their accessory structures shall comply with the *International Residential Code*.

2308.1.1 Portions exceeding limitations of conventional light-frame construction. When portions of a building of otherwise conventional light-frame construction exceed the limits of Section 2308.2, those portions and the supporting load path shall be designed in accordance with accepted engineering practice and the provisions of this code. For the purposes of this section, the term “portions” shall mean parts of buildings containing volume and area such as a room or a series of rooms. The extent of such design need only demonstrate compliance of the non-conventionally light-framed elements with other applicable provisions of this code and shall be compatible with the performance of the conventional light-framed system.

2308.1.2 Connections and fasteners. Connectors and fasteners used in conventional construction shall comply with the requirements of Section 2304.9

2308.2 Limitations. Buildings are permitted to be constructed in accordance with the provisions of conventional light-frame construction, subject to the following limitations;

2308.2.1 Stories. Structures of conventional light-frame construction shall be limited in story height according to Table 2308.2.1

**TABLE 2308.2.1  
ALLOWABLE STORY HEIGHT**

| <u>Seismic Design Category</u> | <u>Allowable Story above grade plane</u> |
|--------------------------------|--|
| <u>A and B</u>                 | <u>Three stories</u>                     |
| <u>C</u>                       | <u>Two Stories</u>                       |
| <u>D and E <sup>a</sup></u>    | <u>One story</u>                         |

a. For the purposes of this section, for buildings assigned to *Seismic Design Category D* or *E*, cripple walls shall be considered to be a story unless cripple walls are solid blocked and do not exceed 14 inches in height.

2308.2.2 Allowable floor-to-floor height. Maximum floor-to-floor height shall not exceed 11 feet, 7 inches (3531 mm). Exterior bearing wall and interior braced wall heights shall not exceed a stud height of 10 feet (3048 mm).

2308.2.3 Allowable Loads. Loads shall be in accordance with Chapter 16 and shall not exceed the following:

1. Average dead loads shall not exceed 15 psf (718 N/m<sup>2</sup>) for combined roof and ceiling, exterior walls, floors and partitions.

Exceptions:

1. Subject to the limitations of Section 2308.6.9.2, stone or masonry veneer up to the lesser of 5 inches (127 mm) thick or 50 psf (2395 N/m<sup>2</sup>) and installed in accordance with Chapter 14 is permitted to a height of 30 feet (9144 mm) above a noncombustible foundation, with an additional 8 feet (2438 mm) permitted for gable ends.

2. Concrete or masonry fireplaces, heaters and chimneys shall be permitted in accordance with the provisions of this code.

3. Live loads shall not exceed 40 psf (1916 N/m<sup>2</sup>) for floors of conventional light-frame construction. Floor live load shall be allowed to exceed 40 psf (1916 N/m<sup>2</sup>) for concrete slab on grade floors.

4. Ground snow loads shall not exceed 50 psf (2395 N/m<sup>2</sup>).

2308.2.4 Allowable wind speed.  $V_{asd}$  as determined in accordance with Section 1609.3.1 shall not exceed 100 miles per hour (mph) (44 m/s) (3-second gust).

Exceptions:

1.  $V_{asd}$  as determined in accordance with Section 1609.3.1 shall not exceed 110 mph (48.4 m/s) (3-second gust) for buildings in Exposure Category B that are not located in a hurricane-prone region.

2. Where  $V_{asd}$  as determined in accordance with Section 1609.3.1 exceeds 100 mph (3-second gust), the provisions of either AF&PA WFCM or ICC 600 are permitted to be used. Wind speeds in Figures 1609A, 1609B, and 1609C shall be converted in accordance with Section 1609.3.1 for use with AF&PA WFCM or ICC 600.

2308.2.5 Allowable roof span. Ceiling joist and rafter framing constructed in accordance with Section 2308.7 and trusses shall not span more than 40 feet (12 192 mm) between points of vertical support. A ridge board in accordance with Section 2308.7 or 2308.7.3.1 shall not be considered a vertical support.

2308.2.6 Risk Category limitation. The use of the provisions for conventional light-frame construction in this section shall not be permitted for Risk Category IV buildings, as determined by Section 1604.5, assigned to Seismic Design Category B, C, D or E.

2308.3 Foundations and footings. Foundations and footings shall be designed and constructed in accordance with Chapter 18 . Connections to foundations and footings shall comply with this section.

2308.3.1 Foundation plates or sills. Foundation plates or sills resting on concrete or masonry foundations shall comply with Section 2304.3.1. Foundation plates or sills shall be bolted or anchored to the foundation with not less than 1/2-inch-diameter (12.7 mm) steel bolts or approved anchors spaced to provide equivalent anchorage as the steel bolts. Bolts shall be embedded at least 7 inches (178 mm) into concrete or masonry.

Bolts shall be spaced not more than 6 feet (1829 mm) apart and there shall be a minimum of two bolts or anchor straps per piece with one bolt or anchor strap located not more than 12 inches (305 mm) or less than 4 inches (102 mm) from each end of each piece. A properly sized nut and washer shall be tightened on each bolt to the plate.

Exceptions:

1. Along braced wall lines in structures assigned to Seismic Design Category E, steel bolts with a minimum nominal diameter of 5/8 inch (15.9 mm) or approved anchor straps load rated in accordance with Section 1706.1 and spaced to provide equivalent anchorage shall be used.

2. Bolts in braced wall lines in structures over two stories above grade shall be spaced not more than 4 feet (1219 mm) o.c.

2308.3.2 Braced wall line sill plate anchorage in Seismic Design Category D and E. Sill plates along braced wall lines shall be anchored with anchor bolts with steel plate washers between the foundation

sill plate and the nut, or *approved* anchor straps load rated in accordance with Section 1706.1. Such washers shall be a minimum of 0.229 inch by 3 inches by 3 inches (5.82 mm by 76 mm by 76 mm) in size. The hole in the plate washer is permitted to be diagonally slotted with a width of up to 3/16 inch (4.76 mm) larger than the bolt diameter and a slot length not to exceed 1-3/4 inches (44 mm), provided a standard cut washer is placed between the plate washer and the nut.

#### 2308.4 Floor framing. Floor framing shall comply with this section.

2308.4.1 Girders. Girders for single-story construction or girders supporting loads from a single floor shall not be less than 4 inches by 6 inches (102 mm by 152 mm) for spans 6 feet (1829 mm) or less, provided that girders are spaced not more than 8 feet (2438 mm) o.c. Spans for built-up 2-inch girders shall be in accordance with Table 2308.4.1(1) or 2308.4.1(2). Other girders shall be designed to support the loads specified in this code. Girder end joints shall occur over supports.

Where a girder is spliced over a support, an adequate tie shall be provided. The ends of beams or girders supported on masonry or concrete shall not have less than 3 inches (76 mm) of bearing.

**TABLE 2308.4.1(1)**

### **HEADER AND GIRDER SPANS<sup>a</sup>** **FOR EXTERIOR BEARING WALLS**

**(Maximum Spans for Douglas Fir-Larch, Hem-Fir, Southern Pine and Spruce-Pine-Fir<sup>b</sup>**  
**and Required Number of Jack Studs)**

| HEADERS<br>SUPPORTING                         | SIZE       | GROUND SNOW LOAD (psf) <sup>e</sup> |                 |      |                 |      |                 |      |                 |      |                 |      |                 |
|---|------------|-------------------------------------|-----------------|------|-----------------|------|-----------------|------|-----------------|------|-----------------|------|-----------------|
|   |            | 30                                  |                 |      |                 |      |                 | 50   |                 |      |                 |      |                 |
|   |            | Building width <sup>c</sup> (feet)  |                 |      |                 |      |                 |      |                 |      |                 |      |                 |
|   |            | 20                                  |                 | 28   |                 | 36   |                 | 20   |                 | 28   |                 | 36   |                 |
|   |            | Span                                | NJ <sup>d</sup> | Span | NJ <sup>d</sup> | Span | NJ <sup>d</sup> | Span | NJ <sup>d</sup> | Span | NJ <sup>d</sup> | Span | NJ <sup>d</sup> |
| Roof & Ceiling                                | 2-2×4      | 3-6                                 | 1               | 3-2  | 1               | 2-10 | 1               | 3-2  | 1               | 2-9  | 1               | 2-6  | 1               |
|   | 2-2×6      | 5-5                                 | 1               | 4-8  | 1               | 4-2  | 1               | 4-8  | 1               | 4-1  | 1               | 3-8  | 2               |
|   | 2-2×8      | 6-10                                | 1               | 5-11 | 2               | 5-4  | 2               | 5-11 | 2               | 5-2  | 2               | 4-7  | 2               |
|   | 2-<br>2×10 | 8-5                                 | 2               | 7-3  | 2               | 6-6  | 2               | 7-3  | 2               | 6-3  | 2               | 5-7  | 2               |
|   | 2-<br>2×12 | 9-9                                 | 2               | 8-5  | 2               | 7-6  | 2               | 8-5  | 2               | 7-3  | 2               | 6-6  | 2               |
|   | 3-2×8      | 8-4                                 | 1               | 7-5  | 1               | 6-8  | 1               | 7-5  | 1               | 6-5  | 2               | 5-9  | 2               |
|   | 3-<br>2×10 | 10-6                                | 1               | 9-1  | 2               | 8-2  | 2               | 9-1  | 2               | 7-10 | 2               | 7-0  | 2               |
|   | 3-<br>2×12 | 12-2                                | 2               | 10-7 | 2               | 9-5  | 2               | 10-7 | 2               | 9-2  | 2               | 8-2  | 2               |
|   | 4-2×8      | 9-2                                 | 1               | 8-4  | 1               | 7-8  | 1               | 8-4  | 1               | 7-5  | 1               | 6-8  | 1               |
|   | 4-<br>2×10 | 11-8                                | 1               | 10-6 | 1               | 9-5  | 2               | 10-6 | 1               | 9-1  | 2               | 8-2  | 2               |
| 4-<br>2×12                                    | 14-1       | 1                                   | 12-2            | 2    | 10-<br>11       | 2    | 12-2            | 2    | 10-7            | 2    | 9-5             | 2    |                 |
| Roof, Ceiling<br>& 1 Center-<br>Bearing Floor | 2-2×4      | 3-1                                 | 1               | 2-9  | 1               | 2-5  | 1               | 2-9  | 1               | 2-5  | 1               | 2-2  | 1               |
|   | 2-2×6      | 4-6                                 | 1               | 4-0  | 1               | 3-7  | 2               | 4-1  | 1               | 3-7  | 2               | 3-3  | 2               |
|   | 2-2×8      | 5-9                                 | 2               | 5-0  | 2               | 4-6  | 2               | 5-2  | 2               | 4-6  | 2               | 4-1  | 2               |
|   | 2-<br>2×10 | 7-0                                 | 2               | 6-2  | 2               | 5-6  | 2               | 6-4  | 2               | 5-6  | 2               | 5-0  | 2               |
|   | 2-         | 8-1                                 | 2               | 7-1  | 2               | 6-5  | 2               | 7-4  | 2               | 6-5  | 2               | 5-9  | 3               |

|   |               |             |          |             |          |             |          |             |          |             |          |             |          |
|---|---------------|-------------|----------|-------------|----------|-------------|----------|-------------|----------|-------------|----------|-------------|----------|
|   | <u>2×12</u>   |             |          |             |          |             |          |             |          |             |          |             |          |
|   | <u>3-2×8</u>  | <u>7-2</u>  | <u>1</u> | <u>6-3</u>  | <u>2</u> | <u>5-8</u>  | <u>2</u> | <u>6-5</u>  | <u>2</u> | <u>5-8</u>  | <u>2</u> | <u>5-1</u>  | <u>2</u> |
|   | <u>3-2×10</u> | <u>8-9</u>  | <u>2</u> | <u>7-8</u>  | <u>2</u> | <u>6-11</u> | <u>2</u> | <u>7-11</u> | <u>2</u> | <u>6-11</u> | <u>2</u> | <u>6-3</u>  | <u>2</u> |
|   | <u>3-2×12</u> | <u>10-2</u> | <u>2</u> | <u>8-11</u> | <u>2</u> | <u>8-0</u>  | <u>2</u> | <u>9-2</u>  | <u>2</u> | <u>8-0</u>  | <u>2</u> | <u>7-3</u>  | <u>2</u> |
|   | <u>4-2×8</u>  | <u>8-1</u>  | <u>1</u> | <u>7-3</u>  | <u>1</u> | <u>6-7</u>  | <u>1</u> | <u>7-5</u>  | <u>1</u> | <u>6-6</u>  | <u>1</u> | <u>5-11</u> | <u>2</u> |
|   | <u>4-2×10</u> | <u>10-1</u> | <u>1</u> | <u>8-10</u> | <u>2</u> | <u>8-0</u>  | <u>2</u> | <u>9-1</u>  | <u>2</u> | <u>8-0</u>  | <u>2</u> | <u>7-2</u>  | <u>2</u> |
|   | <u>4-2×12</u> | <u>11-9</u> | <u>2</u> | <u>10-3</u> | <u>2</u> | <u>9-3</u>  | <u>2</u> | <u>10-7</u> | <u>2</u> | <u>9-3</u>  | <u>2</u> | <u>8-4</u>  | <u>2</u> |
| <b>Roof, Ceiling<br/>&amp; 1 Clear<br/>Span Floor</b> | <u>2-2×4</u>  | <u>2-8</u>  | <u>1</u> | <u>2-4</u>  | <u>1</u> | <u>2-1</u>  | <u>1</u> | <u>2-7</u>  | <u>1</u> | <u>2-3</u>  | <u>1</u> | <u>2-0</u>  | <u>1</u> |
|   | <u>2-2×6</u>  | <u>3-11</u> | <u>1</u> | <u>3-5</u>  | <u>2</u> | <u>3-0</u>  | <u>2</u> | <u>3-10</u> | <u>2</u> | <u>3-4</u>  | <u>2</u> | <u>3-0</u>  | <u>2</u> |
|   | <u>2-2×8</u>  | <u>5-0</u>  | <u>2</u> | <u>4-4</u>  | <u>2</u> | <u>3-10</u> | <u>2</u> | <u>4-10</u> | <u>2</u> | <u>4-2</u>  | <u>2</u> | <u>3-9</u>  | <u>2</u> |
|   | <u>2-2×10</u> | <u>6-1</u>  | <u>2</u> | <u>5-3</u>  | <u>2</u> | <u>4-8</u>  | <u>2</u> | <u>5-11</u> | <u>2</u> | <u>5-1</u>  | <u>2</u> | <u>4-7</u>  | <u>3</u> |
|   | <u>2-2×12</u> | <u>7-1</u>  | <u>2</u> | <u>6-1</u>  | <u>3</u> | <u>5-5</u>  | <u>3</u> | <u>6-10</u> | <u>2</u> | <u>5-11</u> | <u>3</u> | <u>5-4</u>  | <u>3</u> |
|   | <u>3-2×8</u>  | <u>6-3</u>  | <u>2</u> | <u>5-5</u>  | <u>2</u> | <u>4-10</u> | <u>2</u> | <u>6-1</u>  | <u>2</u> | <u>5-3</u>  | <u>2</u> | <u>4-8</u>  | <u>2</u> |
|   | <u>3-2×10</u> | <u>7-7</u>  | <u>2</u> | <u>6-7</u>  | <u>2</u> | <u>5-11</u> | <u>2</u> | <u>7-5</u>  | <u>2</u> | <u>6-5</u>  | <u>2</u> | <u>5-9</u>  | <u>2</u> |
|   | <u>3-2×12</u> | <u>8-10</u> | <u>2</u> | <u>7-8</u>  | <u>2</u> | <u>6-10</u> | <u>2</u> | <u>8-7</u>  | <u>2</u> | <u>7-5</u>  | <u>2</u> | <u>6-8</u>  | <u>2</u> |
|   | <u>4-2×8</u>  | <u>7-2</u>  | <u>1</u> | <u>6-3</u>  | <u>2</u> | <u>5-7</u>  | <u>2</u> | <u>7-0</u>  | <u>1</u> | <u>6-1</u>  | <u>2</u> | <u>5-5</u>  | <u>2</u> |
|   | <u>4-2×10</u> | <u>8-9</u>  | <u>2</u> | <u>7-7</u>  | <u>2</u> | <u>6-10</u> | <u>2</u> | <u>8-7</u>  | <u>2</u> | <u>7-5</u>  | <u>2</u> | <u>6-7</u>  | <u>2</u> |
|   | <u>4-2×12</u> | <u>10-2</u> | <u>2</u> | <u>8-10</u> | <u>2</u> | <u>7-11</u> | <u>2</u> | <u>9-11</u> | <u>2</u> | <u>8-7</u>  | <u>2</u> | <u>7-8</u>  | <u>2</u> |

*(continued)*

**TABLE 2308.4.1(1)—continued**

**HEADER AND GIRDER SPANS<sup>a</sup> FOR EXTERIOR BEARING WALLS**

**(Maximum Spans for Douglas Fir-Larch, Hem-Fir, Southern Pine and Spruce-Pine-Fir<sup>b</sup>  
and Required Number of Jack Studs)**

| HEADERS<br>SUPPORTING                          | SIZE   | GROUND SNOW LOAD (psf) <sup>e</sup> |                 |      |                 |      |                 |      |                 |      |                 |      |                 |
|--|--------|-------------------------------------|-----------------|------|-----------------|------|-----------------|------|-----------------|------|-----------------|------|-----------------|
|  |        | 30                                  |                 |      |                 |      |                 | 50   |                 |      |                 |      |                 |
|  |        | Building width <sup>c</sup> (feet)  |                 |      |                 |      |                 |      |                 |      |                 |      |                 |
|  |        | 20                                  |                 | 28   |                 | 36   |                 | 20   |                 | 28   |                 | 36   |                 |
|  |        | Span                                | NJ <sup>d</sup> | Span | NJ <sup>d</sup> | Span | NJ <sup>d</sup> | Span | NJ <sup>d</sup> | Span | NJ <sup>d</sup> | Span | NJ <sup>d</sup> |
| Roof, Ceiling<br>& 2 Center-<br>Bearing Floors | 2-2×4  | 2-7                                 | 1               | 2-3  | 1               | 2-0  | 1               | 2-6  | 1               | 2-2  | 1               | 1-11 | 1               |
|  | 2-2×6  | 3-9                                 | 2               | 3-3  | 2               | 2-11 | 2               | 3-8  | 2               | 3-2  | 2               | 2-10 | 2               |
|  | 2-2×8  | 4-9                                 | 2               | 4-2  | 2               | 3-9  | 2               | 4-7  | 2               | 4-0  | 2               | 3-8  | 2               |
|  | 2-2×10 | 5-9                                 | 2               | 5-1  | 2               | 4-7  | 3               | 5-8  | 2               | 4-11 | 2               | 4-5  | 3               |
|  | 2-2×12 | 6-8                                 | 2               | 5-10 | 3               | 5-3  | 3               | 6-6  | 2               | 5-9  | 3               | 5-2  | 3               |
|  | 3-2×8  | 5-11                                | 2               | 5-2  | 2               | 4-8  | 2               | 5-9  | 2               | 5-1  | 2               | 4-7  | 2               |
|  | 3-2×10 | 7-3                                 | 2               | 6-4  | 2               | 5-8  | 2               | 7-1  | 2               | 6-2  | 2               | 5-7  | 2               |
|  | 3-2×12 | 8-5                                 | 2               | 7-4  | 2               | 6-7  | 2               | 8-2  | 2               | 7-2  | 2               | 6-5  | 3               |
|  | 4-2×8  | 6-10                                | 1               | 6-0  | 2               | 5-5  | 2               | 6-8  | 1               | 5-10 | 2               | 5-3  | 2               |

|  |                          |             |          |             |          |            |          |             |          |             |          |             |          |
|--|--------------------------|-------------|----------|-------------|----------|------------|----------|-------------|----------|-------------|----------|-------------|----------|
| <b>Roof, Ceiling<br/>&amp; 2 Clear<br/>Span<br/>Floors</b> | <u>4-</u><br><u>2×10</u> | <u>8-4</u>  | <u>2</u> | <u>7-4</u>  | <u>2</u> | <u>6-7</u> | <u>2</u> | <u>8-2</u>  | <u>2</u> | <u>7-2</u>  | <u>2</u> | <u>6-5</u>  | <u>2</u> |
|  | <u>4-</u><br><u>2×12</u> | <u>9-8</u>  | <u>2</u> | <u>8-6</u>  | <u>2</u> | <u>7-8</u> | <u>2</u> | <u>9-5</u>  | <u>2</u> | <u>8-3</u>  | <u>2</u> | <u>7-5</u>  | <u>2</u> |
|  | <u>2-2×4</u>             | <u>2-1</u>  | <u>1</u> | <u>1-8</u>  | <u>1</u> | <u>1-6</u> | <u>2</u> | <u>2-0</u>  | <u>1</u> | <u>1-8</u>  | <u>1</u> | <u>1-5</u>  | <u>2</u> |
|  | <u>2-2×6</u>             | <u>3-1</u>  | <u>2</u> | <u>2-8</u>  | <u>2</u> | <u>2-4</u> | <u>2</u> | <u>3-0</u>  | <u>2</u> | <u>2-7</u>  | <u>2</u> | <u>2-3</u>  | <u>2</u> |
|  | <u>2-2×8</u>             | <u>3-10</u> | <u>2</u> | <u>3-4</u>  | <u>2</u> | <u>3-0</u> | <u>3</u> | <u>3-10</u> | <u>2</u> | <u>3-4</u>  | <u>2</u> | <u>2-11</u> | <u>3</u> |
|  | <u>2-</u><br><u>2×10</u> | <u>4-9</u>  | <u>2</u> | <u>4-1</u>  | <u>3</u> | <u>3-8</u> | <u>3</u> | <u>4-8</u>  | <u>2</u> | <u>4-0</u>  | <u>3</u> | <u>3-7</u>  | <u>3</u> |
|  | <u>2-</u><br><u>2×12</u> | <u>5-6</u>  | <u>3</u> | <u>4-9</u>  | <u>3</u> | <u>4-3</u> | <u>3</u> | <u>5-5</u>  | <u>3</u> | <u>4-8</u>  | <u>3</u> | <u>4-2</u>  | <u>3</u> |
|  | <u>3-2×8</u>             | <u>4-10</u> | <u>2</u> | <u>4-2</u>  | <u>2</u> | <u>3-9</u> | <u>2</u> | <u>4-9</u>  | <u>2</u> | <u>4-1</u>  | <u>2</u> | <u>3-8</u>  | <u>2</u> |
|  | <u>3-</u><br><u>2×10</u> | <u>5-11</u> | <u>2</u> | <u>5-1</u>  | <u>2</u> | <u>4-7</u> | <u>3</u> | <u>5-10</u> | <u>2</u> | <u>5-0</u>  | <u>2</u> | <u>4-6</u>  | <u>3</u> |
|  | <u>3-</u><br><u>2×12</u> | <u>6-10</u> | <u>2</u> | <u>5-11</u> | <u>3</u> | <u>5-4</u> | <u>3</u> | <u>6-9</u>  | <u>2</u> | <u>5-10</u> | <u>3</u> | <u>5-3</u>  | <u>3</u> |
|  | <u>4-2×8</u>             | <u>5-7</u>  | <u>2</u> | <u>4-10</u> | <u>2</u> | <u>4-4</u> | <u>2</u> | <u>5-6</u>  | <u>2</u> | <u>4-9</u>  | <u>2</u> | <u>4-3</u>  | <u>2</u> |
|  | <u>4-</u><br><u>2×10</u> | <u>6-10</u> | <u>2</u> | <u>5-11</u> | <u>2</u> | <u>5-3</u> | <u>2</u> | <u>6-9</u>  | <u>2</u> | <u>5-10</u> | <u>2</u> | <u>5-2</u>  | <u>2</u> |
|  | <u>4-</u><br><u>2×12</u> | <u>7-11</u> | <u>2</u> | <u>6-10</u> | <u>2</u> | <u>6-2</u> | <u>3</u> | <u>7-9</u>  | <u>2</u> | <u>6-9</u>  | <u>2</u> | <u>6-0</u>  | <u>3</u> |

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 47.8 N/m<sup>2</sup>

- Spans are given in feet and inches (ft-in).
- Tabulated values are for No. 2 grade lumber.
- Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
- NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an *approved* framing anchor attached to the full-height wall stud and to the header.
- Use 30 pounds per square foot ground snow load for cases in which ground snow load is less than 30 pounds per square foot and the roof live load is equal to or less than 20 pounds per square foot.

#### 2308.4.2 Floor joists. Floor joists shall comply with this section.

2308.4.2.1 Span. Spans for floor joists shall be in accordance with Tables 2308.4(3) or 2308.4(4) or the *AF&PA Span Tables for Joists and Rafters*.

2308.4.2.2 Bearing. The ends of each joist shall not have less than 1-1/2 inches (38 mm) of bearing on wood or metal, or not less than 3 inches (76 mm) on masonry, except where supported on a 1-inch by 4-inch (25.4 mm by 102 mm) ribbon strip and nailed to the adjoining stud,

2308.4.2.3 Framing details. Joists shall be supported laterally at the ends and at each support by solid blocking except where the ends of the joists are nailed to a header, band or rim joist or to an adjoining stud or by other means. Solid blocking shall not be less than 2 inches (51mm) in thickness and the full depth of the joist. Joist framing from opposite sides of a beam, girder or partition shall be lapped at least 3 inches (76 mm) or the opposing joists shall be tied together in an approved manner. Joists framing into the side of a wood girder shall be supported by framing anchors or on ledger strips not less than 2 inches by 2 inches (51 mm by 51 mm).

2308.4.2.4 Notches and holes. Notches on the ends of joists shall not exceed one-fourth the joist depth. Notches in the top or bottom of joists shall not exceed one sixth the depth and shall not be

located in the middle third of the span. Holes bored in joists shall not be within 2 inches (51 mm) of the top or bottom of the joist and the diameter of any such hole shall not exceed one-third the depth of the joist.

