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DPD 2012 Residential Building Code ORD
May 6, 2013
Version #1

CITY OF SEATTLE

ORDINANCE _____

COUNCIL BILL 117867

AN ORDINANCE relating to the Seattle Residential Code, amending Section 22.150.010, and adopting by reference Chapters 2 through 10, 12 through 24, Section P2904, 44, and Appendices F and G of the 2012 International Residential Code, and amending certain of those chapters; adopting a new Chapter 1 related to administration, permitting and enforcement; and repealing Sections 2-18 of Ordinance 123383.

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. Section 22.150.010 of the Seattle Municipal Code is amended as follows:

SMC 22.150.010 Adoption of International Residential Code((:))

The Seattle Residential Code consists of: 1) the following portions of the ((2009)) 2012 edition of the International Residential Code published by the International Code Council: Chapters 2 through 10, Chapters 12 through 24, Section P2904, Chapter 44, Appendices F and G; 2) the amendments and additions to the ((2009)) 2012 International Residential Code adopted by City Council by ordinance; and 3) a Chapter 1 relating to administration, permitting and enforcement adopted by City Council by ordinance. One copy of the ((2009)) 2012 International Residential Code is filed with the City Clerk in C.F. ((340944)) 313188.

Section 2. Chapter 1 of the Seattle Residential Code is adopted to read as follows:

CHAPTER 1

ADMINISTRATION

SECTION R101

TITLE, SCOPE AND PURPOSE

R101.1 Title. This subtitle shall be known as the "*Seattle Residential Code*" and may be so cited, and is referred to herein as "this code."

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1 **R101.2 Scope.** The provisions of this code apply to the construction, alteration, moving,
2 addition, demolition, repair, maintenance and occupancy of detached one- and two-family
3 dwellings and townhouses not more than three stories above grade plane in height with a
4 separate means of egress, and their accessory structures, including adult family homes, foster
5 family care homes and family day care homes licensed by the Washington State Department of
6 Social and Health Services.

7 **Exceptions:**

- 8 1. Live/work units complying with the requirements of Section 419 of the *International*
9 *Building Code* shall be permitted to be built as one- and two-family *dwellings* or
10 townhouses. Fire suppression shall conform to Section 419 of the *International*
11 *Building Code*.
- 12 2. Owner-occupied lodging houses with five or fewer guestrooms shall be permitted to
13 be constructed in accordance with this code when equipped with a fire sprinkler
14 system in accordance with Section P2904.

15 **Note:** The seismic design for wood-frame buildings with more than two stories above grade
16 shall comply with the *International Building Code* or other standards referenced in Section
17 R301.1. See Sections R301.2.2.3 and Table R602.10.3(3).

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19 **Interpretation R101.2a:** Buildings with mixed occupancies, other than residences with home
20 occupations, are not within the scope of the *Seattle Residential Code* and shall comply with
21 the *Seattle Building Code*.

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23 **Interpretation R101.2b:** Three or more dwellings located above a common garage or other
24 common space are required to comply with the *Seattle Building Code*. Units in detached one-
25 and two-family dwellings may share common space.

1 **R101.3 Applicability of city laws.** A building permit application shall be considered under the
2 applicable city law in effect on the date a valid and fully complete building permit application is
3 submitted or on a date as otherwise required by law.

4 **Exception:** For any project for which an associated, unexpired master use permit has been
5 issued, a building permit application shall be considered under the versions of Seattle
6 Municipal Code Title 23, Seattle Land Use Code; Seattle Municipal Code Chapter 25.09,
7 Environmentally Critical Areas regulations; and Seattle Municipal Code Chapter 25.09, Tree
8 Protection regulations in effect on the date established by Seattle Municipal Code Section
9 23.76.026 or 23.76.032.C.1 for consideration of the master use permit, unless that date is
10 later than the date of the complete building permit application. This exception does not apply
11 to a subdivision or short subdivision component of a master use permit.

12 **Note:** Applicable law includes but is not limited to the Seattle Municipal Code Title 23,
13 Seattle Land Use Code; Seattle Municipal Code Chapter 25.09, Environmentally Critical
14 Areas regulations; Seattle Municipal Code Chapter 25.09, Tree Protection regulations; and
15 the Seattle Building, Mechanical, Fuel Gas, Energy, Stormwater, Grading and Side Sewer
16 codes.

17 **R101.3.1 Complete building permit applications.** A building permit application is
18 complete if the building official determines it meets the requirements of Sections R105.5
19 through R105.5.1.4, and the application includes, without limitation, the construction
20 documents for the architectural and structural components of the building.

21 **Exception:** If the building official allows a building permit application to be submitted in
22 phases for portions of a building, each phased portion submittal shall meet the
23 requirements of Sections R105.5 through R105.5.1.4 applicable to the scope of the
24 allowed phased portion, and the building permit application shall be considered complete
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1 for the purposes of Section R101.3 on the date the phased portion submittal that includes
2 the structural frame for the entire building is submitted.

3 **R101.4 Purpose.** The purpose of this code is to provide minimum standards to safeguard life or
4 limb, health, property and public welfare by regulating and controlling the design, construction,
5 quality of materials, occupancy, location and maintenance of buildings and structures within the
6 City and certain equipment specifically regulated herein. The purpose of this code is to provide
7 for and promote the health, safety and welfare of the general public, and not to create or
8 otherwise establish or designate any particular class or group of persons who will or should be
9 especially protected or benefitted by the terms of this code.

10 **R101.5 Internal consistency.** Where in any specific case, different sections of this code specify
11 different materials, methods of construction or other requirements, the most restrictive governs.
12 Where there is a conflict between a general requirement and a specific requirement, the specific
13 requirement is applicable.

14 **R101.6 Referenced codes and standards.** The codes and standards referenced in this code are
15 considered part of this code to the extent prescribed by each such reference. Where differences
16 occur between provisions of this code and referenced codes and standards, the provisions of this
17 code apply, except that nothing in this Code limits the effect of any provision of the Grading
18 Code, Stormwater and Drainage Control Code, or Regulations for Environmentally Critical
19 Areas.

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

23 **R101.7 Appendices.** Provisions in the *International Residential Code* appendices do not apply
24 unless specifically adopted.

1 **R101.8 Metric units.** Wherever in this code there is a conflict between metric units of
2 measurement and U.S. customary units, the U.S. customary units govern.

3 SECTION R102

4 UNSAFE BUILDINGS, STRUCTURES OR PREMISES

5 **R102.1 Emergency order.** Whenever the building official finds that any building or structure or
6 premises, or portion thereof is in such a dangerous and unsafe condition as to constitute an
7 imminent hazard to life or limb, the building official may issue an emergency order. The
8 emergency order may (1) direct that the building, structure or premises, or portion thereof be
9 restored to a safe condition by a date certain; (2) require that the building, structure or premises,
10 or portion thereof, be vacated within a reasonable time to be specified in the order, or in the case
11 of extreme danger, may specify immediate vacation of the building, structure or premises, or
12 portion thereof; or (3) authorize immediate disconnection of the utilities or energy source.

13 **R102.1.1 Service of emergency order.** The order shall be posted on the premises or personally
14 served on the owner of the building or premises or any person responsible for the condition. The
15 order shall specify the time for compliance.

16 **R102.1.2 Effect of emergency order.** No person may occupy a building, structure or
17 premises, or portion thereof, after the date on which the building is required to be vacated
18 until the building, structure or premises, or portion thereof, is restored to a safe condition as
19 required by the order and this code. It is a violation for any person to fail to comply with an
20 emergency order issued by the building official.

21 **R102.2 Hazard correction order.** Whenever the building official finds that an unsafe building,
22 structure or premises exists, the building official may issue a hazard correction order specifying
23 the conditions causing the building, structure or premises to be unsafe and directing the owner or
24 other person responsible for the unsafe building, structure or premises to correct the condition by
25 a date certain. In lieu of correction, the owner may submit a report or analysis to the building
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1 official analyzing said conditions and establishing that the building, structure or premises is, in
2 fact, safe. The building official may require that the report or analysis be prepared by a licensed
3 engineer and may require compliance with *International Existing Building Code*.

4 **R102.2.1 Service of hazard correction order.** The order shall be posted on the premises or
5 served on the owner of the building or premises or any person responsible for the condition
6 by certified mail with return receipt requested. The order shall specify the time for
7 compliance.

8 **R102.2.2 Effect of hazard correction order.** It is a violation for any person to fail to
9 comply with a hazard correction order as specified in this subsection.

10 SECTION R103

11 ENFORCEMENT, VIOLATIONS AND PENALTIES

12 **R103.1 Violations.** It is a violation of this code for any person to:

- 13 1. Erect, construct, enlarge, repair, move, improve, remove, convert, demolish, equip,
14 occupy, inspect or maintain any building or structure in the City, contrary to or in
15 violation of any of the provisions of this code;
 - 16 2. Knowingly aid, abet, counsel, encourage, hire, induce or otherwise procure another to
17 violate or fail to comply with this code;
 - 18 3. Use any material or to install any device, appliance or equipment that does not comply
19 with applicable standards of this code or that has not been approved by the building
20 official;
 - 21 4. Violate or fail to comply with any notice or order issued by the building official pursuant
22 to the provisions of this code or with any requirements of this code;
 - 23 5. Remove, mutilate, destroy or conceal any notice or order issued or posted by the building
24 official pursuant to the provisions of this code, or any notice or order issued or posted by
25 the building official in response to a natural disaster or other emergency;
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1 6. Conduct work under a permit without requesting an inspection as required by Section
2 R106.

3 **R103.2 Notice of violation.** If, after investigation, the building official determines that standards
4 or requirements of this code have been violated or that orders or requirements have not been
5 complied with, the building official may serve a notice of violation upon the owner, agent or
6 other person responsible for the action or condition. The notice of violation shall state the
7 standards or requirements violated, shall state what corrective action, if any, is necessary to
8 comply with the standards or requirements, and shall set a reasonable time for compliance.

9 **R103.2.1 Service of notice of violation.** The notice shall be served upon the owner, agent or
10 other responsible person by personal service or regular first class mail addressed to the last
11 known address of such person, or if no address is available after reasonable inquiry, the
12 notice may be posted in a conspicuous place on the premises. The notice may also be posted
13 if served by personal service or first class mail. Nothing in this section limits or precludes
14 any action or proceeding to enforce this code, and nothing obligates or requires the building
15 official to issue a notice of violation prior to the imposition of civil or criminal penalties.

16 **R103.2.2 Review of notice of violation by the building official.** Any person affected by a
17 notice of violation issued pursuant to Section R103.2 may obtain a review of the notice by
18 making a request in writing within ten days after service of the notice. When the last day of
19 the period computed is a Saturday, Sunday, or City holiday, the period runs until 5 p.m. of
20 the next business day.

21 **R103.2.2.1 Review procedure.** The review shall occur not less than ten nor more than 20
22 days after the request is received by the building official unless otherwise agreed to by
23 the person requesting the review. Any person affected by the notice of violation may
24 submit additional information to the building official. The review shall be made by a
25 representative of the building official who will review any additional information that is
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1 submitted and the basis for issuance of the notice of violation. The reviewer may request
2 clarification of the information received and may conduct a site visit.

3 **R103.2.2.2 Decision.** After the review, the building official shall:

- 4 1. Sustain the notice;
- 5 2. Withdraw the notice;
- 6 3. Continue the review to a date certain; or
- 7 4. Amend the notice.

8 **R103.2.2.3 Order.** The building official shall issue an order containing the decision
9 within 15 days of the date that the review is completed and shall cause the order to be
10 mailed by regular first class mail to the persons requesting the review and the persons
11 named on the notice of violation, addressed to their last known address.

12 **R103.3 Stop work orders.** The building official may issue a stop work order whenever any
13 work is being done contrary to the provisions of this code, or in the event of dangerous or unsafe
14 conditions related to construction or demolition. The stop work order shall identify the violation
15 and may prohibit work or other activity on the site.

16 **R103.3.1 Service of stop work order.** The building official may serve the stop work order
17 by posting it in a conspicuous place at the site, if posting is physically possible. If posting is
18 not physically possible, then the stop work order may be served in the manner set forth in the
19 Revised Code of Washington (RCW) 4.28.080 for service of a summons or by sending it by
20 first class mail to the last known address of: the property owner, the person doing or causing
21 the work to be done, or the holder of a permit if work is being stopped on a permit. For
22 purposes of this section, service is complete at the time of posting or of personal service, or if
23 mailed, three days after the date of mailing. When the last day of the period so computed is a
24 Saturday, Sunday or city holiday, the period runs until 5 p.m. on the next business day.

1 **R103.3.2 Effective date of stop work order.** Stop work orders are effective when posted,
2 or if posting is not physically possible, when one of the persons identified in Section
3 R103.3.1 is served or, if notice is mailed, three days after the date of mailing.

4 **R103.3.3 Review of stop work orders by the building official.** Any person aggrieved by a
5 stop work order may obtain a review of the order by delivering to the building official a
6 request in writing within two business days of the date of service of the stop work order.

7 **R103.3.3.1 Review procedure.** The review shall occur within two business days after
8 receipt by the building official of the request for review unless otherwise agreed by the
9 person making the request. Any person affected by the stop work order may submit
10 additional information to the building official for consideration as part of the review at
11 any time prior to the review. The review will be made by a representative of the building
12 official who will review all additional information received and may conduct a site visit.

13 **R103.3.3.2 Decision.** After the review, the building official may:

- 14 1. Sustain the stop work order;
- 15 2. Withdraw the stop work order;
- 16 3. Modify the stop work order; or
- 17 4. Continue the review to a date certain.

18 **R103.3.3.3 Order.** The building official shall issue an order of the building official
19 containing the decision within two business days after the review is completed and shall
20 cause the order to be sent by regular first class mail to the person or persons requesting
21 the review, any person on whom the stop work order was served, and any other person
22 who requested a copy before issuance of the order, addressed to their last known address.

23 **R103.4 Occupancy violations.** Whenever any building or structure is being occupied contrary to
24 the provisions of this code, the building official may order such occupancy discontinued and the
25 building or structure, or portion thereof, vacated by notice.

1 **R103.4.1 Service of notice of occupancy violation.** The notice shall be served by personal
2 service or regular first class mail addressed to the last known address of the occupant of the
3 premises or any person causing such occupancy. If no address is available after reasonable
4 inquiry, the notice may be served by posting it in a conspicuous place on the premises.

5 **R103.4.2 Compliance with notice of occupancy violation.** Any person occupying the
6 building or structure shall discontinue the occupancy by the date specified in the notice of the
7 building official, or shall make the building or structure, or portion thereof, comply with the
8 requirements of this code; provided, however, that in the event of an unsafe building, Section
9 102 may apply.

10 **R103.5 Civil penalties.** Any person violating or failing to comply with the provisions of this
11 code shall be subject to a cumulative civil penalty in an amount not to exceed \$500 per day for
12 each violation from the date the violation occurs or begins until compliance is achieved. In cases
13 where the building official has issued a notice of violation, the violation will be deemed to begin,
14 for purposes of determining the number of days of violation, on the date compliance is required
15 by the notice of violation.

16 **R103.6 Enforcement in Municipal Court.** Civil actions to enforce this chapter shall be brought
17 exclusively in Seattle Municipal Court, except as otherwise required by law or court rule. In any
18 civil action for a penalty, the City has the burden of proving by a preponderance of the evidence
19 that a violation exists or existed; the issuance of the notice of violation or of an order following a
20 review by the building official is not itself evidence that a violation exists.

21 **R103.7 Judicial review.** Because civil actions to enforce Seattle Municipal Code (SMC) Title
22 22 must be brought exclusively in Seattle Municipal Court pursuant to Section R103.6, orders of
23 the building official including notices of violation issued under this chapter are not subject to
24 judicial review pursuant to Chapter 36.70C RCW.

1 **R103.8 Alternative criminal penalty.** Anyone who violates or fails to comply with any notice
2 of violation or order issued by the building official pursuant to this code or who removes,
3 mutilates, destroys or conceals a notice issued or posted by the building official shall, upon
4 conviction thereof, be punished by a fine of not more than \$5000 or by imprisonment for not
5 more than 365 days, or by both such fine and imprisonment for each separate violation. Each
6 day's violation shall constitute a separate offense.

7 **R103.9 Additional relief.** The building official may seek legal or equitable relief to enjoin any
8 acts or practices and abate any condition when necessary to achieve compliance.

9 **R103.10 Administrative review by the building official.** Applicants may request
10 administrative review by the building official of decisions or actions pertaining to the
11 administration and enforcement of this code. Requests shall be addressed to the building official.

12 **R103.11 Administrative review by the Construction Codes Advisory Board.** Applicants may
13 request review of decisions or actions pertaining to the application and interpretation of this code
14 by the Construction Codes Advisory Board, except for stop work orders, notices of violations
15 and revocations of permits. The review will be performed by a panel of three or more members
16 of the Construction Codes Advisory Board, chosen by the Board Chair. The Chair shall consider
17 the subject of the review and members' expertise when selecting members to conduct a review.
18 The decision of the review panel is advisory only; the final decision is made by the building
19 official.

20 **R103.12 Recording of notices.** The building official may record a copy of any order or notice
21 with the Department of Records and Elections of King County

22 **R103.13 Appeal to Superior Court.** Final decisions of the Seattle Municipal Court on
23 enforcement actions authorized by Title 22 may be appealed pursuant to the Rules for Appeal of
24 Decisions of Courts of Limited Jurisdiction.

1 the proposed alternate complies with the provisions of this code and that the alternate, when
2 considered together with other safety features of the building or other relevant circumstances,
3 will provide at least an equivalent level of strength, effectiveness, fire resistance, durability,
4 safety and sanitation. Certain code alternates have been pre-approved by the building official and
5 are identified in this code as code alternates. The building official may require that sufficient
6 evidence or proof be submitted to reasonably substantiate any claims regarding the use or
7 suitability of the alternate. The building official may, but is not required to, record the approval
8 of alternates and any relevant information in the files of the building official or on the approved
9 construction documents.

10 **R104.6 Tests.** Whenever there is insufficient evidence of compliance with any of the provisions
11 of this code or evidence that any material or construction does not conform to the requirements
12 of this code, the building official may require tests as proof of compliance to be made at no
13 expense to the City. Test methods shall be specified by this code or by other recognized test
14 standards. If there are no recognized and accepted test methods for the proposed alternate, the
15 building official shall determine the test procedures. All tests shall be made by an approved
16 agency. Reports of such tests shall be retained by the building official for the period required for
17 retention of public records.

18 **R104.7 Rules of the building official.** The building official has authority to issue interpretations
19 of this code and to adopt and enforce rules and regulations supplemental to this code as may be
20 deemed necessary in order to clarify the application of the provisions of this code. Such
21 interpretations, rules and regulations shall be in conformity with the intent and purpose of this
22 code.

23 **R104.7.1 Procedure.** The building official shall promulgate, adopt and issue rules according
24 to the procedures specified in the Administrative Code, Chapter 3.02 of the Seattle Municipal
25 Code.

1 **R104.8 Liability.** Nothing in this code is intended to be nor shall be construed to create or form
2 the basis for any liability on the part of the City, or its officers, employees or agents, for any
3 injury or damage resulting from the failure of a building to conform to the provisions of this
4 code, or by reason or as a consequence of any inspection, notice, order, certificate, permission or
5 approval authorized or issued or done in connection with the implementation or enforcement of
6 this code, or by reason of any action or inaction on the part of the City related in any manner to
7 the enforcement of this code by its officers, employees or agents.

8 This code shall not be construed to relieve or lessen the responsibility of any person owning,
9 operating or controlling any building or structure for any damages to persons or property caused
10 by defects, nor shall the Department of Planning and Development or the City of Seattle be held
11 to have assumed any such liability by reason of the inspections authorized by this code or any
12 permits or certificates issued under this code.

13 **R104.9 Responsibilities of parties.**

14 **R104.9.1 Responsibility for compliance.** Compliance with the requirements of this code is
15 the obligation of the owner of the building, structure, or premises; the duly authorized agent
16 of the owner; and other persons responsible for the condition or work, and not of the City or
17 any of its officers, employees or agents.

18 **R104.9.2 Responsibility of design professional, contractor, plans examiner and**
19 **inspector.** The responsibilities of the design professional in responsible charge, contractor,
20 plans examiner, and field inspector are as provided in the *International Building Code*
21 Section 104.9.

22 **SECTION R105**

23 **BUILDING PERMITS**

24 **R105.1 Permits required.** Except as otherwise specifically provided in this code, a building
25 permit shall be obtained from the building official for each building or structure prior to erecting,
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1 constructing, enlarging, altering, repairing, moving, improving, removing, changing the
2 occupancy of, or demolishing such building or structure, or allowing the same to be done. All
3 work shall comply with this code, even where no permit is required.

4 **R105.2 Work exempt from permit.** A building permit is not required for the work listed below.
5 Exemption from the permit requirements of this code does not authorize any work to be done in
6 any manner in violation of the provisions of this code or any other laws or ordinances of the
7 City.

- 8 1. Minor repairs or alterations that, as determined by the building official, cost the owner
9 \$4,000 or less in any six month period. Such repairs and alterations shall not include the
10 removal, reduction, alteration or relocation of any loadbearing support. Egress, light,
11 ventilation and fire-resistance shall not be reduced without a permit.
- 12 2. Minor work including the following, provided no changes are made to the building
13 envelope: patio and concrete slabs on grade; painting or cleaning a building; repointing a
14 chimney; installing kitchen cabinets, paneling or other surface finishes over existing wall
15 and ceiling systems; insulating existing buildings; abatement of hazardous materials; and
16 in-kind or similar replacement of or repair of deteriorated members of a structure.
- 17 3. One-story detached accessory buildings used for greenhouse, tool or storage shed,
18 playhouse, or similar uses, if:
 - 19 3.1. The projected roof area does not exceed 120 square feet; and
 - 20 3.2. The building is not placed on a concrete foundation other than a slab on grade.
- 21 4. Fences not over 8 feet high that do not have masonry or concrete elements above 6 feet.
- 22 5. Arbors and other open-framed landscape structures not exceeding 120 square feet in
23 projected area.
- 24 6. Retaining walls and rockeries which are not over 4 feet in height measured from the
25 bottom of the footing to the top of the wall, if:

- 1 6.1. There is no surcharge or impoundment of Class I, II or III-A liquids;
- 2 6.2. The wall or rockery is not located in an Environmentally Critical Area (ECA) or
- 3 ECA buffer pursuant to chapter 25.09 of the Seattle Municipal Code;
- 4 6.3. Construction does not support soils in a steep slope area, potential landslide area or
- 5 known slide area as identified in the Seattle Environmentally Critical Areas
- 6 Ordinance, Section 25.09.020 of the Seattle Municipal Code.
- 7 6.4. Possible failure would likely cause no damage to adjoining property or structures.
- 8 7. Platforms, walks and driveways not more than 18 inches above grade and not over any
- 9 basement or story below.
- 10 8. Window awnings supported by an exterior wall when projecting not more than 54 inches.
- 11 9. Prefabricated swimming pools, spas and similar equipment accessory to a building
- 12 subject to this code in which the pool walls are entirely above the adjacent grade and if
- 13 the capacity does not exceed 5,000 gallons.
- 14 10. Replacement of roofing materials and siding. This shall not include structural changes,
- 15 replacement of sheathing or alterations to doors and windows. See Energy Code Sections
- 16 R101.4.3 for insulation requirements for existing buildings.
- 17 **Exception:** In detached one- and two- family dwellings, the existing roof sheathing
- 18 may be replaced and roof structure may be repaired without permit provided no
- 19 changes are made to the building envelope other than adding or replacing insulation,
- 20 and the work is equivalent to or better than the existing structure.
- 21 11. Private playground equipment including tree houses.
- 22 12. Removal and/or replacement of underground storage tanks that are subject to regulation
- 23 by a state or federal agency.

Note: A Fire Department permit is required for removal, replacement and
decommissioning of underground storage tanks.

1 13. Installation of dish and panel antennas 6.56 feet (2 m) or less in diameter or diagonal
2 measurement.

3 14. Portable heating appliances, portable ventilating equipment and portable cooling units,
4 provided that the total capacity of these portable appliances does not exceed 40 percent
5 of the cumulative heating, cooling or ventilating requirements of a building or dwelling
6 unit and does not exceed 3 kW or 10,000 Btu input.

7 15. Any closed system of steam, hot or chilled water piping within heating or cooling
8 equipment regulated by this code.

9 16. Minor work or the replacement of any component part of a mechanical system that does
10 not alter its original approval and complies with other applicable requirements of this
11 code.

12 17. Water tanks not located in Environmentally Critical Areas that are supported directly on
13 grade if the capacity is not greater than 5,000 gallons (18 925 L) the ratio of height to
14 diameter or width is not greater than 2:1.

15 **R105.3 Other permits required.** Unless otherwise exempted by this or other pertinent codes,
16 master use, plumbing, electrical, mechanical and other permits may be required for the above
17 exempted items.

18 **R105.4 Flood hazard areas.** In addition to the permit required by this section, all work to be
19 performed in areas of special flood hazard, as defined in Chapter 25.06 of the Seattle Municipal
20 Code are subject to additional standards and requirements, including floodplain development
21 approval or a Floodplain Development License, as set forth in Chapter 25.06, the Seattle
22 Floodplain Development Ordinance.

23 **R105.5 Application for permit.** To obtain a permit, the applicant shall first file an application in
24 writing on a form furnished by the building official or in another format determined by the
25 building official. Every such application shall:

- 1 1. Identify and describe the work to be covered by the permit for which application is made.
- 2 2. Describe the land on which the proposed work is to be done by legal description, property
- 3 address or similar description that will readily identify and definitely locate the proposed
- 4 building or work.
- 5 3. Provide the contractor's business name, address, phone number and current contractor
- 6 registration number (required if contractor has been selected).
- 7 4. Be accompanied by construction documents, including plans and other data required in
- 8 Section R105.5.1.
- 9 5. State the valuation of any new building or structure or any addition, remodeling or
- 10 alteration to an existing building, including cost breakdown between additions and
- 11 alterations.
- 12 6. Be signed by the owner of the property or building, or the owner's authorized agent, who
- 13 may be required to submit evidence to indicate such authority.
- 14 7. Give such other data and information as may be required by the building official,
- 15 including, but not limited to, master use and shoreline permits and building identification
- 16 plans.
- 17 8. Indicate the name of the owner and contractor and the name, address and phone number
- 18 of a contact person.
- 19 9. Substantially conform with applicable law in effect on the date set forth in Section
- 20 R101.3.
- 21 10. Applications that include a grading component shall include all information prescribed by
- 22 the Grading Code and rules adopted thereunder, and all additional information required
- 23 by the building official pursuant to the Grading Code and rules adopted thereunder.

24 **R105.5.1 Construction documents.** Construction documents shall be submitted in two or
25 more sets with each application for a permit, or shall be submitted in electronic format
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1 determined by the building official. Computations, stress diagrams, shop and fabrication
2 drawings and other data sufficient to show the adequacy of the plans shall be submitted when
3 required by the building official.

4 **Exception:** The building official may waive the submission of construction documents if
5 the building official finds that the nature of the work applied for is such that reviewing of
6 construction documents is not necessary to obtain compliance with this code.

7 **R105.5.1.1 Preparation by registered design professionals.** Construction documents
8 for all work shall be prepared and designed by or under the direct supervision of an
9 architect or structural engineer licensed to practice under the laws of the State of
10 Washington. Each sheet of construction documents shall bear the seal and the signature
11 of the registered design professional before the permit is issued.

12 **Exceptions:**

- 13 1. When authorized by the building official, construction documents need not be
14 prepared by an engineer or architect licensed by the State of Washington for
15 the following:
- 16 1.1. Detached one- and two-family dwellings.
 - 17 1.2. New buildings or structures, and additions, alterations or repairs made to
18 them of wood light-frame construction, having a total valuation of less
19 than \$75,000.
 - 20 1.3. Nonstructural alterations and repairs having a total valuation of less than
21 \$75,000, excluding the value of electrical and mechanical systems,
22 fixtures, equipment, interior finish and millwork.
 - 23 1.4. Other work as specified in rules promulgated by the building official.
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- 1 2. When authorized by the building official, construction documents for
2 assembly line products or designed specialty structural products may be
3 designed by a registered professional engineer.

4 **Interpretation R105.5.1.1:** Steel moment frames or extensive or more complex
5 concrete structures such as concrete frame, mild reinforced or post-tensioned floor
6 slabs, shall be designed by a licensed structural engineer.

7 **R105.5.1.2 Information required on construction documents.** Construction documents
8 shall include the following, as applicable:

- 9 1. A plot plan showing the width of streets, alleys, yards and courts.
10 2. The location (and/or location within a building), floor area, story, height and use
11 defined by the Land Use Code of the proposed building and of every existing
12 building on the property.
13 3. Where there are more than two buildings located on a property, a building
14 identification plan identifying the location of each building on the property and
15 identifying each building by a numbering system unrelated to address. Such plan
16 is not required where a plan for the site is already on file and no new buildings are
17 being added to the site.
18 4. Types of heating and air conditioning systems.
19 5. Architectural plans, including floor plans, elevations and door and finish
20 schedules showing location of all doors, windows, mechanical equipment, shafts,
21 pipes, vents and ducts.
22 6. Structural plans, including foundation plan and framing plans.
23 7. Cross-sections and construction details for both architectural and structural plans,
24 including wall sections, foundation, floor and roof details, connections of
25 structural members and types of construction material.
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1 8. Topographic plans, including original and final contours, location of all buildings
2 and structures on the site and, when required by the building official, adjacent to
3 the site, and cubic yards of cut and fill.

4 9. If the building official has reason to believe that there may be an intrusion into
5 required open areas or over the property line, a survey of the property prepared by
6 a land surveyor licensed by the State of Washington is required for all new
7 construction, and for additions or accessory buildings.

8 10. If any building or structure is to be erected or constructed on property abutting an
9 unimproved or partially improved street or alley, the plans shall also include a
10 profile showing the established or proposed grade of the street or alley, based
11 upon information obtained from the Director of Transportation relating to the
12 proposed finished elevations of the property and improvements thereon.

13 **R105.5.1.3 Information on first sheet.** The first or general note sheet of each set of
14 plans shall specify the following, as applicable:

- 15 1. The building and street address of the work.
- 16 2. The name and address of the owner and person who prepared the plans.
- 17 3. Legal description of the property.
- 18 4. Type of occupancy of all parts of the building as defined in this code, including
19 notation of fixed fire protection devices or systems.
- 20 5. Zoning classification of the property and existing and proposed uses of the
21 structure(s) as defined in the *Land Use Code*.
- 22 6. Number of stories above grade and the number of basements as defined in this
23 code.
- 24 7. Variances, conditional uses, special exceptions, including project numbers,
25 approval and approval extension dates.