**TABLE 2308.4.2(1)**  
**FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES**  
**(Residential Sleeping Areas, Live Load = 30 psf, L/Δ = 360)**

| <b>JOIST<br/>SPACING<br/>(inches)</b> | <b>SPECIES AND<br/>GRADE</b> |           | <b>DEAD LOAD = 10 psf</b>        |                        |                        |                        | <b>DEAD LOAD = 20 psf</b> |                        |                        |                        |
|---------------------------------------|------------------------------|-----------|----------------------------------|------------------------|------------------------|------------------------|---------------------------|------------------------|------------------------|------------------------|
|                                       |                              |           | <b>2x6</b>                       | <b>2x8</b>             | <b>2x10</b>            | <b>2x12</b>            | <b>2x6</b>                | <b>2x8</b>             | <b>2x10</b>            | <b>2x12</b>            |
|                                       |                              |           | <b>Maximum floor joist spans</b> |                        |                        |                        |                           |                        |                        |                        |
|                                       |                              |           | <b>(ft. -<br/>in.)</b>           | <b>(ft. -<br/>in.)</b> | <b>(ft. -<br/>in.)</b> | <b>(ft. -<br/>in.)</b> | <b>(ft. -<br/>in.)</b>    | <b>(ft. -<br/>in.)</b> | <b>(ft. -<br/>in.)</b> | <b>(ft. -<br/>in.)</b> |
| <b>12</b>                             | <b>Douglas Fir-Larch</b>     | <b>SS</b> | <b>12-6</b>                      | <b>16-6</b>            | <b>21-0</b>            | <b>25-7</b>            | <b>12-6</b>               | <b>16-6</b>            | <b>21-0</b>            | <b>25-7</b>            |
|                                       | <b>Douglas Fir-Larch</b>     | <b>#1</b> | <b>12-0</b>                      | <b>15-10</b>           | <b>20-3</b>            | <b>24-8</b>            | <b>12-0</b>               | <b>15-7</b>            | <b>19-0</b>            | <b>22-0</b>            |
|                                       | <b>Douglas Fir-Larch</b>     | <b>#2</b> | <b>11-10</b>                     | <b>15-7</b>            | <b>19-10</b>           | <b>23-0</b>            | <b>11-6</b>               | <b>14-7</b>            | <b>17-9</b>            | <b>20-7</b>            |
|                                       | <b>Douglas Fir-Larch</b>     | <b>#3</b> | <b>9-8</b>                       | <b>12-4</b>            | <b>15-0</b>            | <b>17-5</b>            | <b>8-8</b>                | <b>11-0</b>            | <b>13-5</b>            | <b>15-7</b>            |
|                                       | <b>Hem-Fir</b>               | <b>SS</b> | <b>11-10</b>                     | <b>15-7</b>            | <b>19-10</b>           | <b>24-2</b>            | <b>11-10</b>              | <b>15-7</b>            | <b>19-10</b>           | <b>24-2</b>            |
|                                       | <b>Hem-Fir</b>               | <b>#1</b> | <b>11-7</b>                      | <b>15-3</b>            | <b>19-5</b>            | <b>23-7</b>            | <b>11-7</b>               | <b>15-2</b>            | <b>18-6</b>            | <b>21-6</b>            |
|                                       | <b>Hem-Fir</b>               | <b>#2</b> | <b>11-0</b>                      | <b>14-6</b>            | <b>18-6</b>            | <b>22-6</b>            | <b>11-0</b>               | <b>14-4</b>            | <b>17-6</b>            | <b>20-4</b>            |
|                                       | <b>Hem-Fir</b>               | <b>#3</b> | <b>9-8</b>                       | <b>12-4</b>            | <b>15-0</b>            | <b>17-5</b>            | <b>8-8</b>                | <b>11-0</b>            | <b>13-5</b>            | <b>15-7</b>            |
|                                       | <b>Southern Pine</b>         | <b>SS</b> | <b>12-3</b>                      | <b>16-2</b>            | <b>20-8</b>            | <b>25-1</b>            | <b>12-3</b>               | <b>16-2</b>            | <b>20-8</b>            | <b>25-1</b>            |
|                                       | <b>Southern Pine</b>         | <b>#1</b> | <b>12-0</b>                      | <b>15-10</b>           | <b>20-3</b>            | <b>24-8</b>            | <b>12-0</b>               | <b>15-10</b>           | <b>20-3</b>            | <b>24-8</b>            |
|                                       | <b>Southern Pine</b>         | <b>#2</b> | <b>11-10</b>                     | <b>15-7</b>            | <b>19-10</b>           | <b>24-2</b>            | <b>11-10</b>              | <b>15-7</b>            | <b>18-7</b>            | <b>21-9</b>            |
|                                       | <b>Southern Pine</b>         | <b>#3</b> | <b>10-5</b>                      | <b>13-3</b>            | <b>15-8</b>            | <b>18-8</b>            | <b>9-4</b>                | <b>11-11</b>           | <b>14-0</b>            | <b>16-8</b>            |
|                                       | <b>Spruce-Pine-Fir</b>       | <b>SS</b> | <b>11-7</b>                      | <b>15-3</b>            | <b>19-5</b>            | <b>23-7</b>            | <b>11-7</b>               | <b>15-3</b>            | <b>19-5</b>            | <b>23-7</b>            |
|                                       | <b>Spruce-Pine-Fir</b>       | <b>#1</b> | <b>11-3</b>                      | <b>14-11</b>           | <b>19-0</b>            | <b>23-0</b>            | <b>11-3</b>               | <b>14-7</b>            | <b>17-9</b>            | <b>20-7</b>            |
|                                       | <b>Spruce-Pine-Fir</b>       | <b>#2</b> | <b>11-3</b>                      | <b>14-11</b>           | <b>19-0</b>            | <b>23-0</b>            | <b>11-3</b>               | <b>14-7</b>            | <b>17-9</b>            | <b>20-7</b>            |
|                                       | <b>Spruce-Pine-Fir</b>       | <b>#3</b> | <b>9-8</b>                       | <b>12-4</b>            | <b>15-0</b>            | <b>17-5</b>            | <b>8-8</b>                | <b>11-0</b>            | <b>13-5</b>            | <b>15-7</b>            |
| <b>16</b>                             | <b>Douglas Fir-Larch</b>     | <b>SS</b> | <b>11-4</b>                      | <b>15-0</b>            | <b>19-1</b>            | <b>23-3</b>            | <b>11-4</b>               | <b>15-0</b>            | <b>19-1</b>            | <b>23-0</b>            |
|                                       | <b>Douglas Fir-Larch</b>     | <b>#1</b> | <b>10-11</b>                     | <b>14-5</b>            | <b>18-5</b>            | <b>21-4</b>            | <b>10-8</b>               | <b>13-6</b>            | <b>16-5</b>            | <b>19-1</b>            |
|                                       | <b>Douglas Fir-Larch</b>     | <b>#2</b> | <b>10-9</b>                      | <b>14-1</b>            | <b>17-2</b>            | <b>19-11</b>           | <b>9-11</b>               | <b>12-7</b>            | <b>15-5</b>            | <b>17-10</b>           |
|                                       | <b>Douglas Fir-Larch</b>     | <b>#3</b> | <b>8-5</b>                       | <b>10-8</b>            | <b>13-0</b>            | <b>15-1</b>            | <b>7-6</b>                | <b>9-6</b>             | <b>11-8</b>            | <b>13-6</b>            |
|                                       | <b>Hem-Fir</b>               | <b>SS</b> | <b>10-9</b>                      | <b>14-2</b>            | <b>18-0</b>            | <b>21-11</b>           | <b>10-9</b>               | <b>14-2</b>            | <b>18-0</b>            | <b>21-11</b>           |
|                                       | <b>Hem-Fir</b>               | <b>#1</b> | <b>10-6</b>                      | <b>13-10</b>           | <b>17-8</b>            | <b>20-9</b>            | <b>10-4</b>               | <b>13-1</b>            | <b>16-0</b>            | <b>18-7</b>            |
|                                       | <b>Hem-Fir</b>               | <b>#2</b> | <b>10-0</b>                      | <b>13-2</b>            | <b>16-10</b>           | <b>19-8</b>            | <b>9-10</b>               | <b>12-5</b>            | <b>15-2</b>            | <b>17-7</b>            |
|                                       | <b>Hem-Fir</b>               | <b>#3</b> | <b>8-5</b>                       | <b>10-8</b>            | <b>13-0</b>            | <b>15-1</b>            | <b>7-6</b>                | <b>9-6</b>             | <b>11-8</b>            | <b>13-6</b>            |
|                                       | <b>Southern Pine</b>         | <b>SS</b> | <b>11-2</b>                      | <b>14-8</b>            | <b>18-9</b>            | <b>22-10</b>           | <b>11-2</b>               | <b>14-8</b>            | <b>18-9</b>            | <b>22-10</b>           |
|                                       | <b>Southern Pine</b>         | <b>#1</b> | <b>10-11</b>                     | <b>14-5</b>            | <b>18-5</b>            | <b>22-5</b>            | <b>10-11</b>              | <b>14-5</b>            | <b>17-11</b>           | <b>21-4</b>            |
|                                       | <b>Southern Pine</b>         | <b>#2</b> | <b>10-9</b>                      | <b>14-2</b>            | <b>18-0</b>            | <b>21-1</b>            | <b>10-5</b>               | <b>13-6</b>            | <b>16-1</b>            | <b>18-10</b>           |
|                                       | <b>Southern Pine</b>         | <b>#3</b> | <b>9-0</b>                       | <b>11-6</b>            | <b>13-7</b>            | <b>16-2</b>            | <b>8-1</b>                | <b>10-3</b>            | <b>12-2</b>            | <b>14-6</b>            |
|                                       | <b>Spruce-Pine-Fir</b>       | <b>SS</b> | <b>10-6</b>                      | <b>13-10</b>           | <b>17-8</b>            | <b>21-6</b>            | <b>10-6</b>               | <b>13-10</b>           | <b>17-8</b>            | <b>21-4</b>            |
|                                       | <b>Spruce-Pine-Fir</b>       | <b>#1</b> | <b>10-3</b>                      | <b>13-6</b>            | <b>17-2</b>            | <b>19-11</b>           | <b>9-11</b>               | <b>12-7</b>            | <b>15-5</b>            | <b>17-10</b>           |
|                                       | <b>Spruce-Pine-Fir</b>       | <b>#2</b> | <b>10-3</b>                      | <b>13-6</b>            | <b>17-2</b>            | <b>19-11</b>           | <b>9-11</b>               | <b>12-7</b>            | <b>15-5</b>            | <b>17-10</b>           |
|                                       | <b>Spruce-Pine-Fir</b>       | <b>#3</b> | <b>8-5</b>                       | <b>10-8</b>            | <b>13-0</b>            | <b>15-1</b>            | <b>7-6</b>                | <b>9-6</b>             | <b>11-8</b>            | <b>13-6</b>            |
| <b>19.2</b>                           | <b>Douglas Fir-</b>          | <b>SS</b> | <b>10-8</b>                      | <b>14-1</b>            | <b>18-0</b>            | <b>21-10</b>           | <b>10-8</b>               | <b>14-1</b>            | <b>18-0</b>            | <b>21-0</b>            |

|  |                          |           |             |              |              |             |             |             |              |             |
|--|--------------------------|-----------|-------------|--------------|--------------|-------------|-------------|-------------|--------------|-------------|
|  | <u>Larch</u>             |           |             |              |              |             |             |             |              |             |
|  | <u>Douglas Fir-Larch</u> | <u>#1</u> | <u>10-4</u> | <u>13-7</u>  | <u>16-9</u>  | <u>19-6</u> | <u>9-8</u>  | <u>12-4</u> | <u>15-0</u>  | <u>17-5</u> |
|  | <u>Douglas Fir-Larch</u> | <u>#2</u> | <u>10-1</u> | <u>12-10</u> | <u>15-8</u>  | <u>18-3</u> | <u>9-1</u>  | <u>11-6</u> | <u>14-1</u>  | <u>16-3</u> |
|  | <u>Douglas Fir-Larch</u> | <u>#3</u> | <u>7-8</u>  | <u>9-9</u>   | <u>11-10</u> | <u>13-9</u> | <u>6-10</u> | <u>8-8</u>  | <u>10-7</u>  | <u>12-4</u> |
|  | <u>Hem-Fir</u>           | <u>SS</u> | <u>10-1</u> | <u>13-4</u>  | <u>17-0</u>  | <u>20-8</u> | <u>10-1</u> | <u>13-4</u> | <u>17-0</u>  | <u>20-7</u> |
|  | <u>Hem-Fir</u>           | <u>#1</u> | <u>9-10</u> | <u>13-0</u>  | <u>16-4</u>  | <u>19-0</u> | <u>9-6</u>  | <u>12-0</u> | <u>14-8</u>  | <u>17-0</u> |
|  | <u>Hem-Fir</u>           | <u>#2</u> | <u>9-5</u>  | <u>12-5</u>  | <u>15-6</u>  | <u>17-1</u> | <u>8-11</u> | <u>11-4</u> | <u>13-10</u> | <u>16-1</u> |
|  | <u>Hem-Fir</u>           | <u>#3</u> | <u>7-8</u>  | <u>9-9</u>   | <u>11-10</u> | <u>13-9</u> | <u>6-10</u> | <u>8-8</u>  | <u>10-7</u>  | <u>12-4</u> |

*(continued)*

**TABLE 2308.4.2(1)—continued**  
**FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES**  
**(Residential Sleeping Areas, Live Load = 30 psf, L/Δ□ = 360)**

| <b>JOIST<br/>SPACING<br/>(inches)</b> | <b>SPECIES AND<br/>GRADE</b> |           | <b>DEAD LOAD = 10 psf</b>        |                        |                        |                        | <b>DEAD LOAD = 20 psf</b> |                        |                        |                        |
|---------------------------------------|------------------------------|-----------|----------------------------------|------------------------|------------------------|------------------------|---------------------------|------------------------|------------------------|------------------------|
|                                       |                              |           | <b>2x6</b>                       | <b>2x8</b>             | <b>2x10</b>            | <b>2x12</b>            | <b>2x6</b>                | <b>2x8</b>             | <b>2x10</b>            | <b>2x12</b>            |
|                                       |                              |           | <b>Maximum floor joist spans</b> |                        |                        |                        |                           |                        |                        |                        |
|                                       |                              |           | <b>(ft. -<br/>in.)</b>           | <b>(ft. -<br/>in.)</b> | <b>(ft. -<br/>in.)</b> | <b>(ft. -<br/>in.)</b> | <b>(ft. -<br/>in.)</b>    | <b>(ft. -<br/>in.)</b> | <b>(ft. -<br/>in.)</b> | <b>(ft. -<br/>in.)</b> |
| <b>19.2</b>                           | <u>Southern Pine</u>         | <u>SS</u> | <u>10-6</u>                      | <u>13-10</u>           | <u>17-8</u>            | <u>21-6</u>            | <u>10-6</u>               | <u>13-10</u>           | <u>17-8</u>            | <u>21-6</u>            |
|                                       | <u>Southern Pine</u>         | <u>#1</u> | <u>10-4</u>                      | <u>13-7</u>            | <u>17-4</u>            | <u>21-1</u>            | <u>10-4</u>               | <u>13-7</u>            | <u>16-4</u>            | <u>19-6</u>            |
|                                       | <u>Southern Pine</u>         | <u>#2</u> | <u>10-1</u>                      | <u>13-4</u>            | <u>16-5</u>            | <u>19-3</u>            | <u>9-6</u>                | <u>12-4</u>            | <u>14-8</u>            | <u>17-2</u>            |
|                                       | <u>Southern Pine</u>         | <u>#3</u> | <u>8-3</u>                       | <u>10-6</u>            | <u>12-5</u>            | <u>14-9</u>            | <u>7-4</u>                | <u>9-5</u>             | <u>11-1</u>            | <u>13-2</u>            |
|                                       | <u>Spruce-Pine-Fir</u>       | <u>SS</u> | <u>9-10</u>                      | <u>13-0</u>            | <u>16-7</u>            | <u>20-2</u>            | <u>9-10</u>               | <u>13-0</u>            | <u>16-7</u>            | <u>19-6</u>            |
|                                       | <u>Spruce-Pine-Fir</u>       | <u>#1</u> | <u>9-8</u>                       | <u>12-9</u>            | <u>15-8</u>            | <u>18-3</u>            | <u>9-1</u>                | <u>11-6</u>            | <u>14-1</u>            | <u>16-3</u>            |
|                                       | <u>Spruce-Pine-Fir</u>       | <u>#2</u> | <u>9-8</u>                       | <u>12-9</u>            | <u>15-8</u>            | <u>18-3</u>            | <u>9-1</u>                | <u>11-6</u>            | <u>14-1</u>            | <u>16-3</u>            |
|                                       | <u>Spruce-Pine-Fir</u>       | <u>#3</u> | <u>7-8</u>                       | <u>9-9</u>             | <u>11-10</u>           | <u>13-9</u>            | <u>6-10</u>               | <u>8-8</u>             | <u>10-7</u>            | <u>12-4</u>            |
| <b>24</b>                             | <u>Douglas Fir-Larch</u>     | <u>SS</u> | <u>9-11</u>                      | <u>13-1</u>            | <u>16-8</u>            | <u>20-3</u>            | <u>9-11</u>               | <u>13-1</u>            | <u>16-2</u>            | <u>18-9</u>            |
|                                       | <u>Douglas Fir-Larch</u>     | <u>#1</u> | <u>9-7</u>                       | <u>12-4</u>            | <u>15-0</u>            | <u>17-5</u>            | <u>8-8</u>                | <u>11-0</u>            | <u>13-5</u>            | <u>15-7</u>            |
|                                       | <u>Douglas Fir-Larch</u>     | <u>#2</u> | <u>9-1</u>                       | <u>11-6</u>            | <u>14-1</u>            | <u>16-3</u>            | <u>8-1</u>                | <u>10-3</u>            | <u>12-7</u>            | <u>14-7</u>            |
|                                       | <u>Douglas Fir-Larch</u>     | <u>#3</u> | <u>6-10</u>                      | <u>8-8</u>             | <u>10-7</u>            | <u>12-4</u>            | <u>6-2</u>                | <u>7-9</u>             | <u>9-6</u>             | <u>11-0</u>            |
|                                       | <u>Hem-Fir</u>               | <u>SS</u> | <u>9-4</u>                       | <u>12-4</u>            | <u>15-9</u>            | <u>19-2</u>            | <u>9-4</u>                | <u>12-4</u>            | <u>15-9</u>            | <u>18-5</u>            |
|                                       | <u>Hem-Fir</u>               | <u>#1</u> | <u>9-2</u>                       | <u>12-0</u>            | <u>14-8</u>            | <u>17-0</u>            | <u>8-6</u>                | <u>10-9</u>            | <u>13-1</u>            | <u>15-2</u>            |
|                                       | <u>Hem-Fir</u>               | <u>#2</u> | <u>8-9</u>                       | <u>11-4</u>            | <u>13-10</u>           | <u>16-1</u>            | <u>8-0</u>                | <u>10-2</u>            | <u>12-5</u>            | <u>14-4</u>            |
|                                       | <u>Hem-Fir</u>               | <u>#3</u> | <u>6-10</u>                      | <u>8-8</u>             | <u>10-7</u>            | <u>12-4</u>            | <u>6-2</u>                | <u>7-9</u>             | <u>9-6</u>             | <u>11-0</u>            |
|                                       | <u>Southern Pine</u>         | <u>SS</u> | <u>9-9</u>                       | <u>12-10</u>           | <u>16-5</u>            | <u>19-11</u>           | <u>9-9</u>                | <u>12-10</u>           | <u>16-5</u>            | <u>19-11</u>           |
|                                       | <u>Southern Pine</u>         | <u>#1</u> | <u>9-7</u>                       | <u>12-7</u>            | <u>16-1</u>            | <u>19-6</u>            | <u>9-7</u>                | <u>12-4</u>            | <u>14-7</u>            | <u>17-5</u>            |
|                                       | <u>Southern Pine</u>         | <u>#2</u> | <u>9-4</u>                       | <u>12-4</u>            | <u>14-8</u>            | <u>17-2</u>            | <u>8-6</u>                | <u>11-0</u>            | <u>13-1</u>            | <u>15-5</u>            |
|                                       | <u>Southern Pine</u>         | <u>#3</u> | <u>7-4</u>                       | <u>9-5</u>             | <u>11-1</u>            | <u>13-2</u>            | <u>6-7</u>                | <u>8-5</u>             | <u>9-11</u>            | <u>11-10</u>           |
|                                       | <u>Spruce-Pine-Fir</u>       | <u>SS</u> | <u>9-2</u>                       | <u>12-1</u>            | <u>15-5</u>            | <u>18-9</u>            | <u>9-2</u>                | <u>12-1</u>            | <u>15-0</u>            | <u>17-5</u>            |
|                                       | <u>Spruce-Pine-Fir</u>       | <u>#1</u> | <u>8-11</u>                      | <u>11-6</u>            | <u>14-1</u>            | <u>16-3</u>            | <u>8-1</u>                | <u>10-3</u>            | <u>12-7</u>            | <u>14-7</u>            |
|                                       | <u>Spruce-Pine-Fir</u>       | <u>#2</u> | <u>8-11</u>                      | <u>11-6</u>            | <u>14-1</u>            | <u>16-3</u>            | <u>8-1</u>                | <u>10-3</u>            | <u>12-7</u>            | <u>14-7</u>            |
|                                       | <u>Spruce-Pine-Fir</u>       | <u>#3</u> | <u>6-10</u>                      | <u>8-8</u>             | <u>10-7</u>            | <u>12-4</u>            | <u>6-2</u>                | <u>7-9</u>             | <u>9-6</u>             | <u>11-0</u>            |

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 47.8 N/m<sup>2</sup>

**TABLE 2308.4.2(2)**  
**FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES**  
(Residential Living Areas, Live Load = 40 psf, L/Δ = 360)

| JOIST<br>SPACING<br>(inches) | SPECIES AND<br>GRADE |    | DEAD LOAD = 10 psf        |                |                |                | DEAD LOAD = 20 psf |                |                |                |
|------------------------------|----------------------|----|---------------------------|----------------|----------------|----------------|--------------------|----------------|----------------|----------------|
|                              |                      |    | 2x6                       | 2x8            | 2x10           | 2x12           | 2x6                | 2x8            | 2x10           | 2x12           |
|                              |                      |    | Maximum floor joist spans |                |                |                |                    |                |                |                |
|                              |                      |    | (ft. -<br>in.)            | (ft. -<br>in.) | (ft. -<br>in.) | (ft. -<br>in.) | (ft. -<br>in.)     | (ft. -<br>in.) | (ft. -<br>in.) | (ft. -<br>in.) |
| <u>12</u>                    | Douglas Fir-Larch    | SS | <u>11-4</u>               | <u>15-0</u>    | <u>19-1</u>    | <u>23-3</u>    | <u>11-4</u>        | <u>15-0</u>    | <u>19-1</u>    | <u>23-3</u>    |
|                              | Douglas Fir-Larch    | #1 | <u>10-11</u>              | <u>14-5</u>    | <u>18-5</u>    | <u>22-0</u>    | <u>10-11</u>       | <u>14-2</u>    | <u>17-4</u>    | <u>20-1</u>    |
|                              | Douglas Fir-Larch    | #2 | <u>10-9</u>               | <u>14-2</u>    | <u>17-9</u>    | <u>20-7</u>    | <u>10-6</u>        | <u>13-3</u>    | <u>16-3</u>    | <u>18-10</u>   |
|                              | Douglas Fir-Larch    | #3 | <u>8-8</u>                | <u>11-0</u>    | <u>13-5</u>    | <u>15-7</u>    | <u>7-11</u>        | <u>10-0</u>    | <u>12-3</u>    | <u>14-3</u>    |
|                              | Hem-Fir              | SS | <u>10-9</u>               | <u>14-2</u>    | <u>18-0</u>    | <u>21-11</u>   | <u>10-9</u>        | <u>14-2</u>    | <u>18-0</u>    | <u>21-11</u>   |
|                              | Hem-Fir              | #1 | <u>10-6</u>               | <u>13-10</u>   | <u>17-8</u>    | <u>21-6</u>    | <u>10-6</u>        | <u>13-10</u>   | <u>16-11</u>   | <u>19-7</u>    |
|                              | Hem-Fir              | #2 | <u>10-0</u>               | <u>13-2</u>    | <u>16-10</u>   | <u>20-4</u>    | <u>10-0</u>        | <u>13-1</u>    | <u>16-0</u>    | <u>18-6</u>    |
|                              | Hem-Fir              | #3 | <u>8-8</u>                | <u>11-0</u>    | <u>13-5</u>    | <u>15-7</u>    | <u>7-11</u>        | <u>10-0</u>    | <u>12-3</u>    | <u>14-3</u>    |
|                              | Southern Pine        | SS | <u>11-2</u>               | <u>14-8</u>    | <u>18-9</u>    | <u>22-10</u>   | <u>11-2</u>        | <u>14-8</u>    | <u>18-9</u>    | <u>22-10</u>   |
|                              | Southern Pine        | #1 | <u>10-11</u>              | <u>14-5</u>    | <u>18-5</u>    | <u>22-5</u>    | <u>10-11</u>       | <u>14-5</u>    | <u>18-5</u>    | <u>22-5</u>    |
|                              | Southern Pine        | #2 | <u>10-9</u>               | <u>14-2</u>    | <u>18-0</u>    | <u>21-9</u>    | <u>10-9</u>        | <u>14-2</u>    | <u>16-11</u>   | <u>19-10</u>   |
|                              | Southern Pine        | #3 | <u>9-4</u>                | <u>11-11</u>   | <u>14-0</u>    | <u>16-8</u>    | <u>8-6</u>         | <u>10-10</u>   | <u>12-10</u>   | <u>15-3</u>    |
|                              | Spruce-Pine-Fir      | SS | <u>10-6</u>               | <u>13-10</u>   | <u>17-8</u>    | <u>21-6</u>    | <u>10-6</u>        | <u>13-10</u>   | <u>17-8</u>    | <u>21-6</u>    |
|                              | Spruce-Pine-Fir      | #1 | <u>10-3</u>               | <u>13-6</u>    | <u>17-3</u>    | <u>20-7</u>    | <u>10-3</u>        | <u>13-3</u>    | <u>16-3</u>    | <u>18-10</u>   |
|                              | Spruce-Pine-Fir      | #2 | <u>10-3</u>               | <u>13-6</u>    | <u>17-3</u>    | <u>20-7</u>    | <u>10-3</u>        | <u>13-3</u>    | <u>16-3</u>    | <u>18-10</u>   |
|                              | Spruce-Pine-Fir      | #3 | <u>8-8</u>                | <u>11-0</u>    | <u>13-5</u>    | <u>15-7</u>    | <u>7-11</u>        | <u>10-0</u>    | <u>12-3</u>    | <u>14-3</u>    |
| <u>16</u>                    | Douglas Fir-Larch    | SS | <u>10-4</u>               | <u>13-7</u>    | <u>17-4</u>    | <u>21-1</u>    | <u>10-4</u>        | <u>13-7</u>    | <u>17-4</u>    | <u>21-0</u>    |
|                              | Douglas Fir-Larch    | #1 | <u>9-11</u>               | <u>13-1</u>    | <u>16-5</u>    | <u>19-1</u>    | <u>9-8</u>         | <u>12-4</u>    | <u>15-0</u>    | <u>17-5</u>    |
|                              | Douglas Fir-Larch    | #2 | <u>9-9</u>                | <u>12-7</u>    | <u>15-5</u>    | <u>17-10</u>   | <u>9-1</u>         | <u>11-6</u>    | <u>14-1</u>    | <u>16-3</u>    |
|                              | Douglas Fir-Larch    | #3 | <u>7-6</u>                | <u>9-6</u>     | <u>11-8</u>    | <u>13-6</u>    | <u>6-10</u>        | <u>8-8</u>     | <u>10-7</u>    | <u>12-4</u>    |
|                              | Hem-Fir              | SS | <u>9-9</u>                | <u>12-10</u>   | <u>16-5</u>    | <u>19-11</u>   | <u>9-9</u>         | <u>12-10</u>   | <u>16-5</u>    | <u>19-11</u>   |
|                              | Hem-Fir              | #1 | <u>9-6</u>                | <u>12-7</u>    | <u>16-0</u>    | <u>18-7</u>    | <u>9-6</u>         | <u>12-0</u>    | <u>14-8</u>    | <u>17-0</u>    |
|                              | Hem-Fir              | #2 | <u>9-1</u>                | <u>12-0</u>    | <u>15-2</u>    | <u>17-7</u>    | <u>8-11</u>        | <u>11-4</u>    | <u>13-10</u>   | <u>16-1</u>    |
|                              | Hem-Fir              | #3 | <u>7-6</u>                | <u>9-6</u>     | <u>11-8</u>    | <u>13-6</u>    | <u>6-10</u>        | <u>8-8</u>     | <u>10-7</u>    | <u>12-4</u>    |
|                              | Southern Pine        | SS | <u>10-2</u>               | <u>13-4</u>    | <u>17-0</u>    | <u>20-9</u>    | <u>10-2</u>        | <u>13-4</u>    | <u>17-0</u>    | <u>20-9</u>    |
|                              | Southern Pine        | #1 | <u>9-11</u>               | <u>13-1</u>    | <u>16-9</u>    | <u>20-4</u>    | <u>9-11</u>        | <u>13-1</u>    | <u>16-4</u>    | <u>19-6</u>    |
|                              | Southern Pine        | #2 | <u>9-9</u>                | <u>12-10</u>   | <u>16-1</u>    | <u>18-10</u>   | <u>9-6</u>         | <u>12-4</u>    | <u>14-8</u>    | <u>17-2</u>    |
|                              | Southern Pine        | #3 | <u>8-1</u>                | <u>10-3</u>    | <u>12-2</u>    | <u>14-6</u>    | <u>7-4</u>         | <u>9-5</u>     | <u>11-1</u>    | <u>13-2</u>    |
|                              | Spruce-Pine-Fir      | SS | <u>9-6</u>                | <u>12-7</u>    | <u>16-0</u>    | <u>19-6</u>    | <u>9-6</u>         | <u>12-7</u>    | <u>16-0</u>    | <u>19-6</u>    |
|                              | Spruce-Pine-Fir      | #1 | <u>9-4</u>                | <u>12-3</u>    | <u>15-5</u>    | <u>17-10</u>   | <u>9-1</u>         | <u>11-6</u>    | <u>14-1</u>    | <u>16-3</u>    |
|                              | Spruce-Pine-Fir      | #2 | <u>9-4</u>                | <u>12-3</u>    | <u>15-5</u>    | <u>17-10</u>   | <u>9-1</u>         | <u>11-6</u>    | <u>14-1</u>    | <u>16-3</u>    |
|                              | Spruce-Pine-Fir      | #3 | <u>7-6</u>                | <u>9-6</u>     | <u>11-8</u>    | <u>13-6</u>    | <u>6-10</u>        | <u>8-8</u>     | <u>10-7</u>    | <u>12-4</u>    |
| <u>19.2</u>                  | Douglas Fir-Larch    | SS | <u>9-8</u>                | <u>12-10</u>   | <u>16-4</u>    | <u>19-10</u>   | <u>9-8</u>         | <u>12-10</u>   | <u>16-4</u>    | <u>19-2</u>    |
|                              | Douglas Fir-Larch    | #1 | <u>9-4</u>                | <u>12-4</u>    | <u>15-0</u>    | <u>17-5</u>    | <u>8-10</u>        | <u>11-3</u>    | <u>13-8</u>    | <u>15-11</u>   |
|                              | Douglas Fir-Larch    | #2 | <u>9-1</u>                | <u>11-6</u>    | <u>14-1</u>    | <u>16-3</u>    | <u>8-3</u>         | <u>10-6</u>    | <u>12-10</u>   | <u>14-10</u>   |