1 **R105.5.1.4 Structural notes.** Plans shall include applicable information including, but
2 not limited to, the following:

- 3 1. Design loads: Snow load, live loads and lateral loads. If required by the building
4 official, the structural notes for plans engineered to Chapter 9 of ASCE 7 shall
5 include the factors of the base shear formula used in the design;
- 6 2. Foundations: Foundation investigations, allowable bearing pressure for spread
7 footings, allowable load capacity of piles, lateral earth pressure;
- 8 3. Masonry: Type and strength of units, strength or proportions of mortar and grout,
9 type and strength of reinforcement, method of testing, design strength;
- 10 4. Wood: Species or species groups, and grades of sawn lumber, glued-laminated
11 lumber, plywood and assemblies, type of fasteners;
- 12 5. Concrete: Design strengths, mix designs, type and strength of reinforcing steel,
13 welding of reinforcing steel, restrictions, if any;
- 14 6. Steel and aluminum: Specification types, grades and strengths, welding electrode
15 types and strengths; and
- 16 7. Statement of special inspections as required by *Seattle Building Code* Chapter 17.

17 In lieu of detailed structural notes, the building official may approve minor references
18 on the plans to a specific section or part of this code or other ordinances or laws.

19 **R105.5.2 Deferred submittals.** Deferral of any submittal items shall have the prior approval
20 of the *building official*. The *registered design professional in responsible charge* shall list
21 *deferred submittals* on the *plans* for review by the *building official*.

22 Documents for *deferred submittal* items shall be submitted to the *registered design*
23 *professional in responsible charge* who shall review them and forward them to the *building*
24 *official* with a notation indicating that the *deferred submittal* documents have been reviewed
25 and been found to be in general conformance to the design of the building. The *deferred*

1 *submittal* items shall not be installed until the *deferred submittal* documents have been
2 approved by the *building official*.

3 **R105.5.3 Clarity of plans.** Plans shall be drawn to a clearly indicated and commonly
4 accepted scale upon substantial paper such as blueprint quality or standard drafting paper.
5 Tissue paper, posterboard or cardboard will not be accepted. The plans shall be of microfilm
6 quality and limited to a minimum size of 18 inches by 18 inches (457 mm by 457 mm) and a
7 maximum size of 41 inches by 54 inches (1041 mm by 1372 mm).

8 **Exceptions:**

- 9 1. The plans for metal-plate-connected wood trusses may be not less than 8-1/2
10 inches by 11 inches for detached single family structures and no less than 11
11 inches by 17 inches for all other structures.
12 2. Plans may be submitted in electronic format as determined by the building
13 official.

14 **R105.6 Application review.** The construction documents shall be reviewed by the building
15 official. Such construction documents may be reviewed by other departments of the City to
16 check compliance with the laws and ordinances under their jurisdiction.

17 **R105.6.1 Determination of completeness.** Within 28 days after an application is filed, the
18 building official shall notify the applicant in writing either that the application is complete or
19 that it is not complete, and if not complete, what additional information is required to make it
20 complete. Within 14 days after receiving the additional information, the building official
21 shall notify the applicant in writing whether the application is now complete or what
22 additional information is necessary. An application shall be deemed to be complete if the
23 building official does not notify the applicant in writing by the deadlines in this section that
24 the application is incomplete.

1 **R105.6.2 Decision on application.** Except as provided in Section R105.6.5, the building
2 official shall approve, condition or deny the application within 120 days after the building
3 official notifies the applicant that the application is complete.

4 To determine the number of days that have elapsed after the notification that the
5 application is complete, the following periods shall be excluded:

- 6 1. All periods of time during which the applicant has been requested by the Director to
7 correct plans, perform required studies, or provide additional required information,
8 until the determination that the request has been satisfied. The period shall be
9 calculated from the date the building official notifies the applicant of the need for
10 additional information until the earlier of the date the building official determines
11 whether the additional information satisfies the request for information or 14 days
12 after the date the information has been provided to the building official.
- 13 2. If the building official determines that the information submitted by the applicant
14 under item 1 of this subsection is insufficient, the building official shall notify the
15 applicant of the deficiencies, and the procedures under item 1 of this subsection shall
16 apply as if a new request for information had been made;
- 17 3. All extensions of time mutually agreed upon by the applicant and the building
18 official.

19 If a project permit application is substantially revised by the applicant the time period
20 shall start from the date at which the revised project application is determined to be complete
21 under Section R101.3.1.

22 **R105.6.3 Issuance of permit.** The building official shall issue a permit to the applicant if
23 the building official finds that the work as described in the construction documents satisfies
24 the following:

- 1 1. It conforms to the requirements of this code and other pertinent laws, ordinances and
- 2 regulations and with all conditions imposed under any of them,
- 3 2. The fees specified in the Fee Subtitle have been paid, and
- 4 3. The applicant has complied with all requirements to be performed prior to issuance of
- 5 a permit for the work under other pertinent laws, ordinances or regulations or
- 6 included in a master use permit, or otherwise imposed by the building official

7 When the permit is issued, the applicant or the applicant's authorized agent becomes the
8 permit holder.

9 **R105.6.3.1 Permit conditions and denial.** The building official may impose on a permit
10 any conditions authorized by this code or other pertinent ordinances or regulations,
11 including without limitation the Grading Code, the Stormwater and Drainage Control
12 Code, Regulations for Environmentally Critical Areas, and rules adopted under any of
13 them. In addition, the building official may condition a permit in order to reduce the
14 risks associated with development, construction, ownership and occupancy including, but
15 not limited to risks in potential slide areas. The building official may deny permit if the
16 building official determines that the risks cannot be reduced to an acceptable level; or if
17 the proposed project or construction documents do not conform to the requirements of
18 this code or those of other pertinent laws, ordinances or regulations, or do not conform to
19 requirements included the Master Use Permit or otherwise imposed by the building
20 official or other City department; or if the applicant fails to comply with any requirement
21 or condition under any of the foregoing.

22 **R105.6.3.2 Compliance with approved construction documents.** When the building
23 official issues a permit, the building official shall endorse the permit in writing or in
24 electronic format and stamp the plans APPROVED. Such approved plans and permit
25 shall not be changed, modified or altered without authorization from the building official,

1 and all work shall be done in accordance with the approved construction documents and
2 permit except as the building official may require during field inspection to correct errors
3 or omissions.

4 **Exception:** Approval of the building official is not required for modifications to
5 approved construction documents when the scope of work proposed in the
6 modifications would not require a permit.

7 **R105.6.4 Revisions to the permit.** When changes to the approved work are made during
8 construction, approval of the building official shall be obtained prior to execution. The
9 building inspector may approve minor changes to the construction documents for work not
10 reducing the structural strength or fire and life safety of the structure. The building inspector
11 shall determine if it is necessary to revise the approved construction documents. Changes
12 shall be shown on two sets of plans that shall be submitted to and approved by the building
13 official, accompanied by fees specified in the Fee Subtitle prior to occupancy. All changes
14 shall conform to the requirements of this code and other pertinent laws and ordinances.

15 **R105.6.5 Cancellation of permit applications.** Applications may be cancelled if no permit
16 is issued by the earlier of the following: 1) twelve months following the date of application;
17 or 2) sixty days from the date of written notice that the permit is ready to issue. After
18 cancellation, construction documents submitted for review may be returned to the applicant
19 or destroyed by the building official.

20 The building official will notify the applicant in writing at least 30 days before the
21 application is cancelled. The notice shall specify a date by which a request for extension must
22 be submitted in order to avoid cancellation. The date shall be at least two weeks prior to the
23 date on which the application will be cancelled.

24 **R105.6.5.1 Extensions prior to permit issuance.** At the discretion of the building
25 official, applications for projects that require more than 12 months to review and approve
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1 may be extended for a period that provides reasonable time to complete the review and
2 approval, but in no case longer than 24 months from the date of the original application.
3 No application may be extended more than once. After cancellation, the applicant shall
4 submit a new application and pay a new fee to restart the permit process.

5 Notwithstanding other provisions of this code, an application may be extended where
6 issuance of the permit is delayed by litigation, preparation of environmental impact
7 statements, appeals, strikes or other causes related to the application that are beyond the
8 applicant's control, or while the applicant is making progress toward issuance of a master
9 use permit.

10 **R105.7 Retention of plans.** One set of approved plans, which may be on microfilm or in
11 electronic format, shall be retained by the building official. One set of approved plans shall be
12 returned to the applicant and shall be kept at the site of the building or work for use by the
13 inspection personnel at all times during which the work authorized is in progress.

14 **R105.8 Validity of permit.** The issuance or granting of a permit or approval of construction
15 documents shall:

- 16 1. Not be construed to be a permit for, or an approval of, any violation of any of the
17 provisions of this code or other pertinent laws and ordinances;
- 18 2. Not prevent the building official from requiring the correction of errors in the
19 construction documents or from preventing building operations being carried on
20 thereunder when in violation of this code or of other pertinent laws and ordinances of the
21 City;
- 22 3. Not prevent the building official from requiring correction of conditions found to be in
23 violation of this code or other pertinent laws and ordinances of the City; or
- 24 4. Not be construed to extend the period of time for which any such permit is issued or
25 otherwise affect any period of time for compliance specified in any notice or order issued
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1 by the building official or other administrative authority requiring the correction of any
2 such conditions.

3 **R105.9 Expiration of permits.** Authority to do the work authorized by a permit expires 18
4 months from the date of issuance. An approved renewal extends the life of the permit for an
5 additional 18 months from the prior expiration date. An approved reestablishment extends the
6 life of the permit for 18 months from the date the permit expired.

7 **Exceptions:**

- 8 1. Initial permits for major construction projects that require more than 18 months to
9 complete may be issued for a period that provides reasonable time to complete the
10 work, according to an approved construction schedule. The building official may
11 authorize a permit expiration date not to exceed three years from the date of issuance,
12 except when there is an associated Shoreline Substantial Development permit in
13 which case the building official may authorize an expiration date not to exceed the
14 life of the Shoreline permit.
- 15 2. The building official may issue permits which expire in less than eighteen months if
16 the building official determines a shorter period is appropriate to complete the work.

17 **R105.10 Renewal of permits.** Permits may be renewed and renewed permits may be further
18 renewed by the building official if the following conditions are met:

- 19 1. Application for renewal is made within the 30 day period immediately preceding the date
20 of expiration of the permit; and
- 21 2. If the project has had an associated discretionary Land Use review, the land use approval
22 has not expired; and
- 23 3. If an application for renewal is made more than 18 months after the date of mandatory
24 compliance with a new or revised edition of the *Seattle Residential Code* the permit shall
25 not be renewed unless:
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1 3.1. The building official determines that the permit complies, or is modified to
2 comply, with the Seattle Residential, Energy, Stormwater, Side Sewer and
3 Grading codes in effect on the date of application for renewal; or

4 3.2. The work authorized by the permit is substantially underway and progressing at a
5 rate approved by the building official. "Substantially underway" means that
6 normally required building inspections have been approved for work such as
7 foundations, framing, mechanical, insulation and finish work that is being
8 completed on a continuing basis; or

9 3.3. Commencement or completion of the work authorized by the permit is delayed by
10 litigation, appeals, strikes or other extraordinary circumstances related to the work
11 authorized by the permit beyond the permit holder's control, subject to approval
12 by the building official.

13 **R105.11 Reestablishment of expired permits.** A new permit is required to complete work if
14 a permit has expired and was not renewed.

15 **Exception:** A permit that expired less than one year prior to the date of a request for
16 reestablishment may be reestablished upon approval of the building official, if it complies
17 with Section R105.10, Items 2 and 3 above. Once re-established the permit will not be
18 considered to have expired. The new expiration date of a reestablished permit shall be
19 determined in accordance with Section R105.9.

20 **R105.12 Revocation of building permits.** Whenever the building official determines there are
21 grounds for revoking a permit, the building official may issue a notice of revocation. The notice
22 of revocation shall identify the reason for the proposed revocation, including but not limited to
23 the violations, the conditions violated and any alleged false or misleading information provided.

1 **R105.12.1 Standards for revocation.** The building official may revoke a permit if:

- 2 1. The code or the building permit has been or is being violated and issuance of a notice
3 of violation or stop work order has been or would be ineffective to secure compliance
4 because of circumstances related to the violation; or
5 2. The permit was obtained with false or misleading information.

6 **R105.12.2 Service of notice of revocation.** The notice of revocation shall be served on the
7 owner of the property on which the work is occurring, the holder of a permit if different than
8 the owner, or the person doing or causing the work to be done. The notice of revocation shall
9 be served in the manner set forth in RCW 4.28.080 for service of a summons or sent by first
10 class mail to the last known address of the responsible party. For purposes of this section,
11 service is complete at the time of personal service, or if mailed, three days after the date of
12 mailing. When the last day of the period so computed is a Saturday, Sunday or City holiday,
13 the period runs until 5 p.m. on the next business day.

14 **R105.12.3 Effective date of revocation.** The building official shall identify in the notice of
15 revocation a date certain on which the revocation will take effect. This date may be stayed
16 pending complete review before the building official pursuant to Section R105.12.4.

17 **R105.12.4 Review by the building official for notice of revocation.** Any person aggrieved
18 by a notice of revocation may obtain a review by making a request in writing to the building
19 official within three business days of the date of service of the notice of revocation.

20 **R105.12.4.1 Review procedure.** The review will be made by a representative of the
21 building official who will review all additional information received and may also request
22 a site visit. After the review, the building official may:

- 23 1. Sustain the notice of revocation and affirm or modify the date the revocation will
24 take effect;
25 2. Withdraw the notice of revocation;

1 building official. Neither the building official nor the City is liable for expense entailed in the
2 required removal or replacement of any material to allow inspection.

3 **R106.5 Inspection record.** Work requiring a permit shall not be commenced until the permit
4 holder or the permit holder's agent has posted an inspection record in a conspicuous place on the
5 premises and in a position that allows the building official to conveniently make the required
6 entries regarding inspection of the work. This record shall be maintained in such a position by
7 the permit holder or the permit holder's agent until final approval has been granted by the
8 building official.

9 **R106.6 Approvals required.** No work shall be done on any part of the building or structure
10 beyond the point indicated in each successive inspection without first obtaining the written
11 approval of the building official. Written approval shall be given only after an inspection has
12 been made of each successive step in the construction as indicated by each of the inspections
13 required in Section R106.8. There shall be a final inspection and approval of all buildings when
14 they are completed and ready for occupancy.

15 **R106.6.1 Effect of approval.** Approval as a result of an inspection is not approval of any
16 violation of the provisions of this code or of other pertinent laws and ordinances of the City.
17 Inspections presuming to give authority to violate or cancel the provisions of this code or of
18 other pertinent laws and ordinances of the City are not valid.

19 **R106.7 Concealment of work.** No required reinforcing steel or structural framework of any part
20 of a building or structure shall be covered or concealed in any manner whatsoever without first
21 obtaining the approval of the building official.

22 **Exception:** Modular homes and commercial coaches identified by State of Washington
23 stickers specified in Section 106.13.5 of the *International Building Code* and placed upon a
24 permanent foundation approved and inspected by the building official.

1 **R106.8 Required inspections.** The building official, upon notification by the permit holder or
2 the permit holder's agent, of the property address and permit number, shall make the following
3 inspections and shall either approve that portion of the construction as completed or shall notify
4 the permit holder or the permit holder's agent if the construction fails to comply with the law.

5 **R106.8.1 First ground disturbance inspection.** To be made prior to beginning land-
6 disturbing activity, and following installation of erosion control measures and any required
7 fencing that may restrict land disturbance in steep slope or other buffers as defined in chapter
8 25.09 of the Seattle Municipal Code.

9 **Note:** The purpose of this inspection is to verify the erosion control method, location and
10 proper installation. Approved drainage plan requirements and site plan conditions will also
11 be verified, including buffer delineations.

12 **R106.8.2 Foundation inspection.** To be made after trenches are excavated and forms
13 erected and when all materials for the foundation are delivered on the job. Where concrete
14 from a central mixing plant (commonly termed "ready mix") is to be used, materials need not
15 be on the job.

16 **R106.8.3 Concrete slab or under-floor inspection.** To be made after all in-slab or under-
17 floor building service equipment, conduit, piping accessories and other ancillary equipment
18 items are in place but before any concrete is poured or floor sheathing installed, including the
19 subfloor.

20 **R106.8.4 Frame inspection.** To be made after the roof, all framing, fireblocking and bracing
21 are in place and all pipes, chimneys and vents are complete and the rough electrical,
22 plumbing and heating wires, pipes and ducts are approved.

23 **R106.8.5 Insulation inspection.** To be made after all insulation and vapor barriers are in
24 place but before any gypsum board or plaster is applied.

1 **R106.8.6 Lath and/or gypsum board inspection.** For shear walls, to be made after lathing
2 and/or gypsum board, interior and exterior, is in place, but before any plastering is applied or
3 before gypsum board joints and fasteners are taped and finished.

4 **R106.8.7 Final site inspection.** To be made after all grading is complete, and all
5 **permanent erosion controls, stormwater facilities and stormwater best management**
6 **practices** have been installed.

7 **Exception:** A final site inspection is not required for projects with less than 750 square
8 feet of land disturbing activity.

9 **R106.8.8 Final inspection.** To be made after finish grading and the building is completed
10 and before occupancy.

11 **R106.8.8.1 Elevation documentation.** If located in a flood hazard area, the
12 documentation of elevations required in Section R322.1.10 shall be submitted to the
13 *building official* prior to the final inspection.

14 **R106.9 Special inspection.** Special inspection shall be provided in accordance with
15 International Building Code Chapter 17.

16 **R106.10 Other inspections.** In addition to the inspections specified above, the building official
17 may make or require any other inspections of any construction work or site work to ascertain
18 compliance with the provisions of this code and other pertinent laws and ordinances that are
19 enforced by the building official.

20 **R106.11 Special investigation.** If work that requires a permit or approval is commenced or
21 performed prior to making formal application and receiving the building official's permission to
22 proceed, the building official may make a special investigation inspection before a permit is
23 issued for such work. Where a special investigation is made, a special investigation fee may be
24 assessed in accordance with the Fee Subtitle.

1 **R106.12 Reinspections.** The building official may require a reinspection if work for which an
2 inspection is called is not complete, required corrections are not made, the inspection record is
3 not properly posted on the work site, the approved plans are not readily available to the
4 inspector, access is not provided on the date for which inspection is requested, or if deviations
5 from construction documents that require the approval of the building official have been made
6 without proper approval, or as otherwise required by the building official.

7 **R106.12.1 Compliance with Section R107.3.** For the purpose of determining compliance
8 with Section R107.3, Maintenance, the building official or the fire chief may cause a
9 structure to be reinspected.

10 **R106.12.2 Reinspection fee.** The building official may assess a reinspection fee as set forth
11 in the Fee Subtitle for any action listed above in Section R106.12 for which reinspection is
12 required. In instances where reinspection fees have been assessed, no additional inspection
13 of the work will be performed until the required fees have been paid.

14 **R106.13 Approval for occupancy.** Except for alterations and additions, no building or structure
15 subject to this code shall be occupied until approved for occupancy after final inspection.

16 **R106.13.1 Effect of Final inspection.** Final inspection is not an approval of any violation of
17 the provisions of this code or other pertinent laws and ordinances of the City. Certificates
18 presuming to give authority to violate or cancel the provisions of this code or of other
19 pertinent laws and ordinances of the City are not valid.

20 SECTION R107

21 EXISTING STRUCTURES AND EQUIPMENT

22 **R107.1 General.** Buildings in existence at the time of the passage of this code that were legally
23 constructed and occupied in accordance with the provisions of a prior code may continue their
24 existing use, if such use is not unsafe. Mechanical systems lawful at the time of the adoption of
25 this code may continue and may be maintained or repaired, converted to another type of fuel or
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1 have components replaced if it is done in accordance with the basic original design and location
2 and no hazard to life, health or property is created by such mechanical system.

3 **R107.2 Establishing existing uses for the record.** In order to establish an existing use for the
4 record, the building shall comply with the fire and life safety requirements of this code or the
5 code effective at the time the building was constructed. If the existing use is other than that for
6 which the building was constructed, the building shall comply with this code or the code
7 effective at the time the existing use was legally established.

8 **R107.3 Maintenance.** All buildings and structures, and all parts thereof, shall be maintained in a
9 safe and sanitary condition. All mechanical systems, materials, equipment and appurtenances and
10 all parts thereof shall be maintained in proper operating condition in accordance with the original
11 design and in a safe and hazard-free condition. All devices or safeguards which are or were
12 required by a code in effect when the building or structure was erected, altered or repaired shall
13 be maintained in conformance with the code edition under which installed.

14 **Exception:** The building official is authorized to modify the requirements of this subsection
15 where all or a portion of a building is unoccupied, closed off and reasonably secure from
16 unlawful entry.

17 **R107.3.1 Reinspection for maintenance.** To determine compliance with this subsection,
18 the building official may cause a mechanical system or equipment to be reinspected.

19 **R107.3.2 Responsibility for maintenance.** The owner or the owner's designated agent is
20 responsible for maintenance of buildings, structures, mechanical systems, materials,
21 equipment, devices, safeguards and appurtenances. It is a violation to fail to maintain such
22 buildings, structures, mechanical systems, materials, equipment, devices, safeguards and
23 appurtenances or to fail to immediately comply with any lawful notice or order of the
24 building official.

1 **Exception:** Occupants of dwellings are responsible for the maintenance of smoke alarms
2 required by Section R314 and carbon monoxide alarms required by Section R315.

3 **R107.4 Unsafe building appendages.** Parapet walls, cornices, chimneys and other appendages
4 or structural members that are supported by, attached to, or a part of a building and that are in a
5 deteriorated condition or are otherwise unable to sustain the design loads specified in this code,
6 are hereby designated as unsafe building appendages. All such unsafe building appendages are
7 public nuisances and shall be abated in accordance with Section R102.

8 **R107.5 Additions, alterations or repairs.** Buildings and structures to which additions,
9 alterations or repairs are made shall comply with all the requirements of this code for new
10 facilities except as specifically provided in this section. See also applicable provisions of the
11 *International Energy Conservation Code*. Any building or addition that is not covered by or
12 within the scope of this code as provided in Section R101.2 shall be designed to the provisions of
13 the *International Building Code*.

14 **Exceptions:**

- 15 1. An addition may be made to an existing nonconforming building if the following
16 conditions are met:
- 17 1.1. A fire wall, constructed in compliance with *International Building Code* Section
18 706, separates the addition and the existing structure;
 - 19 1.2. The existing building is not made more nonconforming; and
 - 20 1.3. The addition conforms to this code.
- 21 2. Additions with less than 500 square feet of conditioned floor area are exempt from
22 the requirements for whole house ventilation systems, Section M1507.

23 **R107.5.1 When allowed.** Additions, alterations or repairs may be made to any existing
24 building or structure without requiring the existing building or structure to comply with all
25 the requirements of this code, if the addition, alteration or repair conforms to the standards

1 required for a new building or structure and complies with Section R107.5. Additions,
2 alterations, renovations or repairs may be made to any mechanical system without requiring
3 the existing mechanical system to comply with all the requirements of this code, if the
4 addition, alteration, renovation or repair conforms to the standards required for a new
5 mechanical system. Additions, alterations, renovations or repairs shall not cause an existing
6 system to become unsafe, unhealthy or overloaded. Minor additions, alterations, renovations
7 and repairs to existing mechanical systems may be installed in accordance with the law in
8 effect at the time the original installation was made, if approved by the building official.

9 **R107.5.2 Impracticality.** In cases where compliance with the requirements of this code is
10 impractical, the applicant may arrange a presubmittal conference with the design team and
11 the building official. The applicant shall identify alternate design solutions and modifications
12 and demonstrate conformance to Section R104.4 or R104.5. The building official is
13 authorized to waive specific requirements in this code that the building official determines to
14 be impractical.

15 **R107.5.3 Compliance with retroactive ordinances.** Alterations and repairs to existing
16 buildings that are being made in response to a notice or order requiring compliance with the
17 *Housing and Building Maintenance Code*, Subtitle II, Title 22 of the Seattle Municipal Code,
18 the *Fire Code*, Subtitle VI, Title 22 of the Seattle Municipal Code, or other ordinances
19 applicable to existing buildings, shall be permitted to be made in accordance with the
20 standards contained in those ordinances rather than the standards for new buildings contained
21 in this code. If standards are not specified in those ordinances, such alterations or repairs
22 shall conform to the requirements of this chapter.

23 **R107.5.4 Nonstructural alterations or repairs.** Alterations or repairs that are nonstructural
24 and that do not affect any member or part of the building or structure required to be fire
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1 resistant may be made with the same materials of which the building or structure is
2 constructed, provided that no change is permitted that increases its hazard.

3 **R107.5.5 Maintenance of structural stability.** If approved by the building official, minor
4 structural alterations or repairs necessary to maintain the structural stability of the building
5 may be made with the same material of which the building or structure is constructed.

6 **R107.6 Historic buildings and structures.** The building official may modify the specific
7 requirements of this code as it applies to landmarks, and require in lieu thereof alternate
8 requirements that, in the opinion of the building official, will result in a reasonable degree of
9 safety to the public and the occupants of those buildings.

10 For purposes of this section, a landmark is a building or structure that is subject to a
11 requirement to obtain a certificate of approval from the City Landmarks Preservation Board
12 before altering or making significant changes to specific features or characteristics, that has been
13 nominated for designation or has been designated for preservation by the City Landmarks
14 Preservation Board, that has been designated for preservation by the State of Washington, has
15 been listed or determined eligible to be listed in the National Register of Historic Places or is
16 located in a landmark or special review district subject to a requirement to obtain a certificate of
17 approval before making a change to the external appearance of the structure.

18 **R107.7 Unreinforced masonry chimneys.** If an unreinforced masonry chimney is altered or if
19 the building in which such a chimney is located undergoes substantial alteration as defined in
20 Section R107.8.1, the chimney shall be altered to conform to rules promulgated by the building
21 official.

1 **R107.8 Substantial alterations or repairs.** Any building or structure to which substantial
2 alterations or repairs are made shall conform to the requirements of this Section and Sections
3 R310 (emergency escape and rescue openings), R311 (means of egress), R314 (smoke alarms),
4 R315 (carbon monoxide alarms) and R302.2–R302.4 (dwelling unit separation).

5 **R107.8.1 Definition.** For the purpose of this section, substantial alterations or repairs may
6 mean any one of the following, as determined by the building official:

- 7 1. Repair of buildings with *damage ratios* of 60 percent or more.
- 8 2. Remodeling or additions that substantially extend the useful physical and/or
9 economic life of the building or a significant portion of the building.
- 10 3. Change to a use within the scope of this code from a use not within the scope of this
11 code.
- 12 4. Change from an accessory structure to any other use within the scope of this code.
- 13 5. Change from a detached one- or two-family dwelling to a townhouse.
- 14 6. Change to adult family home or family child day care home from any other use.

15 **R107.8.2 Seismic regulations.** Buildings or structures to which substantial alterations or
16 repairs are made shall comply with Sections R301.1.3 or Sections R403.1.6, R602.10 and
17 R602.11. In addition, the building official may require testing of existing materials, at
18 applicant or property owner's expense, if there is insufficient evidence of structural strength
19 or integrity of the building or structure.

20 **Exception:** In lieu of compliance with the seismic provisions of Sections R403.1.6,
21 R602.10 and R602.11, if approved by the building official, the applicant may evaluate
22 and strengthen portions of the building lateral support structure, such as foundations and
23 cripple walls.

24 **R107.8.3 Other structural work.** All other structural work shall comply with the
25 requirements of Chapters 3, 4, 5, 6, 8 and 10 of this code.

1 **R107.9 Change of use.** If the use of a building or portion thereof is changed, any elements of the
2 dwelling unit envelope that are altered shall comply with the sound transmission control
3 requirements of Section R330. If the use of a building or portion thereof is changed to adult
4 family home or to family home child care, the building shall comply with the applicable
5 provisions of Section R325 or R326.

6 **R107.10 Moved buildings.** Residential buildings or structures moved into or within the City are
7 not required to comply with the requirements of this code if the original use classification of the
8 building or structure is not changed. Compliance with the requirements of this chapter is required
9 if the moved residential buildings or structures undergo substantial alteration as defined in
10 R107.8.1. Work performed on new and existing foundations shall comply with all of the
11 requirements of this code for new construction.

12 **SECTION R108**

13 **FEES**

14 **R108.1 Fees.** A fee for each permit and for other activities related to the enforcement of this
15 code shall be paid as set forth in the Fee Subtitle.
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1 Section 3. The following sections of Chapter 2 of the International Residential Code,
2 2012 Edition, are amended as follows:

3 **CHAPTER 2**
4 **DEFINITIONS**

5 **SECTION R201**

6 **GENERAL**

7 ***

8 **SECTION R202**

9 **DEFINITIONS**

10 ***

11 **[W] ADULT FAMILY HOME.** A dwelling in which a person or persons provide personal
12 care, special care, room and board to more than one but not more than six adults who are not
13 related by blood or marriage to the person or persons providing the services.

14 ***

15 **[W] ATTIC, HABITABLE.** A (~~finished or unfinished~~) conditioned area(~~(, not considered a~~
16 ~~story,)) complying with all of the following requirements:~~

17 1. The occupiable floor area is at least 70 square feet (~~((17))~~ 6.5 m²), in accordance with
18 Section R304,

19 2. The occupiable floor area has a ceiling height in accordance with Section R305, and

20 3. The occupiable space is entirely enclosed by the roof assembly above, knee walls (if
21 applicable) on the sides and the floor-ceiling assembly below.

22 A habitable attic is not considered a story.

23 **Interpretation:** Item 3 does not include dormers, but may include gable ends. Knee walls are
24 inside the structural envelope.

25 ***

1 **BUILDING, EXISTING.** Existing building is a building erected prior to the adoption of this
2 code, or one ~~((for which a legal building permit has been issued))~~ that has passed a final
3 inspection.

4 ***

5 **BUILDING OFFICIAL.** The ~~((officer or other designated authority charged with the~~
6 ~~administration and enforcement of this code))~~ Director of the Department of Planning and
7 Development.

8 ***

9 **[W] CHILD DAY CARE.** Care of children during any period of a 24 hour day.

10 **[W] CHILD CARE, FAMILY HOME.** A child care facility licensed by the state located in the
11 dwelling of the person or persons under whose direct care and supervision the child is placed, for
12 the care of twelve or fewer children, including children who reside at the home.

13 ***

14 **DAMAGE RATIO.** The ratio between the cost of work and the estimated replacement cost of
15 the building, expressed as a percentage. The work includes repair of damage to structural and
16 fire/life safety systems.

17 ***

18 **[W] DWELLING UNIT.** A single unit providing complete independent living facilities for one
19 or more persons, including permanent provisions for living, sleeping, eating, cooking and
20 sanitation. Dwelling units may also include the following uses:

21 1. Adult family homes, foster family care homes, and family home child care licensed by the

22 Washington State Department of Social and Health Services.

23 2. Offices, mercantile, food preparation for off-site consumption, personal care salons and
24 similar uses which are conducted primarily by the occupants of the dwelling unit and are

1 secondary to the use of the unit for dwelling purposes, and which do not exceed 500 square
2 feet (46.4 m²).

3 3. One accessory dwelling unit, which need not be considered a separated dwelling unit,
4 provided:

5 3.1. The accessory dwelling unit is constructed within an existing dwelling unit.

6 3.2. Either the accessory dwelling unit or the primary dwelling unit is owner-occupied.

7 3.3. All required smoke alarms in the accessory dwelling unit and the primary dwelling unit
8 are interconnected in such a manner that the actuation of one alarm will activate all
9 alarms in both the primary dwelling unit and the accessory dwelling unit.

10 ***

11 **[W] FIRE SEPARATION DISTANCE.** The distance measured from the ((building))
12 foundation wall or face of the wall framing, whichever is closer, to one of the following:

- 13 1. To the closest interior *lot line*; or
14 2. To the ((centerline)) opposite side of a street, an alley or public way; or
15 3. To an imaginary line between two buildings on the *lot*.

16 The distance shall be measured at a right angle from ((the face of)) the wall.

17 ***

18 **FLOATING HOME.** A building constructed on a float, used in whole or in part for human
19 habitation as a single-family dwelling, which is moored, anchored or otherwise secured in
20 waters.

21 **FLOATING HOME MOORAGE.** A waterfront facility for the moorage of one or more
22 floating homes and the land and water premises on which it is located.

23 **FLOATING HOME SITE.** A part of a floating home moorage, located over water, and
24 designed to accommodate one floating home.

25 ***

1 **GARBAGE.** All discarded putrescible waste matter, including small dead animals weighing not
2 over 15 pounds (6.8 kg), but not including sewage or human or animal excrement.

3 ***

4 **JURISDICTION.** The ~~((governmental unit that has adopted this code under due legislative~~
5 authority)) city of Seattle.

6 ***

7 **LAND-DISTURBING ACTIVITY.** Any activity that results in a movement of earth, or a
8 change in the existing soil cover, both vegetative and nonvegetative, or the existing topography.
9 Land-disturbing activities include, but are not limited to, clearing, grading, filling, excavation
10 and addition of new or the replacement of impervious surface. Compaction, excluding hot
11 asphalt mix, that is associated with stabilization of structures and road construction shall also be
12 considered a land disturbing activity. Vegetation maintenance practices are not considered land
13 disturbing activities.

14 ***

15 **[W] MEZZANINE, LOFT.** An intermediate level or levels between the floor and ceiling of any
16 story ~~((with an aggregate floor area of not more than one-third of the area of the room or space in~~
17 which the level or levels are located)).

18 ***

19 **PERSON.** Any individual, ~~receiver, administrator, executor, trustee in bankruptcy, trust, estate,~~
20 ~~((heirs, executors, administrators or assigns, and also includes a))~~ firm, partnership, joint
21 venture, club, company, joint stock company, business trust, municipal corporation, political
22 subdivision of the State of Washington, the State of Washington and any instrumentality thereof,
23 ~~((or))~~ corporation, limited liability company, association, society or any group of individuals
24 acting as a unit, whether mutual, cooperative, fraternal, nonprofit or otherwise, and the United

1 States or any instrumentality thereof (~~its or their successors or assigns, or the agent of any of the~~
2 ~~aforesaid~~)).

3 ***

4 **SEWAGE.** (~~Any liquid waste containing animal matter, vegetable matter or other impurity in~~
5 ~~suspension or solution.~~) All water-carried waste discharged from the sanitary facilities of
6 buildings occupied or used by people.

7 ***

8 **[W] SMALL BUSINESS.** Any business entity (including a sole proprietorship, corporation,
9 partnership or other legal entity) which is owned and operated independently from all other
10 businesses, which has the purpose of making a profit, and which has fifty or fewer employees.

11 ***

12 **STORY ABOVE GRADE PLANE.** Any *story* having its finished floor surface entirely above
13 *grade plane*, or in which the finished surface of the floor next above is:

- 14 1. More than 6 feet (1829 mm) *above grade plane*; (~~or~~)
- 15 2. More than 12 feet (3658 mm) above the finished ground level at any point; or
- 16 3. More than 12 feet (3658 mm) above the finished ground level for more than 25 feet (7620
17 mm) of the perimeter. Required driveways up to 22 feet (6706 mm) shall not be considered
18 in calculating the 25 foot distance if there is at least 10 feet (3048 mm) between the
19 driveway and all portions of the 25-foot area. See Figure R202S.

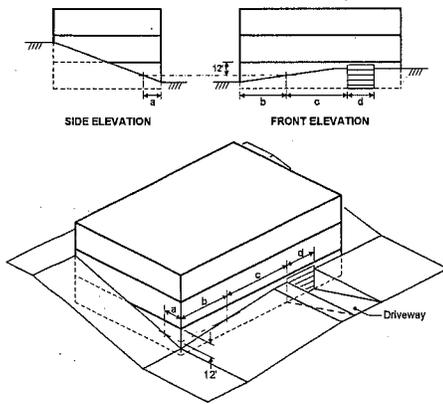


Figure R202S
Story Above Grade Plane
 $a + b < 25'$
 $c \geq 10'$
 $d < 22'$
Lowest level may be a basement
below grade if all these are met

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

UNSAFE. Structurally unsound, provided with inadequate egress, constituting a fire hazard, or otherwise dangerous to human life, or constituting a hazard to safety, health or public welfare.

WATER HEATER. Any heating *appliance* or *equipment* that heats potable water and supplies such water to the potable hot water distribution system.

Interpretation R202W: "Water heater" includes only those appliances that do not exceed pressure of 160 pounds per square inch (1103 kPa), volume of 120 gallons (454 L) and a heat input of 200,000 Btu/hr (58.6 kW).

[W] WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM. A mechanical ventilation system, including fans, controls, and ducts, which replaces, by direct or indirect means, air from the habitable rooms with outdoor air. (~~An exhaust system, supply system, or combination thereof that is designed to mechanically exchange indoor air for outdoor air when~~

1 ~~operating continuously or through a programmed intermittent schedule to satisfy the whole-~~
2 ~~house ventilation rate. For definition applicable in Chapter 11, see Section N1101.9.))~~

3 ***

4 Section 4. The following sections of Chapter 3 of the International Residential Code,
5 2012 Edition, are amended as follows:

6 **CHAPTER 3**
7 **BUILDING PLANNING**
8 **SECTION R301**
9 **DESIGN CRITERIA**

10 ***

11 **R301.2 Climatic and geographic design criteria.** Buildings shall be constructed in accordance
12 with the provisions of this code as limited by the provisions of this section. Additional criteria
13 shall be established by the local *jurisdiction* and set forth in Table R301.2(1).

14 **R301.2.1 Wind design criteria.** Buildings and portions thereof shall be constructed in
15 accordance with the wind provisions of this code using the basic wind speed in Table
16 R301.2(1) as determined from Figure R301.2(4)A. The structural provisions of this code for
17 wind loads are not permitted where wind design is required as specified in Section
18 R301.2.1.1. Where different construction methods and structural materials are used for
19 various portions of a building, the applicable requirements of this section for each portion
20 shall apply. Where not otherwise specified, the wind loads listed in Table R301.2(2) adjusted
21 for height and exposure using Table R301.2(3) shall be used to determine design load
22 performance requirements for wall coverings, curtain walls, roof coverings, exterior
23 windows, skylights, garage doors and exterior doors. Asphalt shingles shall be designed for
24 wind speeds in accordance with Section R905.2.4. A continuous load path shall be provided

1 to transmit the applicable uplift forces in Section R802.11.1 from the roof assembly to the
2 foundation.

3 **R301.2.1.1 Wind limitations and wind design required.** The wind provisions of this
4 code shall not apply to the design of buildings where wind design is required in
5 accordance with Figure R301.2(4)B or where the basic wind speed from Figure
6 R301.2(4)A equals or exceeds 110 miles per hour (49 m/s).

7 **Exceptions:**

- 8 1. For concrete construction, the wind provisions of this code shall apply in
9 accordance with the limitations of Sections R404 and R611.
10 2. For structural insulated panels, the wind provisions of this code shall apply in
11 accordance with the limitations of Section R613.

12 In regions where wind design is required in accordance with Figure R301.2(4)B or
13 where the basic wind speed shown on Figure R301.2(4)A equals or exceeds 110 miles
14 per hour (49 m/s), the design of buildings for wind loads shall be in accordance with one
15 or more of the following methods:

- 16 1. AF&PA *Wood Frame Construction Manual* (WFCM); or
17 2. ICC *Standard for Residential Construction in High-Wind Regions* (ICC 600); or 3.
18 *ASCE Minimum Design Loads for Buildings and Other Structures* (ASCE 7); or
19 4. AISI *Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and*
20 *Two-Family Dwellings* (AISI S230); or
21 5. *International Building Code*.

22 The elements of design not addressed by the methods in Items 1 through 5 shall be in
23 accordance with the provisions of this code. When ASCE 7 or the *International Building*
24 *Code* is used for the design of the building, the wind speed map and exposure category
25 requirements as specified in ASCE 7 and the *International Building Code* shall be used.
26
27
28

1 **R301.2.1.2 Protection of openings.** Exterior glazing in buildings located in windborne
2 debris regions shall be protected from windborne debris. Glazed opening protection or
3 windborne debris shall meet the requirements of the Large Missile Test of ASTM E 1996
4 and ASTM E 1886 referenced therein. The applicable wind zones for establishing missile
5 types in ASTM E 1996 are shown on Figure R301.2(4)C. Garage door glazed opening
6 protection for windborne debris shall meet the requirements of an *approved* impact-
7 resisting standard or ANSI/DASMA 115.

8 **Exception:** Wood structural panels with a minimum thickness of 7/16 inch (11 mm)
9 and a maximum span of 8 feet (2438 mm) shall be permitted for opening protection in
10 one- and two-story buildings. Panels shall be precut and attached to the framing
11 surrounding the opening containing the product with the glazed opening. Panels shall
12 be predrilled as required for the anchorage method and shall be secured with the
13 attachment hardware provided. Attachments shall be designed to resist the component
14 and cladding loads determined in accordance with either Table R301.2(2) or ASCE 7,
15 with the permanent corrosion-resistant attachment hardware provided and anchors
16 permanently installed on the building. Attachment in accordance with Table R301.2.1.2
17 is permitted for buildings with a mean roof height of 33 feet (10 058 mm) or less where
18 located in Wind Zones 1 and 2 in accordance with Figure R301.2(4)C.

TABLE R301.2(1)
CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA

((GROUND)) ROOF SNOW LOAD	WIND DESIGN		SEISMIC DESIGN CATEGORY ^f	SUBJECT TO DAMAGE FROM			WINTER DESIGN TEMP ^e	ICE BARRIER UNDERLAYMENT REQUIRED ^b	FLOOD HAZARDS ^g	AIR FREEZING INDEX ⁱ	MEAN ANNUAL TEMP ^j
	Speed ^d (mph)	Topographic effects ^k		Weathering ^a	Frost line depth ^b	Termites ^c					
25 psf	85	No	D ₂	Moderate	12"	none to slight	24° F	No	(a) 1989 (b) May 16, 1995	250	52.8° F

For SI: 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s.

- a. Weathering may require a higher strength concrete or grade of masonry than necessary to satisfy the structural requirements of this code. The weathering column shall be filled in with the weathering index (i.e., "negligible," "moderate" or "severe") for concrete as determined from the Weathering Probability Map [Figure R301.2(3)]. The grade of masonry units shall be determined from ASTM C 34, C 55, C 62, C 73, C 90, C 129, C 145, C 216 or C 652.
- b. The frost line depth may require deeper footings than indicated in Figure R403.1(1). The jurisdiction shall fill in the frost line depth column with the minimum depth of footing below finish grade.
- c. The jurisdiction shall fill in this part of the table to indicate the need for protection depending on whether there has been a history of local subterranean termite damage.
- d. The jurisdiction shall fill in this part of the table with the wind speed from the basic wind speed map [Figure R301.2(4)A]. Wind exposure category shall be determined on a site-specific basis in accordance with Section R301.2.1.4.
- e. ~~((The outdoor design dry-bulb temperature shall be selected from the columns of 97 1/2 percent values for winter from Appendix D of the International Plumbing Code. Deviations from the Appendix D temperatures shall be permitted to reflect local climates or local weather experience as determined by the building official.))~~ The winter design temperature is taken from the International Energy Conservation Code.
- f. The jurisdiction shall fill in this part of the table with the seismic design category determined from Section R301.2.2.1.
- g. The jurisdiction shall fill in this part of the table with (a) the date of the jurisdiction's entry into the National Flood Insurance Program (date of adoption of the first code or ordinance for management of flood hazard areas), (b) the date(s) of the Flood Insurance Study and (c) the panel numbers and dates of all currently effective FIRMs and FBFMs or other flood hazard map adopted by the authority having jurisdiction, as amended.
- h. In accordance with Sections R905.2.7.1, R905.4.3.1, R905.5.3.1, R905.6.3.1, R905.7.3.1 and R905.8.3.1, where there has been a history of local damage from the effects of ice damming, the jurisdiction shall fill in this part of the table with "YES." Otherwise, the jurisdiction shall fill in this part of the table with "NO."
- i. The jurisdiction shall fill in this part of the table with the 100-year return period air freezing index (BF-days) from Figure R403.3(2) or from the 100-year (99 percent) value on the National Climatic Data Center data table "Air Freezing Index-USA Method (Base 32°F)" at www.ncdc.noaa.gov/fpsf.html.
- j. The jurisdiction shall fill in this part of the table with the mean annual temperature from the National Climatic Data Center data table "Air Freezing Index-USA Method (Base 32°F)" at www.ncdc.noaa.gov/fpsf.html.
- k. In accordance with Section R301.2.1.5, where there is local historical data documenting structural damage to buildings due to topographic wind speed-up effects, the jurisdiction shall fill in this part of the table with "YES." Otherwise, the jurisdiction shall indicate "NO" in this part of the table.

Note to footnote k: Topographical effects shall be included for buildings designed according to the International Building Code.

TABLE R301.2(2)
 COMPONENT AND CLADDING LOADS FOR A BUILDING WITH A MEAN
 ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B (psf)^{a, b, c, e}

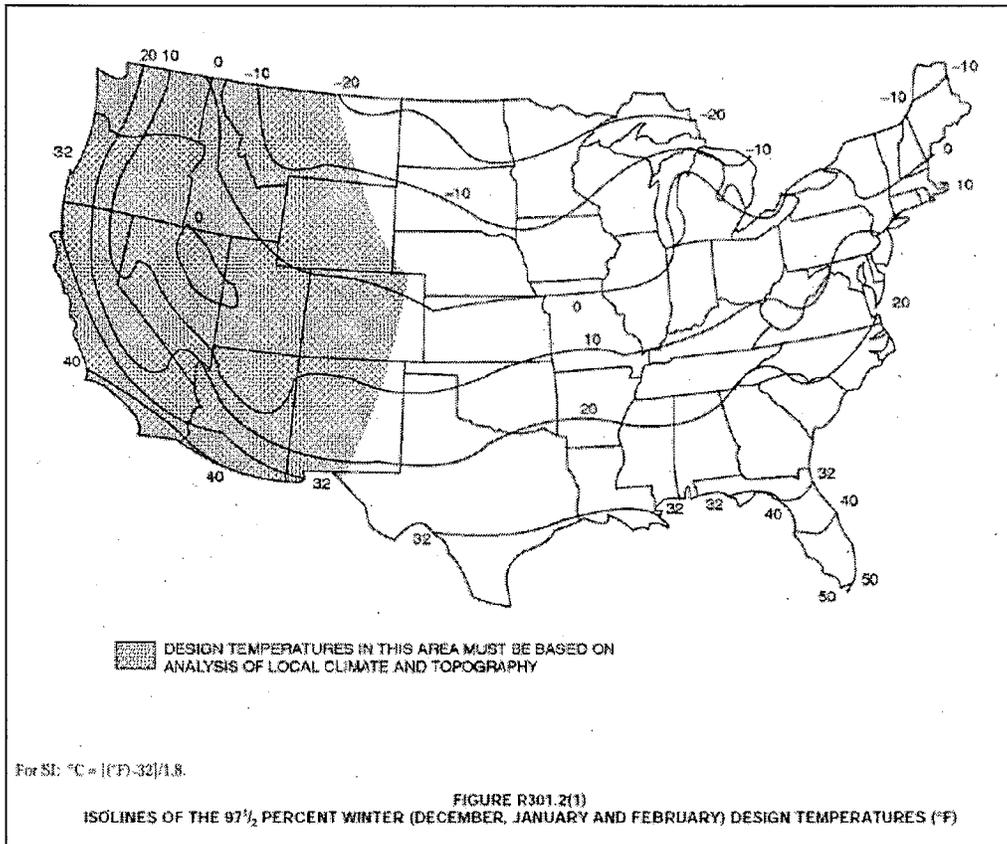
ZONE	EFFECTIVE WIND AREA (feet ²)	BASIC WIND SPEED (mph-3-second gust)																									
		85	90	100	105	110	120	125	130	140	145	150	170														
Roof > 0 to 10 degrees	1	10	10.0	-13.0	10.0	-14.6	10.0	-18.0	10.0	-19.8	10.0	-21.8	10.5	-25.0	11.4	-28.1	12.4	-30.4	14.3	-35.3	15.4	-37.8	16.5	-40.5	21.1	-52.0	
	1	20	10.0	-12.7	10.0	-14.2	10.0	-17.5	10.0	-19.3	10.0	-21.2	10.0	-25.2	10.7	-27.4	11.6	-29.6	13.4	-34.4	14.4	-36.9	15.4	-39.4	19.8	-50.7	
	1	50	10.0	-12.2	10.0	-13.7	10.0	-16.9	10.0	-18.7	10.0	-20.5	10.0	-24.4	10.0	-26.4	10.6	-28.6	12.3	-33.2	13.1	-35.6	14.1	-38.1	18.1	-48.9	
	1	100	10.0	-11.9	10.0	-13.3	10.0	-19.5	10.0	-18.2	10.0	-19.9	10.0	-23.7	10.0	-25.7	10.0	-27.8	11.4	-32.3	12.2	-34.6	13.0	-37.0	16.7	-47.6	
	2	10	10.0	-21.8	10.0	-24.4	10.0	-30.2	10.0	-33.3	10.0	-36.5	10.5	-43.5	11.4	-47.2	12.4	-51.0	14.3	-59.2	15.4	-63.5	16.5	-67.9	21.1	-87.2	
	2	20	10.0	-19.5	10.0	-21.8	10.0	-27.0	10.0	-29.7	10.0	-32.6	10.0	-38.8	10.7	-42.1	11.6	-45.6	13.4	-52.9	14.4	-56.7	15.4	-60.7	19.8	-78.0	
	2	50	10.0	-18.4	10.0	-18.4	10.0	-22.7	10.0	-25.1	10.0	-27.5	10.0	-32.7	10.0	-35.5	10.6	-38.4	12.3	-44.5	13.1	-47.3	14.1	-51.1	18.1	-65.7	
	2	100	10.0	-14.1	10.0	-15.8	10.0	-19.5	10.0	-21.5	10.0	-23.6	10.0	-28.1	10.0	-30.5	10.0	-33.0	11.4	-38.2	12.2	-41.0	13.0	-43.9	16.7	-56.4	
	3	10	10.0	-32.8	10.0	-36.8	10.0	-45.4	10.0	-50.1	10.0	-55.0	10.5	-65.4	11.4	-71.9	12.4	-76.8	14.3	-89.0	15.4	-95.5	16.5	-102.2	21.1	-131.3	
	3	20	10.0	-27.2	10.0	-30.5	10.0	-37.6	10.0	-41.5	10.0	-45.5	10.0	-54.2	10.7	-58.8	11.6	-63.6	13.4	-73.8	14.4	-79.1	15.4	-84.7	19.8	-108.7	
	3	50	10.0	-19.7	10.0	-22.1	10.0	-27.3	10.0	-30.1	10.0	-33.1	10.0	-39.3	10.0	-42.7	10.6	-46.2	12.3	-53.5	13.1	-57.4	14.1	-61.5	18.1	-78.9	
	3	100	10.0	-14.1	10.0	-15.8	10.0	-19.5	10.0	-21.5	10.0	-23.6	10.0	-28.1	10.0	-30.5	10.0	-33.0	11.4	-38.2	12.2	-41.0	13.0	-43.9	16.7	-56.4	
Roof > 10 to 30 degrees	1	10	10.0	-11.9	10.0	-13.3	10.4	-16.5	11.4	-18.2	12.5	-19.9	14.9	-23.7	16.2	-25.7	17.5	-27.8	20.3	-32.3	21.8	-34.6	23.3	-37.0	30.0	-47.6	
	1	20	10.0	-11.6	10.0	-13.0	10.0	-16.4	11.4	-17.5	11.4	-19.4	13.6	-23.0	14.8	-25.0	16.0	-27.0	18.5	-31.4	19.9	-31.7	21.3	-36.0	27.3	-46.3	
	1	50	10.0	-11.1	10.0	-12.5	10.0	-15.4	10.0	-17.0	10.0	-18.6	11.9	-22.2	12.9	-24.1	13.9	-26.0	16.1	-30.2	17.3	-32.4	18.5	-34.6	23.8	-44.5	
	1	100	10.0	-10.8	10.0	-12.1	10.0	-14.9	10.0	-16.5	10.0	-18.1	10.5	-21.5	11.4	-23.3	12.4	-25.2	14.3	-29.3	15.4	-31.4	16.5	-33.6	21.1	-43.2	
	2	10	10.0	-25.1	10.0	-28.2	10.4	-34.8	11.4	-38.3	12.5	-42.1	14.9	-50.1	16.2	-54.3	17.5	-58.7	20.3	-68.1	21.8	-73.1	23.3	-78.2	30.0	-100.5	
	2	20	10.0	-22.8	10.0	-25.6	10.0	-31.5	10.4	-34.8	11.4	-38.2	13.6	-45.4	14.8	-49.3	16.0	-53.3	18.5	-61.8	19.9	-66.3	21.3	-71.0	27.3	-91.2	
	2	50	10.0	-19.7	10.0	-22.1	10.0	-27.3	10.0	-30.1	10.0	-33.0	11.9	-39.3	12.9	-42.7	13.9	-46.1	16.1	-53.5	17.3	-57.4	18.5	-61.4	23.8	-78.9	
	2	100	10.0	-17.4	10.0	-19.5	10.0	-24.1	10.0	-26.6	10.0	-29.1	10.5	-34.7	11.4	-37.6	12.4	-40.7	14.3	-47.2	15.4	-50.6	16.5	-54.2	21.1	-69.6	
	3	10	11.9	-13.0	13.3	-14.6	16.5	-18.0	18.2	-19.8	19.5	-21.8	23.7	-25.9	25.7	-28.1	27.8	-30.4	32.3	-35.3	34.6	-37.8	37.0	-40.5	47.6	-52.0	
	3	20	11.6	-12.3	13.6	-13.8	16.0	-17.1	17.8	-18.8	19.4	-20.7	22.0	-23.0	24.6	25.0	-26.7	27.0	-28.9	31.4	-33.5	33.7	-35.9	36.0	-38.4	46.3	-49.3
	3	50	11.1	-11.5	12.5	-12.8	15.4	-15.9	17.0	-17.5	18.6	-19.2	22.2	-22.8	24.1	-24.8	26.0	-25.8	30.2	-31.1	32.4	-33.3	34.6	-35.7	44.5	-45.8	
	3	100	10.8	-10.8	12.1	-12.1	14.9	-14.9	16.5	-16.5	18.1	-18.1	21.5	-21.5	23.3	-23.3	25.2	-25.2	29.3	-29.3	31.4	-31.4	33.6	-33.6	43.2	-43.2	
Roof > 30 to 45 degrees	2	10	11.9	-15.2	13.3	-17.0	16.5	-21.0	18.2	-23.2	19.9	-25.3	23.7	-30.3	25.7	-32.9	27.8	-35.6	32.3	-41.2	34.6	-44.2	37.0	-47.3	47.6	-60.8	
	2	20	11.6	-14.5	13.0	-16.3	16.0	-20.1	17.6	-22.2	19.4	-24.3	23.0	-29.0	25.0	-31.4	27.0	-34.0	31.4	-39.4	33.7	-42.3	36.0	-45.3	46.3	-58.1	
	2	50	11.1	-13.7	12.5	-15.4	15.4	-18.9	17.0	-20.8	18.6	-22.9	22.2	-27.2	24.1	-29.5	26.0	-32.0	30.2	-37.1	32.4	-39.8	34.6	-42.5	44.5	-54.6	
	2	100	10.8	-13.0	12.1	-14.6	14.9	-18.0	16.5	-19.8	18.1	-21.8	21.5	-25.9	23.3	-28.1	25.2	-30.4	29.3	-35.3	31.4	-37.8	33.6	-40.5	43.2	-52.0	
	3	10	11.9	-15.2	13.3	-17.0	16.5	-21.0	18.2	-23.2	19.9	-25.3	23.7	-30.3	25.7	-32.9	27.8	-35.6	32.3	-41.2	34.6	-44.2	37.0	-47.3	47.6	-60.8	
	3	20	11.6	-14.5	13.0	-16.3	16.0	-20.1	17.6	-22.2	19.4	-24.3	23.0	-29.0	25.0	-31.4	27.0	-34.0	31.4	-39.4	33.7	-42.3	36.0	-45.3	46.3	-58.1	
	3	50	11.1	-13.7	12.5	-15.3	15.4	-18.9	17.0	-20.8	18.6	-22.9	22.2	-27.2	24.1	-29.5	26.0	-32.0	30.2	-37.1	32.4	-39.8	34.6	-42.5	44.5	-54.6	
	3	100	10.8	-13.0	12.1	-14.6	14.9	-18.0	16.5	-19.8	18.1	-21.8	21.5	-25.9	23.3	-28.1	25.2	-30.4	29.3	-35.3	31.4	-37.8	33.6	-40.5	43.2	-52.0	
	Wall	4	10	13.0	-14.1	14.6	-15.8	18.0	-19.5	19.8	-21.5	21.8	-23.6	25.9	-28.1	28.1	-30.5	30.4	-33.0	33.3	-38.2	37.8	-41.0	40.5	-43.9	52.0	-58.4
		4	20	12.4	-13.5	13.9	-15.1	17.2	-18.7	18.9	-20.6	20.8	-22.6	24.7	-26.9	26.8	-29.2	29.0	-31.6	33.7	-36.7	36.1	-39.3	38.7	-42.1	49.6	-54.1
		4	50	11.6	-12.7	13.0	-14.3	16.1	-17.6	17.8	-19.4	19.5	-21.3	23.2	-25.4	25.2	-27.5	27.2	-29.8	31.6	-34.6	33.9	-37.1	36.2	-39.7	46.6	-51.0
		4	100	11.1	-12.2	12.4	-13.6	15.3	-16.8	16.9	-18.5	18.5	-20.4	22.0	-24.2	23.9	-26.3	25.9	-28.4	30.0	-33.0	32.2	-35.4	34.4	-37.8	44.2	-48.6
5		10	13.0	-17.4	14.6	-19.5	18.0	-24.1	19.8	-26.6	21.8	-29.1	25.9	-34.7	28.1	-37.6	30.4	-40.7	35.3	-47.2	37.8	-50.6	40.5	-54.2	52.0	-69.6	
5		20	12.4	-16.2	13.9	-18.2	17.2	-22.5	18.9	-24.8	20.8	-27.2	24.7	-32.4	26.8	-35.1	29.0	-38.0	33.7	-44.0	36.1	-47.2	39.7	-50.5	49.6	-64.9	
5		50	11.6	-14.7	13.0	-16.5	16.1	-20.3	17.8	-22.4	19.5	-24.6	23.2	-29.3	25.2	-31.8	27.2	-34.3	31.6	-39.8	33.9	-42.7	36.2	-45.7	46.6	-58.7	
5		100	11.1	-13.5	12.4	-15.1	15.3	-18.7	16.9	-20.6	18.5	-22.6	22.0	-26.9	23.9	-29.2	23.9	-31.6	30.0	-36.7	32.2	-39.3	34.4	-42.1	44.2	-54.1	

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m², 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.
 a. The effective wind area shall be equal to the span length multiplied by an effective width. This width shall be permitted to be not be less than one-third the span length. For cladding fasteners, the effective wind area shall not be greater than the area that is tributary to an individual fastener.
 b. For effective areas between those given above, the load may be interpolated; otherwise, use the load associated with the lower effective area.
 c. Table values shall be adjusted for height and exposure by multiplying by the adjustment coefficient in Table R301.2(3).
 d. See Figure R301.2(7) for location of zones.
 e. Plus and minus signs signify pressures acting toward and away from the building surfaces.