|  |                          |           |             |              |              |             |            |              |              |              |
|--|--------------------------|-----------|-------------|--------------|--------------|-------------|------------|--------------|--------------|--------------|
|  | <u>Douglas Fir-Larch</u> | <u>#3</u> | <u>6-10</u> | <u>8-8</u>   | <u>10-7</u>  | <u>12-4</u> | <u>6-3</u> | <u>7-11</u>  | <u>9-8</u>   | <u>11-3</u>  |
|  | <u>Hem-Fir</u>           | <u>SS</u> | <u>9-2</u>  | <u>12-1</u>  | <u>15-5</u>  | <u>18-9</u> | <u>9-2</u> | <u>12-1</u>  | <u>15-5</u>  | <u>18-9</u>  |
|  | <u>Hem-Fir</u>           | <u>#1</u> | <u>9-0</u>  | <u>11-10</u> | <u>14-8</u>  | <u>17-0</u> | <u>8-8</u> | <u>10-11</u> | <u>13-4</u>  | <u>15-6</u>  |
|  | <u>Hem-Fir</u>           | <u>#2</u> | <u>8-7</u>  | <u>11-3</u>  | <u>13-10</u> | <u>16-1</u> | <u>8-2</u> | <u>10-4</u>  | <u>12-8</u>  | <u>14-8</u>  |
|  | <u>Hem-Fir</u>           | <u>#3</u> | <u>6-10</u> | <u>8-8</u>   | <u>10-7</u>  | <u>12-4</u> | <u>6-3</u> | <u>7-11</u>  | <u>9-8</u>   | <u>11-3</u>  |
|  | <u>Southern Pine</u>     | <u>SS</u> | <u>9-6</u>  | <u>12-7</u>  | <u>16-0</u>  | <u>19-6</u> | <u>9-6</u> | <u>12-7</u>  | <u>16-0</u>  | <u>19-6</u>  |
|  | <u>Southern Pine</u>     | <u>#1</u> | <u>9-4</u>  | <u>12-4</u>  | <u>15-9</u>  | <u>19-2</u> | <u>9-4</u> | <u>12-4</u>  | <u>14-11</u> | <u>17-9</u>  |
|  | <u>Southern Pine</u>     | <u>#2</u> | <u>9-2</u>  | <u>12-1</u>  | <u>14-8</u>  | <u>17-2</u> | <u>8-8</u> | <u>11-3</u>  | <u>13-5</u>  | <u>15-8</u>  |
|  | <u>Southern Pine</u>     | <u>#3</u> | <u>7-4</u>  | <u>9-5</u>   | <u>11-1</u>  | <u>13-2</u> | <u>6-9</u> | <u>8-7</u>   | <u>10-1</u>  | <u>12-1</u>  |
|  | <u>Spruce-Pine-Fir</u>   | <u>SS</u> | <u>9-0</u>  | <u>11-10</u> | <u>15-1</u>  | <u>18-4</u> | <u>9-0</u> | <u>11-10</u> | <u>15-1</u>  | <u>17-9</u>  |
|  | <u>Spruce-Pine-Fir</u>   | <u>#1</u> | <u>8-9</u>  | <u>11-6</u>  | <u>14-1</u>  | <u>16-3</u> | <u>8-3</u> | <u>10-6</u>  | <u>12-10</u> | <u>14-10</u> |
|  | <u>Spruce-Pine-Fir</u>   | <u>#2</u> | <u>8-9</u>  | <u>11-6</u>  | <u>14-1</u>  | <u>16-3</u> | <u>8-3</u> | <u>10-6</u>  | <u>12-10</u> | <u>14-10</u> |
|  | <u>Spruce-Pine-Fir</u>   | <u>#3</u> | <u>6-10</u> | <u>8-8</u>   | <u>10-7</u>  | <u>12-4</u> | <u>6-3</u> | <u>7-11</u>  | <u>9-8</u>   | <u>11-3</u>  |

(continued)

**TABLE 2308.4.2(2)—continued**  
**FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES**  
**(Residential Living Areas, Live Load = 40 psf, L/Δ = 360)**

| <u>JOIST SPACING</u><br><u>(inches)</u> | <u>SPECIES AND GRADE</u> |           | <u>DEAD LOAD = 10 psf</u>        |                    |                    |                    | <u>DEAD LOAD = 20 psf</u> |                    |                    |                          |
|---|--------------------------|-----------|----------------------------------|--------------------|--------------------|--------------------|---------------------------|--------------------|--------------------|--------------------------|
|   |                          |           | <u>2x6</u>                       | <u>2x8</u>         | <u>2x10</u>        | <u>2x12</u>        | <u>2x6</u>                | <u>2x8</u>         | <u>2x10</u>        | <u>2x12</u>              |
|   |                          |           | <u>Maximum floor joist spans</u> |                    |                    |                    |                           |                    |                    |                          |
|   |                          |           | <u>(ft. - in.)</u>               | <u>(ft. - in.)</u> | <u>(ft. - in.)</u> | <u>(ft. - in.)</u> | <u>(ft. - in.)</u>        | <u>(ft. - in.)</u> | <u>(ft. - in.)</u> | <u>(ft. - in.)</u>       |
| <u>24</u>                               | <u>Douglas Fir-Larch</u> | <u>SS</u> | <u>9-0</u>                       | <u>11-11</u>       | <u>15-2</u>        | <u>18-5</u>        | <u>9-0</u>                | <u>11-11</u>       | <u>14-9</u>        | <u>17-1</u>              |
|   | <u>Douglas Fir-Larch</u> | <u>#1</u> | <u>8-8</u>                       | <u>11-0</u>        | <u>13-5</u>        | <u>15-7</u>        | <u>7-11</u>               | <u>10-0</u>        | <u>12-3</u>        | <u>14-3</u>              |
|   | <u>Douglas Fir-Larch</u> | <u>#2</u> | <u>8-1</u>                       | <u>10-3</u>        | <u>12-7</u>        | <u>14-7</u>        | <u>7-5</u>                | <u>9-5</u>         | <u>11-6</u>        | <u>13-4</u>              |
|   | <u>Douglas Fir-Larch</u> | <u>#3</u> | <u>6-2</u>                       | <u>7-9</u>         | <u>9-6</u>         | <u>11-0</u>        | <u>5-7</u>                | <u>7-1</u>         | <u>8-8</u>         | <u>10-1</u>              |
|   | <u>Hem-Fir</u>           | <u>SS</u> | <u>8-6</u>                       | <u>11-3</u>        | <u>14-4</u>        | <u>17-5</u>        | <u>8-6</u>                | <u>11-3</u>        | <u>14-4</u>        | <u>16-10<sup>a</sup></u> |
|   | <u>Hem-Fir</u>           | <u>#1</u> | <u>8-4</u>                       | <u>10-9</u>        | <u>13-1</u>        | <u>15-2</u>        | <u>7-9</u>                | <u>9-9</u>         | <u>11-11</u>       | <u>13-10</u>             |
|   | <u>Hem-Fir</u>           | <u>#2</u> | <u>7-11</u>                      | <u>10-2</u>        | <u>12-5</u>        | <u>14-4</u>        | <u>7-4</u>                | <u>9-3</u>         | <u>11-4</u>        | <u>13-1</u>              |
|   | <u>Hem-Fir</u>           | <u>#3</u> | <u>6-2</u>                       | <u>7-9</u>         | <u>9-6</u>         | <u>11-0</u>        | <u>5-7</u>                | <u>7-1</u>         | <u>8-8</u>         | <u>10-1</u>              |
|   | <u>Southern Pine</u>     | <u>SS</u> | <u>8-10</u>                      | <u>11-8</u>        | <u>14-11</u>       | <u>18-1</u>        | <u>8-10</u>               | <u>11-8</u>        | <u>14-11</u>       | <u>18-1</u>              |
|   | <u>Southern Pine</u>     | <u>#1</u> | <u>8-8</u>                       | <u>11-5</u>        | <u>14-7</u>        | <u>17-5</u>        | <u>8-8</u>                | <u>11-3</u>        | <u>13-4</u>        | <u>15-11</u>             |
|   | <u>Southern Pine</u>     | <u>#2</u> | <u>8-6</u>                       | <u>11-0</u>        | <u>13-1</u>        | <u>15-5</u>        | <u>7-9</u>                | <u>10-0</u>        | <u>12-0</u>        | <u>14-0</u>              |
|   | <u>Southern Pine</u>     | <u>#3</u> | <u>6-7</u>                       | <u>8-5</u>         | <u>9-11</u>        | <u>11-10</u>       | <u>6-0</u>                | <u>7-8</u>         | <u>9-1</u>         | <u>10-9</u>              |
|   | <u>Spruce-Pine-Fir</u>   | <u>SS</u> | <u>8-4</u>                       | <u>11-0</u>        | <u>14-0</u>        | <u>17-0</u>        | <u>8-4</u>                | <u>11-0</u>        | <u>13-8</u>        | <u>15-11</u>             |
|   | <u>Spruce-Pine-Fir</u>   | <u>#1</u> | <u>8-1</u>                       | <u>10-3</u>        | <u>12-7</u>        | <u>14-7</u>        | <u>7-5</u>                | <u>9-5</u>         | <u>11-6</u>        | <u>13-4</u>              |
|   | <u>Spruce-Pine-Fir</u>   | <u>#2</u> | <u>8-1</u>                       | <u>10-3</u>        | <u>12-7</u>        | <u>14-7</u>        | <u>7-5</u>                | <u>9-5</u>         | <u>11-6</u>        | <u>13-4</u>              |
|   | <u>Spruce-Pine-Fir</u>   | <u>#3</u> | <u>6-2</u>                       | <u>7-9</u>         | <u>9-6</u>         | <u>11-0</u>        | <u>5-7</u>                | <u>7-1</u>         | <u>8-8</u>         | <u>10-1</u>              |

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 47.8 N/m<sup>2</sup>

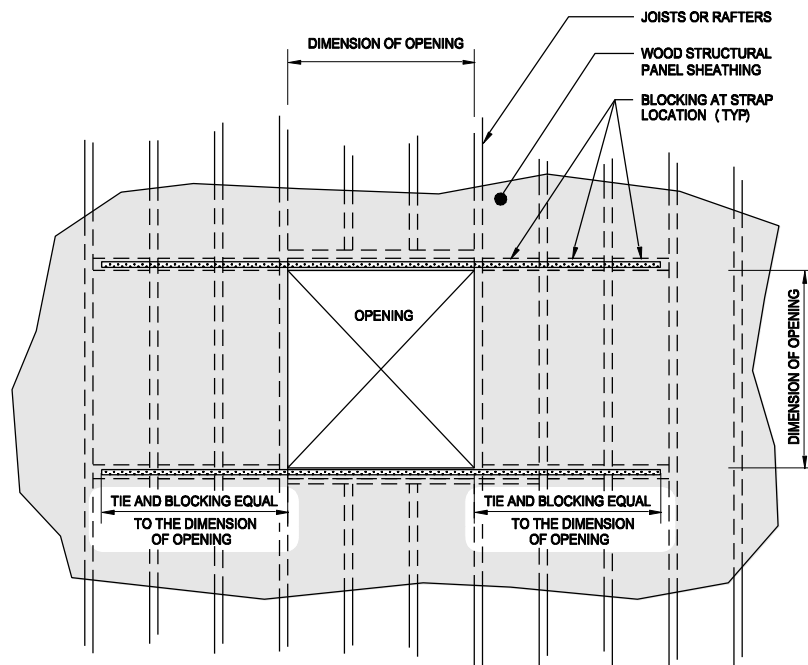
a. End bearing length shall be increased to 2 inches.

**2308.4.3 Engineered wood products.** Engineered wood products shall be installed in accordance with manufacturer's recommendations. Cuts, notches and holes bored in trusses, structural composite lumber, structural glue-laminated members or I-joists are not permitted except where permitted by the manufacturer's recommendations or where the effects of such alterations are specifically considered in the design of the member by a *registered design professional*.

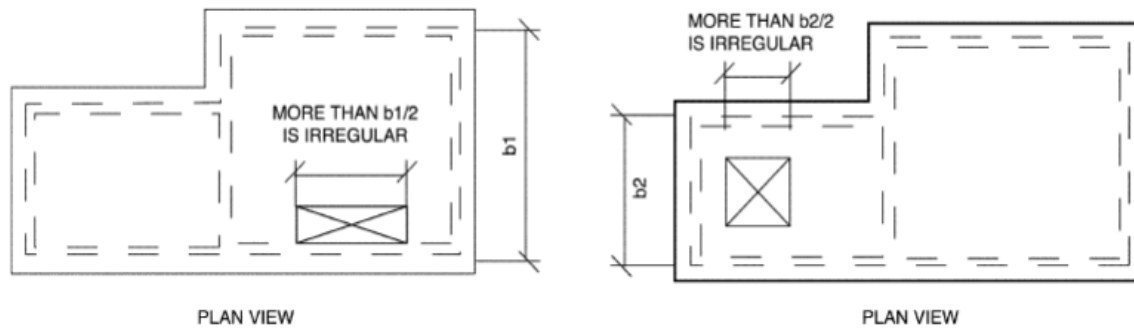
**2308.4.4 Framing around openings.** Trimmer and header joists shall be doubled, or of lumber of equivalent cross section, where the span of the header exceeds 4 feet (1219 mm). The ends of header joists more than 6 feet (1829 mm) long shall be supported by framing anchors or joist hangers unless bearing on a beam, partition or wall. 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).

**2308.4.4.1 Openings in floor diaphragms in Seismic Design Categories B, C, D and E.** Openings in floor diaphragms in Seismic Design Categories B, C, D and E with a dimension greater than 4 feet (1219 mm) shall be constructed with metal ties and blocking in accordance with this section and Figure 2308.4.4.1(1). Metal ties shall not be less than 0.058 inch [1.47 mm (16 galvanized gauge)] thick by 1-1/2 inches (38 mm) wide with a minimum yield stress of 33,000 psi (227 Mpa). Blocking shall extend not less than the dimension of the opening in the direction of the tie and blocking. Ties shall be attached to blocking in accordance with the manufacturer's instructions but with not less than eight 16d common nails on each side of the header-joist intersection.

**Openings in floor diaphragms in Seismic Design Categories D and E** shall not have any dimension exceeding 50 percent of the distance between braced wall lines or an area greater than 25 percent of the area between orthogonal pairs of braced wall lines [see Figure 2308.4.4.1(2)], or the portion of the structure containing the opening shall be designed in accordance with accepted engineering practice to resist the forces specified in Chapter 16, to the extent such irregular opening affects the performance for the conventional framing system.

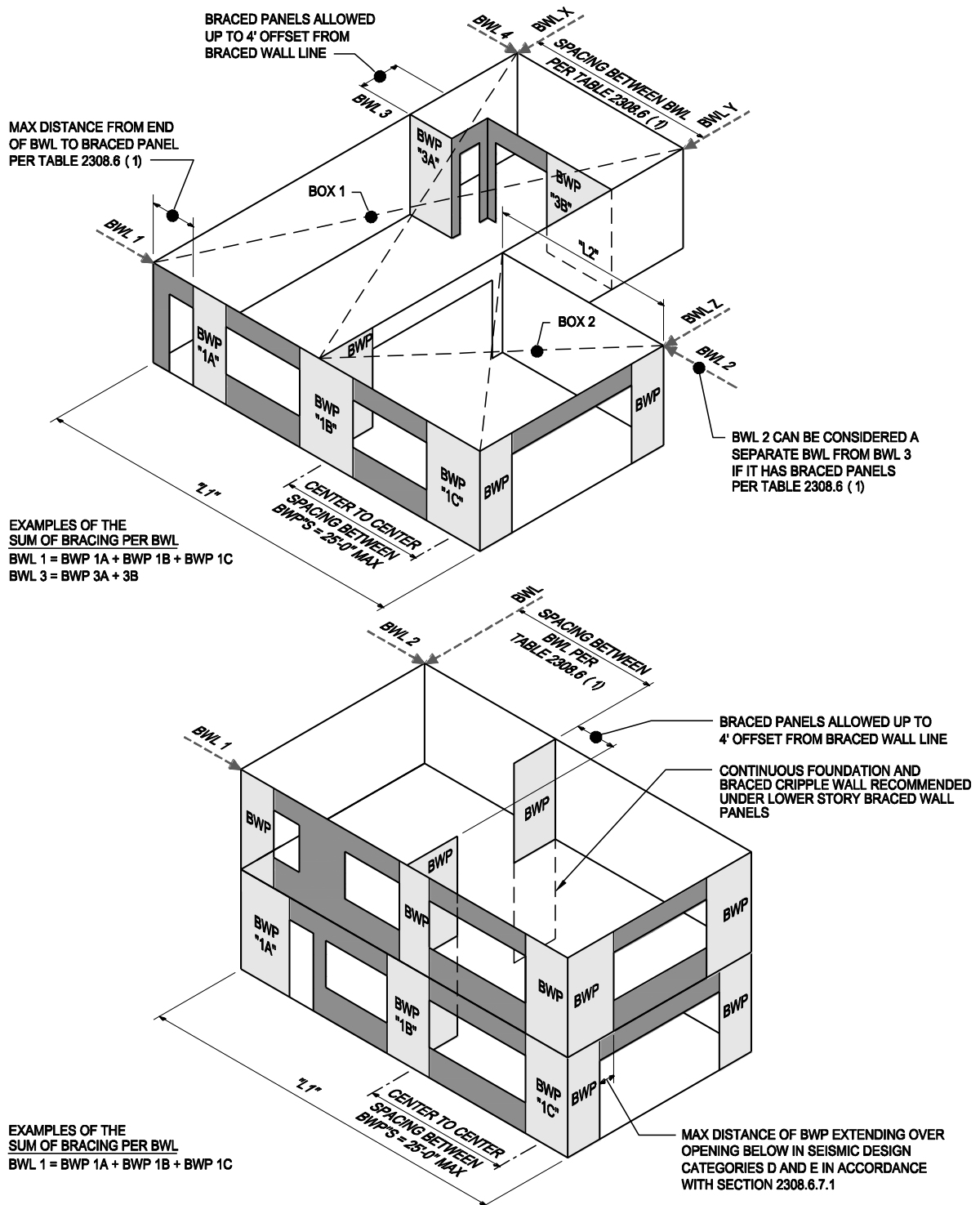


**Figure 2308.4.4.1(1)**  
**OPENINGS IN FLOOR AND ROOF DIAPHRAGMS**



Figure

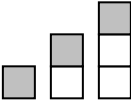
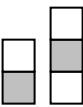




Figure 2308.4.4.1(2)  
OPENING LIMITATIONS  
FOR FLOOR AND ROOF DIAPHRAGMS



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.  
 BWL = BRACED WALL LINE, BWP = BRACED WALL PANEL

**Figure 2308.6(1)**  
**BASIC COMPONENTS OF THE LATERAL BRACING SYSTEM**

**TABLE 2308.6.1**  
**WALL BRACING REQUIREMENTS <sup>a,b</sup>**

| <u>Seismic Design Category</u> | <u>Story Condition</u><br>(See section 2308.2)                                      | <u>Maximum spacing of braced wall lines</u> | <u>Braced panel location, spacing (o.c.) and minimum percentage (x)</u> |  |  | <u>Maximum distance of braced wall panels from each end of braced wall line</u> |
|--------------------------------|---|---|---|--|--|---|
|                                |   |   | <u>Bracing Method</u>   |  |  |   |
|                                |   |   | <u>LIB</u>  | <u>DWB WSP</u>   | <u>SFB PBS PCP HPS GB, <sup>c,d</sup></u>  |   |
| <u>A and B</u>                 |    | <u>35'-0"</u>                               | <u>Each end and ≤25'-0" o.c.</u>  | <u>Each end and ≤25'-0" o.c.</u>   | <u>Each end and ≤25'-0" o.c.</u>   | <u>12'-6"</u>   |
|                                |    | <u>35'-0"</u>                               | <u>Each end and ≤25'-0" o.c.</u>  | <u>Each end and ≤25'-0" o.c.</u>   | <u>Each end and ≤25'-0" o.c.</u>   | <u>12'-6"</u>   |
|                                |    | <u>35'-0"</u>                               | <u>NP</u>   | <u>Each end and ≤25'-0" o.c.</u>   | <u>Each end and ≤25'-0" o.c.</u>   | <u>12'-6"</u>   |
| <u>C</u>                       |  | <u>35'-0"</u>                               | <u>NP</u>   | <u>Each end and ≤25'-0" o.c.</u>   | <u>Each end and ≤25'-0" o.c.</u>   | <u>12'-6"</u>   |
|                                |  | <u>35'-0"</u>                               | <u>NP</u>   | <u>Each end and ≤25'-0" o.c.</u><br>(min 25% of wall length) <sup>e</sup>                                | <u>Each end and ≤25'-0" o.c.</u><br>(min 25% of wall length) <sup>e</sup>                                | <u>12'-6"</u>   |
| <u>D and E</u>                 |  | <u>25'-0"</u>                               | <u>NP</u>   | <u>Sds &lt; 0.50:</u><br><u>Each end and ≤25'-0" o.c.</u><br>(min 21% of wall length) <sup>e</sup>       | <u>Sds &lt; 0.50:</u><br><u>Each end and ≤25'-0" o.c.</u><br>(min 43% of wall length) <sup>e</sup>       | <u>8'-0"</u>  |
|                                |   |   |   | <u>0.5 ≤ Sds &lt; 0.75:</u><br><u>Each end and ≤25'-0" o.c.</u><br>(min 32% of wall length) <sup>e</sup> | <u>0.5 ≤ Sds &lt; 0.75:</u><br><u>Each end and ≤25'-0" o.c.</u><br>(min 59% of wall length) <sup>e</sup> |   |
|                                |   |   |   | <u>0.75 ≤ Sds ≤ 1.00:</u><br><u>Each end and ≤25'-0" o.c.</u><br>(min 37% of wall length) <sup>e</sup>   | <u>0.75 ≤ Sds ≤ 1.00:</u><br><u>Each end and ≤25'-0" o.c.</u><br>(min 75% of wall length) <sup>e</sup>   |   |
|                                |   |   |   | <u>Sds &gt; 1.00:</u><br><u>Each end and ≤25'-0" o.c.</u><br>(min 48% of wall length) <sup>e</sup>       | <u>Sds &gt; 1.00:</u><br><u>Each end and ≤25'-0" o.c.</u><br>(min 100% of wall length) <sup>e</sup>      |   |

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

**NP = Not Permitted**

**a. This table specifies minimum requirements for braced wall panels along interior or exterior braced wall lines.**

**b. See Section 2308.6.2 for full description of bracing methods.**

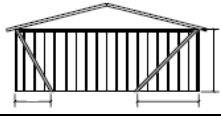
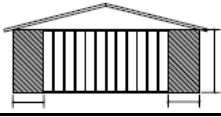
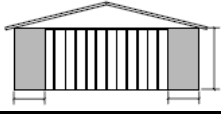
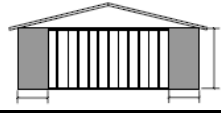
**c. For method GB, gypsum wallboard applied to framing supports that are spaced at 16 inches on center.**

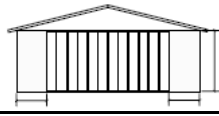
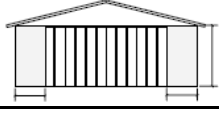
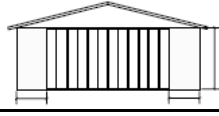
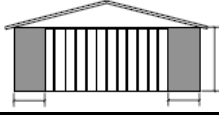
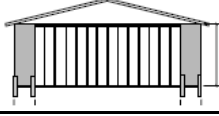
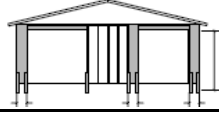
**d. The required lengths shall be doubled for gypsum board applied to only one face of a braced wall panel.**

**e. Percentage shown represents the minimum amount of bracing required along the building length (or wall length if the structure has an irregular shape)**

**2308.6.3 Braced wall panel methods. Construction of braced wall panels shall be by one or a combination of the methods in Table 2308.6.3(1). Braced wall panel length shall be in accordance with Section 2308.6.4 or 2308.6.5.**