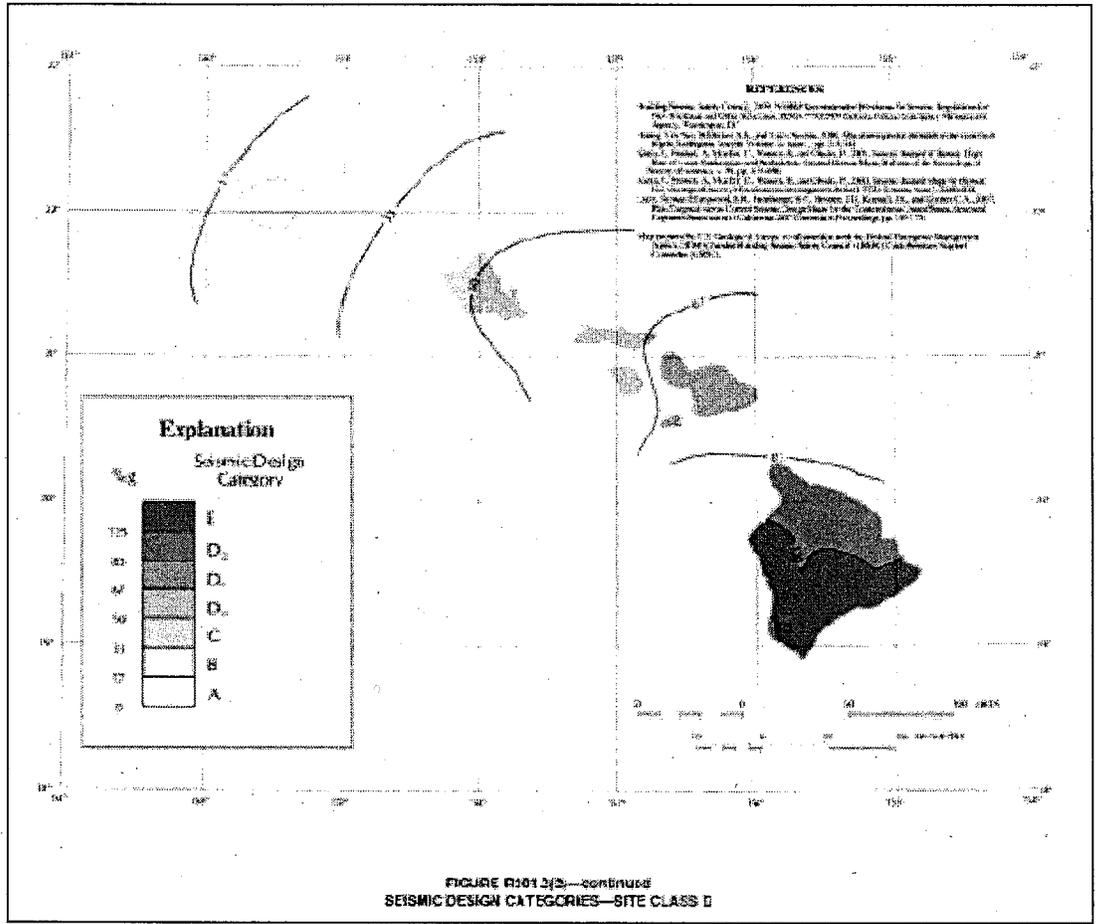
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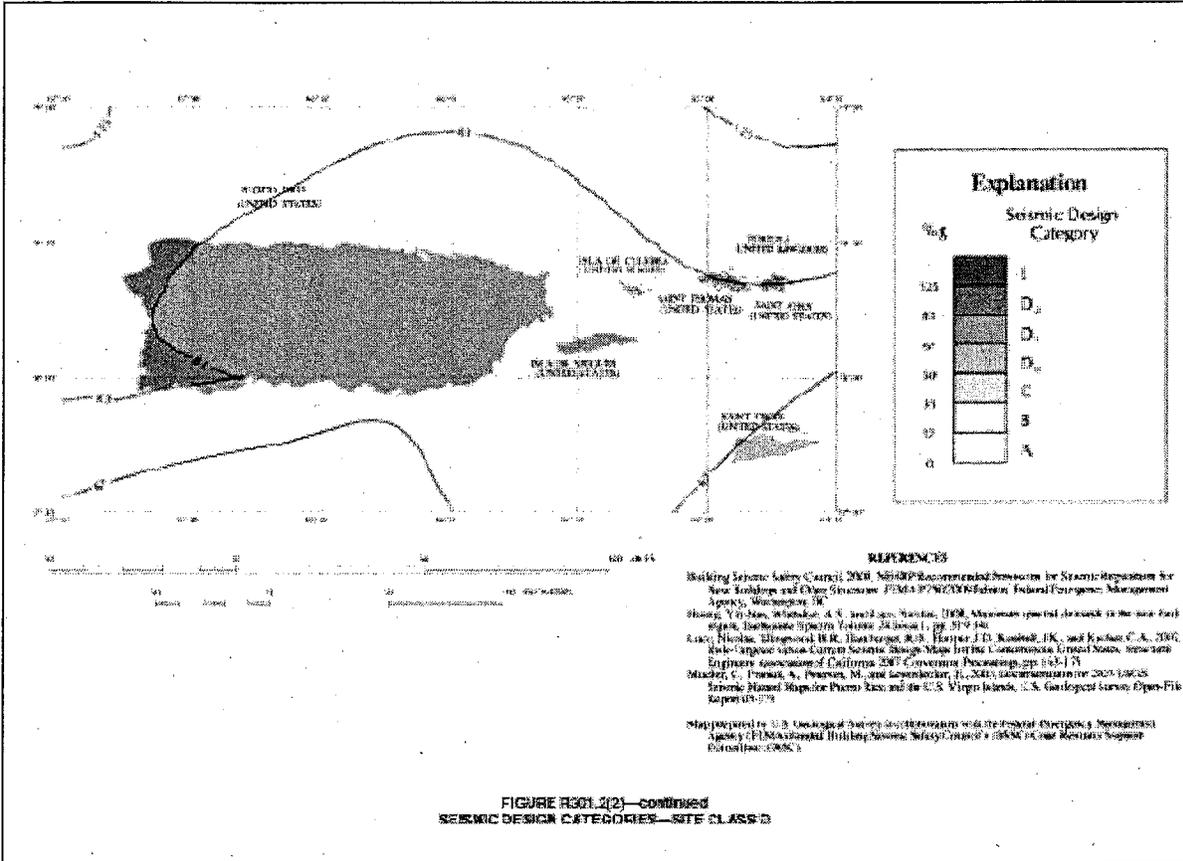
TABLE R301.2(3)
HEIGHT AND EXPOSURE ADJUSTMENT COEFFICIENTS FOR TABLE R301.2(2)

MEAN ROOF HEIGHT	EXPOSURE		
	B	C	D
15	1.00	1.21	1.47
20	1.00	1.29	1.55
25	1.00	1.35	1.61
30	1.00	1.40	1.66
35	1.05	1.45	1.70
40	1.09	1.49	1.74
45	1.12	1.53	1.78
50	1.16	1.56	1.81
55	1.19	1.59	1.84
60	1.22	1.62	1.87

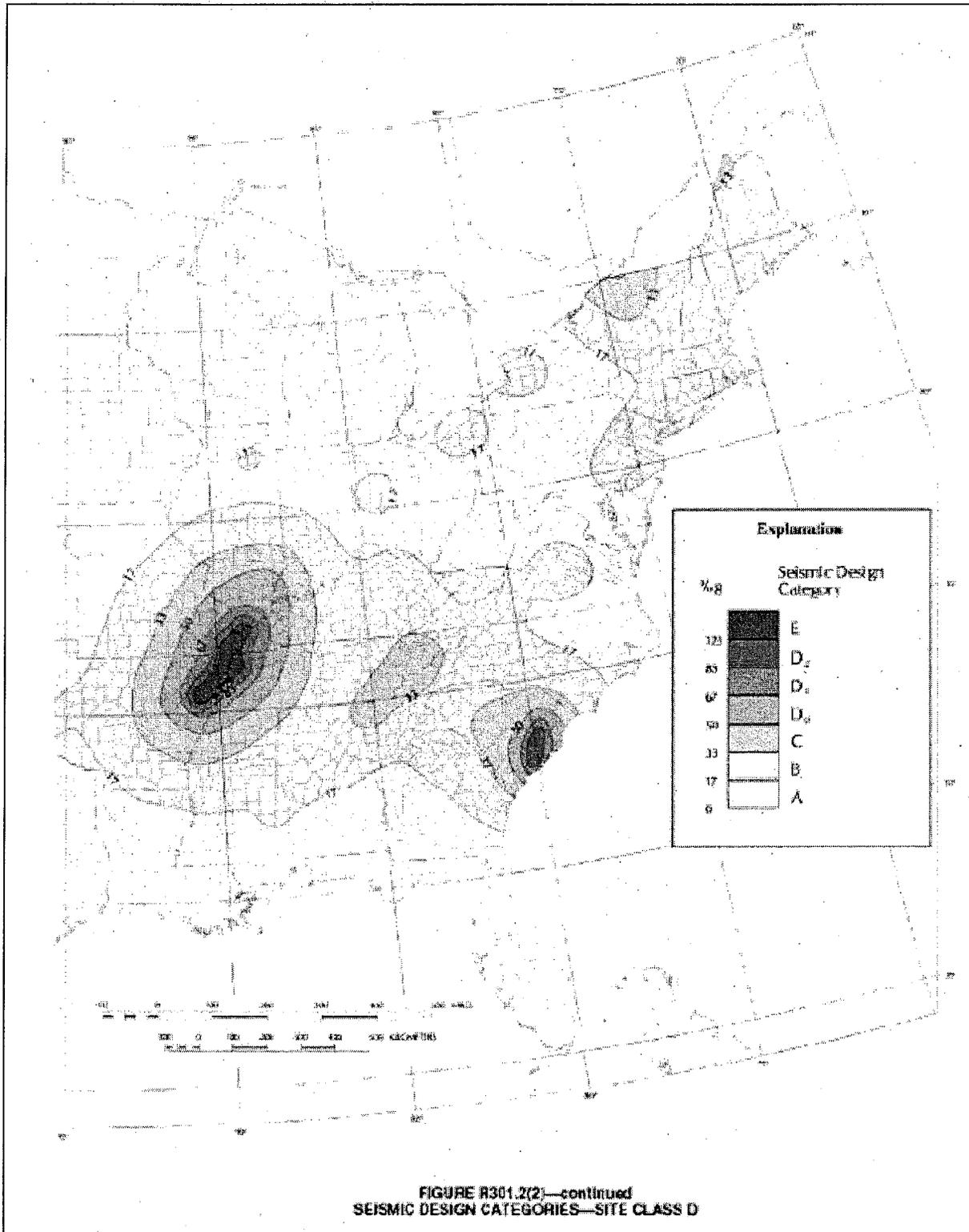


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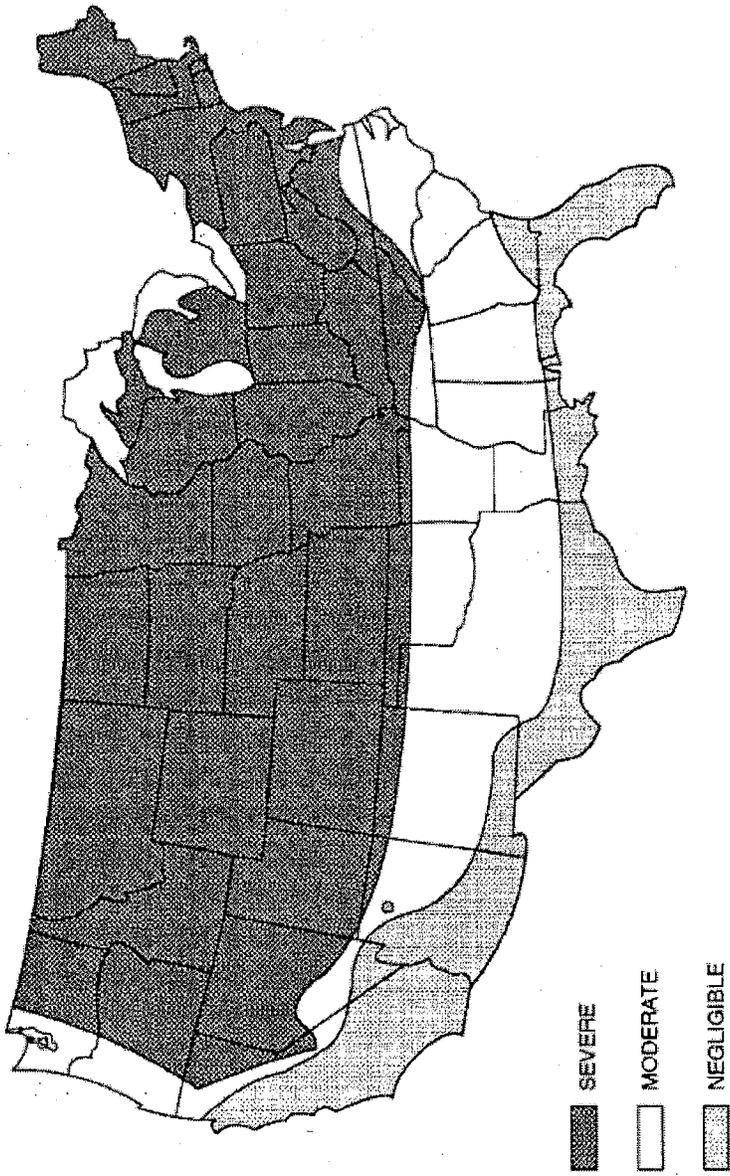




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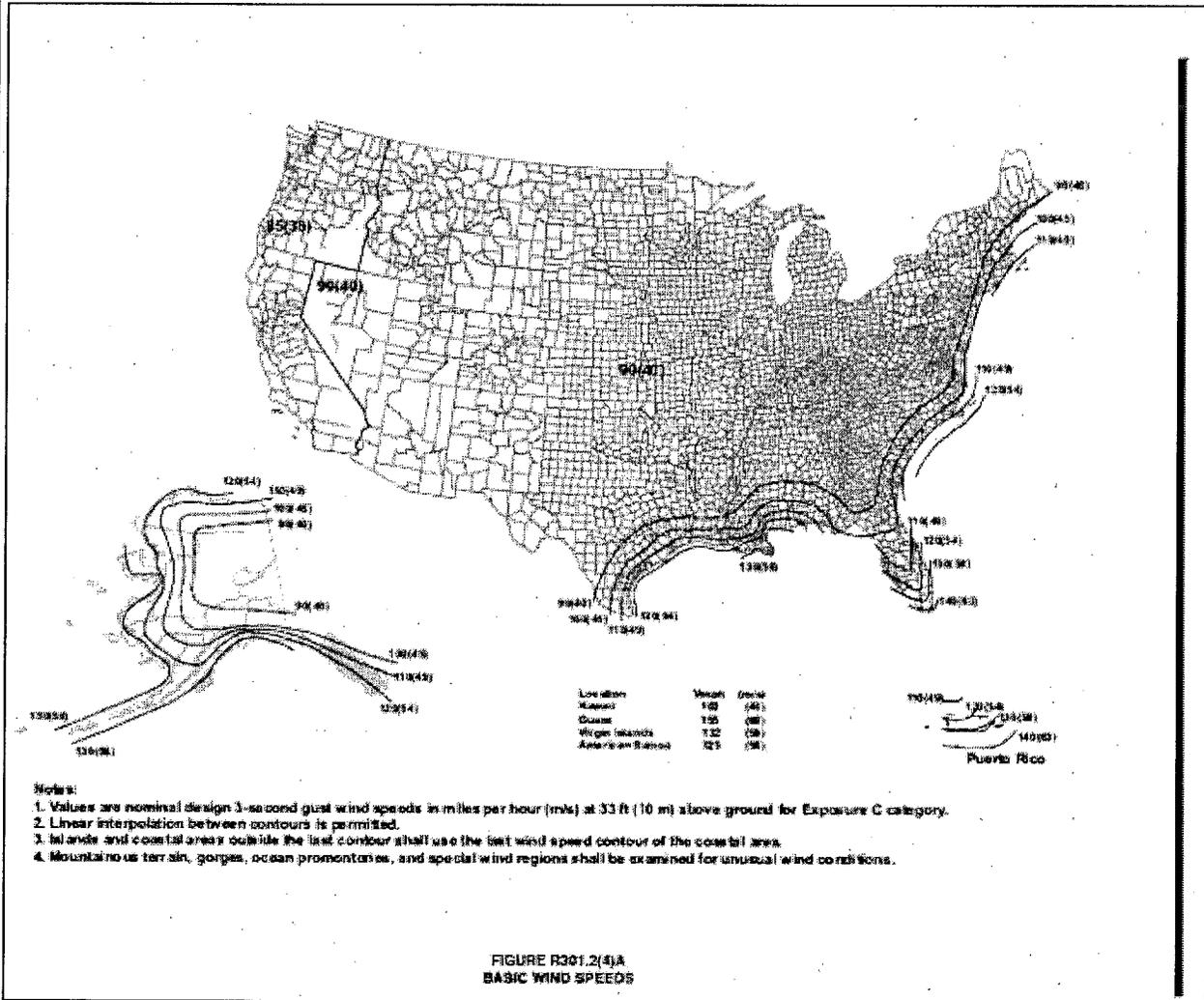


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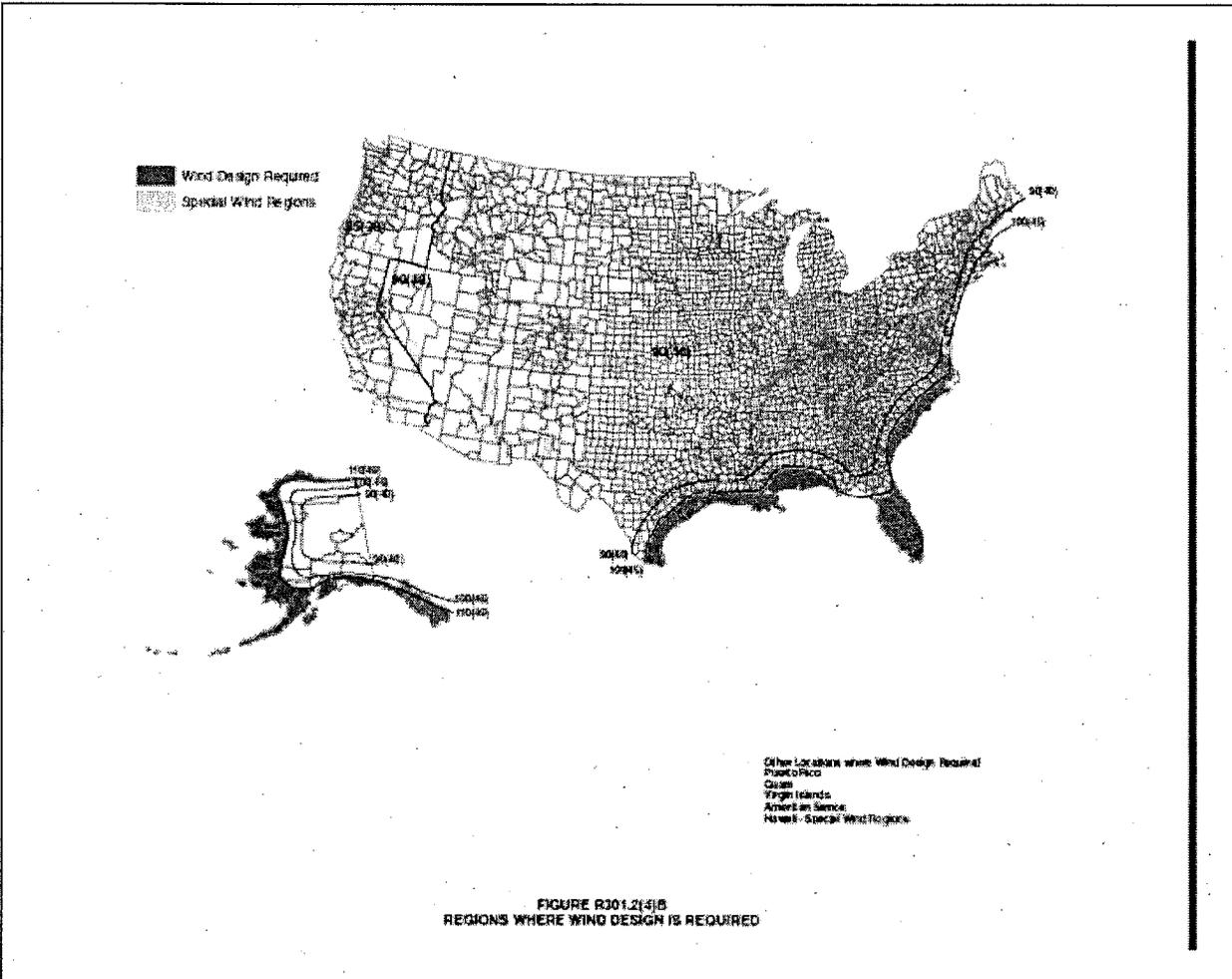


a. Alaska and Hawaii are classified as severe and negligible, respectively.
b. Lines defining areas are approximate only. Local conditions may be more or less severe than indicated by region classification. A severe classification is where weather conditions result in significant snowfall combined with extended periods during which there is little or no natural thawing causing deicing salts to be used extensively.

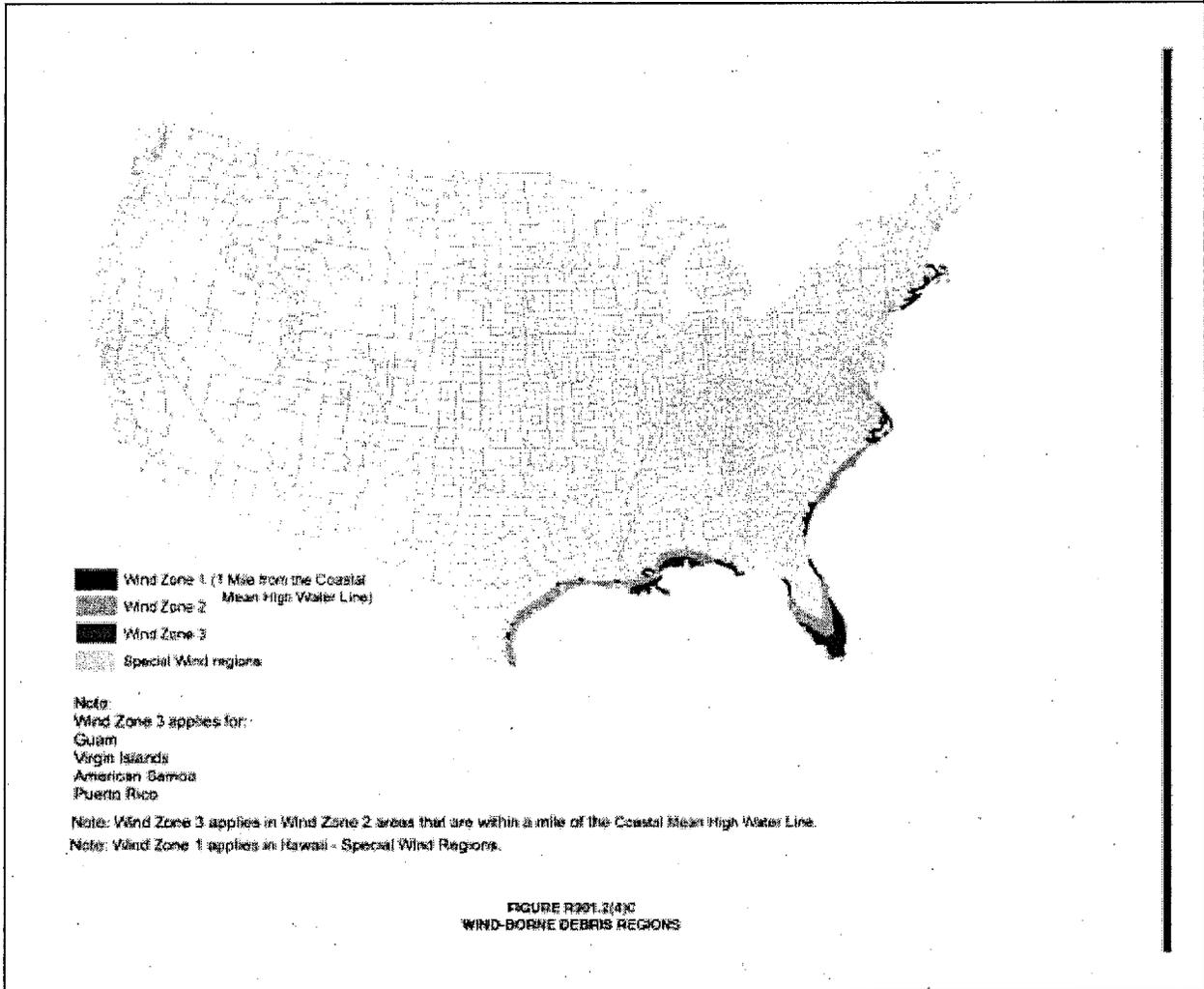
FIGURE R301.2(3)
WEATHERING PROBABILITY MAP FOR CONCRETE^{a, b}

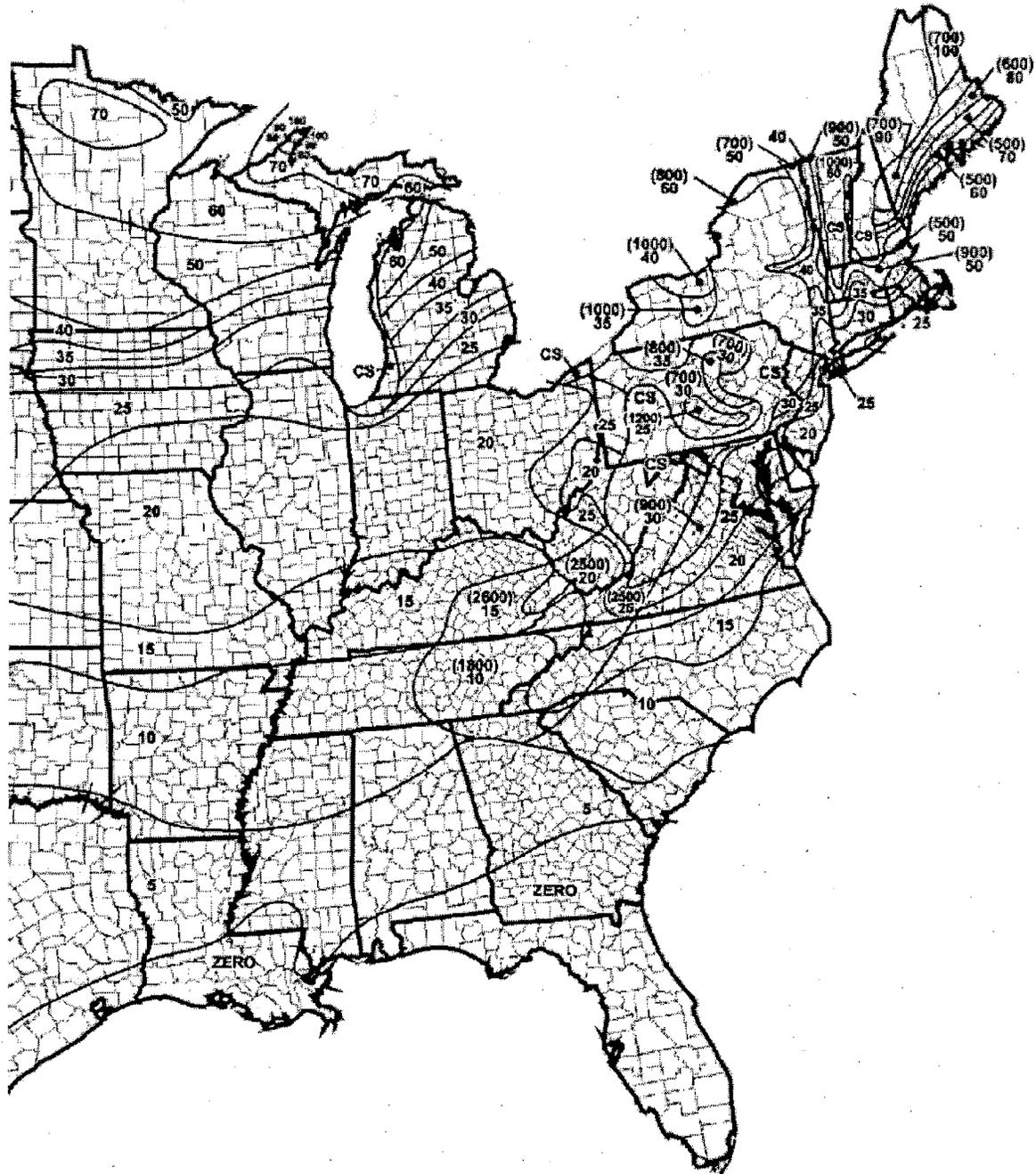


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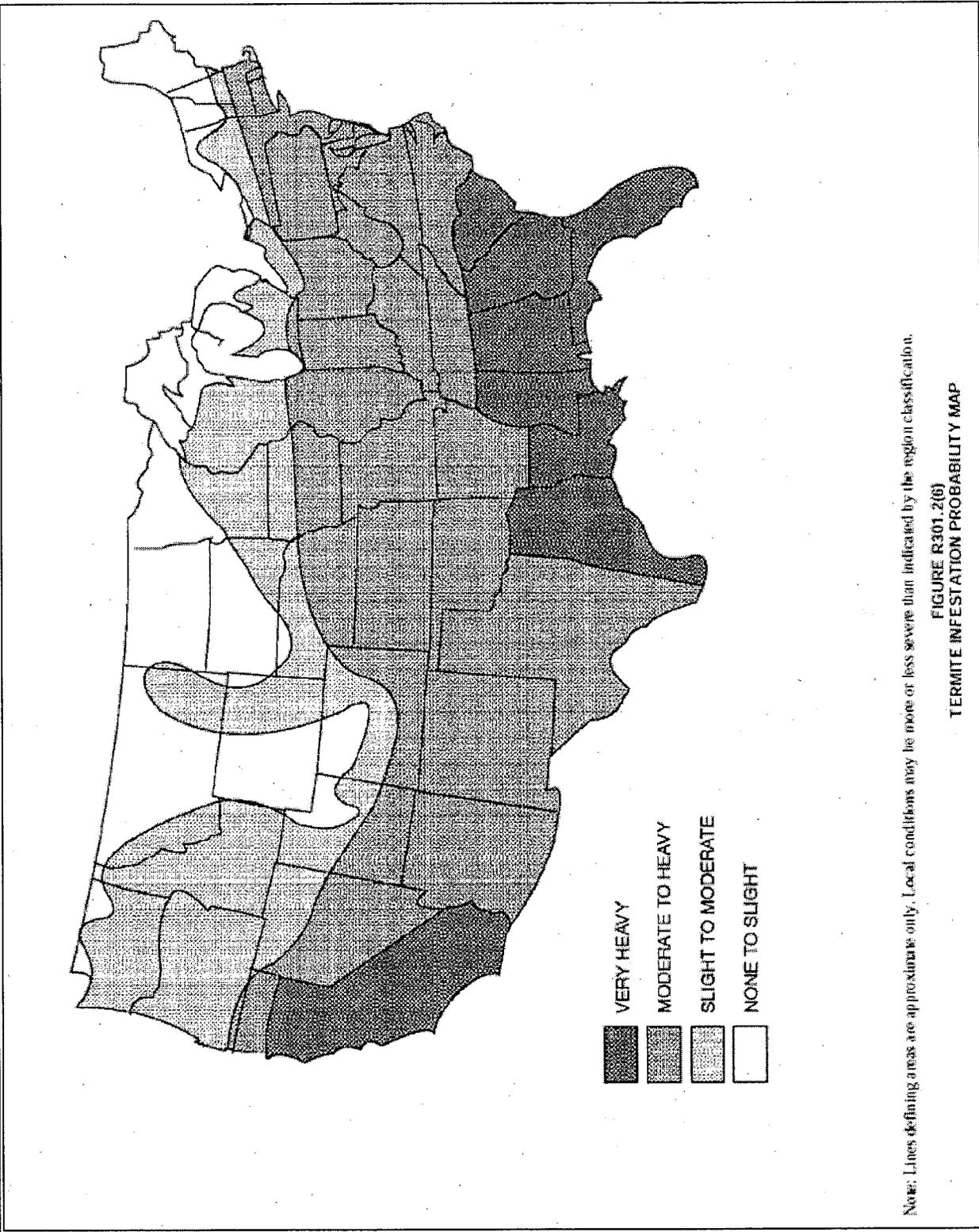




For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

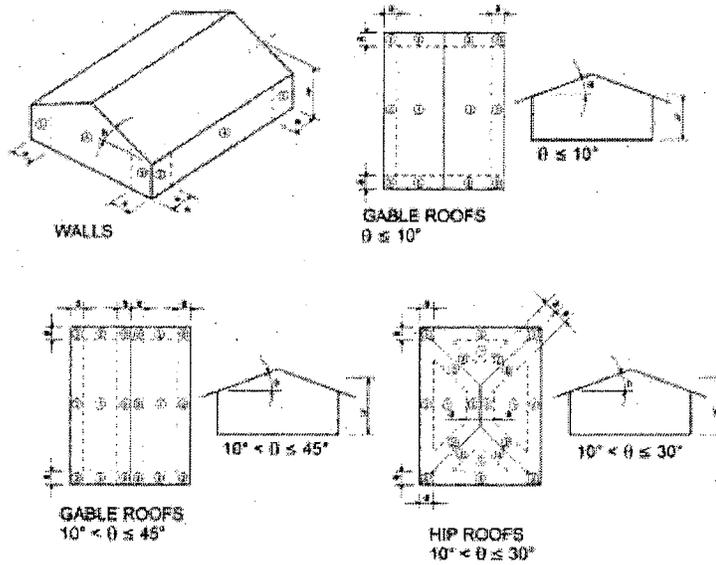
FIGURE R301.2(5)—continued
GROUND SNOW LOADS, P_g , FOR THE UNITED STATES (lb/ft²)

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Note: Lines defining areas are approximate only. Local conditions may be more or less severe than indicated by the region classification.

FIGURE R301.2(6)
TERMITE INFESTATION PROBABILITY MAP



For SI: 1 foot = 304.8 mm, 1 degree = 0.0175 rad.
 Note: a = 4 feet in all cases.

FIGURE R301.2(7)
 COMPONENT AND CLADDING PRESSURE ZONES

TABLE R301.2.1.2
 WINDBORNE DEBRIS PROTECTION FASTENING
 SCHEDULE FOR WOOD STRUCTURAL PANELS^{a, b, d}

FASTENER TYPE	FASTENER SPACING (inches) ^{c, e}		
	Panel span ≤ 4 feet	4 feet < panel span ≤ 6 feet	6 feet < panel span ≤ 8 feet
No. 8 wood screw based anchor with 2-inch embedment length	16	10	8
No. 10 wood screw based anchor with 2-inch embedment length	16	12	9
1/4-inch lag screw based anchor with 2-inch embedment length	16	16	16

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

- This table is based on 130 mph wind speeds and a 33-foot mean roof height.
- Fasteners shall be installed at opposing ends of the wood structural panel. Fasteners shall be located a minimum of 1 inch from the edge of the panel.
- Anchors shall penetrate through the exterior wall covering with an embedment length of 2 inches minimum into the building frame. Fasteners shall be located a minimum of 2 1/2 inches from the edge of concrete block or concrete.
- Where panels are attached to masonry or masonry/stucco, they shall be attached using vibration-resistant anchors having a minimum ultimate withdrawal capacity of 1500 pounds.

**TABLE R301.2.1.3
 EQUIVALENT BASIC WIND SPEEDS***

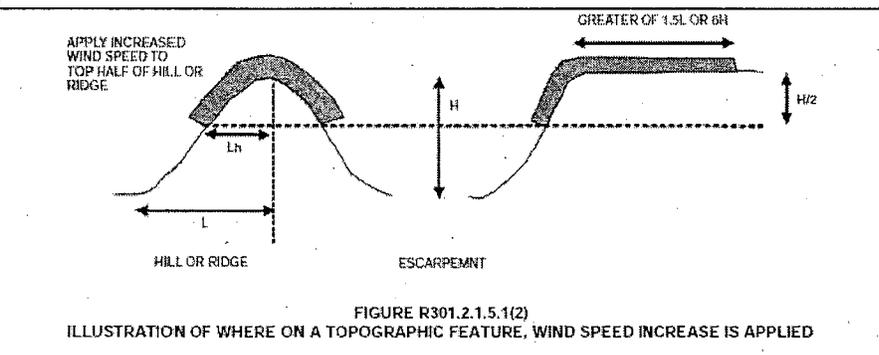
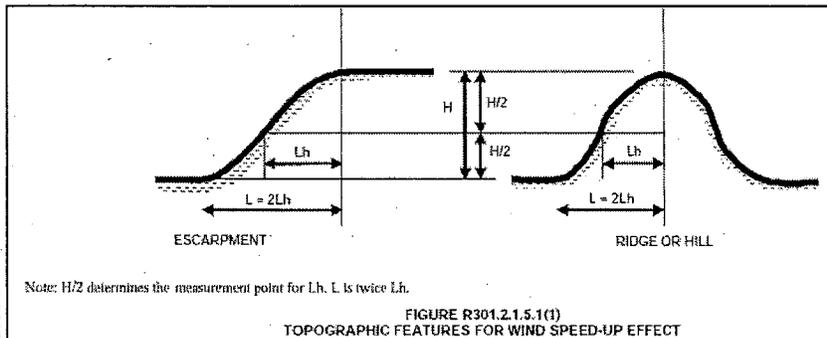
3-second gust, V_{3s}	85	90	100	105	110	120	125	130	140	145	150	160	170
Fastest mile, V_{FM}	71	76	85	90	95	104	109	114	123	128	133	142	152

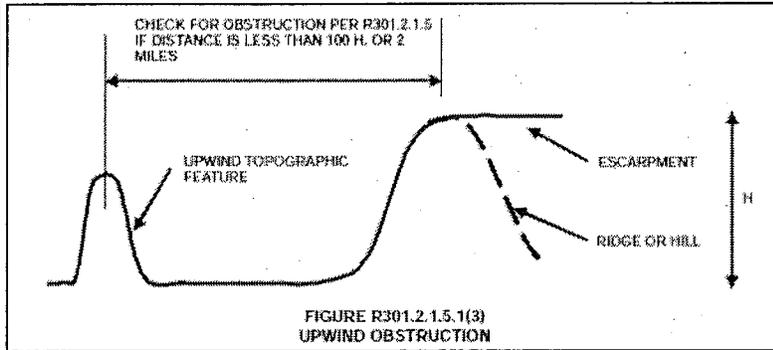
For SI: 1 mile per hour = 0.447 m/s.
 a. Linear interpolation is permitted.

**TABLE R301.2.1.5.1
 BASIC WIND MODIFICATION FOR TOPOGRAPHIC WIND EFFECT**

BASIC WIND SPEED FROM FIGURE R301.2(4) (mph)	AVERAGE SLOPE OF THE TOP HALF OF HILL, RIDGE OR ESCARPMENT (percent)						
	0.10	0.125	0.15	0.175	0.20	0.23	0.25 or greater
	Required basic wind speed-up, modified for topographic wind speed up (mph)						
85	100	100	100	110	110	110	120
90	100	100	110	110	120	120	120
100	110	120	120	130	130	130	140
110	120	130	130	140	140	150	150
120	140	140	150	150	N/A	N/A	N/A
130	150	N/A	N/A	N/A	N/A	N/A	N/A

For SI: 1 mile per hour = 0.447 m/s.





**TABLE R301.2.2.1.1
SEISMIC DESIGN CATEGORY DETERMINATION**

CALCULATED S_{DS}	SEISMIC DESIGN CATEGORY
$S_{DS} \leq 0.17g$	A
$0.17g < S_{DS} \leq 0.33g$	B
$0.33g < S_{DS} \leq 0.50g$	C
$0.50g < S_{DS} \leq 0.67g$	D_0
$0.67g < S_{DS} \leq 0.83g$	D_1
$0.83g < S_{DS} \leq 1.25g$	D_2
$1.25g < S_{DS}$	E

**TABLE R301.2.2.2.1
WALL BRACING ADJUSTMENT FACTORS BY
ROOF COVERING DEAD LOAD***

WALL SUPPORTING	ROOF/CEILING DEAD LOAD	
	15 psf or less	25 psf
Roof only	1.0	1.2
Roof plus one or two stories	1.0	1.1

For SI: 1 pound per square foot = 0.0479 kPa.
 a. Linear interpolation shall be permitted.

TABLE R301.6
MINIMUM ROOF LIVE LOADS IN POUNDS-FORCE PER SQUARE FOOT OF HORIZONTAL PROJECTION

ROOF SLOPE	TRIBUTARY LOADED AREA IN SQUARE FEET FOR ANY STRUCTURAL MEMBER		
	0 to 200	201 to 600	Over 600
Flat or rise less than 4 inches per foot (1:3)	20	16	12
Rise 4 inches per foot (1:3) to less than 12 inches per foot (1:1)	16	14	12
Rise 12 inches per foot (1:1) and greater	12	12	12

For SI: 1 square foot = 0.0929 m², 1 pound per square foot = 0.0479 kPa,
 1 inch per foot = 83.3 mm/m.

R301.2.1.3 Wind speed conversion. When referenced documents are based on fastest mile wind speeds, the three-second gust basic wind speeds, V_{3s} , of Figure R301.2(4) shall be converted to fastest mile wind speeds, V_{fm} , using Table R301.2.1.3.

R301.2.1.4 Exposure category. For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. For a site located in the transition zone between categories, the category resulting in the largest wind forces shall apply. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features. For a site where multiple detached one- and two-family dwellings, *townhouses* or other structures are to be constructed as part of a subdivision, master-planned community, or otherwise designated as a developed area by the authority having jurisdiction, the exposure category for an individual structure shall be based upon the site conditions that will exist at the time when all adjacent structures on the site have been constructed, provided their construction is expected to begin within one year of the start of construction for the structure for which the exposure category is determined. For any

1 given wind direction, the exposure in which a specific building or other structure is sited
2 shall be assessed as being one of the following categories:

3 1. Exposure A. Large city centers with at least 50 percent of the buildings having a height
4 in excess of 70 feet (21 336 mm). Use of this exposure category shall be limited to
5 those areas for which terrain representative of Exposure A prevails in the upwind
6 direction for a distance of at least 0.5 mile (0.8 km) or 10 times the height of the
7 building or other structure, whichever is greater. Possible channeling effects or
8 increased velocity pressures due to the building or structure being located in the wake
9 of adjacent buildings shall be taken into account.

10 2. Exposure B. Urban and suburban areas, wooded areas, or other terrain with numerous
11 closely spaced obstructions having the size of single-family dwellings or larger.
12 Exposure B shall be assumed unless the site meets the definition of another type
13 exposure.

14 3. Exposure C. Open terrain with scattered obstructions, including surface undulations or
15 other irregularities, having heights generally less than 30 feet (9144 mm) extending
16 more than 1,500 feet (457 m) from the building site in any quadrant. This exposure
17 shall also apply to any building located within Exposure B type terrain where the
18 building is directly adjacent to open areas of Exposure C type terrain in any quadrant
19 for a distance of more than 600 feet (183 m). This category includes flat, open country
20 and grasslands.

21 4. Exposure D. Flat, unobstructed areas exposed to wind flowing over open water for a
22 distance of at least 1 mile (1.61 km). Shorelines in Exposure D include inland
23 waterways, the Great Lakes, and coastal areas of California, Oregon, Washington and
24 Alaska. This exposure shall apply only to those buildings and other structures exposed
25 to the wind coming from over the water. Exposure D extends inland from the shoreline
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1 a distance of 1500 feet (457 m) or 10 times the height of the building or structure,
2 whichever is greater.

3 **R301.2.1.5 Topographic wind effects.** In areas designated in Table R301.2(1) as having
4 local historical data documenting structural damage to buildings caused by wind speed-
5 up at isolated hills, ridges and escarpments that are abrupt changes from the general
6 topography of the area, topographic wind effects shall be considered in the design of the
7 building in accordance with Section R301.2.1.5.1 or in accordance with the provisions of
8 ASCE 7. See Figure R301.2.1.5.1(1) for topographic features for wind speed-up effect.

9 In these designated areas, topographic wind effects shall apply only to buildings sited
10 on the top half of an isolated hill, ridge or escarpment where all of the following
11 conditions exist:

- 12 1. The average slope of the top half of the hill, ridge or escarpment is 10 percent or
13 greater.
- 14 2. The hill, ridge or escarpment is 60 feet (18 288 mm) or greater in height for Exposure
15 B, 30 feet (9144 mm) or greater in height for Exposure C, and 15 feet (4572 mm) or
16 greater in height for Exposure D.
- 17 3. The hill, ridge or escarpment is isolated or unobstructed by other topographic features
18 of similar height in the upwind direction for a distance measured from its high point of
19 100 times its height or 2 miles, whichever is less. See Figure R301.2.1.5.1(3) for
20 upwind obstruction.
- 21 4. The hill, ridge or escarpment protrudes by a factor of two or more above the height of
22 other upwind topographic features located in any quadrant within a radius of 2 miles
23 measured from its high point.

24 **R301.2.1.5.1 Simplified topographic wind speedup method.** As an alternative to
25 the ASCE 7 topographic wind provisions, the provisions of Section R301.2.1.5.1 shall

1 be permitted to be used to design for wind speed-up effects, where required by
2 Section R301.2.1.5.

3 Structures located on the top half of isolated hills, ridges or escarpments meeting
4 the conditions of Section R301.2.1.5 shall be designed for an increased basic wind
5 speed as determined by Table R301.2.1.5.1. On the high side of an escarpment, the
6 increased basic wind speed shall extend horizontally downwind from the edge of the
7 escarpment 1.5 times the horizontal length of the upwind slope (1.5L) or 6 times the
8 height of the escarpment (6H), whichever is greater. See Figure R301.2.1.5.1(2) for
9 where wind speed increase is applied.

10 **R301.2.2 Seismic provisions.** The seismic provisions of this code shall apply as follows:

- 11 1. Townhouses in Seismic Design Categories C, D₀, D₁ and D₂.
12 2. Detached one- and two-family dwellings in Seismic Design Categories, D₀, D₁ and D₂.

13 **R301.2.2.1 Determination of seismic design category.** Buildings shall be assigned a
14 seismic design category in accordance with Figure R301.2(2).

15 **R301.2.2.1.1 Alternate determination of seismic design category.** The seismic
16 design categories and corresponding short period design spectral response
17 accelerations, S_{DS} shown in Figure R301.2(2) are based on soil Site Class D, as
18 defined in Section 1613.3.2 of the *International Building Code*. If soil conditions are
19 other than Site Class D, the short period design spectral response accelerations, S_{DS} ,
20 for a site can be determined according to Section 1613.3 of the *International Building*
21 *Code*. The value of S_{DS} determined according to Section 1613.5 of the *International*
22 *Building Code* is permitted to be used to set the seismic design category according to
23 Table R301.2.2.1.1, and to interpolate between values in Tables R602.10.1.3(3),
24 R603.9.2(1) and other seismic design requirements of this code.
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1 **R301.2.2.1.2 Alternative determination of Seismic Design Category E.** Buildings
2 located in Seismic Design Category E in accordance with Figure R301.2(2) are
3 permitted to be reclassified as being in Seismic Design Category D₂ provided one of
4 the following is done:

5 1. A more detailed evaluation of the seismic design category is made in accordance
6 with the provisions and maps of the *International Building Code*. Buildings located
7 in Seismic Design Category E per Table R301.2.2.1.1, but located in Seismic
8 Design Category D per the *International Building Code*, may be designed using the
9 Seismic Design Category D₂ requirements of this code.

10 2. Buildings located in Seismic Design Category E that conform to the following
11 additional restrictions are permitted to be constructed in accordance with the
12 provisions for Seismic Design Category D₂ of this code:

13 2.1. All exterior shear wall lines or *braced wall panels* are in one plane vertically
14 from the foundation to the uppermost story.

15 2.2. Floors shall not cantilever past the exterior walls.

16 2.3. The building is within all of the requirements of Section R301.2.2.2.5 for being
17 considered as regular.

18 **R301.2.2.2 Seismic Design Category C.** Structures assigned to Seismic Design Category
19 C shall conform to the requirements of this section.

20 **R301.2.2.2.1 Weights of materials.** Average dead loads shall not exceed 15 pounds
21 per square foot (720 Pa) for the combined roof and ceiling assemblies (on a horizontal
22 projection). or 10 pounds per square foot (480 Pa) for floor assemblies, except as
23 further limited by Section R301.2.2. Dead loads for walls above *grade* shall not
24 exceed:

25 1. Fifteen pounds per square foot (720 Pa) for exterior light-frame wood walls.
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2. Fourteen pounds per square foot (670 Pa) for exterior light-frame cold-formed steel walls.
3. Ten pounds per square foot (480 Pa) for interior light-frame wood walls.
4. Five pounds per square foot (240 Pa) for interior light-frame cold-formed steel walls.
5. Eighty pounds per square foot (3830 Pa) for 8-inch-thick (203 mm) masonry walls.
6. Eighty-five pounds per square foot (4070 Pa) for 6-inch-thick (152 mm) concrete walls.
7. Ten pounds per square foot (480 Pa) for SIP walls.

Exceptions:

1. Roof and ceiling dead loads not exceeding 25 pounds per square foot (1190 Pa) shall be permitted provided the wall bracing amounts in Chapter 6 are increased in accordance with Table R301.2.2.2.1.
2. Light-frame walls with stone or masonry veneer shall be permitted in accordance with the provisions of Sections R702.1 and R703.
3. Fireplaces and chimneys shall be permitted in accordance with Chapter 10.

WALL SUPPORTING	ROOF/CEILING DEAD LOAD	
	15 psf or less	25 psf
Roof only	1.0	1.2
Roof plus one or two stories	1.0	1.1

For SI: 1 pound per square foot = 0.0479 kPa.
a. Linear interpolation shall be permitted.

R301.2.2.2.2 Stone and masonry veneer. Anchored stone and masonry veneer shall comply with the requirements of Sections R702.1 and R703.

1 **R301.2.2.2.3 Masonry construction.** Masonry construction shall comply with the
2 requirements of Section R606.12.

3 **R301.2.2.2.4 Concrete construction.** Detached one- and two-family *dwelling*s with
4 exterior above-*grade* concrete walls shall comply with the requirements of Section
5 R611, PCA 100 or shall be designed in accordance with ACI 318. *Townhouses* with
6 above-*grade* exterior concrete walls shall comply with the requirements of PCA 100
7 or shall be designed in accordance with ACI 318.

8 **R301.2.2.2.5 Irregular buildings.** The seismic provisions of this code shall not be
9 used for irregular structures located in Seismic Design Categories C, D₀, D₁ and D₂.
10 Irregular portions of structures shall be designed in accordance with accepted
11 engineering practice to the extent the irregular features affect the performance of the
12 remaining structural system. When the forces associated with the irregularity are
13 resisted by a structural system designed in accordance with accepted engineering
14 practice, design of the remainder of the building shall be permitted using the
15 provisions of this code. A building or portion of a building shall be considered to be
16 irregular when one or more of the following conditions occur:

17 1. When exterior shear wall lines or *braced wall panels* are not in one plane vertically
18 from the foundation to the uppermost *story* in which they are required.

19 **Exception:** For wood light-frame construction, floors with cantilevers or setbacks
20 not exceeding four times the nominal depth of the wood floor joists are permitted to
21 support *braced wall panels* that are out of plane with *braced wall panels* below
22 provided that:

- 23 1. Floor joists are nominal 2 inches by 10 inches (51 mm by 254 mm) or larger
24 and spaced not more than 16 inches (406 mm) on center.
25 2. The ratio of the back span to the cantilever is at least 2 to 1.
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1 3. Floor joists at ends of *braced wall panels* are doubled.

2 4. For wood-frame construction, a continuous rim joist is connected to ends of all
3 cantilever joists. When spliced, the rim joists shall be spliced using a galvanized
4 metal tie not less than 0.058 inch (1.5 mm) (16 gage) and 1-1/2 inches (38 mm)
5 wide fastened with six 16d nails on each side of the splice or a block of the
6 same size as the rim joist of sufficient length to fit securely between the joist
7 space at which the splice occurs fastened with eight 16d nails on each side of
8 the splice; and

9 5. Gravity loads carried at the end of cantilevered joists are limited to uniform
10 wall and roof loads and the reactions from headers having a span of 8 feet (2438
11 mm) or less.

12 2. When a section of floor or roof is not laterally supported by shear walls or braced
13 wall lines on all edges.

14 **Exception:** Portions of floors that do not support shear walls or *braced wall panels*
15 above, or roofs, shall be permitted to extend no more than 6 feet (1829 mm) beyond
16 a shear wall or *braced wall line*.

17 3. When the end of a braced wall panel occurs over an opening in the wall below and
18 ends at a horizontal distance greater than 1 foot (305 mm) from the edge of the
19 opening. This provision is applicable to shear walls and braced wall panels offset in
20 plane and to braced wall panels offset out of plane as permitted by the exception to
21 Item 1 above.

22 **Exception:** For wood light-frame wall construction, one end of a *braced wall panel*
23 shall be permitted to extend more than 1 foot (305 mm) over an opening not more
24 than 8 feet (2438 mm) wide in the wall below provided that the opening includes a
25 header in accordance with the following:

1. The building width, loading condition and framing member species limitations of Table R502.5(1) shall apply; and
2. Not less than one 2×12 or two 2×10 for an opening not more than 4 feet (1219 mm) wide; or
3. Not less than two 2×12 or three 2×10 for an opening not more than 6 feet (1829 mm) wide; or
4. Not less than three 2×12 or four 2×10 for an opening not more than 8 feet (2438 mm) wide; and
5. The entire length of the *braced wall panel* does not occur over an opening in the wall below.

4. When an opening in a floor or roof exceeds the lesser of 12 feet (3658 mm) or 50 percent of the least floor or roof dimension.
5. When portions of a floor level are vertically offset.

Exceptions:

1. Framing supported directly by continuous foundations at the perimeter of the building.
2. For wood light-frame construction, floors shall be permitted to be vertically offset when the floor framing is lapped or tied together as required by Section R502.6.1.
6. When shear walls and braced wall lines do not occur in two perpendicular directions.
7. When stories above grade plane partially or completely braced by wood wall framing in accordance with Section R602 or steel wall framing in accordance with Section R603 include masonry or concrete construction. When this irregularity

1 applies, the entire story shall be designed in accordance with accepted engineering
2 practice.

3 **Exception:** Fireplaces, chimneys and masonry veneer as permitted by this code.

4 **R301.2.2.3 Seismic Design Categories D₀, D₁ and D₂.** Structures assigned to Seismic
5 Design Categories D₀, D₁ and D₂ shall conform to the requirements for Seismic Design
6 Category C and the additional requirements of this section.

7 **[W] R301.2.2.3.1 Height limitations.** Wood-framed buildings shall be limited to
8 three *stories above grade plane* or the limits given in Table R602.10.3(3). Cold-
9 formed, steel-framed buildings shall be limited to less than or equal to three *stories*
10 *above grade plane* in accordance with AISI S230. *Mezzanines* as defined in Section
11 R202 that comply with Section R328 shall not be considered as *stories*. Structural
12 insulated panel buildings shall be limited to two *stories above grade plane*.

13 **R301.2.2.3.2 Stone and masonry veneer.** Anchored stone and masonry veneer shall
14 comply with the requirements of Sections R702.1 and R703.

15 **R301.2.2.3.3 Masonry construction.** Masonry construction in Seismic Design
16 Categories D₀ and D₁ shall comply with the requirements of Section R606.12.1.
17 Masonry construction in Seismic Design Category D₂ shall comply with the
18 requirements of Section R606.12.4.

19 **R301.2.2.3.4 Concrete construction.** Buildings with exterior above-*grade* concrete
20 walls shall comply with PCA 100 or shall be designed in accordance with ACI 318.

21 **R301.2.2.3.5 Cold-formed steel framing in Seismic Design Categories D₀, D₁ and**
22 **D₂.** In Seismic Design Categories D₀, D₁ and D₂ in addition to the requirements of
23 this code, cold-formed steel framing shall comply with the requirements of AISI
24 S230.

R301.6 Roof load. The roof shall be designed for the live load indicated in Table R301.6 or the snow load indicated in Table R301.2(1), whichever is greater.

TABLE R301.6
MINIMUM ROOF LIVE LOADS IN POUNDS-FORCE PER SQUARE FOOT OF HORIZONTAL PROJECTION

ROOF SLOPE	TRIBUTARY LOADED AREA IN SQUARE FEET FOR ANY STRUCTURAL MEMBER		
	0 to 200	201 to 600	Over 600
Flat or rise less than 4 inches per foot (1:3)	20	16	12
Rise 4 inches per foot (1:3) to less than 12 inches per foot (1:1)	16	14	12
Rise 12 inches per foot (1:1) and greater	12	12	12

For SI: 1 square foot = 0.0929 m², 1 pound per square foot = 0.0479 kPa.
 1 inch per foot = 83.3 mm/m.

SECTION R302

FIRE-RESISTANT CONSTRUCTION

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls of dwellings* and accessory buildings shall comply with Table R302.1(1); or *dwellings* equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls of *dwellings* and *accessory structures* located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits by Section R105.2 are not required to provide ((wall)) protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).

5. Foundation vents installed in compliance with this code are permitted.

Interpretation I302.1: For purposes of Section R302.1, gutters 6 inches (152 mm) or less in width that are not an integral part of the structure are not considered projections.

**[W] TABLE R302.1(1)
 EXTERIOR WALLS**

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	< 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Projections	Fire-resistance rated	1 hour on the underside ^{a, b}	≥ 2 feet to < 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area per story	0 hours	3 feet
	Unlimited	0 hours	5 feet

Penetrations	All	Comply with Section R302.4	< 5 feet
		None required	5 feet

For SI: 1 foot = 304.8 mm.
 N/A = Not Applicable.

- a. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fireblocking is provided from the wall top plate to the underside of the roof sheathing.
- b. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided no gable vent openings are installed.

[W] TABLE R302.1(2)
EXTERIOR WALLS—DWELLINGS WITH FIRE SPRINKLERS

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from ((the outside)) <u>both sides</u>	0 feet
	Not fire-resistance rated	0 hours	3 feet ^a
Projections	Fire-resistance rated	1 hour on the underside ^{b, c}	2 feet ^a
	Not fire-resistance rated	0 hours	3 feet
Openings in walls	Not allowed	N/A	< 3 feet
	Unlimited	0 hours	3 feet ^a
Penetrations	All	Comply with Section R302.4	< 3 feet
		None required	3 feet ^a

For IS: 1 foot = 304.8 mm.
 N/A = Not Applicable

1 a For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system
2 installed in accordance with P2904, the fire separation distance for nonrated exterior walls and rated projections
3 shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted,
4 where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the
5 property line.

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

8 c Roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided
9 no gable vent openings are installed.

10 **R302.2 Townhouses.** Each *townhouse* shall be considered a separate building and shall be
11 separated by fire-resistance-rated wall assemblies meeting the requirements of Section R302.1
12 for exterior walls.

13 **Exception:** A common 1-hour fire-resistance-rated wall assembly tested in accordance with
14 ASTM E 119 or UL 263 is permitted for townhouses if such walls do not contain plumbing
15 or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be
16 rated for fire exposure from both sides and shall extend to and be tight against exterior walls
17 and the underside of the roof sheathing. Electrical installations shall be installed in
18 accordance with the Seattle Electrical Code ((Chapters 34 through 43)). Penetrations of
19 electrical outlet boxes shall be in accordance with Section R302.4.

20 **[W] R302.2.1 Continuity.** The fire-resistance-rated wall or assembly separating *townhouses*
21 shall be continuous from the foundation to the underside of the roof sheathing, deck or slab.
22 The fire-resistance rating shall extend the full length of the wall or assembly, including wall
23 extensions through and separating attached enclosed *accessory structures*.

24 Where a story extends beyond the exterior wall of a story below:

25 1. The fire-resistance-rated wall or assembly shall extend to the outside edge of the
26 upper story; or

27 2. The underside of the exposed floor-ceiling assembly shall be protected as required
28 for projections in Section R302.

1 **R302.2.2 Parapets.** Parapets constructed in accordance with Section R302.2.3 shall be
2 constructed for *townhouses* as an extension of exterior walls or common walls in accordance
3 with the following:

4 1. Where roof surfaces adjacent to the wall or walls are at the same elevation, the parapet
5 shall extend not less than 30 inches (762 mm) above the roof surfaces.

6 2. Where roof surfaces adjacent to the wall or walls are at different elevations and the
7 higher roof is not more than 30 inches (762 mm) above the lower roof, the parapet shall
8 extend not less than 30 inches (762 mm) above the lower roof surface.

9 **Exception:** A parapet is not required in the two cases above when the roof is covered
10 with a minimum class C roof covering, and the roof decking or sheathing is of
11 noncombustible materials or *approved* fire-retardant-treated wood for a distance of 4 feet
12 (1219 mm) on each side of the wall or walls, or one layer of 5/8-inch (15.9 mm) Type X
13 gypsum board is installed directly beneath the roof decking or sheathing, supported by a
14 minimum of nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing
15 members, for a minimum distance of 4 feet (1219 mm) on each side of the wall or walls
16 and there are no openings or penetrations in the roof within 4 feet (1219 mm) of the
17 common walls.

18 3. A parapet is not required where roof surfaces adjacent to the wall or walls are at different
19 elevations and the higher roof is more than 30 inches (762 mm) above the lower roof.

20 The common wall construction from the lower roof to the underside of the higher roof
21 deck shall have not less than a 1-hour fire-resistance rating. The wall shall be rated for
22 exposure from both sides.

23 **R302.2.3 Parapet construction.** Parapets shall have the same fire-resistance rating as that
24 required for the supporting wall or walls. On any side adjacent to a roof surface, the parapet
25 shall have noncombustible faces for the uppermost 18 inches (457 mm), to include
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1 counterflashing and coping materials. Where the roof slopes toward a parapet at slopes
2 greater than 2 units vertical in 12 units horizontal (16.7-percent slope), the parapet shall
3 extend to the same height as any portion of the roof within a distance of 3 feet (914 mm), but
4 in no case shall the height be less than 30 inches (762 mm).

5 **[W] R302.2.4 Structural independence.** Each individual *townhouse* shall be structurally
6 independent.

7 **Exceptions:**

- 8 1. Foundations supporting *exterior walls* or common walls.
- 9 2. Structural roof and wall sheathing from each unit may fasten to the common wall
10 framing.
- 11 3. Nonstructural wall and roof coverings.
- 12 4. Flashing at termination of roof covering over common wall.
- 13 5. *Townhouses* separated by a common 1-hour fire-resistance-rated wall as provided
14 in Section R302.2.
- 15 6. Floor sheathing may fasten to the floor framing of both units.

16 ***

17 **R302.13 Combustible insulation clearance.** Combustible insulation shall be separated a
18 minimum of 3 inches (76 mm) from recessed luminaires, fan motors and other heat-producing
19 devices.

20 **Exception:** Where heat-producing devices are listed for lesser clearances, combustible
21 insulation complying with the listing requirements shall be separated in accordance with the
22 conditions stipulated in the listing. Recessed luminaires installed in the *building thermal*
23 *envelope* shall meet the requirements of ((Section N1102.4.4 of this code)) the *International*
24 *Energy Conservation Code*.

25 **SECTION R303**

LIGHT, VENTILATION AND HEATING

[W] R303.1 ((Habitable rooms)) Natural light. All habitable rooms shall have an aggregate glazing area of not less than 8 percent of the floor area of such rooms. ~~((Natural ventilation shall be through windows, doors, louvers or other *approved* openings to the outdoor air. Such openings shall be provided with ready access or shall otherwise be readily controllable by the building occupants. The minimum openable area to the outdoors shall be 4 percent of the floor area being ventilated.))~~

Exception((s)):

~~((1. The glazed areas need not be openable where the opening is not required by Section R310 and a whole-house mechanical *ventilation* system is installed in accordance with Section M1507.))~~

~~((2.))~~ The glazed areas need not be installed in rooms where ~~((Exception 1 above is satisfied and))~~ artificial light is provided capable of producing an average illumination of 6 footcandles (65 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.

~~((3. Use of sunroom and patio covers, as defined in Section R202, shall be permitted for *natural ventilation* if in excess of 40 percent of the exterior sunroom walls are open, or are enclosed only by insect screening.))~~

[W] R303.2 Adjoining rooms. For the purpose of determining light ~~((and ventilation))~~ requirements, any room shall be considered as a portion of an adjoining room when at least one-half of the area of the common wall is open and unobstructed and provides an opening of not less than one-tenth of the floor area of the interior room but not less than 25 square feet (2.3 m²).