**TABLE 2308.6.3(1)**  
**BRACING METHODS**

| <b><u>METHODS.</u></b><br><b><u>MATERIAL</u></b>   | <b><u>MINIMUM</u></b><br><b><u>THICKNESS</u></b>   | <b><u>FIGURE</u></b>  | <b><u>CONNECTION</u></b><br><b><u>CRITERIA <sup>a</sup></u></b>  |  |
|--|--|---|--|--|
|  |  |   | <b><u>Fasteners</u></b>  | <b><u>Spacing</u></b>  |
| <b><u>LIB <sup>a</sup></u></b><br><b><u>Let-in-</u></b><br><b><u>bracing</u></b>                     | <b><u>1x4 wood or</u></b><br><b><u>approved</u></b><br><b><u>metal straps</u></b><br><b><u>attached at</u></b><br><b><u>45° to 60°</u></b><br><b><u>angles to studs</u></b><br><b><u>at maximum</u></b><br><b><u>of 16" o.c.</u></b> |   | <b><u>Per Fastener Table</u></b><br><b><u>2304.9.1</u></b>   | <b><u>Wood: per stud</u></b><br><b><u>plus top and bottom</u></b><br><b><u>plates</u></b>  |
|  |  |   | <b><u>Metal strap:</u></b><br><b><u>installed per</u></b><br><b><u>manufacturer's</u></b><br><b><u>installation</u></b><br><b><u>recommendations</u></b> | <b><u>Metal strap:</u></b><br><b><u>installed per</u></b><br><b><u>manufacturer's</u></b><br><b><u>installation</u></b><br><b><u>recommendations</u></b> |
| <b><u>DWB</u></b><br><b><u>Diagonal</u></b><br><b><u>wood boards</u></b>                             | <b><u>3/4" thick</u></b><br><b><u>(1" nominal) x</u></b><br><b><u>6" minimum</u></b><br><b><u>width</u></b><br><b><u>to studs at</u></b><br><b><u>maximum of</u></b><br><b><u>24" o.c.</u></b>                                       |  | <b><u>Per Fastener Table</u></b><br><b><u>2304.9.1</u></b>   | <b><u>Per stud</u></b>   |
| <b><u>WSP</u></b><br><b><u>Wood</u></b><br><b><u>structural</u></b><br><b><u>panel</u></b>           | <b><u>3/8"</u></b><br><br><b><u>Per TABLE</u></b><br><b><u>2308.6.3(2) or</u></b><br><b><u>2308.6.3(3)</u></b>   |  | <b><u>Per Fastener Table</u></b><br><b><u>2304.9.1</u></b>   | <b><u>6" edges</u></b><br><b><u>12" field</u></b>  |
| <b><u>SFB</u></b><br><b><u>Structural</u></b><br><b><u>fiberboard</u></b><br><b><u>sheathing</u></b> | <b><u>1/2"</u></b><br><br><b><u>Per TABLE</u></b><br><b><u>2304.9.1 to studs</u></b><br><b><u>at maximum</u></b><br><b><u>16" o.c.</u></b>   |  | <b><u>Per Fastener Table</u></b><br><b><u>2304.9.1</u></b>   | <b><u>3" edges</u></b><br><b><u>6" field</u></b>   |

|   |   |   |   |  |
|---|---|---|---|--|
| <b>GB</b><br><b>Gypsum board (Double sided)</b>   | <u><math>\frac{1}{2}</math>" by a minimum of 4 feet wide to studs at maximum of 24" o.c.</u>                        |    | <b>Exterior and interior sheathing: with 5d cooler nails (1-5/8" x 0.086") or 1 1/4" screws (type W or S) for 1/2" gypsum board or 1 5/8" screws (type W or S) for 5/8" gypsum board.</b> | <b>For all braced wall panel locations: 7" o.c. along panel edges (including top and bottom plates) and 7" o.c. in the field</b> |
| <b>PBS</b><br><b>Particle-board sheathing</b>     | <u><math>\frac{3}{8}</math>" or <math>\frac{1}{2}</math>" per Table 2308.6.3(4) to studs at maximum of 16" o.c.</u> |    | <b>6d common (2" long x 0.113" dia.) nails for 3/8" thick sheathing or 8d common (2 1/2" long x 0.131" dia.) nails for 1/2" thick sheathing</b>   | <b>3" edges<br/>6" field</b>   |
| <b>PCP</b><br><b>Portland cement plaster</b>      | <u>See Section 2510 to studs at maximum of 16" o.c.</u>   |    | <b>1 1/2" long, 11 gage, 7/16" dia. head nails or 7/8" long, 16 gage staples</b>  | <b>6" o.c. on all framing members</b>  |
| <b>HPS</b><br><b>Hardboard panel siding</b>       | <u><math>\frac{7}{16}</math>"<br/>TABLE 2308.6.3(5)</u>   |   | <b>Per Fastener Table 2304.9.1</b>  | <b>4" edges<br/>8" field</b>   |
| <b>ABW</b><br><b>Alternate braced wall.</b>       | <u><math>\frac{3}{8}</math>"</u>  |  | <b>See Figure 2308.6.5(1) and Section 2308.6.5.1</b>  | <b>See Figure 2308.6.5(1)</b>  |
| <b>PFH</b><br><b>Portal frame with hold-downs</b> | <u><math>\frac{3}{8}</math></u>   |  | <b>See Figure 2308.6.5(2) and Section 2308.6.5.2</b>  | <b>See Figure 2308.6.5(2)</b>  |

For SI: 1 foot 305 mm

a. Method LIB shall have gypsum board fastened to at least one side with nails or screws.

**TABLE 2308.6.3(2)**  
**EXPOSED PLYWOOD PANEL SIDING**

| <u>MINIMUM THICKNESS<sup>a</sup></u><br><u>(inch)</u> | <u>MINIMUM NUMBER OF PLIES</u> | <u>STUD SPACING</u><br><u>(inches)</u><br><u>Plywood siding applied directly to studs or over sheathing</u> |
|---|--------------------------------|---|
| <u><math>\frac{3}{8}</math></u>                       | <u>3</u>                       | <u><sup>b</sup><br/>16</u>  |
| <u><math>\frac{1}{2}</math></u>                       | <u>4</u>                       | <u>24</u>   |

For SI: 1 inch = 25.4 mm.

a. Thickness of grooved panels is measured at bottom of grooves.

b. Spans are permitted to be 24 inches if plywood siding applied with face grain perpendicular to studs or over one of the following: (1) 1-inch board sheathing, (2) <sup>7/</sup><sub>16</sub>-inch wood structural panel sheathing or

<sup>3/</sup>  
(3) 8-inch wood structural panel sheathing with strength axis (which is the long direction of the panel unless otherwise marked) of sheathing perpendicular to studs.

**TABLE 2308.6.3(3)**  
**WOOD STRUCTURAL PANEL WALL SHEATHING<sup>b</sup>**

(Not Exposed to the Weather, Strength Axis Parallel or Perpendicular to Studs Except as Indicated Below)

| <u>MINIMUM THICKNESS (inch)</u>   | <u>PANEL SPAN RATING</u>   | <u>STUD SPACING (inches)</u>  |                                    |   |
|---|--|-------------------------------|------------------------------------|---|
|   |  | <u>Siding nailed to studs</u> | <u>Available sheathing</u>         |   |
|   |  |                               | <u>Sheathing parallel to studs</u> | <u>Sheathing perpendicular to studs</u> |
| <u><sup>3/</sup><br/>8, <sup>15/</sup><br/>32, <sup>1/</sup><br/>2</u>  | <u><sup>16/0, 20/0,</sup><br/><sup>24/0, 32/16</sup><br/>Wall—24"<br/>o.c.</u> | <u>24</u>                     | <u>16</u>                          | <u>24</u>                               |
| <u><sup>7/</sup><br/>16, <sup>15/</sup><br/>32, <sup>1/</sup><br/>2</u> | <u><sup>24/0, 24/16,</sup><br/><sup>32/16</sup><br/>Wall—24"<br/>o.c.</u>      | <u>24</u>                     | <u>24<sup>a</sup></u>              | <u>24</u>                               |

For SI: 1 inch = 25.4 mm.

a. Plywood shall consist of four or more plies.

b. Blocking of horizontal joints shall not be required except as specified in Sections 2306.3 and 2308.12.4.

**TABLE 2308.6.3(4)**  
**ALLOWABLE SPANS FOR PARTICLEBOARD WALL SHEATHING**

(Not Exposed to the Weather, Long Dimension of the Panel Parallel or Perpendicular to Studs)

| <u>GRADE</u>                                       | <u>THICKNESS (inch)</u> | <u>STUD SPACING (inches)</u>  |   |
|--|-------------------------|-------------------------------|---|
|  |                         | <u>Siding nailed to studs</u> | <u>Sheathing under coverings specified in Section 2308.9.3 parallel or perpendicular to studs</u> |
| <u>M-S "Exterior Glue" and M-2 "Exterior Glue"</u> | <u>3/8</u>              | <u>16</u>                     | <u>=</u>  |
|  | <u>1/2</u>              | <u>16</u>                     | <u>16</u>   |

For SI: 1 inch = 25.4 mm.



**TABLE 2308.6.3(5)**  
**HARDBOARD SIDING**

| <u>SIDING</u>                       | <u>MINIMUM<br/>NOMINAL<br/>THICKNESS<br/>(inch)</u> | <u>2 × 4 FRAMING<br/>MAXIMUM<br/>SPACING</u> | <u>NAIL<br/>SIZE<sup>a</sup>,<br/>b, d</u> | <u>NAIL SPACING</u>   |  |
|-------------------------------------|---|--|--|---|--|
|                                     |   |  |  | <u>General</u>  | <u>Bracing panels<sup>c</sup></u>                                  |
| <u>1. Lap siding</u>                | -   |  |  |   |  |
| <u>Direct to studs</u>              | <u>3/8</u>  | <u>16” o.c.</u>                              | <u>8d</u>                                  | <u>16” o.c.</u>   | <u>Not applicable</u>  |
| <u>Over sheathing</u>               | <u>3/8</u>  | <u>16” o.c.</u>                              | <u>10d</u>                                 | <u>16” o.c.</u>   | <u>Not applicable</u>  |
| <u>2. Square edge panel siding</u>  |   |  |  |   |  |
| <u>Direct to studs</u>              | <u>3/8</u>  | <u>24” o.c.</u>                              | <u>6d</u>                                  | <u>6” o.c. edges;<br/>12” o.c. at<br/>intermediate<br/>supports</u> | <u>4” o.c. edges;<br/>8” o.c. at<br/>intermediate<br/>supports</u> |
| <u>Over sheathing</u>               | <u>3/8</u>  | <u>24” o.c.</u>                              | <u>8d</u>                                  | <u>6” o.c. edges;<br/>12” o.c. at<br/>intermediate<br/>supports</u> | <u>4” o.c. edges;<br/>8” o.c. at<br/>intermediate<br/>supports</u> |
| <u>3. Shiplap edge panel siding</u> |   |  |  |   |  |
| <u>Direct to studs</u>              | <u>3/8</u>  | <u>16” o.c.</u>                              | <u>6d</u>                                  | <u>6” o.c. edges;<br/>12” o.c. at<br/>intermediate<br/>supports</u> | <u>4” o.c. edges;<br/>8” o.c. at<br/>intermediate<br/>supports</u> |
| <u>Over sheathing</u>               | <u>3/8</u>  | <u>16” o.c.</u>                              | <u>8d</u>                                  | <u>6” o.c. edges;<br/>12” o.c. at<br/>intermediate<br/>supports</u> | <u>4” o.c. edges;<br/>8” o.c. at<br/>intermediate<br/>supports</u> |

For SI: 1 inch = 25.4 mm.

a. \_\_\_\_\_ Nails shall be corrosion resistant.

b. \_\_\_\_\_ Minimum acceptable nail dimensions:

| -                     | <u>Panel Siding (inch)</u> | <u>Lap Siding (inch)</u> |
|-----------------------|----------------------------|--------------------------|
| <u>Shank diameter</u> | <u>0.092</u>               | <u>0.099</u>             |
| <u>Head diameter</u>  | <u>0.225</u>               | <u>0.240</u>             |

c. \_\_\_\_\_ Where used to comply with Section 2308.6

d. \_\_\_\_\_ Nail length must accommodate the sheathing and penetrate framing 1 1/2 inches

2308.6.4 Length of braced wall panels. For Methods DWB, WSP, SFB, PBS, PCP and HPS each panel must be at least 48 inches (1219 mm) in length, covering three stud spaces where studs are spaced 16 inches (406 mm) apart and covering two stud spaces where studs are spaced 24 inches (610 mm) apart. *Braced wall panels* less than the required 48" length shall not contribute towards the amount of bracing required. *Braced wall panels* longer than the required length shall be credited for their actual length. For Method GB, each panel must be at least 96 inches (2438 mm) in length where applied to one side of the studs or 48 inches (1219 mm) where applied to both sides.

All vertical joints of panel sheathing shall occur over studs and adjacent panel joints shall be nailed to common framing members. Horizontal joints shall occur over blocking or other framing equal in size to the studding except where waived by the installation requirements for the specific sheathing materials. Sole plates shall be nailed to the floor framing in accordance with Section 2308.6.7 and top plates shall be connected to the framing above in accordance with Section 2308.5.3. Where joists are perpendicular to braced wall lines above, blocking shall be provided under and in line with the *braced wall panels*.

2308.6.5 Alternative bracing. An Alternate Braced Wall (ABW) or a Portal Frame with Hold-downs (PFH) described in this section is permitted to substitute for a 48" braced wall panel of methods DWB, WSP, SFB, PBS, PCP or HPS. For method GB, each 96- inch (2438 mm) section (applied to one face) or 48-inch (1219 mm) section (applied to both faces) or portion thereof required by Table 2308.6.1 is permitted to be replaced by one panel constructed in accordance with method ABW or PFH.

2308.6.5.1. Alternate Braced Wall (ABW). An ABW shall be constructed in accordance with this section and Figure 2308.6.5.1. In one-story buildings, each panel shall have a length of not less than 2 feet 8 inches (813 mm) and a height of not more than 10 feet (3048 mm). Each panel shall be sheathed on one face with 3/8- inch-minimum-thickness (9.5 mm) wood structural panel sheathing nailed with 8d common or galvanized box nails in accordance with Table 2304.9.1 and blocked at wood structural panel edges. Two anchor bolts installed in accordance with Section 2308.3.1 shall be provided in each panel. Anchor bolts shall be placed at each panel outside quarter points. Each panel end stud shall have a hold-down device fastened to the foundation, capable of providing an *approved* uplift capacity of not less than 1,800 pounds (8006 N). The hold-down device shall be installed in accordance with the manufacturer's recommendations. The ABW shall be supported directly on a foundation or on floor framing supported directly on a foundation that is continuous across the entire length of the braced wall line. This foundation shall be reinforced with not less than one No. 4 bar top and bottom. Where the continuous foundation is required to have a depth greater than 12 inches (305 mm), a minimum 12-inch by 12-inch (305 mm by 305 mm) continuous footing or turned down slab edge is permitted at door openings in the braced wall line. This continuous footing or turned down slab edge shall be reinforced with not less than one No. 4 bar top and bottom. This reinforcement shall be lapped 15 inches (381 mm) with the reinforcement required in the continuous foundation located directly under the braced wall line.

When the ABW is installed at the first story of two-story buildings, the wood structural panel sheathing shall be provided on both faces, three anchor bolts shall be placed at one-quarter points, and tie-down device uplift capacity shall not be less than 3,000 pounds (13 344 N).

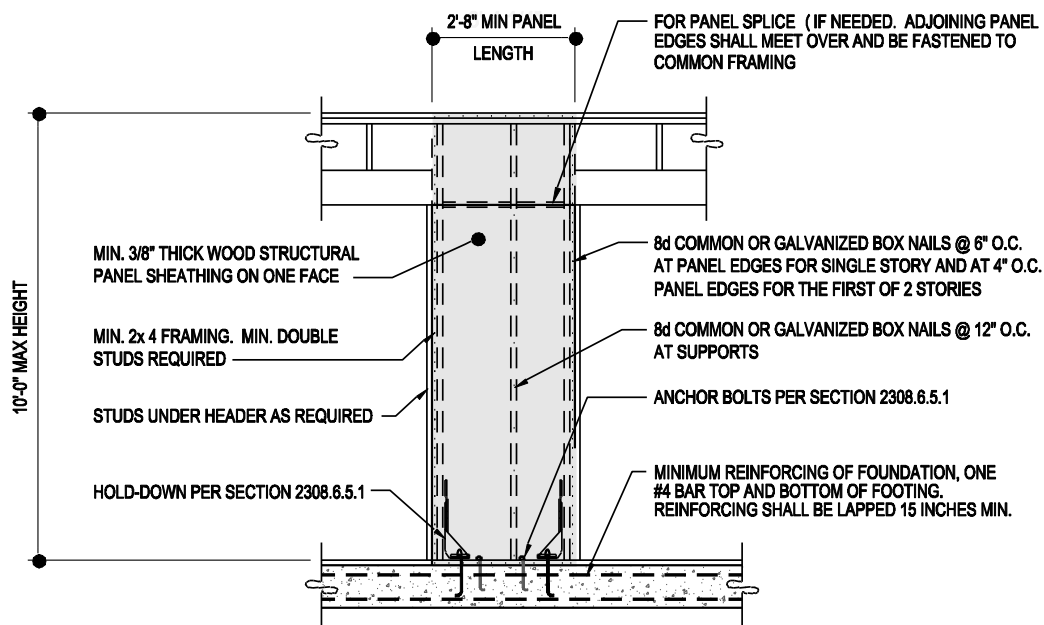
2308.6.5.2 Portal Frame with Hold-downs (PFH). A PFH shall be constructed in accordance with this section and Figure 2308.6.5.2. The adjacent door or window opening shall have a full-length header.

In one-story buildings, each panel shall have a length of not less than 16 inches (406 mm) and a height of not more than 10 feet (3048 mm). Each panel shall be sheathed on one face with a single layer of 3/8 inch (9.5 mm) minimum thickness wood structural panel sheathing nailed with 8d common or galvanized box nails in accordance with Figure 2308.6.5.2. The wood structural panel sheathing shall extend up over the solid sawn or glued-laminated header and shall be nailed in accordance with Figure 2308.6.5.2. A built-up header consisting of at least two 2 × 12s and fastened in accordance with Item 24 of Table 2304.9.1 shall be permitted to be used. A spacer, if used, shall be placed on the side of the built-up beam opposite the wood structural panel sheathing. The header shall extend between the inside faces of the first full-

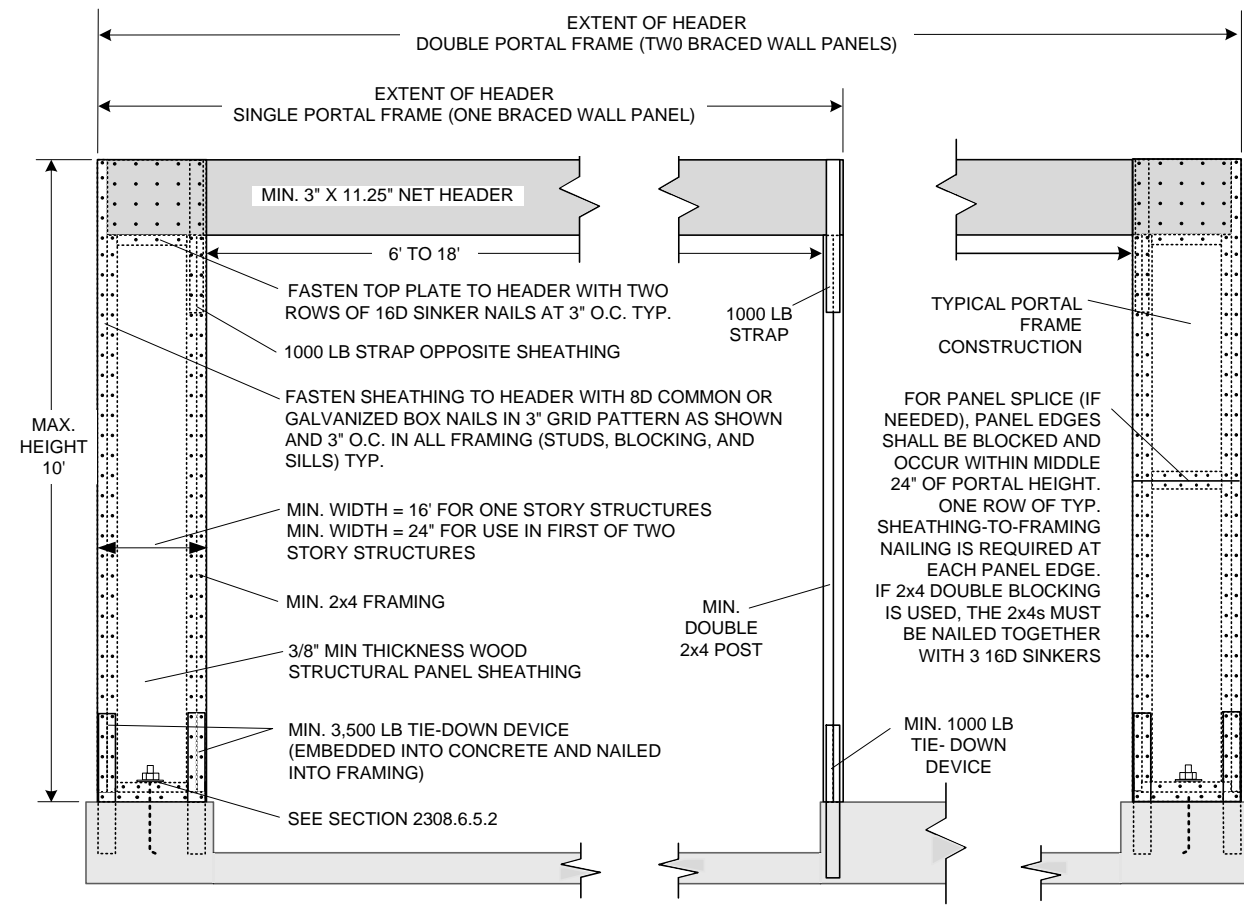
length outer studs of each panel. The clear span of the header between the inner studs of each panel shall be not less than 6 feet (1829 mm) and not more than 18 feet (5486 mm) in length. A strap with an uplift capacity of not less than 1,000 pounds (4,400 N) shall fasten the header to the inner studs opposite the sheathing. One anchor bolt not less than 5/8 inch (15.9 mm) diameter and installed in accordance with Section 2308.3.1 shall be provided in the center of each sill plate. The studs at each end of the panel shall have a hold-down device fastened to the foundation with an uplift capacity of not less than 3,500 pounds (15569 N).

Where a panel is located on one side of the opening, the header shall extend between the inside face of the first full-length stud of the panel and the bearing studs at the other end of the opening. A strap with an uplift capacity of not less than 1,000 pounds (4400 N) shall fasten the header to the bearing studs. The bearing studs shall also have a hold-down device fastened to the foundation with an uplift capacity of not less than 1,000 pounds (4400 N). The hold-down devices shall be an embedded strap type, installed in accordance with the manufacturer's recommendations. The PFH panels shall be supported directly on a foundation that is continuous across the entire length of the braced wall line. This foundation shall be reinforced with not less than one No. 4 bar top and bottom. Where the continuous foundation is required to have a depth greater than 12 inches (305 mm), a minimum 12-inch by 12-inch (305 mm by 305 mm) continuous footing or turned down slab edge is permitted at door openings in the braced wall line. This continuous footing or turned down slab edge shall be reinforced with not less than one No. 4 bar top and bottom. This reinforcement shall be lapped not less than 15 inches (381 mm) with the reinforcement required in the continuous foundation located directly under the braced wall line.

When a PFH is installed at the first story of two-story buildings, each panel shall have a length of not less than 24 inches (610 mm).



**FIGURE 2308.6.5.1**  
**ALTERNATE BRACED WALL PANEL (ABW)**



**Figure 2308.6.5.2**  
**PORTAL FRAME WITH HOLD-DOWNS (PFH)**

**2308.6.6 Cripple wall bracing. Cripple walls shall be braced in accordance with the following.**

**2308.6.6.1 Cripple wall bracing in *Seismic Design Category A, B and C.* For the purposes of this section, cripple walls in Seismic Design Categories A, B and C having a stud height exceeding 14 inches (356 mm) shall be considered a story and shall be braced in accordance with Table 2308.6(1). Spacing of edge nailing for required cripple wall bracing shall not exceed 6 inches (152mm) o.c. along the foundation plate and the top plate of the cripple wall. Nail size, nail spacing for field nailing and more restrictive boundary nailing requirements shall be as required elsewhere in the code for the specific bracing material used.**

**2308.6.6.2 Cripple wall bracing in *Seismic Design Category D and E* For the purposes of this section, cripple walls in Seismic Design Category D and E having a stud height exceeding 14 inches (356 mm) shall be considered a story and shall be braced in accordance with Table 2308.6.1. Where interior braced wall lines occur without a continuous foundation below, the length of parallel exterior cripple wall bracing shall be one and one-half times the lengths required by Table 2308.6.1. Where the cripple wall sheathing type used is method WSP or DWB and this additional length of bracing cannot be provided, the capacity of WSP or DWB sheathing shall be increased by reducing the spacing of fasteners along the perimeter of each piece of sheathing to 4 inches (102 mm) o.c.**

**2308.6.7 Connections of braced wall panels. Braced wall panel joints shall occur over studs or blocking. Braced wall panels shall be fastened to studs, top and bottom plates and at panel edges.**

Braced wall panels shall be applied to nominal 2-inch-wide [actual 1-1/2 inch (38 mm)] or larger stud framing.

2308.6.7.1 Bottom plate connection. Braced wall line bottom plates shall be connected to joists or full-depth blocking below in accordance with Table 2304.9.1, or to foundations in accordance with Section 2308.3.1.