Exception: Openings required for light ~~((and/or ventilation))~~ shall be permitted to open into a sunroom with thermal isolation or a patio cover, provided that there is an openable area between the adjoining room and the sunroom or patio cover of not less than one-tenth of the

1 floor area of the interior room but not less than 20 square feet (2 m²). ((The minimum
2 openable area to the outdoors shall be based upon the total floor area being ventilated.))

3 **[W]** ~~((R303.3 Bathrooms. Bathrooms, water closet compartments and other similar rooms shall
4 be provided with aggregate glazing area in windows of not less than 3 square feet (0.3 m²), one
5 half of which must be openable.~~

6 ~~**Exception:** The glazed areas shall not be required where artificial light and a local exhaust
7 system are provided. The minimum local exhaust rates shall be determined in accordance
8 with Section M1507. Exhaust air from the space shall be exhausted directly to the outdoors.))~~

9 ~~((R303.4 Mechanical ventilation. Where the air infiltration rate of a dwelling unit is less than 5
10 air changes per hour when tested with a blower door at a pressure of 0.2 inch w.e (50 Pa) in
11 accordance with Section N1102.4.1.2, the dwelling unit shall be provided with whole house
12 mechanical ventilation in accordance with Section M1507.3.))~~

13 **[W]** **R303.4 Minimum ventilation performance.** *Dwelling units shall be equipped with local
14 exhaust and whole house ventilation systems designed and installed as specified in Section
15 M1507.*

16 **Exception:** Additions with less than 500 square feet of conditioned floor area are exempt
17 from the requirements for whole house ventilation systems.

18 **R303.5 Opening location.** Outdoor intake and exhaust openings shall be located in accordance
19 with Sections R303.5.1 and R303.5.2.

20 **R303.5.1 Intake openings.** Mechanical and gravity outdoor air intake openings shall be
21 located a minimum of 10 feet (3048 mm) from any hazardous or noxious contaminant, such
22 as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks, except as
23 otherwise specified in this code. Where a source of contaminant is located within 10 feet
24 (3048 mm) of an intake opening, such opening shall be located a minimum of 3 feet (914
25 mm) below the contaminant source.

1 For the purpose of this section, the exhaust from *dwelling* unit toilet rooms, bathrooms
2 and kitchens shall not be considered as hazardous or noxious.

3 **[W] R303.5.2 Exhaust openings.** Exhaust air shall not be directed onto walkways. All
4 exhaust ducts shall terminate outside the building. Terminal elements shall have at least the
5 equivalent net free area of the ductwork.

6 **[W] R303.5.2.1 Exhaust ducts.** Exhaust ducts shall be equipped with back-draft
7 dampers. All exhaust ducts in unconditioned spaces shall be insulated to a minimum of
8 R-4.

9 ***

10 **[W] R303.7 Stairway illumination.** All interior and exterior stairways shall be provided with a
11 means to illuminate the stairs, including the landings and treads. Stairway illumination shall
12 receive primary power from the building wiring. Interior stairways shall be provided with an
13 artificial light source located in the immediate vicinity of each landing of the stairway. For
14 interior stairs the artificial light sources shall be capable of illuminating treads and landings to
15 levels not less than 1 footcandle (11 lux) measured at the center of treads and landings. Exterior
16 stairways shall be provided with an artificial light source located in the immediate vicinity of the
17 top landing of the stairway. Exterior stairways providing access to a *basement* from the outside
18 *grade* level shall be provided with an artificial light source located in the immediate vicinity of
19 the bottom landing of the stairway.

20 **Exception:** An artificial light source is not required at the top and bottom landing, provided
21 an artificial light source is located directly over each stairway section.

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

1 Protection Agency certified or exempt from certification by the United States Environmental
2 Protection Agency and conforms with RCW 70.94.011, 70.94.450, 70.94.453 and 70.94.457.

3 **Exceptions:**

4 1. Wood cook stoves.

5 2. Antique wood heaters manufactured prior to 1940.

6 ***

7 **SECTION R309**

8 **GARAGES AND CARPORTS**

9 ***

10 **R309.5 Fire sprinklers.** Private garages shall be protected by fire sprinklers where the garage
11 wall has been designed based on Table R302.1(2), Footnote a. Sprinklers in garages shall be
12 connected to an automatic sprinkler system that complies with Section P2904. Garage sprinklers
13 shall be residential sprinklers or quick-response sprinklers, designed to provide a density of 0.05
14 gpm/ft². Garage doors shall not be considered obstructions with respect to sprinkler placement.

15 ***

16 **SECTION R311**

17 **MEANS OF EGRESS**

18 ***

19 **[W] R311.4 Vertical egress.** Egress from habitable levels including habitable attics and
20 *basements* not provided with an egress door in accordance with Section R311.2 shall be by a
21 ramp in accordance with Section R311.8 or a stairway in accordance with Section R311.7.

22 **Exception:** Stairs or ladders within an individual *dwelling unit* used for access to areas of
23 200 square feet (18.6 m²) or less, and not containing the primary bathroom or kitchen.

24 ***

25 **[W] SECTION R313**

AUTOMATIC FIRE SPRINKLER SYSTEMS

R313.1 ~~((Townhouse-a))~~ Automatic fire sprinkler systems. Where installed, the design and installation of residential fire sprinkler systems shall be in accordance with Section P2904.

~~((An automatic residential fire sprinkler system shall be installed in townhouses.~~

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

R313.1.1 Design and installation. ~~Automatic residential fire sprinkler systems for townhouses shall be designed and installed in accordance with Section P2904.~~

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

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

R313.2.1 Design and installation. ~~Automatic residential fire sprinkler systems shall be designed and installed in accordance with Section P2904 or NFPA 13D.)~~

SECTION R314

SMOKE ALARMS

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

1. In each sleeping room.
2. Outside each separate sleeping area in the immediate vicinity of the bedrooms.
3. On each additional *story* of the *dwelling*, including *basements* and habitable attics but not including crawl spaces and uninhabitable *attics*. In *dwellings* or *dwelling units* with split levels and without an intervening door between the adjacent levels, a smoke alarm installed

1 on the upper level shall suffice for the adjacent lower level provided that the lower level is
2 less than one full *story* below the upper level.

3 4. In napping areas in *family home child care*.

4 **[W] R314.3.1 Alterations, repairs and additions.** When *alterations*, repairs or *additions*
5 requiring a *permit* occur, or when one or more sleeping rooms are added or created in
6 existing *dwelling*s, the individual *dwelling unit* shall be equipped with smoke alarms
7 ((~~located~~)) as required for new *dwelling*s.

8 **Exceptions:**

- 9 1. Work involving the exterior surfaces of *dwelling*s, such as the replacement of roofing
10 or siding, or the *addition* or replacement of windows or doors, or the *addition* of a
11 porch or deck, are exempt from the requirements of this section.
12 2. Installation, *alteration* or repairs of plumbing, electrical or mechanical systems are
13 exempt from the requirements of this section.

14 ***

15 **SECTION R315**

16 **CARBON MONOXIDE ALARMS**

17 **[W] R315.1 Carbon monoxide alarms.** For new construction, an approved carbon monoxide
18 alarm shall be installed outside of each separate sleeping area in the immediate vicinity of the
19 bedrooms in *dwelling units* ((~~within which fuel-fired appliances are installed and in dwelling~~
20 ~~units that have attached garages~~)) and on each level of the *dwelling* and in accordance with the
21 manufacturer's recommendations.

22 **[W] R315.2 Carbon monoxide detection systems.** Carbon monoxide detection systems that
23 include carbon monoxide detectors and audible notification appliances, installed and maintained
24 in accordance with this section for carbon monoxide alarms and NFPA 720, shall be permitted.
25 The carbon monoxide detectors shall be listed as complying with UL 2075. Where a household
26

1 carbon monoxide detection system is installed, it shall become a permanent fixture of the
2 occupancy(~~(, owned by the homeowner and shall be monitored by an approved supervising~~
3 ~~station))~~).

4 **Exception:** Where carbon monoxide alarms are installed meeting the requirements of
5 Section R315.1, compliance with Section 315.2 is not required.

6 **[W] R315.3 Where required in existing dwellings.** (~~Where work requiring a permit occurs in~~
7 ~~existing dwellings that have attached garages or in existing dwellings within which fuel-fired~~
8 ~~appliances exist, carbon monoxide alarms shall be provided in accordance with Section~~
9 ~~R315.1.)) Existing dwellings shall be equipped with carbon monoxide alarms in accordance with
10 Section R315.1. Carbon monoxide alarms shall be installed when alterations, repairs or
11 additions requiring a permit occur, or when one or more sleeping rooms are added or created.~~

12 **Exceptions:**

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

21 **[W] R315.4 Alarm requirements.** Single-station carbon monoxide alarms shall be listed as
22 complying with UL 2034 and shall be installed in accordance with this code, NFPA 720 and the
23 manufacturer's installation instructions.

24 ***

25 **SECTION R319**

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

3 **R322.1.4 Establishing the design flood elevation.** The design flood elevation shall be used
4 to define flood hazard areas. At a minimum, the design flood elevation is the higher of:

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

10 **R322.1.4.1 Determination of design flood elevations.** If design flood elevations are not
11 specified, the *building official* is authorized to require the applicant to:

- 12 1. Obtain and reasonably use data available from a federal, state or other source; or
13 2. Determine the design flood elevation in accordance with accepted hydrologic and
14 hydraulic engineering practices used to define special flood hazard areas.

15 Determinations shall be undertaken by a registered *design professional* who shall
16 document that the technical methods used reflect currently accepted engineering
17 practice. Studies, analyses and computations shall be submitted in sufficient detail to
18 allow thorough review and approval.

19 **R322.1.4.2 Determination of impacts.** In riverine flood hazard areas where design flood
20 elevations are specified but floodways have not been designated, the applicant shall
21 demonstrate that the effect of the proposed buildings and structures on design flood
22 elevations, including fill, when combined with all other existing and anticipated flood
23 hazard area encroachments, will not increase the design flood elevation more than 1 foot
24 (305 mm) at any point within the jurisdiction.

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

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

14 **Exception:** Locating electrical systems, *equipment* and components; heating, ventilating,
15 air conditioning; plumbing *appliances* and plumbing fixtures; *duct systems*; and other
16 service *equipment* is permitted below the elevation required in Section R322.2 (flood
17 hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones)
18 provided that they are designed and installed to prevent water from entering or
19 accumulating within the components and to resist hydrostatic and hydrodynamic loads
20 and stresses, including the effects of buoyancy, during the occurrence of flooding to the
21 design flood elevation in accordance with ASCE 24. Electrical wiring systems are
22 permitted to be located below the required elevation provided they conform to the
23 provisions of the electrical part of this code for wet locations.

24 **R322.1.7 Protection of water supply and sanitary sewage systems.** New and replacement
25 water supply systems shall be designed to minimize or eliminate infiltration of flood waters
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1 into the systems in accordance with the plumbing provisions of this code. New and
2 replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration
3 of floodwaters into systems and discharges from systems into floodwaters in accordance with
4 the Uniform Plumbing Code (~~plumbing provisions of this code and Chapter 3 of the~~
5 ~~International Private Sewage Disposal Code~~)).

6 **R322.1.8 Flood-resistant materials.** Building materials used below the elevation required in
7 Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas
8 including V Zones) shall comply with the following:

9 1. All wood, including floor sheathing, shall be pressure-preservative-treated in accordance
10 with AWPA U1 for the species, product, preservative and end use or be the decay-resistant
11 heartwood of redwood, black locust or cedars. Preservatives shall be listed in Section 4 of
12 AWPA U1.

13 2. Materials and installation methods used for flooring and interior and *exterior walls* and
14 wall coverings shall conform to the provisions of FEMA/FIA-TB-2.

15 **R322.1.9 Manufactured homes.** New or replacement *manufactured homes* shall be elevated
16 in accordance with Section R322.2 (flood hazard areas including A Zones) or Section R322.3
17 in coastal high-hazard areas (V Zones). The anchor and tie-down requirements of Sections
18 AE604 and AE605 of Appendix E shall apply. The foundation and anchorage of
19 *manufactured homes* to be located in identified floodways shall be designed and constructed
20 in accordance with ASCE 24.

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

23 **R322.2 Flood hazard areas (including A Zones).** All areas that have been determined to be
24 prone to flooding but not subject to high-velocity wave action shall be designated as flood hazard
25 areas. Flood hazard areas that have been delineated as subject to wave heights between 11/2 feet
26

1 (457 mm) and 3 feet (914 mm) shall be designated as Coastal A Zones. All building and
2 structures constructed in whole or in part in flood hazard areas shall be designed and constructed
3 in accordance with Sections R322.2.1 through R322.2.3.

4 **R322.2.1 Elevation requirements.**

- 5 1. Buildings and structures in flood hazard areas not designated as Coastal A Zones shall
6 have the lowest floors elevated to or above the design flood elevation, or a greater elevation
7 as designated by the Seattle Municipal Code.
- 8 2. Buildings and structures in flood hazard areas designated as Coastal A Zones shall have
9 the lowest floors elevated to or above the base flood elevation plus 1 foot (305 mm), or to
10 the design flood elevation, whichever is higher.
- 11 3. In areas of shallow flooding (AO Zones), buildings and structures shall have the lowest
12 floor (including *basement*) elevated at least as high above the highest adjacent *grade* as the
13 depth number specified in feet on the FIRM, or at least 2 feet (610 mm) if a depth number
14 is not specified.
- 15 4. Basement floors that are below *grade* on all sides shall be elevated to or above the design
16 flood elevation.

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

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

- 21 1. Be used solely for parking of vehicles, building access or storage.
- 22 2. Be provided with flood openings that meet the following criteria:
- 23 2.1. There shall be a minimum of two openings on different sides of each enclosed area;
24 if a building has more than one enclosed area below the design flood elevation, each
25 area shall have openings on exterior walls.
- 26

1 2.2. The total net area of all openings shall be at least 1 square inch (645 mm²) for each
2 square foot (0.093 m²) of enclosed area, or the openings shall be designed and the
3 *construction documents* shall include a statement by a registered *design*
4 *professional* that the design of the openings will provide for equalization of
5 hydrostatic flood forces on exterior walls by allowing for the automatic entry and
6 exit of floodwaters as specified in Section 2.6.2.2 of ASCE 24.

7 2.3. The bottom of each opening shall be 1 foot (305 mm) or less above the adjacent
8 ground level.

9 2.4. Openings shall be not less than 3 inches (76 mm) in any direction in the plane of
10 the wall.

11 2.5. Any louvers, screens or other opening covers shall allow the automatic flow of
12 floodwaters into and out of the enclosed area.

13 2.6. Openings installed in doors and windows, that meet requirements 2.1 through 2.5,
14 are acceptable; however, doors and windows without installed openings do not meet
15 the requirements of this section.

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

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

19 1. The unsupported height of 6-inch (152 mm) plain masonry walls shall be no more
20 than 3 feet (914 mm).

21 2. The unsupported height of 8-inch (203 mm) plain masonry walls shall be no more
22 than 4 feet (1219 mm).

23 3. The unsupported height of 8-inch (203 mm) reinforced masonry walls shall be no
24 more than 8 feet (2438 mm).

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

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

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

9 1. New buildings and buildings that are determined to be substantially improved pursuant to
10 Section ((~~R105.3.1.1~~) R105.6.3.3), shall be located landward of the reach of mean high tide.

11 2. For any alteration of sand dunes and mangrove stands the *building official* shall require
12 submission of an engineering analysis which demonstrates that the proposed *alteration* will not
13 increase the potential for flood damage.

14 **R322.3.2 Elevation requirements.**

15 1. All buildings and structures erected within coastal high-hazard areas shall be elevated so that
16 the lowest portion of all structural members supporting the lowest floor, with the exception of
17 piling, pile caps, columns, grade beams and bracing, is:

18 1.1. Located at or above the design flood elevation, if the lowest horizontal structural member is
19 oriented parallel to the direction of wave approach, where parallel shall mean less than or equal
20 to 20 degrees (0.35 rad) from the direction of approach, or

21 1.2. Located at the base flood elevation plus 1 foot (305 mm), or the design flood elevation,
22 whichever is higher, if the lowest horizontal structural member is oriented perpendicular to the
23 direction of wave approach, where perpendicular shall mean greater than 20 degrees (0.35 rad)
24 from the direction of approach.

25 2. Basement floors that are below *grade* on all sides are prohibited.

1 3. The use of fill for structural support is prohibited.

2 4. Minor grading, and the placement of minor quantities of fill, shall be permitted for
3 landscaping and for drainage purposes under and around buildings and for support of parking
4 slabs, pool decks, patios and walkways.

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

7 **R322.3.3 Foundations.** Buildings and structures erected in coastal high-hazard areas shall be
8 supported on pilings or columns and shall be adequately anchored to such pilings or columns.

9 The space below the elevated building shall be either free of obstruction or, if enclosed with
10 walls, the walls shall meet the requirements of Section R322.3.4. Pilings shall have adequate soil
11 penetrations to resist the combined wave and wind loads (lateral and uplift). Water-loading
12 values used shall be those associated with the design flood. Wind-loading values shall be those
13 required by this code. Pile embedment shall include consideration of decreased resistance
14 capacity caused by scour of soil strata surrounding the piling. Pile systems design and
15 installation shall be certified in accordance with Section R322.3.6. Spread footing, mat, raft or
16 other foundations that support columns shall not be permitted where soil investigations that are
17 required in accordance with Section R401.4 indicate that soil material under the spread footing,
18 mat, raft or other foundation is subject to scour or erosion from wave-velocity flow conditions. If
19 permitted, spread footing, mat, raft or other foundations that support columns shall be designed
20 in accordance with ASCE 24. Slabs, pools, pool decks and walkways shall be located and
21 constructed to be structurally independent of buildings and structures and their foundations to
22 prevent transfer of flood loads to the buildings and structures during conditions of flooding,
23 scour or erosion from wave velocity flow conditions, unless the buildings and structures and
24 their foundation are designed to resist the additional flood load.

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

4 1. Electrical, mechanical, and plumbing system components are not to be mounted on or
5 penetrate through walls that are designed to break away under flood loads; and

6 2. Are constructed with insect screening or open lattice; or

7 3. Are designed to break away or collapse without causing collapse, displacement or other
8 structural damage to the elevated portion of the building or supporting foundation system. Such
9 walls, framing and connections shall have a design safe loading resistance of not less than 10
10 (479 Pa) and no more than 20 pounds per square foot (958 Pa); or

11 4. Where wind loading values of this code exceed 20 pounds per square foot (958 Pa), the
12 *construction documents* shall include documentation prepared and sealed by a registered *design*
13 *professional* that:

14 4.1. The walls and partitions below the design flood elevation have been designed to collapse
15 from a water load less than that which would occur during the design flood.

16 4.2. The elevated portion of the building and supporting foundation system have been designed
17 to withstand the effects of wind and flood loads acting simultaneously on all building
18 components (structural and nonstructural). Water-loading values used shall be those associated
19 with the design flood. Wind-loading values shall be those required by this code.

20 **R322.3.5 Enclosed areas below design flood elevation.** Enclosed areas below the design flood
21 elevation shall be used solely for parking of vehicles, building access or storage.

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

25 ***

1 **[W] SECTION R324**

2 **SWIMMING POOLS, SPAS AND HOT TUBS**

3 **[W] R324.1 Appendix G.** Swimming pools, spas and hot tubs shall comply with the provisions
4 of Appendix G.

5 **[W] SECTION R325**

6 **ADULT FAMILY HOMES**

7 **R325.1 General.** This section shall apply to all newly constructed *adult family homes* and all
8 existing single family homes being converted to *adult family homes*. This section shall not apply
9 to those *adult family homes* licensed by the state of Washington Department of Social and Health
10 Services prior to July 1, 2001.

11 **R325.2 Submittal standards.** In addition to those requirements in Section R105, the submittal
12 shall identify the project as an R-3 Adult Family Home Occupancy. A floor plan shall be
13 submitted identifying the means of egress and the components in the means of egress such as
14 stairs, ramps, platform lifts and elevators. The plans shall indicate the rooms used for clients and
15 the sleeping room classification of each room.

16 **R325.3 Sleeping room classification.** Each sleeping room in an *adult family home* shall be
17 classified as:

- 18 1. Type S - Where the means of egress contains stairs, elevators or platform lifts.
19 2. Type NS1 - Where one means of egress is at grade level or a ramp constructed in
20 accordance with R325.9 is provided.
21 3. Type NS2 - Where two means of egress are at grade level or ramps constructed in
22 accordance with R325.9 are provided.

23 **R325.4 Types of locking devices and door activation.** All bedroom and bathroom doors shall
24 be openable from the outside when locked.

25 Every closet shall be readily openable from the inside.

1 Operable parts of door handles, pulls, latches, locks and other devices installed in *adult family*
2 *homes* shall be operable with one hand and shall not require tight grasping, pinching or twisting
3 of the wrist.

4 Pocket doors shall have graspable hardware available when in the closed or open position.

5 The force required to activate operable parts shall be 5.0 pounds (22.2 N) maximum. Required
6 exit doors shall have no additional locking devices.

7 Required exit door hardware shall unlock inside and outside mechanisms when exiting the
8 building allowing reentry into the *adult family home* without the use of a key, tool or special
9 knowledge.

10 **R325.5 Smoke and carbon monoxide alarm requirements.** All *adult family homes* shall be
11 equipped with smoke and carbon monoxide alarms installed as required in Sections R314 and
12 R315. Alarms shall be installed in such a manner so that the detection device warning is audible
13 from all areas of the *dwelling* upon activation of a single alarm.

14 **R325.6 Escape windows and doors.** Every sleeping room shall be provided with emergency
15 escape and rescue windows as required by Section R310. No alternatives to the sill height such
16 as steps, raised platforms or other devices placed by the openings will be approved as meeting
17 this requirement.

18 **R325.7 Fire apparatus access roads and water supply for fire protection.** *Adult family homes*
19 shall be served by fire apparatus access roads and water supplies meeting the requirements of the
20 *International Fire Code*.

21 **R325.8 Grab bar general requirements.** Where facilities are designated for use by *adult family*
22 *home* clients, grab bars for water closets, bathtubs and shower stalls shall be installed according
23 to this section.

24 **R325.8.1 Grab bar cross section.** Grab bars with a circular cross section shall have an
25 outside diameter of 1-1/4 inches minimum and 2 inches maximum. Grab bars with

1 noncircular cross section shall have a cross section dimension of 2 inches maximum and a
2 perimeter dimension of 4 inches minimum and 4-5/8 inches maximum.

3 **R325.8.2 Grab bar installation.** Grab bars shall have a spacing of 1-1/2 inches between the
4 wall and the bar. Projecting objects, control valves and bathtub or shower stall enclosure
5 features above, below and at the ends of the grab bar shall have a clear space of 1-1/2 inches
6 to the grab bar.

7 **Exception:** Swing-up grab bars shall not be required to meet the 1-1/2 inch spacing
8 requirement.

9 Grab bars shall have a structural strength of 250 pounds applied at any point on the grab
10 bar, fastener, mounting device or supporting structural member. Grab bars shall not be
11 supported directly by any residential grade fiberglass bathing or showering unit. Acrylic bars
12 found in bathing units shall be removed.

13 Fixed position grab bars, when mounted, shall not rotate, spin or move, and shall have a
14 graspable surface finish.

15 **R325.8.3 Grab bars at water closets.** Water closets shall have grab bars mounted on both
16 sides. Grab bars can be a combination of fixed position and swing-up bars. Grab bars shall
17 meet the requirements of Section R325.8.

18 **R325.8.3.1 Fixed position grab bars.** Fixed position grab bars shall be 36 inches in
19 length and start 12 inches from the rear wall.

20 **R325.8.3.2 Swing-up grab bars.** Swing-up grab bars shall be a minimum of 28 inches in
21 length from the rear wall. Grab bars shall mount between 33 inches and 36 inches above
22 floor grade. Centerline distance between grab bars, regardless of type used, shall be
23 between 25 inches minimum and 30 inches maximum.

24 **R325.8.4 Grab bars at bathtubs.** Horizontal and vertical grab bars shall meet the
25 requirements of R325.8.

1 **R325.8.4.1 Vertical grab bars.** Vertical grab bars shall be 18 inches long and installed at
2 the control end wall and head end wall. Grab bars shall mount within 4 inches of the
3 exterior of the bath tub edge or within 4 inches within the bath tub. The bottom end of the
4 bar shall start between 36 inches and 42 inches above floor grade.

5 **Exception:** The required vertical grab bar can be substituted with a floor to ceiling
6 grab bar meeting the requirements of R325.8 at the control end and head end entry
7 points.

8 **R325.8.4.2 Horizontal grab bars.** Horizontal grab bars shall be provided at the control
9 end, head end, and the back wall within the bathtub area. Grab bars shall be mounted
10 between 33 inches and 36 inches above floor grade. Control end and head end grab bars
11 shall be 24 inches in length. Back wall grab bars shall be 36 inches in length.

12 **R325.8.5 Grab bars at shower stalls.** Where shower stalls are provided to meet the
13 requirements for bathing facilities, grab bars shall meet the requirements of Section R325.8.

14 **Exception:** Shower stalls with permanent built-in seats are not required to have vertical or
15 horizontal grab bars at the seat end wall. A vertical floor to ceiling grab bar shall be
16 installed within 4 inches of the exterior of the shower aligned with the nose of the built-in
17 seat.

18 **R325.8.5.1 Vertical grab bars.** Vertical 18 inch grab bars shall be installed at the control
19 end wall and end wall. Vertical bars shall mount within 4 inches of the exterior of the
20 shower stall or within 4 inches inside the shower stall. The bottom end of vertical bars
21 shall be mounted between 36 inches and 42 inches above floor grade.

22 **R325.8.5.2 Horizontal grab bars.** Horizontal grab bars shall be installed on all sides of
23 the shower stall mounted between 33 inches and 36 inches above the floor grade.
24 Horizontal grab bars shall be a maximum of 6 inches from adjacent walls. Horizontal
25 grab bars shall not interfere with shower control valves.

1 **R325.9 Ramps.** All interior and exterior *ramps*, when provided, shall be constructed in
2 accordance with Section R311.8 with a maximum slope of 1 vertical to 12 horizontal. The
3 exception to Section R311.8.1 is not allowed for *adult family homes*. Handrails shall be installed
4 in accordance with Section R325.9.1.

5 **R325.9.1 Handrails for ramps.** Handrails shall be installed on both sides of ramps between
6 the slope of 1 vertical to 12 horizontal and 1 vertical and 20 horizontal in accordance with
7 Sections R311.8.1 through R311.8.3.3.

8 **R325.10 Stair treads and risers.** Stair treads and risers shall be constructed in accordance with
9 Section R311.7.4. Handrails shall be installed in accordance with Section R325.10.1.

10 **R325.10.1 Handrails for treads and risers.** Handrails shall be installed on both sides of
11 treads and risers numbering from one riser to multiple risers. Handrails shall be installed in
12 accordance with Sections R311.7.8 through R311.7.8.4.

13 **R325.11 Shower stalls.** Where provided to meet the requirements for bathing facilities, the
14 minimum size of shower stalls for adult family homes shall be 30 inches deep by 48 inches long.

15 **[W] SECTION R326**

16 **FAMILY HOME CHILD CARE**

17 **R326.1 Family home child care means of egress.** For *family home child care* with more than
18 six children, each floor level used for family child care purposes shall be served by two remote
19 means of egress. Exterior exit doors shall be operable from the inside without the use of keys or
20 any special knowledge or effort.

21 **R326.1.1 Basement egress.** Basements located more than 4 feet (1219 mm) below grade
22 level shall not be used for *family home child care* unless one of following conditions exist:

- 23 1. Stairways from the basement open directly to the exterior of the building without
24 entering the first floor; or

1 2. One of the two required means of egress discharges directly to the exterior from the
2 basement level, and a self-closing door is installed at the top or bottom of the interior
3 stair leading to the floor above; or

4 3. One of the two required means of egress is an operable window or door, approved for
5 emergency escape or rescue, that opens directly to a public street, public alley, yard or
6 exit court; or

7 4. A residential sprinkler system is provided throughout the entire building in accordance
8 with NFPA 13D.

9 **R326.1.2 Floors above grade.** Floors located more than 4 feet above grade level shall not
10 be occupied by children in *family home child care*.

11 **Exceptions:**

12 1. Use of toilet facilities while under supervision of an adult staff person.

13 2. *Family home child care* may be allowed on the second story if one of the following
14 conditions exists:

15 2.1. Stairways from the second story open directly to the exterior of the building
16 without entering the first floor; or

17 2.2. One of the two required means of egress discharges directly to the exterior from
18 the second story level, and a self-closing door is installed at the top or bottom of
19 the interior stair leading to the floor below; or

20 2.3. A residential sprinkler system is provided throughout the entire building in
21 accordance with NFPA 13D.

22 **R326.2 Emergency escape and rescue.** Every sleeping or napping room in a *family home child*
23 *care* shall have at least one operable window for emergency rescue.

24 **Exception:** Sleeping or napping rooms having doors leading to two separate means of egress,
25 or a door leading directly to the exterior of the building.

1 **R326.3 Special hazards.** Rooms or spaces containing a commercial-type cooking kitchen,
2 boiler, maintenance shop, janitor closet, laundry, woodworking shop, flammable or combustible
3 storage, or painting operation shall be separated from the *family home child care* area by at least
4 one-hour fire-resistance-rated construction.

5 **Exception:** A fire-resistance-rated separation is not required where the food preparation
6 kitchen contains only a domestic cooking range, and the preparation of food does not result in
7 the production of smoke or grease-laden vapors.

8 **SECTION R327**

9 **FLOATING HOMES**

10 **R327.1 Definitions.** Certain words and terms used in this section, unless clearly inconsistent
11 with their context, are defined as follows:

12 **R327.2 Moorage location.** Every *floating home moorage* shall be located on privately-owned or
13 privately-controlled premises in accordance with the Land Use Code, Title 23 of the Seattle
14 Municipal Code.

15 **R327.3 Land access.** Every *floating home moorage* shall have not less than 20 feet (6096 mm)
16 of land frontage abutting a public street sufficiently improved for automobile travel.

17 **R327.4 Moorage walkways.** Every *floating home moorage* shall have firm and substantial
18 walkways with a net width of not less than 4 feet (1219 mm) and extending from land to every
19 *floating home site* in the moorage.

20 **R327.5 Moorage lighting.** Every *floating home moorage* and the walkways to every *floating*
21 *home site* shall be illuminated to provide safe access. All luminaires shall be listed for the use.

22 **R327.6 Fire protection.** *Floating home moorages* shall be provided with fire extinguishing
23 equipment as follows:

- 24 1. Portable fire-protection equipment. One fire extinguisher, 2A, 20-B:C rating minimum,
25 shall be provided in each required hose station. The fire chief shall designate the type and
26

1 number of all other fire appliances to be installed and maintained in each floating home
2 moorage.

3 2. Standpipes. All portions of floats exceeding 250 feet (76 500 mm) in distance from fire
4 apparatus access and marine service stations shall be provided with an approved Class I
5 standpipe system installed according to *International Building Code* Section 905 and the
6 *International Fire Code*.

7 **R327.7 Water service connections.** Every *floating home moorage* shall have a water service
8 connection and shall provide water service piping securely fastened and stabilized above water
9 from the water service connection to an outlet connection at each floating home site on a *floating*
10 *home moorage*. The water piping in every *floating home* in a *floating home moorage* shall be
11 connected to the water service outlet serving the *floating home* and the connection shall be
12 securely fastened and stabilized above high water line. Water service connections and water
13 service piping shall be constructed, installed and maintained in accordance with applicable
14 standards established by or pursuant to ordinance.

15 **R327.8 Public sewer connection.** Every *floating home moorage* any part of which is within 300
16 feet (91 440 mm) of a public sewer and every *floating home moorage* on Shilshole Bay, Salmon
17 Bay, Lake Washington Ship Canal, Lake Union, Portage Bay, Union Bay and that portion of
18 Lake Washington lying within the city limits of Seattle shall have a lawfully-installed connection
19 to a public sewer.

20 **R327.9 Local side sewer system.** Every *floating home moorage* within the limits specified in
21 Section R332.8 shall provide a local side sewer system for the collection of *sewage* from every
22 *floating home* in the moorage. The local side sewer system shall be connected to the public
23 sewer, shall have an inlet connection at each *floating home site* and shall be constructed, installed
24 and maintained in accordance with this and all other applicable ordinances regulating the
25 construction, alteration, repair and connection of side sewers.

1 **R327.10 Connection to local side sewer system.** Every *floating home* in a *floating home*
2 *moorage* that is required under Section R327.8 to be connected to a public sewer shall be
3 connected to the local side sewer system. Owners and operators of *floating home moorages* shall
4 not permit any *floating home* to be moored at any moorage under their control unless the *floating*
5 *home* is connected to the local side sewer system. It is a violation for any person to use, occupy
6 or let any *floating home* for human habitation within the limits specified in Section R327.8
7 unless it is connected to the sewer system.

8 A reconnection permit is required for any *floating home* that is relocated from its original site
9 of connection to a local side sewer system. Such reconnection is subject to the approval of the
10 Director of Seattle Public Utilities.

11 **R327.11 Sewer installation fees.** The fee for the installation of any side sewer serving a *floating*
12 *home moorage* is the fee provided by law for the connection to the public sewer of side sewers
13 serving mobile home parks.

14 **R327.12 Plumbing systems.** All plumbing and plumbing systems in every *floating home* shall
15 meet the requirements of the *Uniform Plumbing Code* except as otherwise approved by the
16 Director of Public Health.

17 **R327.13 Garbage disposal.** Every *floating home moorage* shall be provided with adequate
18 *garbage* storage and collection facilities, which shall be located in an accessible place on the
19 moorage site. No garbage or refuse shall be thrown or dumped into the waters.

20 **R327.14 Electrical service and wiring.** Electrical service approved by City Light shall be
21 provided to *floating homes* and *floating home moorages*. Electrical wiring and equipment in
22 every *floating home* shall conform to requirements of the *Seattle Electrical Code*. No *floating*
23 *home* shall be permitted to connect or reconnect to the electric utility's distribution system unless
24 approved for such connection by the building official in accordance with the *Seattle Electrical*
25 *Code*.

1 **R327.15 Housing standards for existing floating homes.** *Every floating home shall comply*
2 *with the minimum housing standards of the Seattle Housing and Building Maintenance Code*
3 *except as otherwise approved by the building official in accordance with the Housing and*
4 *Building Maintenance Code.*

5 **R327.16 Property lines.** *The boundaries of floating home moorage sites shall be considered the*
6 *lot line for determining compliance with Section R302.*

7 **Interpretation R327.16:** *For the purposes of determining the required wall and opening*
8 *protection and roof-covering requirements, distance shall be measured to the exterior wall of*
9 *the home, and not to the float.*

10 **R327.17 Approval of moorage site plan required.** *Every floating home moorage shall*
11 *continuously conform to a moorage site plan that has been approved by the building official.*
12 *Such approval shall be obtained as follows: Three copies of the site plan, drawn to scale and*
13 *completely dimensioned, and setting forth the address and legal description of the property on*
14 *which the moorage is located and the name and address of the owner or operator of the moorage,*
15 *shall be filed with the building official.*

16 The moorage site plan shall show:

- 17 1. The dimensions of the *floating home moorage* site;
- 18 2. The location of abutting public waterways;
- 19 3. The location and dimensions of private waterways and land access to the moorage;
- 20 4. The location and identification of individual floating home sites;
- 21 5. The location and dimensions of off-street parking spaces;
- 22 6. The location and dimensions of walkways and any accessory structures or facilities;
- 23 7. The water service system;
- 24 8. The local side sewer system; and
- 25 9. The electrical service and lighting system.

1 **R328.5 Openness.** A mezzanine shall be open and unobstructed to the room in which the
2 mezzanine is located except for walls not more than 42 inches (1067 mm) in height, columns and
3 posts.

4 **Exceptions:**

5 1. Mezzanines or portions thereof are not required to be open to the room in which they are
6 located, provided that the aggregate floor area of the enclosed space is not greater than 10
7 percent of the mezzanine area.

8 2. Mezzanines that are no more than two stories above grade plane and equipped
9 throughout with an automatic sprinkler system in accordance with NFPA 13R, NFPA
10 13D or Appendix S, a mezzanine having two or more means of egress is not required to
11 be open to the room in which the mezzanine is located.

12 **SECTION R329**

13 **SECURITY FROM CRIMINAL ACTIVITY**

14 **R329.1 Building entrance locks.** Building entrance doors, including garage doors, shall be
15 capable of locking. They shall be equipped with a dead-locking latch bolt with at least a 1/2 inch
16 throw that penetrates the striker not less than 1/4 inch. Building entrance doors shall be openable
17 from the inside without use of a key or special knowledge or effort.

18 **Exception:** Garage-to-exterior doors are permitted to be equipped with an electronically-
19 operated remote control device for opening and closing in lieu of a dead-locking latch bolt.

20 When garage-to-exterior doors are equipped with remote control devices, garage-to-building
21 doors need not be capable of locking.

22 **R329.2 Observation ports.** Every building entrance door, other than garage doors, shall have a
23 visitor observation port or glass side light. Observation ports shall be installed at a height of not
24 less than 54 inches (1372 mm) and not more than 66 inches (1676 mm) from the floor.

1 **R329.3 Windows and sliding doors.** Dead bolts or other approved locking devices shall be
2 provided on all sliding doors and openable windows. The lock shall be installed so that the
3 mounting screws for the lock case are inaccessible from the outside.

4 **Exception:** Windows with sills located 10 feet (3048 mm) or more above grade, or 10 feet or
5 more above a deck, balcony or porch that is not readily accessible from grade except through
6 a housing unit need not have operable inside latching devices.

7 **R329.4 Alternate security devices.** Subject to the approval of the building official, alternate
8 security devices are permitted to be substituted for those required by this section. Alternate
9 devices must have equal capability to resist illegal entry. The installation of the device shall not
10 conflict with other requirements of this code and other ordinances regulating the safety of
11 exiting.

12 **SECTION R330**

13 **SOUND TRANSMISSION CONTROL**

14 **R330.1 General.** Wall and floor-ceiling assemblies separating dwelling units shall provide
15 sound insulation in accordance with this Section R330.

16 **R330.1.1 Perimeter joints.** Joints in the perimeter of such separating wall or floor-ceiling
17 assembly shall be acoustically sealed with a permanent resilient material approved for the
18 purpose. The separating wall or floor-ceiling assembly shall extend completely to and be
19 sealed to another separating assembly or an exterior wall, roof or floor assembly.

20 **R330.1.2 Penetrations.** Conduits, ducts, pipes and vents within the wall or floor-ceiling
21 assembly causing vibration shall be reasonably isolated from the building construction at
22 points of support by means of resilient sleeves, mounts or underlayments. All other openings
23 through which such conduits, ducts, pipes or vents pass shall have the excess opening fully
24 sealed with insulative and permanently resilient materials approved for the purpose.

1 **R330.1.3 Fire-resistance ratings.** Design and materials for sound transmission control shall
2 not impair the fire-resistance rating of separating walls or floor-ceiling assemblies required to
3 be of fire-resistance-rated construction.

4 **R330.2 Airborne sound.** Airborne sound insulation for wall and floor-ceiling assemblies shall
5 meet a Sound Transmission Class (STC) rating of 45 when tested in accordance with ASTM E
6 90.

7 **R330.2.1 Outlet boxes.** Electrical outlet boxes shall not be placed back-to-back and shall be
8 offset by not less than 12 inches (305 mm) from outlets in the opposite wall surface. The
9 back and sides of boxes shall be sealed with 1/8 inch resilient sealant and backed by a
10 minimum of 2 inch thick mineral fiber insulation or approved equivalent.

11 **R330.3 Structural-borne sound.** Floor-ceiling assemblies between dwelling units or between a
12 dwelling unit and a public or service area within a structure shall have an Impact Insulation Class
13 (IIC) rating of not less than 50 when tested in accordance with ASTM E 492. Floor covering may
14 be included in the assembly to obtain the required ratings.

15 **Exception:** Floor assemblies in bathrooms are not required to meet the IIC rating of 50
16 where structural concrete floor systems are used.

17 **R330.4 Tested assemblies.** Field- or laboratory-tested wall or floor-ceiling designs having an
18 STC or IIC of 50 or more may be used without additional field testing when, in the opinion of
19 the building official, the tested design has not been compromised by flanking paths. Tests may
20 be required by the building official when evidence of compromised separations is noted. Wall or
21 floor-ceiling designs field tested by ASTM E 336 having a minimum FSTC or FIIC rating of 45
22 may be used.

23 **R330.5 Field testing and certification.** Field testing, when permitted to determine airborne
24 sound transmission or impact sound insulation class, shall be done in accordance with ASTM E
25 492 under the supervision of an acoustical professional who is experienced in the field of

1 acoustical testing and engineering and who shall forward certified test results to the building
2 official that minimum sound insulation requirements stated above have been met.

3 **R330.6 Sound transmission control systems.** Generic systems listed in GA 600 may be
4 accepted where a laboratory test indicates that the requirements of Section R330 are met by the
5 system.

6 Section 5. The following sections of Chapter 4 of the International Residential Code,
7 2012 Edition, are amended as follows:

8 **CHAPTER 4**
9 **FOUNDATIONS**

10
11 **SECTION R401**
12 **GENERAL**

13 ***

14 **R401.5 Protection of adjoining property.** Adjoining public and private property shall be
15 protected from damage during construction, remodeling and demolition work. Protection shall be
16 provided for footings, foundations, party walls, chimneys, skylights and roofs. Provisions shall
17 be made to control water runoff and erosion during construction or demolition activities. When
18 the existing grade of a site is altered by filling, excavating, dredging or moving of earth
19 materials, the owner shall protect all adjoining property during construction from encroachment
20 or collapse by sloping the sides of the temporary grading at a slope that is safe and not more than
21 one horizontal to one vertical. In addition, adjoining property shall be protected from
22 encroachment or collapse by sloping the sides of the permanent grading at a slope not greater
23 than two horizontal to one vertical. The building official is authorized to approve temporary or
24 permanent slopes that are steeper based on a design by an experienced geotechnical engineer.

In areas of known unsuitable soils, the building official is authorized to require slopes that are less steep to assure protection of adjoining property.

SECTION R402

MATERIALS

R402.2 Concrete. Concrete shall have a minimum specified compressive strength of $f'c$, as shown in Table R402.2. Concrete subject to moderate or severe weathering as indicated in Table R301.2(1) shall be air entrained as specified in Table R402.2. The maximum weight of fly ash, other pozzolans, silica fume, slag or blended cements that is included in concrete mixtures for garage floor slabs and for exterior porches, carport slabs and steps that will be exposed to deicing chemicals shall not exceed the percentages of the total weight of cementitious materials specified in Section 4.2.3 of ACI 318. Materials used to produce concrete and testing thereof shall comply with the applicable standards listed in Chapter 3 of ACI 318 or ACI 332.

Code Alternate R402.2: Five-sack 2000 psi (13 790 kPa) and 5-1/2-sack 2500 psi (17 237 kPa) concrete mixes in accordance with *International Building Code* Section 1904.2 are equivalent to 3000 psi (20 684 kPa) concrete for weathering potential. In addition, air-entrainment is not required to address weathering.

TABLE R402.2
 MINIMUM SPECIFIED COMPRESSIVE STRENGTH OF CONCRETE

TYPE OR LOCATION OF CONCRETE CONSTRUCTION	MINIMUM SPECIFIED COMPRESSIVE STRENGTH ^a (f' _c)		
	Weathering Potential ^b		
	Negligible	Moderate	Severe
Basement walls, foundations and other concrete not exposed to the weather	2,500	2,500	2,500 ^c
Basement slabs and interior slabs on grade, except garage floor slabs	2,500	2,500	2,500 ^c
Basement walls, foundation walls, exterior walls and other vertical concrete work exposed to the weather	2,500	3,000 ^d	3,000 ^d
Porches, carport slabs and steps exposed to the weather, and garage floor slabs	2,500	3,000 ^{d,e,f}	3,500 ^{d,e,f}

For SI: 1 pound per square inch = 6.895 kPa.

a. Strength at 28 days post.

b. See Table R301.2(1) for weathering potential.

c. Concrete in these locations that may be subject to freezing and thawing during construction shall be air-entrained concrete in accordance with Footnote d.

d. Concrete shall be air-entrained. Total air content (percent by volume of concrete) shall be not less than 5 percent or more than 7 percent.

e. See Section R402.2 for maximum cementitious materials content.

f. For garage floors with a steel-troweled finish, reduction of the total air content (percent by volume of concrete) to not less than 3 percent is permitted if the specified compressive strength of the concrete is increased to not less than 4,000 psi.

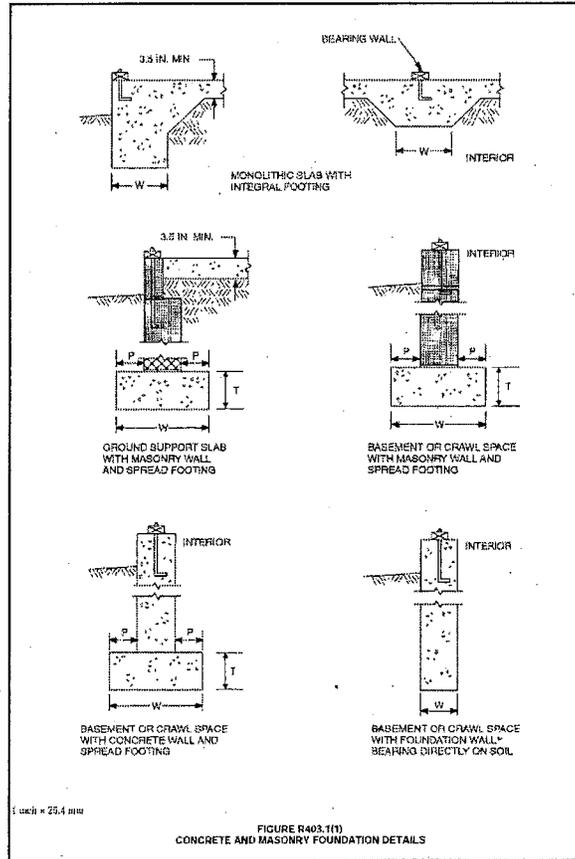
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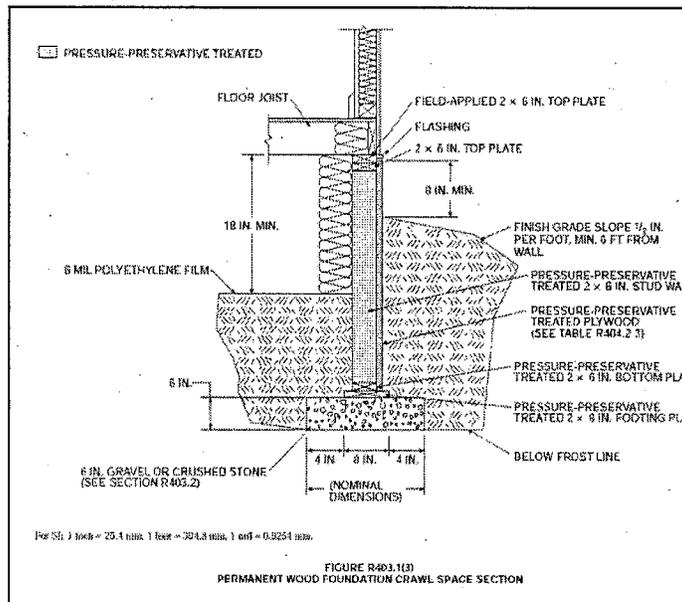
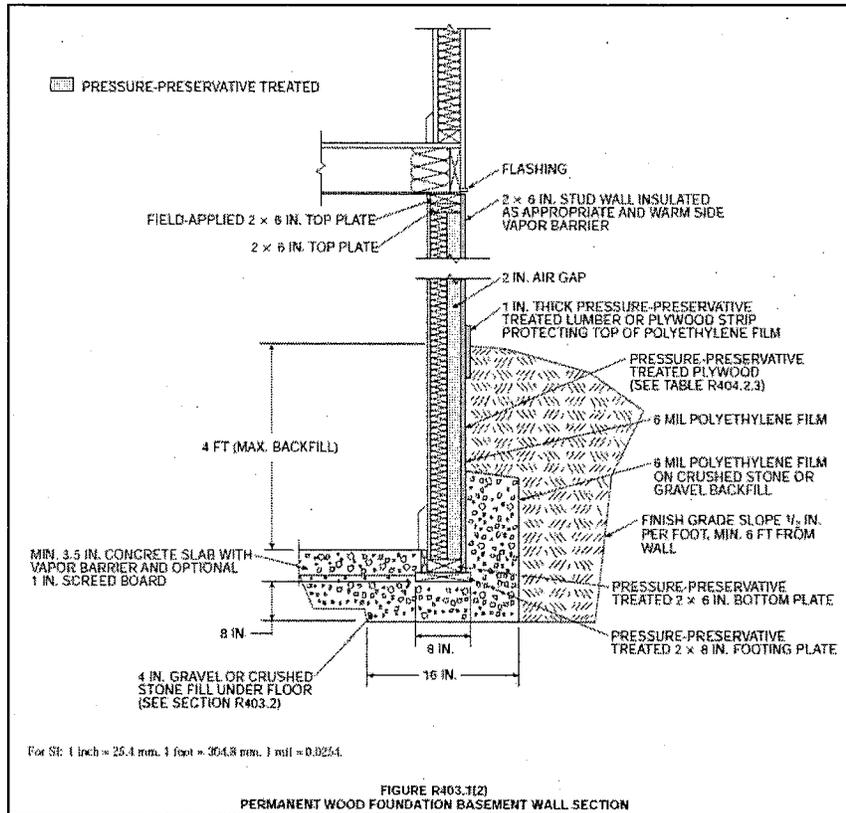
SECTION R403
FOOTINGS

R403.1 General. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other *approved* structural systems which shall be of sufficient design to accommodate all loads according to Section R301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil. Footings shall be supported on undisturbed natural soils or engineered fill. Concrete footing shall be designed and constructed in accordance with the provisions of Section R403 or in accordance with ACI 332.

R403.1.1 Minimum size. Minimum sizes for concrete and masonry footings shall be as set forth in Table R403.1 and Figure R403.1(1). The footing width, *W*, shall be based on the load-bearing value of the soil in accordance with Table R401.4.1. Spread footings shall be at least 6 inches (152 mm) in thickness, *T*. Footing projections, *P*, shall be at least 2 inches (51 mm) and shall not exceed the thickness of the footing. The size of footings supporting piers and columns shall be based on the tributary load and allowable soil pressure in accordance with Table R401.4.1. Footings for wood foundations shall be in accordance with the details set forth in Section R403.2, and Figures R403.1(2) and R403.1(3).

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1 **[W] R403.1.2 Continuous footing in Seismic Design Categories D₀, D₁ and D₂.** The
2 *braced wall panels* at exterior walls of buildings located in Seismic Design Categories
3 D₀, D₁ and D₂ shall be supported by continuous footings. All required interior *braced*
4 *wall panels* (~~(in buildings with plan dimensions greater than 50 feet (15,240 mm) shall~~
5 ~~also be supported by continuous footings)) shall be supported on footings at intervals not~~
6 ~~exceeding 50 feet (15,240 mm).~~

7 **R403.1.3 Seismic reinforcing.** Concrete footings located in Seismic Design Categories
8 D₀, D₁ and D₂, as established in Table R301.2(1), shall have minimum reinforcement.
9 Bottom reinforcement shall be located a minimum of 3 inches (76 mm) clear from the
10 bottom of the footing. In Seismic Design Categories D₀, D₁ and D₂ where a construction
11 joint is created between a concrete footing and a stem wall, a minimum of one No. 4 bar
12 shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall
13 extend to 3 inches (76 mm) clear of the bottom of the footing, have a standard hook and
14 extend a minimum of 14 inches (357 mm) into the stem wall. In Seismic Design
15 Categories D₀, D₁ and D₂ where a grouted masonry stem wall is supported on a concrete
16 footing and stem wall, a minimum of one No. 4 bar shall be installed at not more than 4
17 feet (1219 mm) on center. The vertical bar shall extend to 3 inches (76 mm) clear of the
18 bottom of the footing and have a standard hook. In Seismic Design Categories D₀, D₁ and
19 D₂ masonry stem walls without solid grout and vertical reinforcing are not permitted.

20 **Exception:** In detached one- and two-family *dwelling*s which are three stories or less in
21 height and constructed with stud bearing walls, isolated plain concrete footings,
22 supporting columns or pedestals are permitted.

23 **R403.1.3.1 Foundations with stemwalls.** Foundations with stem walls shall have
24 installed a minimum of one No. 4 bar within 12 inches (305 mm) of the top of the wall

1 and one No. 4 bar located 3 inches (76 mm) to 4 inches (102 mm) from the bottom of the
2 footing.

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

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

9 Where the slab is not cast monolithically with the footing, No. 3 or larger vertical
10 dowels with standard hooks on each end shall be provided in accordance with Figure
11 R403.1.3.2. Standard hooks shall comply with Section R611.5.4.5.

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

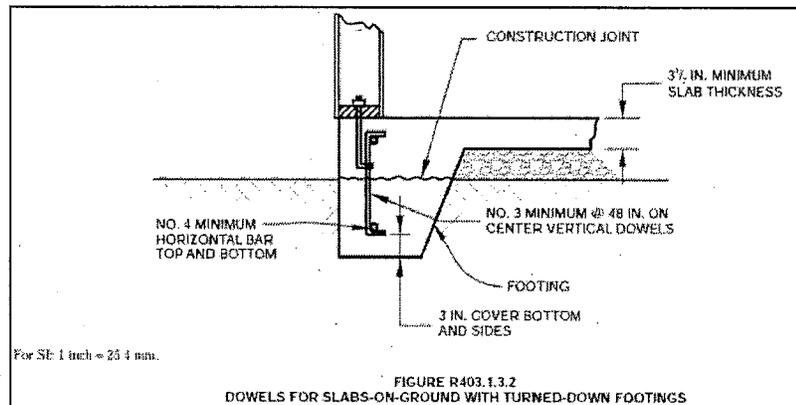
	LOAD-BEARING VALUE OF SOIL (psf)			
	1,500	2,000	3,000	≥4,000
Conventional light-frame construction				
1-story	12	12	12	12
2-story	15	12	12	12
3-story	23	17	12	12
4-inch brick veneer over light frame or 8-inch hollow concrete masonry				
1-story	12	12	12	12
2-story	21	16	12	12
3-story	32	24	16	12
8-inch solid or fully-grouted masonry				
1-story	16	12	12	12
2-story	29	21	14	12
3-story	42	32	21	16

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

a. Where minimum footing width is 12 inches, use of a single wythe of solid or fully grouted 12-inch nominal concrete masonry units is permitted.

b. Represents the number of floors supported

c. Footings shall be permitted to support a roof in addition to the stipulated number of floors. Footings supporting a roof only shall be as required for supporting one floor.



R403.1.4 Minimum depth. All exterior footings shall be placed at least 12 inches (305 mm) below the undisturbed ground surface. Where applicable, the depth of footings shall also conform to Sections R403.1.4.1 through R403.1.4.2.

R403.1.4.1 Frost protection. Except where otherwise protected from frost, foundation walls, piers and other permanent supports of buildings and structures shall be protected from frost by one or more of the following methods:

1. Extended below the frost line specified in Table R301.2.(1);
2. Constructing in accordance with Section R403.3;
3. Constructing in accordance with ASCE 32; or
4. Erected on solid rock.

Exceptions:

1. Protection of freestanding *accessory structures* with an area of 600 square feet (56 m²) or less, of light-frame construction, with an eave height of 10 feet (3048 mm) or less shall not be required.
2. Protection of freestanding *accessory structures* with an area of 400 square feet (37 m²) or less, of other than light-frame construction, with an eave height of 10 feet (3048 mm) or less shall not be required.

1 3. Decks not supported by a dwelling need not be provided with footings that extend
2 below the frost line.

3 Footings shall not bear on frozen soil unless the frozen condition is permanent.

4 **R403.1.4.2 Seismic conditions.** In Seismic Design Categories D₀, D₁ and D₂, interior
5 footings supporting bearing or bracing walls and cast monolithically with a slab on *grade*
6 shall extend to a depth of not less than 12 inches (305 mm) below the top of the slab.

7 **R403.1.5 Slope.** The top surface of footings shall be level. The bottom surface of footings
8 shall not have a slope exceeding one unit vertical in 10 units horizontal (10-percent slope).
9 Footings shall be stepped where it is necessary to change the elevation of the top surface of
10 the footings or where the slope of the bottom surface of the footings will exceed one unit
11 vertical in ten units horizontal (10-percent slope).

12 **R403.1.6 Foundation anchorage.** Sill plates and walls supported directly on continuous
13 foundations shall be anchored to the foundation in accordance with this section. Wood sole
14 plates at all exterior walls on monolithic slabs, wood sole plates of *braced wall panels* at
15 building interiors on monolithic slabs and all wood sill plates shall be anchored to the
16 foundation with anchor bolts spaced a maximum of 6 feet (1829 mm) on center. Bolts shall
17 be at least 1/2 inch (12.7 mm) in diameter and shall extend a minimum of 7 inches (178 mm)
18 into concrete or grouted cells of concrete masonry units. A nut and washer shall be tightened
19 on each anchor bolt. There shall be a minimum of two bolts per plate section with one bolt
20 located not more than 12 inches (305 mm) or less than seven bolt diameters from each end of
21 the plate section. Interior bearing wall sole plates on monolithic slab foundation that are not
22 part of a *braced wall panel* shall be positively anchored with *approved* fasteners. Sill plates
23 and sole plates shall be protected against decay and termites where required by Sections
24 R317 and R318. Cold-formed steel framing systems shall be fastened to wood sill plates or
25 anchored directly to the foundation as required in Section R505.3.1 or R603.3.1.

1 **Exceptions:**

- 2 1. Foundation anchorage, spaced as required to provide equivalent anchorage to 1/2-
- 3 inch-diameter (12.7 mm) anchor bolts.
- 4 2. Walls 24 inches (610 mm) total length or shorter connecting offset *braced wall*
- 5 *panels* shall be anchored to the foundation with a minimum of one anchor bolt
- 6 located in the center third of the plate section and shall be attached to adjacent
- 7 *braced wall panels* at corners as shown in item 8 of Table R602.3(1).
- 8 3. Connection of walls 12 inches (305 mm) total length or shorter connecting offset
- 9 *braced wall panels* to the foundation without anchor bolts shall be permitted. The
- 10 wall shall be attached to adjacent *braced wall panels* at corners as shown in item 8 of
- 11 Table R602.3(1).

12 **R403.1.6.1 Foundation anchorage in Seismic Design Categories C, D₀, D₁ and D₂.** In

13 addition to the requirements of Section R403.1.6, the following requirements shall apply

14 to wood light-frame structures in Seismic Design Categories D₀, D₁ and D₂ and wood

15 light-frame townhouses in Seismic Design Category C.

- 16 1. Plate washers conforming to Section R602.11.1 shall be provided for all anchor
- 17 bolts over the full length of required *braced wall lines* except where *approved*
- 18 anchor straps are used. Properly sized cut washers shall be permitted for anchor bolts
- 19 in wall lines not containing *braced wall panels*.
- 20 2. Interior braced wall plates shall have anchor bolts spaced at not more than 6 feet
- 21 (1829 mm) on center and located within 12 inches (305 mm) of the ends of each
- 22 plate section when supported on a continuous foundation.
- 23 3. Interior bearing wall sole plates shall have anchor bolts spaced at not more than 6
- 24 feet (1829 mm) on center and located within 12 inches (305 mm) of the ends of each
- 25 plate section when supported on a continuous foundation.

1 4. The maximum anchor bolt spacing shall be 4 feet (1219 mm) for buildings over two
2 stories in height.

3 5. Stepped cripple walls shall conform to Section R602.11.2.

4 6. Where continuous wood foundations in accordance with Section R404.2 are used,
5 the force transfer shall have a capacity equal to or greater than the connections
6 required by Section R602.11.1 or the *braced wall panel* shall be connected to the
7 wood foundations in accordance with the *braced wall panel-to-floor* fastening
8 requirements of Table R602.3(1).

9 **R403.1.7 Footings on or adjacent to slopes.** The placement of buildings and structures on
10 or adjacent to slopes steeper than one unit vertical in three units horizontal (33.3-percent
11 slope) shall conform to Sections R403.1.7.1 through R403.1.7.4.

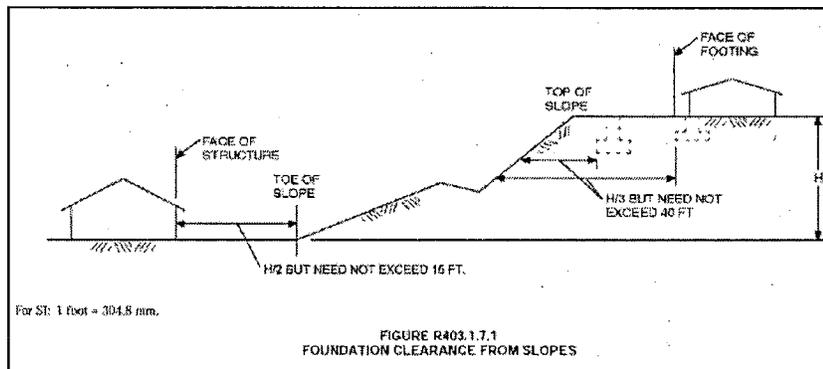
12 **R403.1.7.1 Building clearances from ascending slopes.** In general, buildings below
13 slopes shall be set a sufficient distance from the slope to provide protection from slope
14 drainage, erosion and shallow failures. Except as provided in Section R403.1.7.4 and
15 Figure 403.1.7.1, the following criteria will be assumed to provide this protection. Where
16 the existing slope is steeper than one unit vertical in one unit horizontal (100-percent
17 slope), the toe of the slope shall be assumed to be at the intersection of a horizontal plane
18 drawn from the top of the foundation and a plane drawn tangent to the slope at an angle
19 of 45 degrees (0.79 rad) to the horizontal. Where a retaining wall is constructed at the toe
20 of the slope, the height of the slope shall be measured from the top of the wall to the top
21 of the slope.