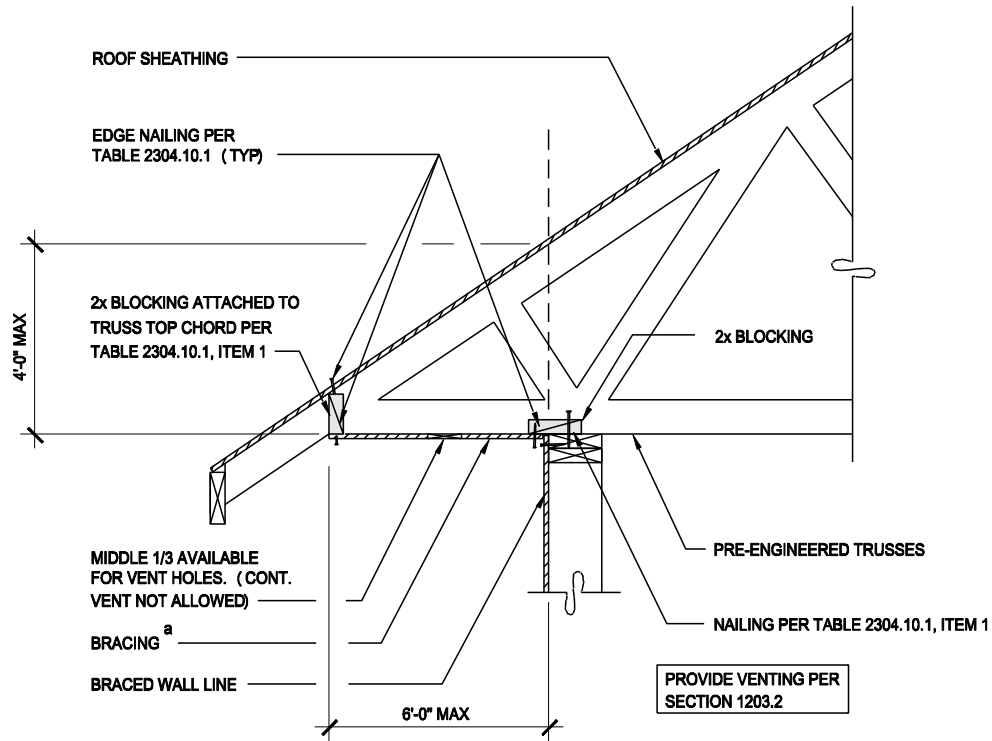
2308.6.7.2 Top plate connection. Where joists and/or rafters are used, braced wall line top plates shall be fastened over the full length of the braced wall line to joists, rafters, rim boards or full-depth blocking above in accordance with Table 2304.9.1, as applicable, based on the orientation of the joists or rafters to the braced wall line. Blocking at joists with walls above shall be equal to the depth of the joist at the braced wall line. Blocking shall be a minimum of 2 inches (51 mm) nominal thickness and shall be fastened to the braced wall line top plate as specified in Table 2304.9.1. Notching or drilling of holes in blocking in accordance with the requirements of Section 2308.4.2.4 or Section 2308.7.4 shall be permitted.

At exterior gable end walls braced wall panel sheathing in the top story shall be extended and fastened to roof framing where the spacing between parallel exterior braced wall lines is greater than 50 feet (15 240 mm).

Where roof trusses are used and are installed perpendicular to an exterior braced wall line, lateral forces shall be transferred from the roof diaphragm to the braced wall over the full length of the braced wall line by blocking of the ends of the trusses or by other *approved* methods providing equivalent lateral force transfer. Blocking shall be minimum 2 inches (51 mm) nominal thickness and equal to the depth of the truss at the wall line and shall be fastened to the braced wall line top plate as specified in Table 2304.9.1. Notching or drilling of holes in blocking in accordance with the requirements of Section 2308.4.2.4 or Section 2308.7.4 shall be permitted.

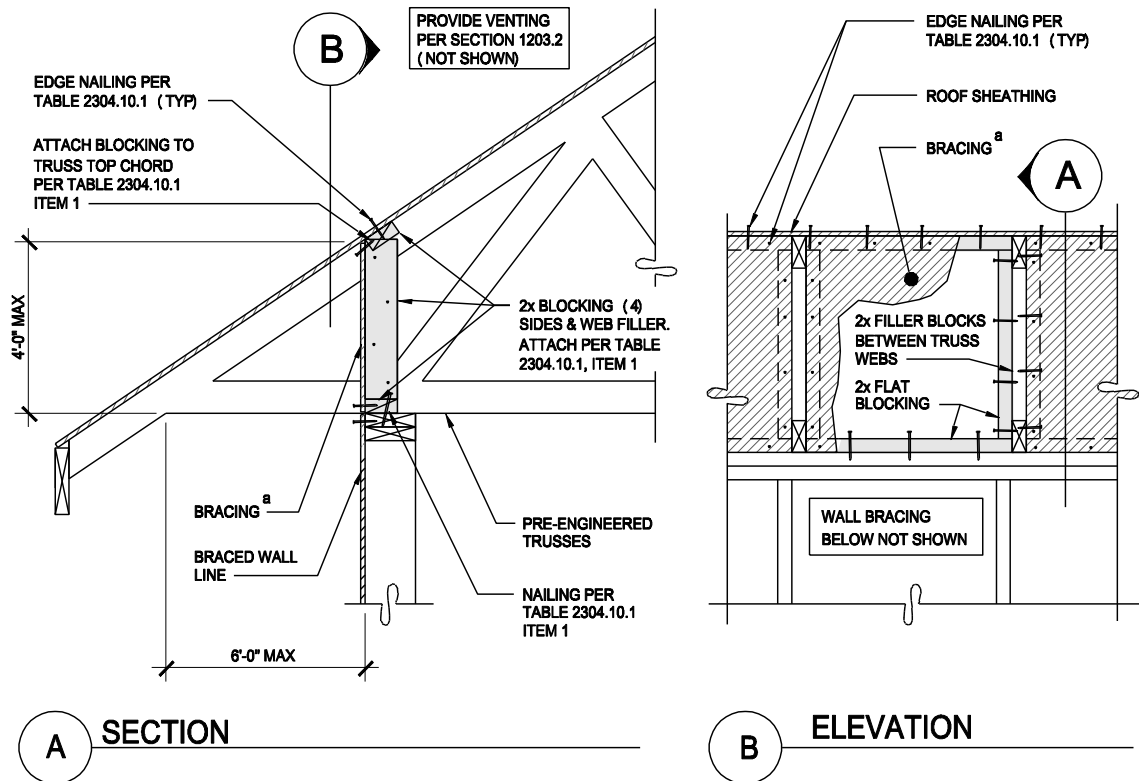
Exception. Where the roof sheathing is greater than 9-1/4 inches (235 mm) above the top plate solid blocking is not required when the framing members are connected in accordance with one of the following methods:

1. In accordance with Figure 2308.6.7.2 (1)
2. In accordance with Figure 2308.6.7.2 (2)
3. With full height engineered blocking panels designed for values listed in American Forest and Paper Association (AF&PA) Wood Frame Construction Manual for One- and Two-Family Dwellings (WFCM).
4. Designed in accordance with accepted engineering methods.



a. Methods of bracing shall be as described in Table 2308.6.3 (1) DWB, WSP, SFB, GB, PBS, PCP or HPS.

**Figure 2308.6.7.2(1)**



a. Methods of bracing shall be as described in Table 2308.6.3 (1) DWB, WSP, SFB, GB, PBS, PCP or HPS.

**Figure 2308.6.7.2(2)**

2308.6.7.3 Sill anchorage. Where foundations are required by Section 2308.6.7, braced wall line sills shall be anchored to concrete or masonry foundations. Such anchorage shall conform to the requirements of Section 2308.3. The anchors shall be distributed along the length of the braced wall line. Other anchorage devices having equivalent capacity are permitted.

2308.6.7.4 Anchorage to all-wood foundations. Where all-wood foundations are used, the force transfer from the braced wall lines shall be determined based on calculation and shall have a capacity greater than or equal to the connections required by Section 2308.3.

2308.6.8 Braced wall line and diaphragm support. Braced wall lines and floor and roof diaphragms shall be supported in accordance to this section.

2308.6.8.1 Foundation requirements. Braced wall lines shall be supported by continuous foundations.

Exception: For structures with a maximum plan dimension not over 50 feet (15 240 mm), continuous foundations are required at exterior walls only.

For structures in *Seismic Design Category D and E*, exterior braced wall panels shall be in the same plane vertically with the foundation or the portion of the structure containing the offset shall be designed in accordance with accepted engineering practice according to section 2308.1.1

Exceptions:

1. Exterior braced wall panels may be located up to 4 feet from the foundation below when supported by a floor constructed in accordance with all the following:

1. Cantilevers or setbacks shall not exceed four times the nominal depth of the floor joists.

2. Floor joists shall be 2 inches by 10 inches (51 mm by 254 mm) or larger and spaced not more than 16 inches (406 mm) o.c.

3. The ratio of the back span to the cantilever shall be at least 2:1.

4. Floor joists at ends of braced wall panels shall be doubled.

5. A continuous rim joist shall be connected to the ends of cantilevered joists. The rim joist is permitted to be spliced using a metal tie not less than 0.058 inch (1.47 mm) (16 galvanized gage) and 1 1/2 inches (38 mm) wide fastened with six 16d common nails on each side. The metal tie shall have a minimum yield stress of 33,000 psi (227 MPa).

6. Joists at setbacks or the end of cantilevered joists shall not carry gravity loads from more than a single story having uniform wall and roof loads, nor carry the reactions from headers having a span of 8 feet (2438 mm) or more.

2. The end of a required braced wall panel shall be allowed to extend not more than 1 foot (305 mm) over an opening in the wall below. This requirement is applicable to braced wall panels offset in plane and to braced wall panels offset out of plane as permitted by the exception to Item 1 above in this section.

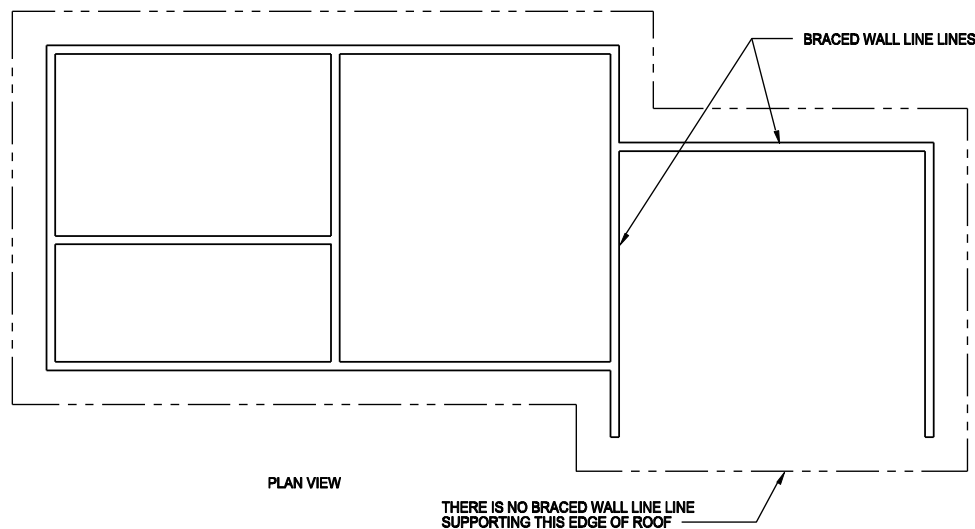
Exception: Braced wall panels are permitted to extend over an opening not more than 8 feet (2438 mm) in width where the header is a 4-inch by 12-inch (102 mm by 305 mm) or larger member.

**2308.6.8.2 Floor and roof diaphragm support in Seismic Design Category D and E. In structures assigned to Seismic Design Category D or E, floor and roof diaphragms shall be laterally supported by braced wall lines on all edges and connected in accordance with Section 2308.6.7 [see Figure 2308.6.7.2(1)].**

**Exception: Portions of roofs or floors that do not support braced wall panels above are permitted to extend up to 6 feet (1829 mm) beyond a braced wall line [see Figure 2308.6.7.2(2)] provided that the framing members are connected to the braced wall line below in accordance with Section 2308.6.6.**

**2308.6.8.3 Stepped footings in Seismic Design Category B, C, D and E . In Seismic Design Category B, C, D and E, where the height of a required braced wall panel extending from foundation to floor above varies more than 4 feet (1219 mm), the following construction shall be used:**

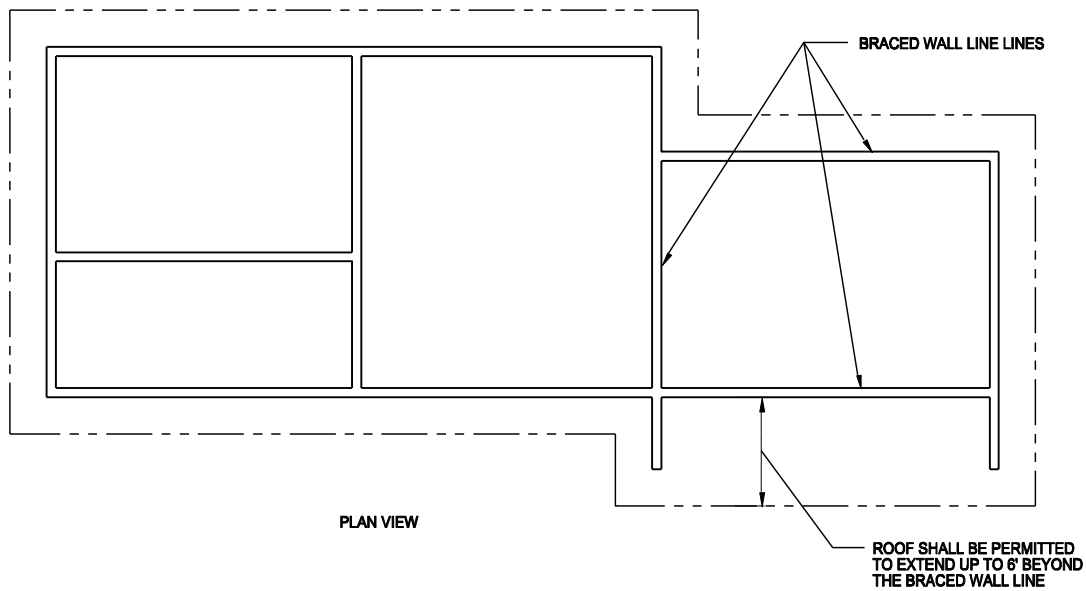
- 1. Where the bottom of the footing is stepped and the lowest floor framing rests directly on a sill bolted to the footings, the sill shall be anchored as required in Section 2308.3.**
- 2. Where the lowest floor framing rests directly on a sill bolted to a footing not less than 8 feet (2438 mm) in length along a line of bracing, the line shall be considered to be braced. The double plate of the cripple stud wall beyond the segment of footing extending to the lowest framed floor shall be spliced to the sill plate with metal ties, one on each side of the sill and plate. The metal ties shall not be less than 0.058 inch [1.47 mm (16 galvanized gage)] by 11/2 inches (38 mm) wide by 48 inches (1219 mm) with eight 16d common nails on each side of the splice location (see Figure 2308.6.7.3(1). The metal tie shall have a minimum yield stress of 33,000 pounds per square inch (psi) (227 MPa).**
- 3. Where cripple walls occur between the top of the footing and the lowest floor framing, the bracing requirements for a story shall apply.**



**For SI: 1 foot = 304.8 mm.**

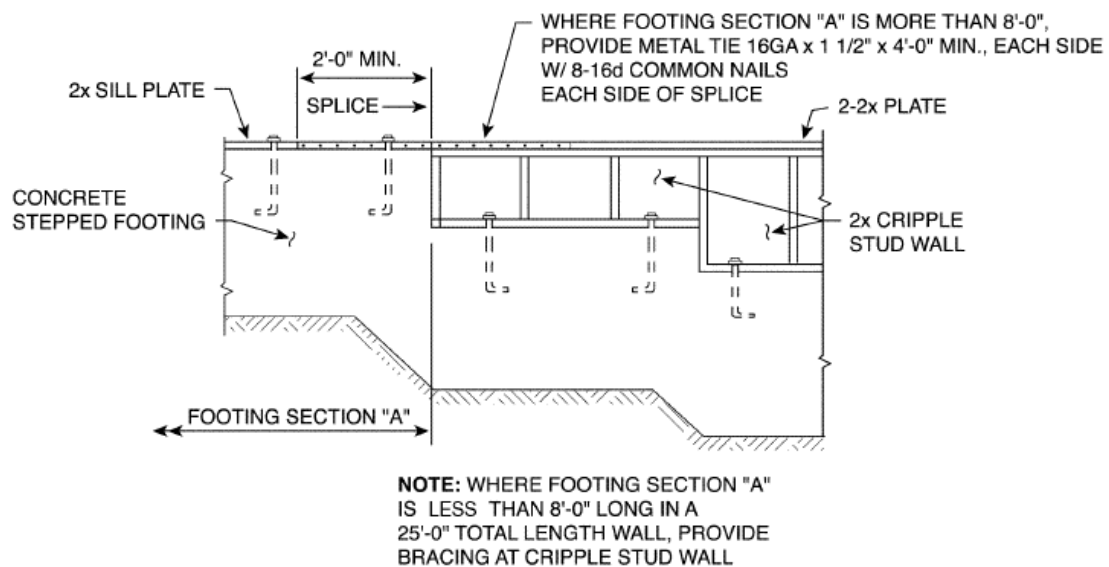
**FIGURE 2308.6.8.2(1)**  
**ROOF IN SDC D OR E NOT SUPPORTED ON ALL EDGES**





For SI: 1 foot = 304.8 mm.

**FIGURE 2308.6.8.2(2)**  
**ROOF EXTENSION IN SDC D OR E BEYOND BRACED WALL LINE**



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

**FIGURE 2308.6.8.3(1)**  
**STEPPED FOOTING CONNECTION DETAILS**

**2308.6.9 Attachment of sheathing.** Fastening of braced wall panel sheathing shall not be less than that prescribed in Table 2308.6.1 and 2304.9.1. Wall sheathing shall not be attached to framing members by adhesives.

**2308.6.10 Limitations of concrete or masonry veneer. Concrete or masonry veneer shall comply with Chapter 14 and this section.**

**2308.6.10.1 Limitations of concrete or masonry veneer in *Seismic Design Categories B or C*. In Seismic Design Category B and C, concrete or masonry walls and stone or masonry veneer shall not extend above a basement.**

**Exceptions:**

**1. In structures assigned to *Seismic Design Category B*, stone and masonry veneer is permitted to be used in the first two stories above grade plane or the first three stories above grade plane where the lowest story has concrete or masonry walls, provided that structural use panel wall bracing is used and the length of bracing provided is one and one-half times the required length as determined in Table 2308.6.1.**

**2. Stone and masonry veneer is permitted to be used in the first story above grade plane or the first two stories above grade plane where the lowest story has concrete or masonry walls.**

**3. Stone and masonry veneer is permitted to be used in both stories of buildings with two stories above grade plane, provided the following criteria are met:**

**3.1. Type of brace per Section 2308.6.1 shall be WSP and the allowable shear capacity in accordance with Section 2306.3 shall be a minimum of 350 plf (5108 N/m).**

**3.2. Braced wall panels in the second story shall be located in accordance with Section 2308.6.1 and not more than 25 feet (7620 mm) on center, and the total length of braced wall panels shall be not less than 25 percent of the braced wall line length. Braced wall panels in the first story shall be located in accordance with Section 2308.6.1 and not more than 25 feet (7620 mm) on center, and the total length of braced wall panels shall be not less than 45 percent of the braced wall line length.**

**3.3. Hold-down connectors shall be provided at the ends of each braced wall panel for the second story to first story connection with an allowable capacity of 2,000 pounds (8896 N). Hold-down connectors shall be provided at the ends of each braced wall panel for the first story to foundation connection with an allowable capacity of 3,900 pounds (17 347 N). In all cases, the hold-down connector force shall be transferred to the foundation.**

**3.4. Cripple walls shall not be permitted.**

**2308.6.10.2 Limitations of concrete or masonry in *Seismic Design Categories D and E*. In Seismic Design Category D and E concrete or masonry walls and stone or masonry veneer shall not extend above a basement.**

**Exception: In structures assigned to *Seismic Design Category D*, stone and masonry veneer is permitted to be used in the first story above grade plane, provided the following criteria are met:**

**1. Type of brace in accordance with Section 2308.6.1 shall be WSP and the allowable shear capacity in accordance with Section 2306.3 shall be a minimum of 350 plf (5108 N/m).**

**2. The bracing of the first story shall be located at each end and at least every 25 feet (7620 mm) o.c. but not less than 45 percent of the braced wall line.**

3. Hold-down connectors shall be provided at the ends of braced walls for the first floor to foundation with an allowable capacity of 2,100 pounds (9341 N).

4. Cripple walls shall not be permitted.

2308.7 Roof and ceiling framing. The framing details required in this section apply to roofs having a minimum slope of three units vertical in 12 units horizontal (25-percent slope) or greater. Where the roof slope is less than three units vertical in 12 units horizontal (25-percent slope), members supporting rafters and ceiling joists such as ridge board, hips and valleys shall be designed as beams.

2308.7.1 Ceiling joist spans. Allowable spans for ceiling joists shall be in accordance with Table 2308.7.1(1) or 2308.7.1(2). For other grades and species, refer to the AF&PA Span Tables for Joists and Rafters.

2308.7.2 Rafter spans. Allowable spans for rafters shall be in accordance with Table 2308.7.2(1), 2308.7.2(2), 2308.7.2(3), 2308.7.2(4), 2308.7.2(5) or 2308.7.2(6). For other grades and species, refer to the AF&PA Span Tables for Joists and Rafters.

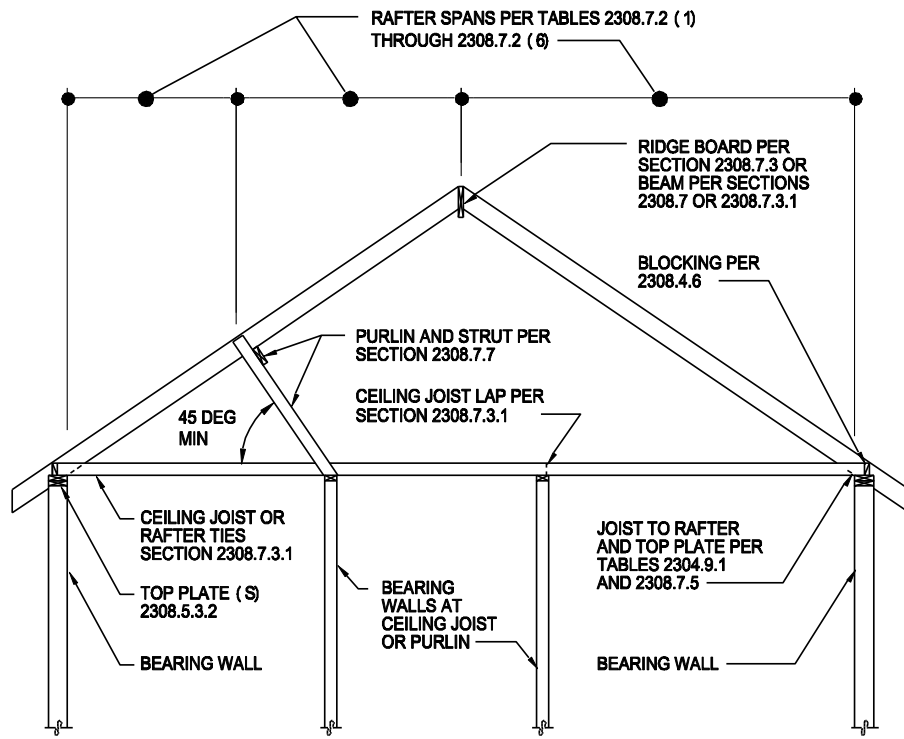
2308.7.3 Ceiling joist and rafter framing. Rafters shall be framed directly opposite each other at the ridge. There shall be a ridge board at least 1-inch (25 mm) nominal thickness at ridges and not less in depth than the cut end of the rafter. At valleys and hips, there shall be a single valley or hip rafter not less than 2-inch (51 mm) nominal thickness and not less in depth than the cut end of the rafter.

2308.7.3.1 Ceiling joist and rafter connections. Ceiling joists and rafters shall be nailed to each other and the assembly shall be nailed to the top wall plate in accordance with Tables 2304.9.1 and 2308.7.5. Ceiling joists shall be continuous or securely joined where they meet over interior partitions and be fastened to adjacent rafters in accordance with Tables 2304.9.1 and 2308.7.3.1 to provide a continuous rafter tie across the building where such joists are parallel to the rafters. Ceiling joists shall have a bearing surface of not less than 1-1/2 inches (38 mm) on the top plate at each end.

Where ceiling joists are not parallel to rafters, an equivalent rafter tie shall be installed in a manner to provide a continuous tie across the building, at a spacing of not more than 4 feet (1219 mm) o.c. The connections shall be in accordance with Tables 2308.7.3.1 and 2304.9.1, or connections of equivalent capacities shall be provided. Where ceiling joists or rafter ties are not provided at the top of the rafter support walls, the ridge formed by these rafters shall also be supported by a girder conforming to Section 2308.2.7. Rafter ties shall be spaced not more than 4 feet (1219 mm) o.c.

Rafter tie connections shall be based on the equivalent rafter spacing in Table 2308.7.3.1. Rafter/ceiling joist connections and rafter/tie connections shall be of sufficient size and number to prevent splitting from nailing.

Roof framing member connection to braced wall lines shall be in accordance with 2308.6.6.2.



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 installed per section 2308.7.3.1

**FIGURE 2308.7**  
**ROOF CEILING FRAMING**

**Table 2308.7.3.1**  
**RAFTER TIE CONNECTIONS<sup>g</sup>**

| <u>RAFTER<br/>SLOPE</u> | <u>TIE SPACING<br/>(inches)</u> | <u>NO SNOW LOAD</u>  |           |           |           | <u>GROUND SNOW LOAD (pound per square foot)</u> |           |           |           |                                      |           |           |           |
|-------------------------|---------------------------------|--|-----------|-----------|-----------|---|-----------|-----------|-----------|--------------------------------------|-----------|-----------|-----------|
|                         |                                 |  |           |           |           | <u>30 pounds per square<br/>foot</u>            |           |           |           | <u>50 pounds per square<br/>foot</u> |           |           |           |
|                         |                                 |  |           |           |           | <u>Roof span (feet)</u>                         |           |           |           |                                      |           |           |           |
|                         |                                 | <u>12</u>  | <u>20</u> | <u>28</u> | <u>36</u> | <u>12</u>                                       | <u>20</u> | <u>28</u> | <u>36</u> | <u>12</u>                            | <u>20</u> | <u>28</u> | <u>36</u> |
|                         |                                 | <u>Required number of 16d common (3 ½" x 0.162") nails <sup>a,b</sup> per connection <sup>c, d, e, f</sup></u> |           |           |           |   |           |           |           |                                      |           |           |           |
| <u>3:12</u>             | <u>12</u>                       | <u>4</u>   | <u>6</u>  | <u>8</u>  | <u>10</u> | <u>4</u>  | <u>6</u>  | <u>8</u>  | <u>11</u> | <u>5</u>                             | <u>8</u>  | <u>12</u> | <u>15</u> |
|                         | <u>16</u>                       | <u>5</u>   | <u>7</u>  | <u>10</u> | <u>13</u> | <u>5</u>  | <u>8</u>  | <u>11</u> | <u>14</u> | <u>6</u>                             | <u>11</u> | <u>15</u> | <u>20</u> |
|                         | <u>24</u>                       | <u>7</u>   | <u>11</u> | <u>15</u> | <u>19</u> | <u>7</u>  | <u>11</u> | <u>16</u> | <u>21</u> | <u>9</u>                             | <u>16</u> | <u>23</u> | <u>30</u> |
|                         | <u>32</u>                       | <u>10</u>  | <u>14</u> | <u>19</u> | <u>25</u> | <u>10</u>                                       | <u>16</u> | <u>22</u> | <u>28</u> | <u>12</u>                            | <u>27</u> | <u>30</u> | <u>40</u> |
|                         | <u>48</u>                       | <u>14</u>  | <u>21</u> | <u>29</u> | <u>37</u> | <u>14</u>                                       | <u>32</u> | <u>36</u> | <u>42</u> | <u>18</u>                            | <u>32</u> | <u>46</u> | <u>60</u> |
| <u>4:12</u>             | <u>12</u>                       | <u>3</u>   | <u>4</u>  | <u>5</u>  | <u>6</u>  | <u>3</u>  | <u>5</u>  | <u>6</u>  | <u>8</u>  | <u>4</u>                             | <u>6</u>  | <u>9</u>  | <u>11</u> |
|                         | <u>16</u>                       | <u>3</u>   | <u>5</u>  | <u>7</u>  | <u>8</u>  | <u>4</u>  | <u>6</u>  | <u>8</u>  | <u>11</u> | <u>5</u>                             | <u>8</u>  | <u>12</u> | <u>15</u> |
|                         | <u>24</u>                       | <u>4</u>   | <u>7</u>  | <u>10</u> | <u>12</u> | <u>5</u>  | <u>9</u>  | <u>12</u> | <u>16</u> | <u>7</u>                             | <u>12</u> | <u>17</u> | <u>22</u> |
|                         | <u>32</u>                       | <u>6</u>   | <u>9</u>  | <u>13</u> | <u>16</u> | <u>8</u>  | <u>12</u> | <u>16</u> | <u>22</u> | <u>10</u>                            | <u>16</u> | <u>24</u> | <u>30</u> |
|                         | <u>48</u>                       | <u>8</u>   | <u>14</u> | <u>19</u> | <u>24</u> | <u>10</u>                                       | <u>18</u> | <u>24</u> | <u>32</u> | <u>14</u>                            | <u>24</u> | <u>34</u> | <u>44</u> |
| <u>5:12</u>             | <u>12</u>                       | <u>3</u>   | <u>3</u>  | <u>4</u>  | <u>5</u>  | <u>3</u>  | <u>4</u>  | <u>5</u>  | <u>7</u>  | <u>3</u>                             | <u>5</u>  | <u>7</u>  | <u>9</u>  |
|                         | <u>16</u>                       | <u>3</u>   | <u>4</u>  | <u>5</u>  | <u>7</u>  | <u>3</u>  | <u>5</u>  | <u>7</u>  | <u>9</u>  | <u>4</u>                             | <u>7</u>  | <u>9</u>  | <u>12</u> |
|                         | <u>24</u>                       | <u>4</u>   | <u>6</u>  | <u>8</u>  | <u>10</u> | <u>4</u>  | <u>7</u>  | <u>10</u> | <u>13</u> | <u>6</u>                             | <u>10</u> | <u>14</u> | <u>18</u> |
|                         | <u>32</u>                       | <u>5</u>   | <u>8</u>  | <u>10</u> | <u>13</u> | <u>6</u>  | <u>10</u> | <u>14</u> | <u>18</u> | <u>8</u>                             | <u>14</u> | <u>18</u> | <u>24</u> |
|                         | <u>48</u>                       | <u>7</u>   | <u>11</u> | <u>15</u> | <u>20</u> | <u>8</u>  | <u>14</u> | <u>20</u> | <u>26</u> | <u>12</u>                            | <u>20</u> | <u>28</u> | <u>36</u> |
| <u>7:12</u>             | <u>12</u>                       | <u>3</u>   | <u>3</u>  | <u>3</u>  | <u>4</u>  | <u>3</u>  | <u>3</u>  | <u>4</u>  | <u>5</u>  | <u>3</u>                             | <u>4</u>  | <u>5</u>  | <u>7</u>  |
|                         | <u>16</u>                       | <u>3</u>   | <u>3</u>  | <u>4</u>  | <u>5</u>  | <u>3</u>  | <u>4</u>  | <u>5</u>  | <u>6</u>  | <u>3</u>                             | <u>5</u>  | <u>7</u>  | <u>9</u>  |
|                         | <u>24</u>                       | <u>3</u>   | <u>4</u>  | <u>6</u>  | <u>7</u>  | <u>3</u>  | <u>5</u>  | <u>7</u>  | <u>9</u>  | <u>4</u>                             | <u>7</u>  | <u>10</u> | <u>13</u> |
|                         | <u>32</u>                       | <u>4</u>   | <u>6</u>  | <u>8</u>  | <u>10</u> | <u>4</u>  | <u>8</u>  | <u>10</u> | <u>12</u> | <u>6</u>                             | <u>10</u> | <u>14</u> | <u>18</u> |
|                         | <u>48</u>                       | <u>5</u>   | <u>8</u>  | <u>11</u> | <u>14</u> | <u>6</u>  | <u>10</u> | <u>14</u> | <u>18</u> | <u>9</u>                             | <u>14</u> | <u>20</u> | <u>26</u> |
| <u>9:12</u>             | <u>12</u>                       | <u>3</u>   | <u>3</u>  | <u>3</u>  | <u>3</u>  | <u>3</u>  | <u>3</u>  | <u>3</u>  | <u>4</u>  | <u>3</u>                             | <u>3</u>  | <u>4</u>  | <u>5</u>  |
|                         | <u>16</u>                       | <u>3</u>   | <u>3</u>  | <u>3</u>  | <u>4</u>  | <u>3</u>  | <u>3</u>  | <u>4</u>  | <u>5</u>  | <u>3</u>                             | <u>4</u>  | <u>5</u>  | <u>7</u>  |
|                         | <u>24</u>                       | <u>3</u>   | <u>3</u>  | <u>5</u>  | <u>6</u>  | <u>3</u>  | <u>4</u>  | <u>6</u>  | <u>7</u>  | <u>3</u>                             | <u>6</u>  | <u>8</u>  | <u>10</u> |
|                         | <u>32</u>                       | <u>3</u>   | <u>4</u>  | <u>6</u>  | <u>8</u>  | <u>4</u>  | <u>6</u>  | <u>8</u>  | <u>10</u> | <u>5</u>                             | <u>8</u>  | <u>10</u> | <u>14</u> |
|                         | <u>48</u>                       | <u>4</u>   | <u>6</u>  | <u>9</u>  | <u>11</u> | <u>5</u>  | <u>8</u>  | <u>12</u> | <u>14</u> | <u>7</u>                             | <u>12</u> | <u>16</u> | <u>20</u> |
| <u>12:12</u>            | <u>12</u>                       | <u>3</u>   | <u>3</u>  | <u>3</u>  | <u>3</u>  | <u>3</u>  | <u>3</u>  | <u>3</u>  | <u>3</u>  | <u>3</u>                             | <u>3</u>  | <u>3</u>  | <u>4</u>  |
|                         | <u>16</u>                       | <u>3</u>   | <u>3</u>  | <u>3</u>  | <u>3</u>  | <u>3</u>  | <u>3</u>  | <u>3</u>  | <u>4</u>  | <u>3</u>                             | <u>3</u>  | <u>4</u>  | <u>5</u>  |
|                         | <u>24</u>                       | <u>3</u>   | <u>3</u>  | <u>3</u>  | <u>4</u>  | <u>3</u>  | <u>3</u>  | <u>4</u>  | <u>6</u>  | <u>3</u>                             | <u>4</u>  | <u>6</u>  | <u>8</u>  |
|                         | <u>32</u>                       | <u>3</u>   | <u>3</u>  | <u>4</u>  | <u>5</u>  | <u>3</u>  | <u>5</u>  | <u>6</u>  | <u>8</u>  | <u>4</u>                             | <u>6</u>  | <u>8</u>  | <u>10</u> |
|                         | <u>48</u>                       | <u>3</u>   | <u>4</u>  | <u>6</u>  | <u>7</u>  | <u>4</u>  | <u>7</u>  | <u>8</u>  | <u>12</u> | <u>6</u>                             | <u>8</u>  | <u>12</u> | <u>16</u> |

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 47.8 N/m<sup>2</sup>.

- 40d box (5" x 0.162") or 16d sinker (3 1/4" x 0.148") nails are permitted to be substituted for 16d common (3 1/2" x 0.162") nails.
- Nailing requirements are permitted to be reduced 25 percent if nails are clinched.
- Rafter tie heel joint connections are not required where the ridge is supported by a load-bearing wall, header or ridge beam.
- When intermediate support of the rafter is provided by vertical struts or purlins to a load-bearing wall, the tabulated heel joint connection requirements are permitted to be reduced proportionally to the reduction in span.
- Equivalent nailing patterns are required for ceiling joist to ceiling joist lap splices.
- Connected members shall be of sufficient size to prevent splitting due to nailing.
- For snow loads less than 30 pounds per square foot, the required number of nails is permitted to be reduced by multiplying by the ratio of actual snow load plus 10 divided by 40, but not less than the number required for no snow load.

**2308.7.4 Notches and holes.** Notching at the ends of rafters or ceiling joists shall not exceed one-fourth the depth. Notches in the top or bottom of the rafter or ceiling joist shall not exceed one-sixth the depth and shall not be located in the middle one-third of the span, except that a notch not exceeding one-third of the depth is permitted in the top of the rafter or ceiling joist not further from the face of the support than the depth of the member. Holes bored in rafters or ceiling joists shall not be within 2 inches (51 mm) of the top and bottom and their diameter shall not exceed one-third the depth of the member.

**2308.7.5 Wind uplift.** The roof construction shall have rafter and truss ties to the wall below. Resultant uplift loads shall be transferred to the foundation using a continuous load path. The rafter or truss to wall connection shall comply with Tables 2304.9.1 and 2308.7.5

**Table 2308.7.5**

**REQUIRED RATING OF APPROVED UPLIFT CONNECTORS (pounds)** <sup>a, b, c, e, f, g, h</sup>

| NOMINAL DESIGN WIND<br>SPEED, $V_i$<br>$_{asd}$ | ROOF SPAN (feet) |      |      |      |      |      |      | OVERHANGS<br>(pounds/foot) <sup>d</sup> |
|---|------------------|------|------|------|------|------|------|---|
|   | 12               | 20   | 24   | 28   | 32   | 36   | 40   |   |
| 85  | -72              | -120 | -145 | -169 | -193 | -217 | -241 | -38.55                                  |
| 90  | -91              | -151 | -181 | -212 | -242 | -272 | -302 | -43.22                                  |
| 100   | -131             | -281 | -262 | -305 | -349 | -393 | -436 | -53.36                                  |
| 110   | -175             | -292 | -351 | -409 | -467 | -526 | -584 | -64.56                                  |

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 1.61 km/hr, 1 pound = 0.454 Kg, 1 pound/foot = 14.5939 N/m.

- a. The uplift connection requirements are based on a 30-foot mean roof height located in Exposure B. For Exposure C or D and for other mean roof heights,

| EXPOSURE | Mean Roof Height (feet) |      |      |      |      |      |      |      |      |      |
|----------|-------------------------|------|------|------|------|------|------|------|------|------|
|          | 15                      | 20   | 25   | 30   | 35   | 40   | 45   | 50   | 55   | 60   |
| B        | 1.00                    | 1.00 | 1.00 | 1.00 | 1.05 | 1.09 | 1.12 | 1.16 | 1.19 | 1.22 |
| C        | 1.21                    | 1.29 | 1.35 | 1.40 | 1.45 | 1.49 | 1.53 | 1.56 | 1.59 | 1.62 |
| D        | 1.47                    | 1.55 | 1.61 | 1.66 | 1.70 | 1.74 | 1.78 | 1.81 | 1.84 | 1.87 |

- b. The uplift connection requirements are based on the framing being spaced 24 inches on center. Multiply by 0.67 for framing spaced 16 inches on center and multiply by 0.5 for framing spaced 12 inches on center.
- c. The uplift connection requirements include an allowance for 10 pounds of dead load.
- d. The uplift connection requirements do not account for the effects of overhangs. The magnitude of the above loads shall be increased by adding the overhang loads found in the table. The overhang loads are also based on framing spaced 24 inches on center. The overhang loads given shall be multiplied by the overhang projection and added to the roof uplift value in the table.
- e. The uplift connection requirements are based upon wind loading on end zones as defined in Figure 28.6.3 of ASCE 7. Connection loads for connections located a distance of 20 percent of the least horizontal dimension of the building from the corner of the building are permitted to be reduced by multiplying the table connection value by 0.7 and multiplying the overhang load by 0.8.
- f. For wall-to-wall and wall-to-foundation connections, the capacity of the uplift connector is permitted to be reduced by 100 pounds for each full wall above. (For example, if a 500-pound rated connector is used on the roof framing, a 400-pound rated connector is permitted at the next floor level down).
- g. Interpolation is permitted for intermediate values of  $V_{asd}$  and roof spans.
- h. The rated capacity of approved tie-down devices is permitted to include up to a 60-percent increase for wind effects where allowed by material specifications.
- i.  $V_{asd}$  shall be determined in accordance with Section 1609.3.1.

**2308.7.6 Framing around openings.** Trimmer and header rafters shall be doubled, or of lumber of equivalent cross section, where the span of the header exceeds 4 feet (1219 mm). The ends of header

rafters more than 6 feet (1829 mm) long shall be supported by framing anchors or rafter hangers unless bearing on a beam, partition or wall.

2308.7.6.1 Openings in roof diaphragms in *Seismic Design Categories B, C, D and E*. Openings in horizontal diaphragms with a dimension perpendicular to the joist that is greater than 4 feet (1219 mm) shall be constructed with metal ties and blocking in accordance with this section and Figure 2308.4.4.1(1). Metal ties shall not be less than 0.058 inch [1.47 mm (16 galvanized gage)] thick by 1-1/2 inches (38 mm) wide with a minimum yield stress of 33,000 psi (227 Mpa). Blocking shall be provided 2 feet minimum beyond headers. Ties shall be attached to blocking with eight 16d common nails on each side of the header-joist intersection.

2308.7.7 Purlins. Purlins to support roof loads are permitted to be installed to reduce the span of rafters within allowable limits and shall be supported by struts to bearing walls. The maximum span of 2-inch by 4-inch (51 mm by 102 mm) purlins shall be 4 feet (1219 mm). The maximum span of the 2-inch by 6-inch (51 mm by 152 mm) purlin shall be 6 feet (1829 mm), but in no case shall the purlin be smaller than the supported rafter. Struts shall not be smaller than 2-inch by 4-inch (51 mm by 102 mm) members. The unbraced length of struts shall not exceed 8 feet (2438 mm) and the minimum slope of the struts shall not be less than 45 degrees (0.79 rad) from the horizontal.

2308.7.8 Blocking. Roof rafters and ceiling joists shall be supported laterally to prevent rotation and lateral displacement in accordance with the provisions of Section 2308.4.6 and connected to braced wall lines per Section 2308.6.6.2.

2308.7.9 Engineered wood products. Prefabricated wood I-joists, structural glued-laminated timber and structural composite lumber shall not be notched or drilled except where permitted by the manufacturer's recommendations or where the effects of such alterations are specifically considered in the design of the member by a registered design professional.

2308.7.10 Roof sheathing. Roof sheathing shall be in accordance with Tables 2304.7(3) and 2304.7(5) for wood structural panels, and Tables 2304.7(1) and 2304.7(2) for lumber and shall comply with Section 2304.7.2.

2308.7.11 Joints. Joints in lumber sheathing shall occur over supports unless *approved* end-matched lumber is used, in which case each piece shall bear on at least two supports.

2308.7.12 Roof planking. Planking shall be designed in accordance with the general provisions of this code.

In lieu of such design, 2-inch (51 mm) tongue-and groove planking is permitted in accordance with Table 2308.7.12. Joints in such planking are permitted to be randomly spaced, provided the system is applied to not less than three continuous spans, planks are center matched and end matched or splined, each plank bears on at least one support, and joints are separated by at least 24 inches (610 mm) in adjacent pieces.

TABLE 2308.7.12  
ALLOWABLE SPANS FOR 2-INCH TONGUE-AND-GROOVE DECKING

| <u>SPAN<sup>a</sup></u><br><u>(feet)</u> | <u>LIVE LOAD</u><br><u>(pound per</u><br><u>square foot)</u> | <u>DEFLECTION</u><br><u>LIMIT</u> | <u>BENDING</u><br><u>STRESS (f)</u><br><u>(pound per square</u><br><u>inch)</u> | <u>MODULUS OF ELASTICITY (E)</u><br><u>(pound per square inch)</u> |
|--|--|-----------------------------------|---|--|
| <u>Roofs</u>                             |  |                                   |   |  |
| <u>4</u>                                 | <u>20</u>  | <u>1/240</u>                      | <u>160</u>  | <u>170,000</u>   |

|            |           |                              |            |                                      |
|------------|-----------|------------------------------|------------|--------------------------------------|
|            |           | <u>1/360</u>                 |            | <u>256,000</u>                       |
|            | <u>30</u> | <u>1/240</u><br><u>1/360</u> | <u>210</u> | <u>256,000</u><br><u>384,000</u>     |
|            | <u>40</u> | <u>1/240</u><br><u>1/360</u> | <u>270</u> | <u>340,000</u><br><u>512,000</u>     |
| <u>4.5</u> | <u>20</u> | <u>1/240</u><br><u>1/360</u> | <u>200</u> | <u>242,000</u><br><u>305,000</u>     |
|            | <u>30</u> | <u>1/240</u><br><u>1/360</u> | <u>270</u> | <u>363,000</u><br><u>405,000</u>     |
|            | <u>40</u> | <u>1/240</u><br><u>1/360</u> | <u>350</u> | <u>484,000</u><br><u>725,000</u>     |
| <u>5.0</u> | <u>20</u> | <u>1/240</u><br><u>1/360</u> | <u>250</u> | <u>332,000</u><br><u>500,000</u>     |
|            | <u>30</u> | <u>1/240</u><br><u>1/360</u> | <u>330</u> | <u>495,000</u><br><u>742,000</u>     |
|            | <u>40</u> | <u>1/240</u><br><u>1/360</u> | <u>420</u> | <u>660,000</u><br><u>1,000,000</u>   |
| <u>5.5</u> | <u>20</u> | <u>1/240</u><br><u>1/360</u> | <u>300</u> | <u>442,000</u><br><u>660,000</u>     |
|            | <u>30</u> | <u>1/240</u><br><u>1/360</u> | <u>400</u> | <u>662,000</u><br><u>998,000</u>     |
|            | <u>40</u> | <u>1/240</u><br><u>1/360</u> | <u>500</u> | <u>884,000</u><br><u>1,330,000</u>   |
| <u>6.0</u> | <u>20</u> | <u>1/240</u><br><u>1/360</u> | <u>360</u> | <u>575,000</u><br><u>862,000</u>     |
|            | <u>30</u> | <u>1/240</u><br><u>1/360</u> | <u>480</u> | <u>862,000</u><br><u>1,295,000</u>   |
|            | <u>40</u> | <u>1/240</u><br><u>1/360</u> | <u>600</u> | <u>1,150,000</u><br><u>1,730,000</u> |

*(continued)*

**TABLE 2308.7.12—continued**  
**ALLOWABLE SPANS FOR 2-INCH TONGUE-AND-GROOVE DECKING**

| <u>SPAN<sup>a</sup></u><br><u>(feet)</u> | <u>LIVE LOAD</u><br><u>(pound per</u><br><u>square foot)</u> | <u>DEFLECTION</u><br><u>LIMIT</u> | <u>BENDING</u><br><u>STRESS (f)</u><br><u>(pound per square</u><br><u>inch)</u> | <u>MODULUS OF ELASTICITY (E)</u><br><u>(pound per square inch)</u> |
|--|--|-----------------------------------|---|--|
| <u>Roofs</u>                             |  |                                   |   |  |
| <u>6.5</u>                               | <u>20</u>  | <u>1/240</u><br><u>1/360</u>      | <u>420</u>  | <u>595,000</u><br><u>892,000</u>                                   |
|  | <u>30</u>  | <u>1/240</u><br><u>1/360</u>      | <u>560</u>  | <u>892,000</u><br><u>1,340,000</u>                                 |
|  | <u>40</u>  | <u>1/240</u><br><u>1/360</u>      | <u>700</u>  | <u>1,190,000</u><br><u>1,730,000</u>                               |
| <u>7.0</u>                               | <u>20</u>  | <u>1/240</u><br><u>1/360</u>      | <u>490</u>  | <u>910,000</u><br><u>1,360,000</u>                                 |
|  | <u>30</u>  | <u>1/240</u><br><u>1/360</u>      | <u>650</u>  | <u>1,370,000</u><br><u>2,000,000</u>                               |
|  | <u>40</u>  | <u>1/240</u><br><u>1/360</u>      | <u>810</u>  | <u>1,820,000</u><br><u>2,725,000</u>                               |
| <u>7.5</u>                               | <u>20</u>  | <u>1/240</u><br><u>1/360</u>      | <u>560</u>  | <u>1,125,000</u><br><u>1,685,000</u>                               |
|  | <u>30</u>  | <u>1/240</u><br><u>1/360</u>      | <u>750</u>  | <u>1,685,000</u><br><u>2,530,000</u>                               |



|                                      |           |                              |  |  |
|--------------------------------------|-----------|------------------------------|--|--|
|                                      | <u>40</u> | <u>1/240</u><br><u>1/360</u> | <u>930</u>                               | <u>2,250,000</u><br><u>3,380,000</u>                     |
| <u>8.0</u>                           | <u>20</u> | <u>1/240</u><br><u>1/360</u> | <u>640</u>                               | <u>1,360,000</u><br><u>2,040,000</u>                     |
|                                      | <u>30</u> | <u>1/240</u><br><u>1/360</u> | <u>850</u>                               | <u>2,040,000</u><br><u>3,060,000</u>                     |
| <u>Floors</u>                        |           |                              |  |  |
| <u>4</u><br><u>4.5</u><br><u>5.0</u> | <u>40</u> | <u>1/360</u>                 | <u>840</u><br><u>950</u><br><u>1,060</u> | <u>1,000,000</u><br><u>1,300,000</u><br><u>1,600,000</u> |

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kN/m<sup>2</sup>, 1 pound per square inch = 0.00689 N/mm<sup>2</sup>.

- a. Spans are based on simple beam action with 10 pounds per square foot dead load and provisions for a 300-pound concentrated load on a 12-inch width of decking. Random layup is permitted in accordance with the provisions of Section 2308.10.9. Lumber thickness is 1 ½ inches nominal.

2308.7.13 Wood trusses. Wood trusses shall be designed in accordance with Section 2303.4. Connection to braced wall lines shall be in accordance with 2308.6.6.2.

2308.7.14 Attic ventilation. For attic ventilation, see Section 1203.2.

2308.8 Design of elements. Combining of engineered elements or systems and conventionally specified elements or systems shall be permitted subject to the following limits.

2308.8.1 Elements exceeding limitations of conventional construction. When a building of otherwise conventional construction contains structural elements exceeding the limits of Section 2308.2, these elements and the supporting load path shall be designed in accordance with accepted engineering practice and the provisions of this code.

2308.8.2 Structural elements or systems not described herein. When a building of otherwise conventional construction contains structural elements or systems not described in Section 2308, these elements or systems shall be designed in accordance with accepted engineering practice and the provisions of this code. The extent of such design need only demonstrate compliance of the nonconventional elements with other applicable provisions of this code and shall be compatible with the performance of the conventionally framed system.

**CHAPTER 24**  
**GLASS AND GLAZING**

**\*\* NO OREGON AMENDMENTS \*\***

**CHAPTER 25**  
**GYPSUM BOARD AND PLASTER**

**\*\* NO OREGON AMENDMENTS \*\***

## CHAPTER 26

### PLASTIC

#### **2603.10 Special approval.**

Foam plastic shall not be required to comply with the requirements of Sections 2603.4 ~~through or~~ Section 2603.8~~6~~ where specifically approved based on large-scale tests such as, but not limited to, NFPA 286 (with the acceptance criteria of Section 803.2), FM 4880, UL 1040 or UL 1715. Such testing shall be related to the actual end-use configuration and be performed on the finished manufactured foam plastic assembly in the maximum thickness intended for use. Foam plastics that are used as interior finish on the basis of special tests shall also conform to the flame spread and smoke-developed requirements of Chapter 8. Assemblies tested shall include seams, joints and other typical details used in the installation of the assembly and shall be tested in the manner intended for use.

#### **~~2603.10.1 Exterior walls.~~**

~~Testing based on Section 2603.10 shall not be used to eliminate any component of the construction of an exterior wall assembly when that component was included in the construction that has met the requirements of Section 2603.5.5.~~

## CHAPTER 27 ELECTRICAL

### [F] 2702.1 Installation.

Emergency and standby power systems required by this code or the ~~International~~ *Fire Code* shall be installed in accordance with this code, NFPA 110 and 111.

**Exception: Fuel supply requirements of NFPA 110, Section 5.1.2 may be reduced, when approved by the building official, based on the operational needs and uses of the facility served by the emergency or standby power system.**

**[F] 2702.2.21 Group I-2. Automatic emergency power and/or standby power supplies shall be provided for all health care facilities, as defined in NFPA 99. The approved alternative power supply shall maintain operating energy to the facility for a period of not less than 90 minutes. Emergency and standby power supplies shall be installed as required in the Electrical Code and in accordance with NFPA 99.**

**CHAPTER 28**  
**MECHANICAL SYSTEMS**

**\*\* NO OREGON AMENDMENTS \*\***

## CHAPTER 29 PLUMBING SYSTEMS

### [P] 2901.1 Scope.

The provisions of this chapter ~~and the International Plumbing Code~~ shall govern the ~~erection, installation, alteration, repairs, relocation, replacement, addition to, use or maintenance of plumbing equipment and systems~~ **location, availability, signage and minimum number of plumbing fixtures in a facility**. Toilet and bathing rooms shall be constructed in accordance with Section 1210. Plumbing systems and equipment shall be ~~constructed, installed and maintained~~ in accordance with the ~~International Plumbing Code~~. Private sewage disposal systems shall conform to the ~~International Private Sewage Disposal Code~~.

## SECTION 2902 MINIMUM PLUMBING FACILITIES

### [P] 2902.1 Minimum number of fixtures.

Plumbing fixtures shall be provided for the type of occupancy or use of space in relation to Table 2902.1 and in the minimum number shown in Table 2902.1. Types of occupancies not shown in Table 2902.1 shall be considered individually by the *building official* **and shall reflect the use of the space being served by the fixtures**. The number of occupants shall be determined by this code. Occupancy classification **and use of space** shall be determined in accordance with Chapter 3.

**[P] TABLE 2902.1**  
**MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES<sup>a</sup>**  
**(See Sections 2902.2 and 2902.3)**

| No. | CLASSIFICATION       | OCCUPANCY        | DESCRIPTION  | WATER CLOSETS (URINALS SEE SECTION 419.2 OF THE INTERNATIONAL PLUMBING CODE MAY REPLACE WATER CLOSETS AT A RATIO OF 1 URINAL PER 2/3 WATER CLOSETS ) |          | LAVATORIES |        | BATH TUBS/SHOWERS | DRINKING FOUNTAINS <sup>e,f</sup> (SEE SECTION 410.1 OF THE INTERNATIONAL PLUMBING CODE) | OTHER          |
|-----|----------------------|------------------|--|--|----------|------------|--------|-------------------|--|----------------|
|     |                      |                  |  | MALE   | FEMALE   | MALE       | FEMALE |                   |  |                |
| 1   | Assembly (continued) | A-1 <sup>d</sup> | Theaters and other buildings for the performing arts and motion pictures | 1 per 125  | 1 per 65 | 1 per 200  |        | —                 | 1 per 500<br><b>1 per floor</b>  | 1 service sink |
|     |                      | A-2 <sup>d</sup> | Nightclubs, bars,  | 1 per 40   | 1 per 40 | 1 per 75   |        | —                 | 1 per 500<br><b>1 per floor</b>  | 1 service      |

|  |  |                  |  |                                 |                            |                         |   |  |                                   |
|--|--|------------------|--|---------------------------------|----------------------------|-------------------------|---|--|-----------------------------------|
|  |  |                  | taverns,<br>dance halls<br>and<br>buildings<br>for similar<br>purposes   |                                 |                            |                         |   |  | e-sink                            |
|  |  |                  | Restaurants,<br>banquet<br>halls and<br>food courts  | 1 per<br>75                     | 1 per<br>75                | 1 per 200               | — | <del>1 per 500</del><br><b>1 per floor</b>   | <del>1</del><br>service<br>e-sink |
|  |  | A-3 <sup>d</sup> | Auditoriums without<br>permanent<br>seating, art<br>galleries,<br>exhibition<br>halls,<br>museums,<br>lecture<br>halls,<br>libraries,<br>arcades and<br>gymnasiums | 1 per<br>125                    | 1 per<br>65                | 1 per 200               | — | <del>1 per 500</del><br><b>1 per floor</b>   | <del>1</del><br>service<br>e-sink |
|  |  |                  | Passenger<br>terminals<br>and<br>transportation<br>facilities  | 1 per<br>500                    | 1 per<br>500               | 1 per 750               | — | <del>1 per 1,000</del><br><b>1 per floor</b> | <del>1</del><br>service<br>e-sink |
|  |  |                  | <b><u>Places of<br/>worship<br/>and other<br/>religious<br/>services<br/>without<br/>fixed<br/>seating</u></b>   | <b><u>1<br/>per<br/>120</u></b> | <b><u>1 per<br/>60</u></b> | <b><u>1 per 200</u></b> |   | <b><u>1 per floor</u></b>                    |                                   |
|  |  |                  | Places of<br>worship and<br>other<br>religious<br>services<br><b><u>with fixed<br/>seating</u></b>   | 1 per<br>150                    | 1 per<br>75                | 1 per 200               | — | <del>1 per 1,000</del><br><b>1 per floor</b> | <del>1</del><br>service<br>e-sink |



(continued)

**[P] TABLE 2902.1—continued**  
**MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES<sup>a</sup>**  
**(See Sections 2902.2 and 2902.3)**

| No. | CLASSIFICATION | OCCUPANCY | DESCRIPTION   | WATER CLOSETS (URINALS SEE SECTION 419.2 OF THE INTERNATIONAL PLUMBING CODE MAY REPLACE WATER CLOSETS AT A RATIO OF 1 URINAL PER 2/3 WATER CLOSETS) |   | LAVATORIES  |           | BATH TUBS/SHOWERS | DRINKING FOUNTAINS <sup>e,f</sup> (SEE SECTION 410.1 OF THE INTERNATIONAL PLUMBING CODE) | OTHER                                 |
|-----|----------------|-----------|---|---|---|---|-----------|-------------------|--|---------------------------------------|
|     |                |           |   | MAL E   | FEMALE  | MALE  | FEMALE    |                   |  |                                       |
| 1   | Assembly       | A-4       | Coliseums, arenas, skating rinks, pools and tennis courts for indoor sporting events and activities | 1 per 75 for the first 1,500 and 1 per 120 for the remainder exceeding 1,500  | 1 per 40 for the first 1,520 and 1 per 60 for the remainder exceeding 1,520 | 1 per 200   | 1 per 150 | —                 | <del>1 per 1,000</del><br><b>1 per floor</b>   | <del>1 service sink</del>             |
|     |                | A-5       | Stadiums, amusement parks, bleachers and grandstands for outdoor sporting events and activities     | 1 per 75 for the first 1,500 and 1 per 120 for the remainder exceeding 1,500  | 1 per 40 for the first 1,520 and 1 per 60 for the remainder exceeding 1,520 | 1 per 200   | 1 per 150 | —                 | <del>1 per 1,000</del><br><b>1 per floor</b>   | <del>1 service sink</del>             |
| 2   | Business       | B         | Buildings for the transaction of business, professional   | 1 per 25 for the first 50 and 1 per 50 for the remainder exceeding 50   |   | 1 per 40 for the first 80 and 1 per 80 for the remainder exceeding 80 |           | —                 | <del>1 per 100</del>   | <del>1 service sink<sup>g</sup></del> |

|   |                        |             |  |                             |                             |   |  |                           |
|---|------------------------|-------------|--|-----------------------------|-----------------------------|---|--|---------------------------|
|   |                        |             | services, other services involving merchandise, office buildings, banks, light industrial and similar uses     |                             |                             |   |  |                           |
| 3 | Educational            | E           | Educational facilities   | 1 per 50                    | 1 per 50                    | —   | <del>1 per 100</del><br><b>1 per floor</b> | <del>1 service sink</del> |
| 4 | Factory and industrial | F-1 and F-2 | Structures in which occupants are engaged in work fabricating, assembly or processing of products or materials | 1 per 100                   | 1 per 100                   | See Section 411 of the <i>International Plumbing Code</i> | <del>1 per 400</del>                       | <del>1 service sink</del> |
| 5 | Institutional          | I-1         | Residential care   | 1 per 10                    | 1 per 10                    | 1 per 8   | <del>1 per 100</del>                       | <del>1 service sink</del> |
|   |                        | I-2         | Hospitals, ambulatory nursing home care <sup>b</sup> recipient   | 1 per per room <sup>c</sup> | 1 per per room <sup>c</sup> | 1 per 15  | <del>1 per 100</del>                       | <del>1 service sink</del> |
|   |                        |             | Employees, other than residential care <sup>b</sup>  | 1 per 25                    | 1 per 35                    | —   | <del>1 per 100</del>                       | —                         |
|   |                        |             | Visitors, other than residential care  | 1 per 75                    | 1 per 100                   | —   | <del>1 per 500</del>                       | —                         |
|   |                        | I-3         | Prisons <sup>b</sup>   | 1 per cell                  | 1 per cell                  | 1 per 15  | <del>1 per 100</del>                       | <del>1 service sink</del> |
|   |                        | I-3         | Reformatories, detention centers and correctional centers <sup>b</sup>   | 1 per 15                    | 1 per 15                    | 1 per 15  | <del>1 per 100</del>                       | <del>1 service sink</del> |
|   |                        |             | Employees <sup>b</sup>   | 1 per 25                    | 1 per 35                    | —   | <del>1 per 100</del>                       | —                         |
|   |                        | I-4         | Adult day care and child day care  | 1 per 15                    | 1 per 15                    | 1   | <del>1 per 100</del>                       | <del>1 service sink</del> |

(continued)

**[P] TABLE 2902.1—continued**  
**MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES<sup>a</sup>**  
**(See Sections 2902.2 and 2902.3)**

| N<br>o. | CLASSIFICA<br>TION | OCCUPA<br>NCY | DESCRIP<br>TION  | WATER<br>CLOSETS<br>(URINALS<br>SEE<br>SECTION<br>419.2 OF<br>THE<br>INTERNATIO<br>NAL<br>PLUMBING<br>CODE MAY<br>REPLACE<br>WATER<br>CLOSETS<br>AT A RATIO<br>OF 1<br>URINAL PER<br>2/3 WATER<br>CLOSETS) |            | LAVATORIE<br>S      |            | BATH<br>TUBS<br>OR<br>SHOW<br>ERS | DRINKING<br>FOUNTAIN<br>S <sup>e,f</sup><br>(SEE<br>SECTION<br>410.1 OF<br>THE<br>INTERNATI<br>ONAL<br>PLUMBING<br>CODE) | OTHE<br>R                              |
|---------|--------------------|---------------|--|--|------------|---------------------|------------|-----------------------------------|--|--|
|         |                    |               |  | MA<br>LE   | FEMA<br>LE | MA<br>LE            | FEMA<br>LE |                                   |  |  |
| 6       | Mercantile         | M             | Retail stores, service stations, shops, salesrooms, markets and shopping centers | 1 per 500  |            | 1 per 750           |            | —                                 | <del>1 per 1,000</del>   | <del>1</del> service sink <sup>g</sup> |
| 7       | Residential        | R-1           | Hotels, motels, boarding houses (transient)                                      | 1 per sleeping unit  |            | 1 per sleeping unit |            | 1 per sleeping unit               | —  | <del>1</del> service sink              |
|         |                    | R-2           | Dormitories, fraternities, sororities and boarding houses (not transient)        | 1 per 10   |            | 1 per 10            |            | 1 per 8                           | <del>1 per 100</del>   | <del>1</del> service sink              |
|         |                    | R-2           | Apartment house  | 1 per dwelling unit  |            | 1 per dwelling unit |            | 1 per dwelling unit               | —  | 1 kitchen sink per dwellin             |

|   |         |            |  |                        |           |   |                        |   |
|---|---------|------------|--|------------------------|-----------|---|------------------------|---|
|   |         |            |  |                        |           |   |                        | g unit;<br>1<br>automatic<br>clothes<br>washer<br>connection per<br>20<br>dwelling<br>g units                                       |
|   |         | R-3        | One- and<br>two-family<br>dwellings  | 1 per dwelling<br>unit | 1 per 10  | 1 per<br>dwelling<br>unit   | —                      | 1<br>kitchen<br>sink<br>per<br>dwelling<br>unit;<br>1<br>automatic<br>clothes<br>washer<br>connect<br>ion per<br>dwelling<br>g unit |
|   |         | R-3        | Congregate<br>living<br>facilities<br>with 16 or<br>fewer<br>persons   | 1 per 10               | 1 per 10  | 1 per 8   | <del>1 per 100</del>   | 1<br>service<br>sink  |
|   |         | R-4        | Congregate<br>living<br>facilities<br>with 16 or<br>fewer<br>persons   | 1 per 10               | 1 per 10  | 1 per 8   | <del>1 per 100</del>   | 1<br>service<br>sink  |
| 8 | Storage | S-1<br>S-2 | Structures<br>for the<br>storage of<br>goods,<br>warehouses,<br>storehouses<br>and freight<br>depots, low<br>and<br>moderate<br>hazard | 1 per 100              | 1 per 100 | See<br>Section<br>411 of<br>the<br><i>Internati<br/>onal<br/>Plumbin<br/>g Code</i> | <del>1 per 1,000</del> | 1<br>service<br>sink  |

- The fixtures shown are based on one fixture being the minimum required for the number of persons indicated or any fraction of the number of persons indicated. The number of occupants shall be determined by this code.
- Toilet facilities for employees shall be separate from facilities for inmates or care recipients.
- A single-occupant toilet room with one water closet and one lavatory serving not more than two adjacent patient sleeping units shall be permitted where such room is provided with direct access from each patient sleeping unit and with provisions for privacy.
- The occupant load for seasonal outdoor seating and entertainment areas shall be included when determining the minimum number of facilities required.

- e. The minimum number of required drinking fountains shall comply with Table 2902.1 and Chapter 11.
- ~~f. Drinking fountains are not required for an occupant load of 15 or fewer.~~
- ~~g. For business and mercantile occupancies with an occupant load of 15 or fewer, service sinks shall not be required.~~

**[P] 2902.1.1 Fixture calculations.**

To determine the *occupant load* of each sex, the total *occupant load* shall be divided in half. To determine the required number of fixtures, the fixture ratio or ratios for each fixture type shall be applied to the *occupant load* of each sex in accordance with Table 2902.1. Fractional numbers resulting from applying the fixture ratios of Table 2902.1 shall be rounded up to the next whole number. For calculations involving multiple occupancies, such fractional numbers for each occupancy shall first be summed and then rounded up to the next whole number.

**Exception:** The total *occupant load* shall not be required to be divided in half where *approved* statistical data indicate a distribution of the sexes of other than 50 percent of each sex.

**[P] 2902.1.2 Family or assisted-use toilet and bath fixtures.**

Fixtures located within family or assisted-use toilet and bathing rooms required by Section 1109.2.1 are permitted to be included in the number of required fixtures for either the male or female occupants in assembly and mercantile occupancies.

**[P] 2902.2 Separate facilities.**

Where plumbing fixtures are required, separate facilities shall be provided for each sex.

**Exceptions:**

1. Separate facilities shall not be required for *dwelling units* and *sleeping units*.
2. Separate facilities shall not be required in structures or tenant spaces with a total *occupant load*, including both employees and customers, of 15 or less.
3. Separate facilities shall not be required in mercantile occupancies in which the maximum occupant load is 100 or less.

**[P] 2902.2.1 Family or assisted-use toilet facilities serving as separate facilities.**

Where a building or tenant space requires a separate toilet facility for each sex and each toilet facility is required to have only one water closet, two family/assisted-use toilet facilities shall be permitted to serve as the required separate facilities. Family or assisted-use toilet facilities shall not be required to be identified for exclusive use by either sex as required by Section 2902.4.

**[P] 2902.3 Employee and public toilet facilities.**

Customers, patrons and visitors shall be provided with public toilet facilities in structures and tenant spaces intended for public utilization. The number of plumbing fixtures located within the required toilet facilities shall be provided in accordance with Section 2902.1 for all users. Employees shall be provided with toilet facilities in all occupancies. Employee toilet facilities shall either be separate or combined employee and public toilet facilities.

**Exception:** Public toilet facilities shall not be required in open or enclosed parking garages. Toilet facilities shall not be required in parking garages where there are no parking attendants.

**[P] 2902.3.1 Access.**

The route to the public toilet facilities required by Section 2902.3 shall not pass through kitchens, storage rooms or closets. Access to the required facilities shall be from within the building or from the exterior of the building. All routes shall comply with the accessibility requirements of this code. The public shall have access to the required toilet facilities at all times that the building is occupied.

**[P] 2902.3.2 Location of toilet facilities in occupancies other than malls.**

In occupancies other than covered and open mall buildings, the required *public* and employee toilet facilities shall be located not more than one story above or below the space required to be provided with toilet facilities, and the path of travel to such facilities shall not exceed a distance of 500 feet (152 m).

**Exceptions:**

**1. In Group B (other than restaurants and dining facilities), F, H, M and S occupancies, toilet facilities may be located in an adjacent building on the same property. The path of travel to such facilities shall not exceed a distance of 300 feet (91 440 mm) and be on an accessible route complying with Chapter 11.**

**2.** The location and maximum travel distances to required employee facilities in factory and industrial occupancies are permitted to exceed that required by this section, provided that the location and maximum travel distance are *approved*.

**[P] 2902.3.3 Location of toilet facilities in malls.**

In covered and open mall buildings, the required *public* and employee toilet facilities shall be located not more than one story above or below the space required to be provided with toilet facilities, and the path of travel to such facilities shall not exceed a distance of 300 feet (91 440 mm). In mall buildings,

The required facilities shall be based on total square footage (m<sup>2</sup>) within a covered mall building or within the perimeter line of an open mall building, and facilities shall be installed in each individual store or in a central toilet area located in accordance with this section. The maximum travel distance to central toilet facilities in mall buildings shall be measured from the main entrance of any store or tenant space. In mall buildings, where employees' toilet facilities are not provided in the individual store, the maximum travel distance shall be measured from the employees' work area of the store or tenant space.

**[P] 2902.3.4 Pay facilities.**

Where pay facilities are installed, such facilities shall be in excess of the required minimum facilities. Required facilities shall be free of charge.

**[P] 2902.3.5 Door locking.**

Where a toilet room is provided for the use of multiple occupants, the egress door for the room shall not be lockable from the inside of the room. This section does not apply to family or assisted-use toilet rooms.

**[P] 2902.4 Signage.**

Required public facilities shall be designated by a legible sign for each sex. Signs shall be readily visible and located near the entrance to each toilet facility. Signs for accessible toilet facilities shall comply with Section 1110.

**[P] 2902.4.1 Directional signage.**

Directional signage indicating the route to the public facilities shall be posted in accordance with Section 3107. Such signage shall be located in a *corridor* or aisle, at the entrance to the facilities for customers and visitors.

**[P] 2902.5 Drinking fountain location.**

~~Drinking fountains as prescribed by Table 2902.1 shall not be required to be located in individual tenant spaces provided that public drinking fountains are located within a travel distance of 500 feet of the most remote location in the tenant space and not more than one story above or below the tenant space. Where the tenant space is~~  
**drinking fountains are** in a covered or open mall, such distance shall not exceed 300 feet. Drinking fountains

shall be located on an accessible route.

**SECTION 2903**  
**ALTERATION OF EXISTING**  
**GROUP A, M & E OCCUPANCIES**

**2903.1 Definitions.**

**SUBSTANTIAL ALTERATION.**  
**STRUCTURALLY IMPRACTICAL.**

**2903.2 Requirements. Where substantial alterations are made to an existing Groups A, M and E occupancy with an occupant load in excess of 300, water closets, as specified in Table 2902.1 for new construction, shall be provided.**

**Exception: The building official may approve substantial alterations without the installation of additional water closets only where it is structurally infeasible to make such alterations; where existing site conditions, including the size of existing public water or sewer lines, prohibit such installations; or where zoning regulations prohibit adding floor area to the existing building. The number of water closets provided shall be the maximum number feasible but need not exceed the number required for new construction.**

## CHAPTER 30 ELEVATORS AND CONVEYING SYSTEMS

### 3001.2 Referenced standards.

Except as otherwise provided for in this code, the design, construction, installation, *alteration*, repair and maintenance of elevators and conveying systems and their components shall conform to ~~ASME A17.1/CSA B44, ASME A90.1, ASME B20.1, ALI ALCTV, and ASCE 24~~ Elevator Code adopted under OAR 918-400-0455 for construction in *flood hazard areas* established in Section 1612.3.

All references to the adopted elevator safety standard, ASME A17.1 are governed by the Elevator Specialty. Inspections and plan review are performed only by inspectors authorized by the state. References to ASME A17.1 in this section are provided for clarification.

**3001.3 Accessibility.** Passenger elevators required to be accessible shall conform to Chapter 11 ~~or to serve as part of an accessible means of egress shall comply with Sections 1107 and 1109.7.6.~~ and the Elevator Code.

## SECTION 3003 EMERGENCY OPERATIONS

### [F] 3003.1 Standby power.

In buildings and structures where standby power is required or furnished to operate an elevator, the operation shall be in accordance with Sections 3003.1.1 through 3003.1.4. Elevators under standby power shall operate as required by ASME A17.1.

#### [F] 3003.1.3 Two or more elevators.

Where two or more elevators are controlled by a common operating system, all elevators shall automatically transfer to standby power within 60 seconds after failure of normal power where the standby power source is of sufficient capacity to operate all elevators at the same time. Where the standby power source is not of sufficient capacity to operate all elevators at the same time, the operation of all elevators shall comply with ASME A17.1. ~~all elevators shall transfer to standby power in sequence, return to the designated landing and disconnect from the standby power source. After all elevators have been returned to the designated level, at least one elevator shall remain operable from the standby power source.~~

### 3004.1 Vents required.

Hoistways of elevators and dumbwaiters with a hoistway height of 25 feet (7620 mm) or more as measured from the bottom floor landing to the underside of the hoistway ceiling, ~~penetrating more than three stories~~ shall be provided with a means for venting smoke and hot gases to the outer air in case of fire.

### 3004.2 Location of vents.

Vents shall be located at the top of the hoistway and shall open either directly to the outer air or through noncombustible ducts to the outer air. Noncombustible ducts shall be permitted to pass through the elevator machine room, provided that portions of the ducts located outside the hoistway or machine room are enclosed by construction having not less than the *fire-resistance rating* required for the hoistway. Holes in the machine room floors for the passage of ropes, cables or other moving elevator equipment shall be limited as not to provide greater than 2 inches (51 mm) of clearance on all sides.

Ducts passing through machine rooms shall not encroach on working or electrical clearances required around elevator equipment.

### 3004.4 Plumbing and mechanical systems.

Plumbing and mechanical systems shall not be located in an elevator ~~hoistway enclosure~~ shaft except as allowed by ASME A17.1.



**Exception:** ~~Floor drains, sumps and sump pumps shall be permitted at the base of the hoistway enclosure provided they are indirectly connected to the plumbing system.~~

#### **3005.1 General.**

Escalators, moving walks, conveyors, personnel hoists and material hoists shall comply with ~~the provisions of Sections 3005.2 through 3005.4~~ **ASME A17.1 and the Oregon Elevator Specialty Lifts, Part 1, whichever is applicable.**

#### **3006.1 Access.**

An *approved* means of access shall be provided to elevator machine rooms and overhead machinery spaces **as required by ASME A17.1.**

### **SECTION 3007 FIRE SERVICE ACCESS ELEVATOR**

#### **3007.1 General.**

Where required by Section 403.6.1, every floor of the building shall be served by fire service access elevators complying with Sections 3007.1 through 3007.10. Except as modified in this section, fire service access elevators shall be installed in accordance with this chapter and ASME A17.1/~~CSA B44~~.

#### **3007.2 Phase I Emergency recall operation.**

Actuation of any building fire alarm-initiating device shall initiate Phase I emergency recall operation on all fire service access elevators in accordance with the requirements in ASME A17.1/~~CSA B44~~. All other elevators shall remain in normal service unless Phase I emergency recall operation is manually initiated by a separate, required three-position, key-operated “Fire Recall” switch or automatically initiated by the associated elevator lobby, hoistway or elevator machine room *smoke detectors*. In addition, if the building also contains occupant evacuation elevators in accordance with Section 3008, an independent, three-position, key-operated “Fire Recall” switch conforming to the applicable requirements in ASME A17.1/~~CSA B44~~ shall be provided at the designated level for each fire service access elevator.

### **SECTION 3008 OCCUPANT EVACUATION ELEVATORS**

#### **3008.2 Phase I Emergency recall operation.**

An independent, three-position, key-operated “Fire Recall” switch complying with ASME A17.1/~~CSA B44~~ shall be provided at the designated level for each occupant evacuation elevator.

## **CHAPTER 31 SPECIAL CONSTRUCTION**

**3102.7 Engineering design.** The structure shall be designed and constructed to sustain dead loads; loads due to tension or inflation; live loads including wind, snow or flood and seismic loads and in accordance with Chapter 16.

### **SECTION 3109 SWIMMING POOL ENCLOSURES AND SAFETY DEVICES**

**Note: Section 3109 is not adopted by the State of Oregon. Please reference OAR Chapter 333, Division 60 concerning Public Swimming Pools as promulgated by the Department of Human Services under the authority established in ORS, Chapter 448.**

### **SECTION 3111 SOLAR PHOTOVOLTAIC PANELS/MODULES**

#### **3111.1 General.**

Solar photovoltaic panels/modules shall comply with the requirements of ~~this code and the *International Fire Code*.~~ **the Solar Code.**

**CHAPTER 32**  
**ENCROACHMENTS INTO THE PUBLIC RIGHT-OF-WAY**

**\*\* NO OREGON AMENDMENTS \*\***

## **CHAPTER 33 SAFEGUARDS DURING CONSTRUCTION**

### **3302.3 Fire safety during construction.**

Fire safety during construction shall comply with the applicable requirements of this code and the applicable provisions of Chapter 33 of the ~~International~~ *Fire Code*.

### **3303.7 Fire safety during demolition.**

Fire safety during demolition shall comply with the applicable requirements of this code and the applicable provisions of Chapter 56 of the ~~International~~ *Fire Code*.

## CHAPTER 34 EXISTING STRUCTURES

### 3401.2 Maintenance.

**Not adopted by the State of Oregon but may be adopted by local municipalities.** Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or safeguards which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. To determine compliance with this subsection, the *building official* shall have the authority to require a building or structure to be reinspected. The requirements of this chapter shall not provide the basis for removal or abrogation of fire protection and safety systems and devices in existing structures.

### 3401.3 Compliance.

*Alterations, repairs, additions* and changes of occupancy to, existing structures shall comply with the provisions for *alterations, repairs, additions* and changes of occupancy in the ~~*International Energy Conservation Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code, International Property Maintenance Code, International Private Sewage Disposal Code, International Residential Code*~~ and NFPA 70.

#### 3401.4.2 New and replacement materials.

Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. **Except for structural repairs and alterations,** ~~like~~ like materials shall be permitted for repairs and alterations, provided no hazard to life, health or property is created. Hazardous materials shall not be used where the code for new construction would not *permit* their use in buildings of similar occupancy, purpose and location.

#### 3401.4.3 Existing seismic force-resisting systems.

Where the existing seismic force-resisting system is a type that can be designated ordinary **and is a type that is allowed in the Seismic Design Category,** values of  $R$ ,  $\Omega_0$ , and  $C_d$  for the existing seismic force-resisting system shall be those specified by this code for an ordinary system unless it is demonstrated that the existing system will provide performance equivalent to that of a detailed, intermediate or special system.

### 3401.5 Alternative compliance.

Work performed in accordance with the **latest revision of Oregon Alternate Method 08-05** ~~*International Existing Building Code*~~ shall be deemed to comply with the provisions of this chapter.

### 3402.1 Definitions.

The following terms are defined in Chapter 2:

**DANGEROUS.**

**EXISTING STRUCTURE.**

**PRIMARY FUNCTION.** See Chapter 11, Accessibility

**SUBSTANTIAL STRUCTURAL DAMAGE.**

**TECHNICALLY INFEASIBLE.** See Chapter 11, Accessibility

**3403.2 Flood hazard areas.** For buildings and structures in *flood hazard areas* established by the **Flood Plain Administrator** ~~local governing authority in Section 1612.3~~, any *addition* that constitutes substantial improvement of the existing structure, as defined in Section 1612.2, shall comply with the flood design requirements for new construction, and all aspects of the existing structure shall be brought into compliance with the requirements for new construction for flood design.

For buildings and structures in *flood hazard areas* established by the **Flood Plain Administrator** ~~local governing authority in Section 1612.3~~, any additions that do not constitute substantial improvement of the existing

structure, as defined in Section 1612.2, are not required to comply with the flood design requirements for new construction.

#### **3403.5 Smoke alarms in existing portions of a building.**

Where an *addition* is made to a building or structure of a Group R or I-1 occupancy, the existing building shall be provided with *smoke alarms* in accordance with Section 1103.8 of the ~~International~~ Fire Code.

**3404.2 Flood hazard areas.** For buildings and structures in *flood hazard areas* established by the **Flood Plain Administrator** ~~local governing authority in Section 1612.3~~, any *alteration* that constitutes *substantial improvement* of the *existing structure*, as defined in Section 1612.2, shall comply with the flood design requirements for new construction, and all aspects of the *existing structure* shall be brought into compliance with the requirements for new construction for flood design.

For buildings and structures in *flood hazard areas* established by the **Flood Plain Administrator** ~~local governing authority in Section 1612.3~~, any *alterations* that do not constitute *substantial improvement* of the *existing structure*, as defined in Section 1612.2, are not required to comply with the flood design requirements for new construction.

#### **3404.6 Smoke alarms.**

Individual sleeping units and individual dwelling units in Group R and I-1 occupancies shall be provided with smoke alarms in accordance with Section 1103.8 of the ~~International~~ Fire Code.

## **SECTION 3405 REPAIRS**

#### **3405.1 General.**

Buildings and structures, and parts thereof, shall be repaired in compliance with Section 3405 ~~and 3401.2~~.

**Devices or safeguards which are required by this code shall be repaired in conformance with the code edition under which installed. To determine compliance with this subsection, the building official shall have the authority to require a building or structure to be reinspected.**

Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter. Routine maintenance required by Section 3401.2, ordinary repairs exempt from *permit* in accordance with Section 105.2, and abatement of wear due to normal service conditions shall not be subject to the requirements for *repairs* in this section.

#### **3405.2.2 Extent of repair for compliant buildings.**

If the evaluation establishes compliance of the pre-damage building in accordance with Section 3405.2.1, then repairs shall be **in accordance with the Building Code for new construction.** ~~permitted that restore the building to its pre-damage state, based on material properties and design strengths applicable at the time of original construction.~~

#### **3405.3 Substantial structural damage to gravity load-carrying components.**

Gravity load-carrying components that have sustained *substantial structural damage* shall be rehabilitated to comply with the applicable provisions of this code for **gravity loads** ~~dead and live loads. Snow loads shall be considered if the substantial structural damage was caused by or related to snow load effects. Existing gravity load-carrying structural elements shall be permitted to be designed for live loads approved prior to the damage.~~ Non damaged gravity load-carrying components that receive dead, live or snow loads from rehabilitated components shall also be rehabilitated or shown to have the capacity to carry the design loads of the rehabilitation design. New structural members and connections required by this rehabilitation design shall comply with the detailing provisions of this code for new buildings of similar structure, purpose and location.

#### **3405.4 Less than substantial structural damage.**

For damage less than *substantial structural damage*, repairs shall be **in accordance with the *Building Code*** ~~allowed that restore the building to its pre-damage state, based on material properties and design strengths applicable at the time of original construction.~~ New structural members and connections used for this repair shall comply with the detailing provisions of this code for new buildings of similar structure, purpose and location.

**3405.5 Flood hazard areas.** For buildings and structures in *flood hazard areas* established by the **Flood Plain Administrator** ~~local governing authority in Section 1612.3~~, any *repair* that constitutes substantial improvement of the existing structure, as defined in Section 1612.2, shall comply with the flood design requirements for new construction, and all aspects of the existing structure shall be brought into compliance with the requirements for new construction for flood design.

For buildings and structures in *flood hazard areas* established by the **Flood Plain Administrator** ~~local governing authority in Section 1612.3~~, any *repairs* that do not constitute substantial improvement or repair of substantial damage of the existing structure, as defined in Section 1612.2, are not required to comply with the flood design requirements for new construction.

### **SECTION 3408 CHANGE OF OCCUPANCY**

#### **3408.1 Conformance.**

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 occupancies or in a different group of occupancies, unless such building is made to comply with the requirements of this code for such division or group of occupancies. 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.

**Unless additions or alterations are made to the building or facility, change in use or occupancy alone shall not require compliance with the provisions of Chapter 11, Accessibility. Additionally, changes in occupancy resulting in multifamily dwellings need not comply with Division III, Covered multifamily dwellings (see Section 1102).**

### **SECTION 3409 HISTORIC BUILDINGS**

#### **3409.1 Historic buildings.**

~~The provisions of this code relating to the construction, repair, alteration, addition, restoration and movement of structures, and change of occupancy shall not be mandatory for historic buildings where such buildings are judged by the building official to not constitute a distinct life safety hazard.~~

#### **3409.2 Flood hazard areas.**

~~Within flood hazard areas established in accordance with Section 1612.3, where the work proposed constitutes substantial improvement as defined in Section 1612.2, the building shall be brought into compliance with Section 1612.~~

**Exception:** Historic buildings that are:

- ~~1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places;~~
- ~~2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district; or~~
- ~~3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.~~

**3409.1 Historic buildings. Repairs, alterations and additions necessary for the preservation, restoration, rehabilitation or continued use of a building or structure may be made without conformance to all the requirements of this code when authorized by the building official, provided:**

- 1. The building or structure has been designated by official action of the legally constituted authority of this jurisdiction as having special historical or architectural significance.**
- 2. Any unsafe conditions as described in this code are corrected.**
- 3. The restored building or structure will be no more hazardous based on life safety, fire safety and sanitation than the existing building.**
- 4. The building official seeks the advice of the State of Oregon historic preservation officer. In case of appeals related to historic buildings, the local appeals board or the appropriate state appeals board shall seek the advice of the State of Oregon historic preservation officer.**

## **SECTION 3410 MOVED STRUCTURES**

**3410.1 Conformance.** Structures moved into or within the jurisdiction shall comply with the provisions of this code for new structures. **Buildings or structures moved into or within the jurisdiction shall comply with ORS 455.410.**

## **SECTION 3411 ACCESSIBILITY FOR EXISTING BUILDINGS**

**3411.1 Scope.** The provisions of Sections 3411.1 through 3411.9 apply to maintenance, change of occupancy, additions and alterations to existing buildings, including those identified as *historic buildings*.

**Exception: Type B dwelling or sleeping units required by Section 1107 of this code are not required to be provided in existing buildings and facilities being altered or undergoing a change of occupancy.**

**3411.4 Change in occupancy. Where a building or a portion thereof is changed to a new occupancy classification, any alterations shall comply with Sections 3411.6, 3411.7 and 3411.8.**

**Exception:** ~~Type B dwelling units or sleeping units~~ required by Section 1107 of this code are not required to be provided in existing buildings and facilities undergoing a change of occupancy in conjunction with alterations where the work area is 50 percent or less of the aggregate area of the building.

**3411.4.2 Complete change of occupancy.**

~~Where an entire building undergoes a change of occupancy, it shall comply with Section 3411.4.1 and shall have all of the following accessible features:~~

- ~~1. At least one accessible building entrance.~~
- ~~2. At least one accessible route from an accessible building entrance to primary function areas.~~
- ~~3. Signage complying with Section 1110.~~
- ~~4. Accessible parking, where parking is being provided.~~
- ~~5. At least one accessible passenger loading zone, when loading zones are provided.~~
- ~~6. At least one accessible route connecting accessible parking and accessible passenger loading zones to an accessible entrance.~~

~~Where it is technically infeasible to comply with the new construction standards for any of these requirements for a change of group or occupancy, the above items shall conform to the requirements to the maximum extent technically feasible.~~

**Exception:** The accessible features listed in Items 1 through 6 are not required for an accessible route to Type B units.



### 3411.6 Alterations.

A building, *facility* or element that is altered shall comply with the applicable provisions in Chapter 11 of this code and ICC A117.1, unless *technically infeasible*. Where compliance with this section is *technically infeasible*, the *alteration* shall provide access to the maximum extent technically feasible.

#### Exceptions:

1. The altered element or space is not required to be on an *accessible* route, unless required by Section 3411.7.
2. *Accessible means of egress* required by Chapter 10 are not required to be provided in existing facilities.
3. The *alteration* to Type A individually owned dwelling units within a Group R-2 occupancy shall ~~be permitted to meet the provision for a Type B dwelling unit~~ **and shall comply with the applicable provisions in Chapter 11 and ICC A117.1.**
4. ~~Type B dwelling or sleeping units required by Section 1107 of this code are not required to be provided in existing buildings and facilities undergoing a change of occupancy in conjunction with alterations where the work area is 50 percent or less of the aggregate area of the building.~~

**3412.2.4.1 Flood hazard areas.** For existing buildings located in *flood hazard areas* established **by the Flood Plain Administrator** ~~in Section 1612.3~~, if the alterations and repairs constitute substantial improvement of the existing building, the existing building shall be brought into compliance with the requirements for new construction for flood design.

**3411.7 Alterations affecting an area containing a primary function.** Where an alteration affects the accessibility to, or contains an area of primary function, the route to the primary function area shall be accessible. The accessible route to the primary function area shall include toilet facilities or drinking fountains serving the area of primary function.

#### Exceptions:

1. The costs of providing the *accessible* route are not required to exceed 25 percent of the costs of the *alterations* affecting the area of *primary function*. **(See ORS 447.241)**
2. This provision does not apply to *alterations* limited solely to windows, hardware, operating controls, electrical outlets and signs.
3. This provision does not apply to *alterations* limited solely to mechanical systems, electrical systems, installation or *alteration* of fire protection systems and abatement of hazardous materials.
4. This provision does not apply to alterations undertaken for the primary purpose of increasing the accessibility of **an existing building, a facility or element.**
5. This provision does not apply to altered areas limited to Type B dwelling and sleeping units.

**3411.8.2 Elevators.** Altered elements of existing elevators shall comply with ~~ASME A17.1~~ **Elevator Code** and ICC A117.1. Such elements shall also be altered in elevators programmed to respond to the same hall call control as the altered elevator.

**3411.8.3 Platform lifts.** Platform (wheelchair) lifts complying with ICC A117.1 and installed in accordance with ~~ASME A18.1~~ **Elevator Code** shall be permitted as a component of an *accessible* route.

Exception: For existing churches and fraternal organizations, Limited Use/Limited Access (LULA) elevators may be used in lieu of a standard elevator when approved by the building official and the Oregon Building Codes Division Elevator Safety Section.

### **3411.8.6 Reserved.**

**3411.8.7 Accessible dwelling or sleeping units.** Where Group I-1, I-2, I-3, R-1, or R-4 *dwelling or sleeping units* are being altered or added, the requirements of Section 1107 for *Accessible* units apply only to the quantity of spaces being altered or added.

Where Group R-2 *dwelling or sleeping units* are being added, the requirements of Section 1107 for *Accessible units* apply only to the quantity of units being added.

**3411.8.8 Type A dwelling or sleeping units.** Where more than 20 Group R-2 dwelling or sleeping units are being altered or added, the requirements of Section 1107 for Type A units apply only to the quantity of spaces being altered or added. **Where Group I-1 Condition 2 assisted living facilities and residential care facilities, and Group R-4 Condition 2 assisted living facilities and residential care facilities are being altered or added, the requirements of Section 1107 for Type A units apply only to the quantity of spaces being altered or added. Where Group I-1 Condition 2 assisted living facilities and residential care facilities, and R-4 Condition 2 assisted living facilities and residential care facilities are being converted by a change of use or undergo a change of occupancy, the requirements of Section 1107 for accessible units and Type A units shall apply.**

**Exceptions:**

**Where existing bathing facilities are being altered in Group I-1 Condition 2 residential care facilities without memory care endorsement and Group R-4 Condition 2 residential care facilities without memory care endorsement, one in ten existing bathing facilities shall be required to meet the roll-in type shower compartment requirements of Section 1107 if a common bathing facility is provided outside the dwelling or sleeping unit.**

**3411.8.9 Type B dwelling or sleeping units.** Where four or more Group I-1, I-2, R-1, R-2, R-3, or R-4 dwelling or sleeping units are being added, the requirements of Section 1107 for Type B units shall apply only to the quantity of spaces being added. ~~Where Group I-1, I-2, R-1, R-2, R-3 or R-4 dwelling or sleeping units are being altered and where the work area is greater than 50 percent of the aggregate area of the building, the requirements of Section 1107 for Type B units apply only to the quantity of spaces being altered.~~

**3411.8.13 Reserved.**

**3411.9 Historic buildings.** These provisions shall apply to buildings and facilities designated as historic structures that undergo alterations or a change of occupancy, unless *technically infeasible*. Where compliance with the requirements for *accessible* routes, entrances or toilet facilities would threaten or destroy the historic significance of the building or facility, as determined by the ~~applicable governing authority~~ **building official after consultation with the appropriate historic preservation officer**, the alternative requirements of Sections 3411.9.1 through 3411.9.4 for that element shall be permitted.

**Exception:** *Type B dwelling or sleeping units* required by Section 1107 are not required to be provided in historical buildings.

**3411.9.2 Multilevel buildings and facilities.** An *accessible* route from an *accessible* entrance to public spaces on the level of the *accessible* entrance shall be provided. **Where an accessible route is technically infeasible to all levels then displays, written information and documents shall be located where they can be seen by a seated person.**

**3411.9.3 Entrances.** At least one main entrance shall be *accessible*.

**Exceptions:**

1. If a main entrance cannot be made *accessible*, an *accessible* nonpublic entrance that is unlocked while the building is occupied shall be provided; or
2. If a main entrance cannot be made *accessible*, a locked *accessible* entrance with a notification system or remote monitoring shall be provided.

**The route of travel for the accessible entry shall not pass through hazardous areas, storage rooms, closets, kitchens or spaces used for similar purposes.**

Signs complying with Section 1110 shall be provided at the primary entrance and the *accessible* entrance.

**3411.9.4 Toilet and bathing facilities.** Where toilet rooms are provided and the alteration of the same would adversely affect the historical significance of the building, at least one *accessible* family or assisted-use toilet room complying with Section 1109.2.1 shall be provided.

**3412.2 Applicability.** Structures existing prior to ~~[DATE TO BE INSERTED BY THE JURISDICTION. NOTE: IT IS RECOMMENDED THAT THIS DATE COINCIDE WITH THE EFFECTIVE DATE OF BUILDING CODES WITHIN THE JURISDICTION]~~ April 1<sup>st</sup>, 2014, in which there is work involving additions, alterations or changes of occupancy shall be made to comply with the requirements of this section or the provisions of Sections 3403 through 3409. The provisions in Sections 3412.2.1 through 3412.2.5 shall apply to existing occupancies that will continue to be, or are proposed to be, in Groups A, B, E, F, M, R, S and U. These provisions shall not apply to buildings with occupancies in Group H or I.

**~~3412.2.5 Accessibility requirements.~~** ~~All portions of the buildings proposed for change of occupancy shall conform to the accessibility provisions of Section 3411.~~

## CHAPTER 35 REFERENCED STANDARDS

# ASCE/SEI

American Society of Civil Engineers  
Structural Engineering Institute  
1801 Alexander Bell Drive  
Reston, VA 20191-4400

| Standard<br>reference<br>number               | Referenced<br>in code<br>section number                     |
|---|---|
| 24—05 Flood Resistant Design and Construction | 1203.3.2, 1612.4, 1612.5,<br>3001.2, G103.1, G401.3, G401.4 |

# ASTM

ASTM International  
100 Barr Harbor Drive  
West Conshohocken, PA 19428-2959

| Standard<br>reference<br>number  | Referenced<br>in code<br>section number        |
|--|--|
| ASTM C 33-2003 Specification for Concrete Aggregates   | 721.3.1.4, 721.4.1.1.3,<br><b>1811.2.1.1.1</b> |
| ASTM C 94/C 94M-2007 Standard Specification for Ready-Mixed Concrete   | 110.3.1, <b>1811.1</b>                         |
| <b>ASTM C 494-2011 Standard Specification for Chemical Admixtures for Concrete</b>   | <b>1811.1</b>                                  |
| ASTM C 920-2005 Standard Specification for Elastomeric Joint Sealants  | Table 2506.2, <b>1811.2.3.2.1</b>              |
| <b>ASTM C 1193-2011 Standard Guide for Use of Joint Sealants</b>   | <b>1811.2.3.2.1</b>                            |
| <b>ASTM E 154-2008 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground cover</b> | <b>1811.2.2.1</b>                              |

# FEMA

Federal Emergency Management Agency  
Federal Center Plaza  
500 C Street S.W.  
Washington, DC 20472

| Standard<br>reference<br>number  | Referenced<br>in code<br>section number |
|--|---|
| FIA TB 11—01 Crawlspace Construction for Buildings Located in Special Flood Hazard Areas | 1805.1.2.1                              |
| P646—08 Guidelines for Design for Structures for Vertical Evacuation from Tsunamis       | M101.4                                  |

# NFPA

National Fire Protection Association  
1 Batterymarch Park  
Quincy, MA 02169-7471

| Standard<br>reference<br>number | Title                                 | Referenced<br>in code<br>section number                    |
|---------------------------------|---------------------------------------|--|
| 10— <del>13</del> 40            | Portable Fire Extinguishers           | 906.2, 906.3.2, 906.3.4, Table<br>906.3(1), Table 906.3(2) |
| 11—10                           | Low Expansion Foam                    | 904.7  |
| 12— <del>11</del> 40            | Carbon Dioxide Extinguishing Systems  | 904.8, 904.11  |
| 12A—09 Halon 1301               | Halon 1301 Fire Extinguishing Systems | 904.9  |

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| 13— <del>1340</del>  | Installation of Sprinkler Systems   | 708.2, 903.3.1.1, 903.3.2, 903.3.5.1.1, 903.3.5.2, 904.11, 905.3.4, 907.6.3, 1009.3  |
| 13D— <del>1340</del> | Installation of Sprinkler Systems in One- and Two-family Dwellings and Manufactured Homes               | 903.3.1.3, 903.3.5.1.1   |
| 13R— <del>1340</del> | Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height | 903.3.1.2, 903.3.5.1.1, 903.3.5.1.2, 903.4   |
| 14— <del>1340</del>  | Installation of Standpipe and Hose System   | 905.2, 905.3.4, 905.4.2, 905.6.2, 905.8  |
| 16—11                | Installation of Foam-water Sprinkler and Foam-water Spray Systems                                       | 904.7, 904.11  |
| 17— <del>1309</del>  | Dry Chemical Extinguishing Systems  | 904.6, 904.11  |
| 17A— <del>1309</del> | Wet Chemical Extinguishing Systems  | 904.5, 904.11  |
| 20—10                | Installation of Stationary Pumps for Fire Protection  | 913.1, 913.2.1, 913.5  |
| 30—12                | Flammable and Combustible Liquids Code  | 415.5, 507.8.1.1.1, 507.8.1.1.2  |
| 31— <del>1106</del>  | Installation of Oil-burning Equipment   | 2113.15  |
| 32—11                | Dry Cleaning Plants   | 415.8.4  |
| 40—11                | Storage and Handling of Cellulose Nitrate Film  | 409.1  |
| 58—11                | Liquefied Petroleum Gas Code  | 415.8.3  |
| 61— <del>1308</del>  | Prevention of Fires and Dust Explosions in Agricultural and Food Product Facilities                     | 415.8.1  |
| 70—11                | National Electrical Code  | 108.3, 415.10.1.8, 904.3.1, 907.6.1, 909.12.1, 909.16.3, 1205.4.1, 2701.1, 3401.3, H106.1, H106.2, K101, K111.1  |
| 72— <del>1340</del>  | National Fire Alarm Code  | 901.6, 903.4.1, 904.3.5, 907.2, 907.2.5, 907.2.11, 907.2.13.2, 907.3, 907.3.3, 907.3.4, 907.5.2.1.2, 907.5.2.2, 907.6, 907.6.1, 907.6.5, 907.7, 907.7.1, 907.7.2, 907.2.9.2, 911.1.5, 3006.5, 3007.8 |
| 80— <del>1340</del>  | Fire Doors and Other Opening Protectives  | 410.3.5, 509.4.2, 716.5, 716.5.7, 716.5.8.1, 716.5.9.2, 716.6, 716.6.4, 1008.1.4.2, 1008.1.4.3   |
| 82—09                | Standard for Incinerators and Waste and Linen Handling Systems and Equipment, 2009 Edition              | 713.13   |
| 85—11                | Boiler and Combustion System Hazards Code (Note: NFPA 8503 has been incorporated into NFPA 85)          | 415.8.1  |
| 92B—09               | Smoke Management Systems in Malls, Atria and Large Spaces   | 909.8  |
| 99— <del>1240</del>  | Standard for Health Care Facilities   | 407.10   |
| 101—12               | Life Safety Code  | 1028.6.2   |
| 105— <del>1340</del> | Standard for the Installation of Smoke Door Assemblies  | 405.4.2, 710.5.2.2, 716.5.3.1,   |

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|                      |  | 909.20.4.1   |
| 110— <del>1340</del> | Emergency and Standby Power Systems  | 2702.1   |
| 111— <del>1340</del> | Stored Electrical Energy Emergency and Standby Power Systems   | 2702.1   |
| 120—10               | Coal Preparation Plants  | 415.8.1  |
| 170— <del>1209</del> | Standard for Fire Safety and Emergency Symbols   | 1024.2.6.1   |
| 211— <del>1340</del> | Chimneys, Fireplaces, Vents and Solid Fuel-burning Appliances  | 2112.5   |
| 221—09               | Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls, 2009 Edition   | 706.2  |
| 252—12               | Standard Methods of Fire Tests of Door Assemblies  | 715.4.2, 715.4.3, 715.4.7.3.1, Table 716.3, 716.4, 716.5.1, 716.5.3, 716.5.8, 716.5.8.1.1, 716.5.8.3.1 |
| 253—11               | Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source  | 406.8.3, 424.2, 804.2, 804.3   |
| 257—12               | Standard for Fire Test for Window and Glass Block Assemblies   | Table 716.3, 716.4, 716.5.3.2, 716.6, 716.6.1, 716.6.2, 716.6.7.3                                      |
| 259—08               | Test Method for Potential Heat of Building Materials   | 2603.4.1.10, 2603.5.3  |
| 265—11               | Method of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Wall Coverings on Full Height Panels and Walls                              | 803.1.3, 803.1.3.1   |
| 268—12               | Standard Test Method for Determining Ignitibility of Exterior Wall Assemblies Using a Radiant Heat Energy Source   | 1406.2.1.1, 1406.2.1.1.1, 1406.2.1.1.2, 2603.5.7, D105.1   |
| 275—09               | Standard Method Of Fire Tests for the Evaluation of Thermal Barriers Used Over Foam Plastic Insulation   | 1407.10.2, 2603.4  |
| 285—11               | Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components | 718.2.6, 1403.5, 1407.10.4, 1409.10.4, 1509.6.2, 2603.5.5  |
| 286—11               | Standard Method of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth   | 402.6.4.4, 803.1.2, 803.1.2.1, 803.9, 2603.4, 2603.7, 2603.10, 2604.2.4, 2613.4                        |
| 288—12               | Standard Method of Fire Tests of Floor Fire Door Assemblies Installed Horizontally in Fire-resistance-rated Floor Systems                                | 711.8  |
| 289— <del>1309</del> | Standard Method of Fire Test for Individual Fuel Packages  | 402.6.2, 407.6.4.6, 424.2  |
| <b><u>307-11</u></b> | <b><u>Standard for the Construction and Fire Protection of Marine Terminals, Piers and wharves</u></b>   | <b><u>903.2.11.7</u></b>   |
| 409— <del>1340</del> | Aircraft Hangars   | 412.4.6, Table 412.4.6, 412.4.6.1, 412.6.5   |
| 418—11               | Standard for Heliports   | 412.7.4  |
| 484—12               | Combustible Metals   | 415.8.1  |
| 654— <del>1344</del> | Prevention of Fire & Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids                                   | 415.8.1  |
| 655—12               | Prevention of Sulfur Fires and Explosions  | 415.8.1  |

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| 664—12                | Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities          | 415.8.1  |
| 701—10                | Standard Methods of Fire Tests for Flame-propagation of Textiles and Films                | 410.3.6, 424.2, 801.4, 806.1, 806.1.2, 806.2, 3102.3, 3102.3.1, 3102.6.1.1, 3105.4, D102.2.8, H106.1.1 |
| 704—12                | Standard System for the Identification of the Hazards of Materials for Emergency Response | 202, 414.7.2   |
| 720— <del>1209</del>  | Standard for the Installation of Carbon Monoxide (CO) Detection and Warning Equipment     | 908.7  |
| 1124— <del>1306</del> | Manufacture, Transportation and Storage of Fireworks and Pyrotechnic Articles             | 415.5.1.1, 415.3.1   |
| 2001— <del>1208</del> | Clean Agent Fire Extinguishing Systems  | 904.10   |

## APPENDICES

### **Informational note:**

*The following appendices are not adopted by the State of Oregon but may be adopted by local municipalities:*

1. A – Employee Qualifications;
2. B – Board of Appeals;
3. D – Fire Districts ;
4. F – Rodentproofing;
5. H – Signs
6. J – Grading

*The following appendices are not adopted by the State of Oregon and may not be adopted by local municipalities:*

1. E – Supplementary Accessibility Requirements;
2. K – Administrative Provisions;
3. L – Earthquake Recording Instrumentation

## APPENDIX C GROUP U–AGRICULTURAL BUILDINGS

### SECTION C101 GENERAL

**C101.1 Scope.** ~~The provisions of this appendix shall apply exclusively to agricultural buildings. Agricultural buildings and equine facilities meeting the parameters of ORS 455.315 (1) and (2) are exempt from this code, including submission of plans and permits.~~

Unless otherwise exempted by ORS 455.315 (1) and (2), the provisions of this appendix shall apply exclusively to agricultural buildings. Such buildings shall be classified as Group U and shall include the following uses:

1. Livestock shelters or buildings, including shade structures and milking barns.
2. Poultry buildings or shelters.
3. Barns.
4. Storage of equipment and machinery used exclusively in agriculture.
5. Horticultural structures, including detached production greenhouses and crop protection shelters.
6. Sheds.
7. Grain silos.
8. Stables.

## APPENDIX I PATIO COVERS

~~*The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.*~~

### SECTION I101 GENERAL

**I101.1 General.** Patio covers shall be permitted to be detached from or attached to *dwelling units*. Patio covers shall be used only for recreational, outdoor living purposes and not as carports, garages, storage rooms or habitable rooms. Openings shall be permitted to be enclosed with insect screening, approved translucent or transparent plastic not more than 0.125 inch (3.2 mm) in thickness, glass conforming to the provisions of Chapter 24 or any combination of the foregoing.



## SECTION I102 DEFINITIONS

**I102.1 General.** The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of the *International Building Code* for general definitions.

**PATIO COVERS.** ~~A structure with open or glazed walls which is used for recreational, outdoor living purposes associated with a dwelling unit.~~ One story structures not exceeding 12 feet (3657 mm) in height. Enclosure walls shall be permitted to be of any configuration, provided the open or glazed area of the longer wall and one additional wall is equal to at least 65 percent of the area below a minimum of 6 feet 8 inches (2032 mm) of each wall, measured from the floor.

## SECTION I103 EXTERIOR WALLS AND OPENINGS

### **I103.1 Enclosure walls.**

~~Enclosure walls shall be permitted to be of any configuration, provided the open or glazed area of the longer wall and one additional wall is equal to at least 65 percent of the area below a minimum of 6 feet 8 inches (2032 mm) of each wall, measured from the floor. Openings shall be permitted to be enclosed with insect screening, approved translucent or transparent plastic not more than 0.125 inch (3.2 mm) in thickness, glass conforming to the provisions of Chapter 24 or any combination of the foregoing.~~

**I103.12 Light, ventilation and emergency egress.** Exterior openings ~~of the dwelling unit~~ required for light and ventilation shall be permitted to open into a patio structure. However, the patio structure shall be unenclosed if such openings are serving as emergency egress or rescue openings from sleeping rooms. Where such exterior openings serve as an exit from the dwelling unit, the patio structure, unless unenclosed, shall be provided with exits conforming to the provision of Chapter 10.

## SECTION I104 HEIGHT

### **I104.1 Height.**

~~Patio covers shall be limited to one story structures not exceeding 12 feet (3657 mm) in height.~~

## SECTION I1045 STRUCTURAL PROVISIONS

**I1045.1 Design loads.** Patio covers shall be designed and constructed to sustain, within the stress limits of this code, all dead loads plus a minimum vertical live load of 10 pounds per square foot (0.48 kN/m<sup>2</sup>) except that snow loads shall be used where such snow loads exceed this minimum. Such patio covers shall be designed to resist the minimum wind and seismic loads set forth in this code.

**I1045.2 Footings.** In areas with a frost depth of zero, a patio cover shall be permitted to be supported on a concrete slab on grade without footings, provided the slab conforms to the provisions of Chapter 19 of this code, is not less than 3½ inches (89 mm) thick and further provided that the columns do not support loads in excess of 750 pounds (3.36 kN) per column.