22 **R403.1.7.2 Footing setback from descending slope surfaces.** Footings on or adjacent to
23 slope surfaces shall be founded in material with an embedment and setback from the
24 slope surface sufficient to provide vertical and lateral support for the footing without
25 detrimental settlement. Except as provided for in Section R403.1.7.4 and Figure
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1 R403.1.7.1, the following setback is deemed adequate to meet the criteria. Where the
2 slope is steeper than one unit vertical in one unit horizontal (100-percent slope), the
3 required setback shall be measured from an imaginary plane 45 degrees (0.79 rad) to the
4 horizontal, projected upward from the toe of the slope.

5 **R403.1.7.3 Foundation elevation.** On graded sites, the top of any exterior foundation
6 shall extend above the elevation of the street gutter at point of discharge or the inlet of an
7 *approved* drainage device a minimum of 12 inches (305 mm) plus 2 percent. Alternate
8 elevations are permitted subject to the approval of the *building official*, provided it can be
9 demonstrated that required drainage to the point of discharge and away from the structure
10 is provided at all locations on the site.

11 **R403.1.7.4 Alternate setback and clearances.** Alternate setbacks and clearances are
12 permitted, subject to the approval of the *building official*. The *building official* is
13 permitted to require an investigation and recommendation of a qualified engineer to
14 demonstrate that the intent of this section has been satisfied. Such an investigation shall
15 include consideration of material, height of slope, slope gradient, load intensity and
16 erosion characteristics of slope material.



1 foundation walls, project drawings, typical details and specifications are not required to bear
2 the seal of the architect or engineer responsible for design, unless otherwise required by the
3 state law of the *jurisdiction* having authority.

4 **R404.1.1.1 Masonry foundation walls.** Concrete masonry and clay masonry foundation
5 walls shall be constructed as set forth in Table R404.1.1(1), R404.1.1(2), R404.1.1(3) or
6 R404.1.1(4) and shall also comply with applicable provisions of Sections R606, R607
7 and R608. In buildings assigned to Seismic Design Categories D₀, D₁ and D₂, concrete
8 masonry and clay masonry foundation walls shall also comply with Section R404.1.4.1.
9 Rubble stone masonry foundation walls shall be constructed in accordance with Sections
10 R404.1.8 and R607.2.2. Rubble stone masonry walls shall not be used in Seismic Design
11 Categories D₀, D₁ and D₂.

12 **R404.1.2 Concrete foundation walls.** Concrete foundation walls that support light-frame
13 walls shall be designed and constructed in accordance with the provisions of this section,
14 ACI 318, ACI 332 or PCA 100. Concrete foundation walls that support above-grade concrete
15 walls that are within the applicability limits of Section R611.2 shall be designed and
16 constructed in accordance with the provisions of this section, ACI 318, ACI 332 or PCA 100.
17 Concrete foundation walls that support above-grade concrete walls that are not within the
18 applicability limits of Section R611.2 shall be designed and constructed in accordance with
19 the provisions of ACI 318, ACI 332 or PCA 100. When ACI 318, ACI 332, PCA 100 or the
20 provisions of this section are used to design concrete foundation walls, project drawings,
21 typical details and specifications are not required to bear the seal of the architect or engineer
22 responsible for design, unless otherwise required by the state law of the *jurisdiction* having
23 authority.

24 **R404.1.2.1 Concrete cross-section.** Concrete walls constructed in accordance with this
25 code shall comply with the shapes and minimum concrete cross-sectional dimensions
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1 required by Table R611.3. Other types of forming systems resulting in concrete walls not
2 in compliance with this section and Table R611.3 shall be designed in accordance with
3 ACI 318.

4 **[W] R404.1.2.2 Reinforcement for foundation walls.** Concrete foundation walls shall
5 be laterally supported at the top (~~and bottom~~) except where permitted in R404.1.2.2.1
6 and R404.1.2.2.2, and at the bottom where required elsewhere in this code. Horizontal
7 reinforcement shall be provided in accordance with Table R404.1.2(1). Vertical
8 reinforcement shall be provided in accordance with Table R404.1.2(2), R404.1.2(3),
9 R404.1.2(4), R404.1.2(5), R404.1.2(6), R404.1.2(7) or R404.1.2(8). Vertical
10 reinforcement for flat *basement* walls retaining 4 feet (1219 mm) or more of unbalanced
11 backfill is permitted to be determined in accordance with Table R404.1.2(9). For
12 *basement* walls supporting above-grade concrete walls, vertical reinforcement shall be
13 the greater of that required by Tables R404.1.2(2) through R404.1.2(8) or by Section
14 R611.6 for the above-grade wall. In buildings assigned to Seismic Design Category D₀,
15 D₁ or D₂, concrete foundation walls shall also comply with Section R404.1.4.2.

16 **R404.1.2.2.1 Concrete foundation stem walls supporting above-grade concrete**
17 **walls.** Foundation stem walls that support above-grade concrete walls shall be
18 designed and constructed in accordance with this section.

- 19 1. Stem walls not laterally supported at top. Concrete stem walls that are not
20 monolithic with slabs-on-ground or are not otherwise laterally supported by
21 slabs-on-ground shall comply with this section. Where unbalanced backfill
22 retained by the stem wall is less than or equal to 18 inches (457 mm), the stem
23 wall and above-grade wall it supports shall be provided with vertical
24 reinforcement in accordance with Section R611.6 and Table R611.6(1),
25 R611.6(2) or R611.6(3) for above-grade walls. Where unbalanced backfill
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1 retained by the stem wall is greater than 18 inches (457 mm), the stem wall and
2 above-grade wall it supports shall be provided with vertical reinforcement in
3 accordance with Section R611.6 and Table R611.6(4).

4 2. Stem walls laterally supported at top. Concrete stem walls that are monolithic
5 with slabs-on-ground or are otherwise laterally supported by slabs-on-ground
6 shall be vertically reinforced in accordance with Section R611.6 and Table
7 R611.6(1), R611.6(2) or R611.6(3) for above-grade walls. Where the unbalanced
8 backfill retained by the stem wall is greater than 18 inches (457 mm), the
9 connection between the stem wall and the slab-on-ground, and the portion of the
10 slab-on-ground providing lateral support for the wall shall be designed in
11 accordance with PCA 100 or in accordance with accepted engineering practice.

12 Where the unbalanced backfill retained by the stem wall is greater than 18 inches
13 (457 mm), the minimum nominal thickness of the wall shall be 6 inches (152
14 mm).

15 **R404.1.2.2.2 Concrete foundation stem walls supporting light-frame above-grade**
16 **walls.** Concrete foundation stem walls that support light-frame above-grade walls
17 shall be designed and constructed in accordance with this section.

18 1. Stem walls not laterally supported at top. Concrete stem walls that are not
19 monolithic with slabs-on-ground or are not otherwise laterally supported by
20 slabs-on-ground and retain 48 inches (1219 mm) or less of unbalanced fill,
21 measured from the top of the wall, shall be constructed in accordance with
22 Section R404.1.2. Foundation stem walls that retain more than 48 inches (1219
23 mm) of unbalanced fill, measured from the top of the wall, shall be designed in
24 accordance with Sections R404.1.3 and R404.4.

1 2. Stem walls laterally supported at top. Concrete stem walls that are monolithic
2 with slabs-on-ground or are otherwise laterally supported by slabs-on-ground
3 shall be constructed in accordance with Section R404.1.2. Where the unbalanced
4 backfill retained by the stem wall is greater than 48 inches (1219 mm), the
5 connection between the stem wall and the slab-on-ground, and the portion of the
6 slab-on-ground providing lateral support for the wall shall be designed in
7 accordance with PCA 100 or in accordance with accepted engineering practice.

8 **R404.1.2.3 Concrete, materials for concrete, and forms.** Materials used in concrete,
9 the concrete itself and forms shall conform to requirements of this section or ACI 318.

10 **R404.1.2.3.1 Compressive strength.** The minimum specified compressive strength
11 of concrete, f'_c , shall comply with Section R402.2 and shall be not less than 2,500 psi
12 (17.2 MPa) at 28 days in buildings assigned to Seismic Design Category A, B or C
13 and 3000 psi (20.5 MPa) in buildings assigned to Seismic Design Category D₀, D₁ or
14 D₂.

15 **R404.1.2.3.2 Concrete mixing and delivery.** Mixing and delivery of concrete shall
16 comply with ASTM C 94 or ASTM C 685.

17 **R404.1.2.3.3 Maximum aggregate size.** The nominal maximum size of coarse
18 aggregate shall not exceed one-fifth the narrowest distance between sides of forms, or
19 three-fourths the clear spacing between reinforcing bars or between a bar and the side
20 of the form.

21 **Exception:** When *approved*, these limitations shall not apply where removable
22 forms are used and workability and methods of consolidation permit concrete to be
23 placed without honeycombs or voids.

24 **R404.1.2.3.4 Proportioning and slump of concrete.** Proportions of materials for
25 concrete shall be established to provide workability and consistency to permit
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1 concrete to be worked readily into forms and around reinforcement under conditions
2 of placement to be employed, without segregation or excessive bleeding. Slump of
3 concrete placed in removable forms shall not exceed 6 inches (152 mm).

4 **Exception:** When *approved*, the slump is permitted to exceed 6 inches (152 mm)
5 for concrete mixtures that are resistant to segregation, and are in accordance with
6 the form manufacturer's recommendations. Slump of concrete placed in stay-in-
7 place forms shall exceed 6 inches (152 mm). Slump of concrete shall be
8 determined in accordance with ASTM C 143.

9 **R404.1.2.3.5 Consolidation of concrete.** Concrete shall be consolidated by suitable
10 means during placement and shall be worked around embedded items and
11 reinforcement and into corners of forms. Where stay-in-place forms are used,
12 concrete shall be consolidated by internal vibration.

13 **Exception:** When *approved* for concrete to be placed in stay-in-place forms, self-
14 consolidating concrete mixtures with slumps equal to or greater than 8 inches (203
15 mm) that are specifically designed for placement without internal vibration need
16 not be internally vibrated.

17 **R404.1.2.3.6 Form materials and form ties.** Forms shall be made of wood, steel,
18 aluminum, plastic, a composite of cement and foam insulation, a composite of cement
19 and wood chips, or other *approved* material suitable for supporting and containing
20 concrete. Forms shall provide sufficient strength to contain concrete during the
21 concrete placement operation. Form ties shall be steel, solid plastic, foam plastic, a
22 composite of cement and wood chips, a composite of cement and foam plastic, or
23 other suitable material capable of resisting the forces created by fluid pressure of
24 fresh concrete.

1 **R404.1.2.3.6.1 Stay-in-place forms.** Stay-in-place concrete forms shall comply
2 with this section.

3 1. Surface burning characteristics. The flame-spread index and smoke-
4 developed index of forming material, other than foam plastic, left exposed on
5 the interior shall comply with Section R302. The surface burning
6 characteristics of foam plastic used in insulating concrete forms shall comply
7 with Section R316.3.

8 2. Interior covering. Stay-in-place forms constructed of rigid foam plastic shall
9 be protected on the interior of the building as required by Section R316.
10 Where gypsum board is used to protect the foam plastic, it shall be installed
11 with a mechanical fastening system. Use of adhesives in addition to
12 mechanical fasteners is permitted.

13 3. Exterior wall covering. Stay-in-place forms constructed of rigid foam plastics
14 shall be protected from sunlight and physical damage by the application of an
15 *approved* exterior wall covering complying with this code. Exterior surfaces
16 of other stay-in-place forming systems shall be protected in accordance with
17 this code.

18 4. Termite hazards. In areas where hazard of termite damage is very heavy in
19 accordance with Figure R301.2(6), foam plastic insulation shall be permitted
20 below *grade* on foundation walls in accordance with one of the following
21 conditions:

22 4.1. Where in addition to the requirements in Section R318.1, an *approved*
23 method of protecting the foam plastic and structure from subterranean
24 termite damage is provided.

1 4.2. The structural members of walls, floors, ceilings and roofs are entirely of
2 noncombustible materials or pressure-preservative-treated wood.

3 4.3. On the interior side of *basement* walls.

4 5. Flat ICF wall system forms shall conform to ASTM E 2634.

5 **R404.1.2.3.7 Reinforcement.**

6 **R404.1.2.3.7.1 Steel reinforcement.** Steel reinforcement shall comply with the
7 requirements of ASTM A 615, A 706, or A 996. ASTM A 996 bars produced from
8 rail steel shall be Type R. In buildings assigned to Seismic Design Category A, B or
9 C, the minimum yield strength of reinforcing steel shall be 40,000 psi (Grade 40)
10 (276 MPa). In buildings assigned to Seismic Design Category D₀, D₁ or D₂,
11 reinforcing steel shall comply with the requirements of ASTM A 706 for low-alloy
12 steel with a minimum yield strength of 60,000 psi (Grade 60) (414 MPa).

13 **R404.1.2.3.7.2 Location of reinforcement in wall.** The center of vertical
14 reinforcement in *basement* walls determined from Tables R404.1.2(2) through
15 R404.1.2(7) shall be located at the centerline of the wall. Vertical reinforcement in
16 *basement* walls determined from Table R404.1.2(8) shall be located to provide a
17 maximum cover of 1.25 inches (32 mm) measured from the inside face of the wall.
18 Regardless of the table used to determine vertical wall reinforcement, the center of
19 the steel shall not vary from the specified location by more than the greater of 10
20 percent of the wall thickness and 3/8-inch (10 mm). Horizontal and vertical
21 reinforcement shall be located in foundation walls to provide the minimum cover
22 required by Section R404.1.2.3.7.4.

23 **R404.1.2.3.7.3 Wall openings.** Vertical wall reinforcement required by Section
24 R404.1.2.2 that is interrupted by wall openings shall have additional vertical

1 reinforcement of the same size placed within 12 inches (305 mm) of each side of the
2 opening.

3 **R404.1.2.3.7.4 Support and cover.** Reinforcement shall be secured in the proper
4 location in the forms with tie wire or other bar support system to prevent
5 displacement during the concrete placement operation. Steel reinforcement in
6 concrete cast against the earth shall have a minimum cover of 3 inches (75 mm).
7 Minimum cover for reinforcement in concrete cast in removable forms that will be
8 exposed to the earth or weather shall be 1-1/2 inches (38 mm) for No. 5 bars and
9 smaller, and 2 inches (50 mm) for No. 6 bars and larger. For concrete cast in
10 removable forms that will not be exposed to the earth or weather, and for concrete
11 cast in stay-in-place forms, minimum cover shall be 3/4 inch (19 mm). The minus
12 tolerance for cover shall not exceed the smaller of one-third the required cover or 3/8
13 inch (10 mm).

14 **R404.1.2.3.7.5 Lap splices.** Vertical and horizontal wall reinforcement shall be the
15 longest lengths practical. Where splices are necessary in reinforcement, the length of
16 lap splice shall be in accordance with Table R611.5.4.(1) and Figure R611.5.4(1). The
17 maximum gap between noncontact parallel bars at a lap splice shall not exceed the
18 smaller of one-fifth the required lap length and 6 inches (152 mm). See Figure
19 R611.5.4(1).

20 **R404.1.2.3.7.6 Alternate grade of reinforcement and spacing.** Where tables in
21 Section R404.1.2.2 specify vertical wall reinforcement based on minimum bar size
22 and maximum spacing, which are based on Grade 60 (414 MPa) steel reinforcement,
23 different size bars and/or bars made from a different grade of steel are permitted
24 provided an equivalent area of steel per linear foot of wall is provided. Use of Table
25 R404.1.2(9) is permitted to determine the maximum bar spacing for different bar
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1 sizes than specified in the tables and/or bars made from a different grade of steel.

2 Bars shall not be spaced less than one-half the wall thickness, or more than 48 inches
3 (1219 mm) on center.

4 **R404.1.2.3.7.7 Standard hooks.** Where reinforcement is required by this code to
5 terminate with a standard hook, the hook shall comply with Section R611.5.4.5 and
6 Figure R611.5.4(3).

7 **R404.1.2.3.7.8 Construction joint reinforcement.** Construction joints in foundation
8 walls shall be made and located to not impair the strength of the wall. Construction
9 joints in plain concrete walls, including walls required to have not less than No. 4
10 bars at 48 inches (1219 mm) on center by Sections R404.1.2.2 and R404.1.4.2, shall
11 be located at points of lateral support, and a minimum of one No. 4 bar shall extend
12 across the construction joint at a spacing not to exceed 24 inches (610 mm) on center.
13 Construction joint reinforcement shall have a minimum of 12 inches (305 mm)
14 embedment on both sides of the joint. Construction joints in reinforced concrete walls
15 shall be located in the middle third of the span between lateral supports, or located
16 and constructed as required for joints in plain concrete walls.

17 **Exception:** Use of vertical wall reinforcement required by this code is permitted
18 in lieu of construction joint reinforcement provided the spacing does not exceed
19 24 inches (610 mm), or the combination of wall reinforcement and No.4 bars
20 described above does not exceed 24 inches (610 mm).

21 **R404.1.2.3.8 Exterior wall coverings.** Requirements for installation of masonry veneer,
22 stucco and other wall coverings on the exterior of concrete walls and other construction
23 details not covered in this section shall comply with the requirements of this code.
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1 **R404.1.2.4 Requirements for Seismic Design Category C.** Concrete foundation walls
2 supporting above-grade concrete walls in townhouses assigned to Seismic Design Category
3 C shall comply with ACI 318, ACI 332 or PCA 100 (see Section R404.1.2).

4 **R404.1.3 Design required.** Concrete or masonry foundation walls shall be designed in
5 accordance with accepted engineering practice when either of the following conditions
6 exists:

- 7 1. Walls are subject to hydrostatic pressure from groundwater.
- 8 2. Walls supporting more than 48 inches (1219 mm) of unbalanced backfill that do not
9 have permanent lateral support at the top or bottom.

10 **R404.1.4 Seismic Design Category D0, D1 or D2.**

11 **R404.1.4.1 Masonry foundation walls.** In addition to the requirements of Table
12 R404.1.1(1) plain masonry foundation walls in buildings assigned to Seismic Design
13 Category D₀, D₁ or D₂, as established in Table R301.2(1), shall comply with the
14 following.

- 15 1. Wall height shall not exceed 8 feet (2438 mm).
- 16 2. Unbalanced backfill height shall not exceed 4 feet (1219 mm).
- 17 3. Minimum nominal thickness for plain masonry foundation walls shall be 8 inches
18 (203 mm).
- 19 4. Masonry stem walls shall have a minimum vertical reinforcement of one No. 3 (No.
20 10) bar located a maximum of 4 feet (1219 mm) on center in grouted cells. Vertical
21 reinforcement shall be tied to the horizontal reinforcement in the footings.

22 Foundation walls in buildings assigned to Seismic Design Category D₀, D₁ or D₂, as
23 established in Table R301.2(1), supporting more than 4 feet (1219 mm) of
24 unbalanced backfill or exceeding 8 feet (2438 mm) in height shall be constructed in
25 accordance with Table R404.1.1(2), R404.1.1(3) or R404.1.1(4). Masonry

1 foundation walls shall have two No. 4 (No. 13) horizontal bars located in the upper
2 12 inches (305 mm) of the wall.

3 **R404.1.4.2 Concrete foundation walls.** In buildings assigned to Seismic Design
4 Category D₀, D₁ or D₂, as established in Table R301.2(1), concrete foundation walls that
5 support light-frame walls shall comply with this section, and concrete foundation walls
6 that support above-grade concrete walls shall comply with ACI 318, ACI 332 or PCA
7 100 (see Section R404.1.2). In addition to the horizontal reinforcement required by Table
8 R404.1.2(1), plain concrete walls supporting light-frame walls shall comply with the
9 following.

- 10 1. Wall height shall not exceed 8 feet (2438 mm).
- 11 2. Unbalanced backfill height shall not exceed 4 feet (1219 mm).
- 12 3. Minimum thickness for plain concrete foundation walls shall be 7.5 inches (191
13 mm) except that 6 inches (152 mm) is permitted where the maximum wall height is
14 4 feet, 6 inches (1372 mm). Foundation walls less than 7.5 inches (191 mm) in
15 thickness, supporting more than 4 feet (1219 mm) of unbalanced backfill or
16 exceeding 8 feet (2438 mm) in height shall be provided with horizontal
17 reinforcement in accordance with Table R404.1.2(1), and vertical reinforcement in
18 accordance with Table R404.1.2(2), R404.1.2(3), R404.1.2(4), R404.1.2(5),
19 R404.1.2(6), R404.1.2(7) or R404.1.2(8). Where Tables R404.1.2(2) through
20 R404.1.2(8) permit plain concrete walls, not less than No. 4 (No. 13) vertical bars at
21 a spacing not exceeding 48 inches (1219 mm) shall be provided.

22 **R404.1.5 Foundation wall thickness based on walls supported.** The thickness of masonry
23 or concrete foundation walls shall not be less than that required by Section R404.1.5.1 or
24 R404.1.5.2, respectively.

1 **R404.1.5.1 Masonry wall thickness.** Masonry foundation walls shall not be less than the
2 thickness of the wall supported, except that masonry foundation walls of at least 8-inch
3 (203 mm) nominal thickness shall be permitted under brick veneered frame walls and
4 under 10-inch-wide (254 mm) cavity walls where the total height of the wall supported,
5 including gables, is not more than 20 feet (6096 mm), provided the requirements of
6 Section R404.1.1 are met.

7 **R404.1.5.2 Concrete wall thickness.** The thickness of concrete foundation walls shall be
8 equal to or greater than the thickness of the wall in the *story* above. Concrete foundation
9 walls with corbels, brackets or other projections built into the wall for support of masonry
10 veneer or other purposes are not within the scope of the tables in this section. Where a
11 concrete foundation wall is reduced in thickness to provide a shelf for the support of
12 masonry veneer, the reduced thickness shall be equal to or greater than the thickness of
13 the wall in the *story* above. Vertical reinforcement for the foundation wall shall be based
14 on Table R404.1.2(8) and located in the wall as required by Section R404.1.2.3.7.2 where
15 that table is used. Vertical reinforcement shall be based on the thickness of the thinner
16 portion of the wall.

17 **Exception:** Where the height of the reduced thickness portion measured to the
18 underside of the floor assembly or sill plate above is less than or equal to 24 inches
19 (610 mm) and the reduction in thickness does not exceed 4 inches (102 mm), the
20 vertical reinforcement is permitted to be based on the thicker portion of the wall.

21 **R404.1.5.3 Pier and curtain wall foundations.** Use of pier and curtain wall foundations
22 shall be permitted to support light-frame construction not more than two stories in height,
23 provided the following requirements are met:

- 24 1. All load-bearing walls shall be placed on continuous concrete footings placed
25 integrally with the exterior wall footings.

- 1 2. The minimum actual thickness of a load-bearing masonry wall shall be not less than
2 4 inches (102 mm) nominal or 3-3/8 inches (92 mm) actual thickness, and shall be
3 bonded integrally with piers spaced in accordance with Section R606.9.
- 4 3. Piers shall be constructed in accordance with Section R606.6 and Section R606.6.1,
5 and shall be bonded into the load-bearing masonry wall in accordance with Section
6 R608.1.1 or R608.1.1.2.
- 7 4. The maximum height of a 4-inch (102 mm) load-bearing masonry foundation wall
8 supporting wood-frame walls and floors shall not be more than 4 feet (1219 mm).
- 9 5. Anchorage shall be in accordance with Section R403.1.6, Figure R404.1.5(1), or as
10 specified by engineered design accepted by the *building official*.
- 11 6. The unbalanced fill for 4-inch (102 mm) foundation walls shall not exceed 24
12 inches (610 mm) for solid masonry or 12 inches (305 mm) for hollow masonry.
- 13 7. In Seismic Design Categories D0, D1 and D2, prescriptive reinforcement shall be
14 provided in the horizontal and vertical direction. Provide minimum horizontal joint
15 reinforcement of two No. 9 gage wires spaced not less than 6 inches (152 mm) or
16 one 1/4 inch (6.4 mm) diameter wire at 10 inches (254 mm) on center vertically.
17 Provide minimum vertical reinforcement of one No. 4 bar at 48 inches (1220 mm)
18 on center horizontally grouted in place.

19 **R404.1.6 Height above finished grade.** Concrete and masonry foundation walls shall extend
20 above the finished *grade* adjacent to the foundation at all points a minimum of 4 inches (102
21 mm) where masonry veneer is used and a minimum of 6 inches (152 mm) elsewhere.

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

1 **Exception:** Bracing is not required for walls supporting less than 4 feet (1219 mm) of
2 unbalanced backfill.

3 **R404.1.8 Rubble stone masonry.** Rubble stone masonry foundation walls shall have a
4 minimum thickness of 16 inches (406 mm), shall not support an unbalanced backfill
5 exceeding 8 feet (2438 mm) in height, shall not support a soil pressure greater than 30
6 pounds per square foot per foot (4.71 kPa/m), and shall not be constructed in Seismic Design
7 Categories D₀, D₁ D₂ or townhouses in Seismic Design Category C, as established in Figure
8 R301.2(2).

9 **R404.1.9 Isolated masonry piers.** Isolated masonry piers shall be constructed in accordance
10 with this section and the general masonry construction requirements of Section R606.

11 Hollow masonry piers shall have a minimum nominal thickness of 8 inches (203 mm), with a
12 nominal height not exceeding four times the nominal thickness and a nominal length not
13 exceeding three times the nominal thickness. Where hollow masonry units are solidly filled
14 with concrete or grout, piers shall be permitted to have a nominal height not exceeding ten
15 times the nominal thickness. Footings for isolated masonry piers shall be sized in accordance
16 with Section R403.1.1.

17 **R404.1.9.1 Pier cap.** Hollow masonry piers shall be capped with 4 inches (102 mm) of
18 solid masonry or concrete, a masonry cap block, or shall have cavities of the top course
19 filled with concrete or grout. Where required, termite protection for the pier cap shall be
20 provided in accordance with Section R318.

21 **R404.1.9.2 Masonry piers supporting floor girders.** Masonry piers supporting wood
22 girders sized in accordance with Tables R502.5(1) and R502.5(2) shall be permitted in
23 accordance with this section. Piers supporting girders for interior bearing walls shall have
24 a minimum nominal dimension of 12 inches (305 mm) and a maximum height of 10 feet
25 (3048 mm) from top of footing to bottom of sill plate or girder. Piers supporting girders
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for exterior bearing walls shall have a minimum nominal dimension of 12 inches (305 mm) and a maximum height of 4 feet (1220 mm) from top of footing to bottom of sill plate or girder. Girders and sill plates shall be anchored to the pier or footing in accordance with Section R403.1.6 or Figure R404.1.5(1). Floor girder bearing shall be in accordance with Section R502.6.

R404.1.9.3 Masonry piers supporting braced wall panels. Masonry piers supporting *braced wall panels* shall be designed in accordance with accepted engineering practice.

R404.1.9.4 Seismic design of masonry piers. Masonry piers in all *dwelling*s located in Seismic Design Category D0, D1 or D2, and townhouses in Seismic Design Category C, shall be designed in accordance with accepted engineering practice.

R404.1.9.5 Masonry piers in flood hazard areas. Masonry piers for *dwelling*s in flood hazard areas shall be designed in accordance with Section R322.

TABLE R404.1.1(1)
 PLAIN MASONRY FOUNDATION WALLS

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

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 Pa.
 a. Mortar shall be Type M or S and masonry shall be laid in running bond. UngROUTED hollow masonry units are permitted except where otherwise indicated.
 b. Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1.
 c. Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab-on-grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.
 d. Solid grouted hollow units or solid masonry units.
 e. Wall construction shall be in accordance with either Table R404.1.1(2), Table R404.1.1(3), Table R404.1.1(4), or a design shall be provided.

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TABLE R404.1.1(2)
8-INCH MASONRY FOUNDATION WALLS WITH REINFORCING WHERE d > 5 INCHES^{a,c}

WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL ^b	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES) ^{b,c}		
		Soil classes and lateral soil load ^d (psf per foot below grade)		
		GM, GP, SW and SP soils 30	GM, GC, SM, SA, SC and ML soils 45	SC, ML, CL and inorganic CL soils 60
6 feet 8 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#4 at 48
	6 feet 8 inches	#4 at 48	#5 at 48	#6 at 48
7 feet 4 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#4 at 48
	7 feet 4 inches	#4 at 48	#5 at 48	#5 at 48
8 feet	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#4 at 48
	8 feet	#4 at 48	#5 at 48	#5 at 48
8 feet 8 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#4 at 48
	8 feet 8 inches	#4 at 48	#5 at 48	#5 at 48
9 feet 4 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#4 at 48
	9 feet 4 inches	#4 at 48	#5 at 48	#5 at 48
10 feet	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#4 at 48
	10 feet	#4 at 48	#5 at 48	#5 at 48

^a For SI: 1 inch = 25.4 mm, 8 feet = 2438 mm, 1 pound per square foot = 0.157 kPa/m².
^b Mortar shall be Type M or S and masonry shall be laid in running bond.
^c Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per linear foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches.
^d Vertical reinforcement shall be Grade 60 minimum. The distance, d, from the face of the soil side of the wall to the center of vertical reinforcement shall be at least 3 inches.
^e Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for static conditions without hydrostatic pressure. Refer to Table R405.1.

TABLE R404.1.1(D)
10-INCH MASONRY FOUNDATION WALLS WITH REINFORCING WHERE $d > 6.75$ INCHES*

WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL*	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES)†		
		Soil classes and later soil load† (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, ML-CL and inorganic CL soils 60
6 feet 8 inches	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet 8 inches	#4 at 56	#5 at 56	#5 at 56
7 feet 4 inches	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	7 feet 4 inches	#4 at 56	#4 at 56	#5 at 56
8 feet	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#4 at 56	#5 at 56
	8 feet	#5 at 56	#5 at 56	#6 at 48
8 feet 8 inches	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#4 at 56	#5 at 56
	8 feet 8 inches	#5 at 56	#5 at 48	#6 at 32
9 feet 4 inches	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#5 at 56	#5 at 56
	7 feet	#4 at 56	#5 at 56	#6 at 50
	9 feet 4 inches	#5 at 56	#6 at 36	#6 at 24
10 feet	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#5 at 56	#5 at 56
	7 feet	#5 at 56	#6 at 48	#6 at 48
	8 feet	#5 at 56	#6 at 48	#6 at 40
	10 feet	#6 at 48	#6 at 40	#6 at 24

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

a. Mortar shall be Type M or S and masonry shall be laid in running bond.

b. Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per linear foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches.

c. Vertical reinforcement shall be Grade 60 minimum. The distance, d , from the face of the soil side of the wall to the center of vertical reinforcement shall be at least 6.75 inches.

d. Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for moist conditions without hydrostatic pressure. Refer to Table R403.1.

e. Unbalanced backfill height is the difference in height between the exterior finish ground level and the toep of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab on grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.

TABLE R404.1.1(4)
12-INCH MASONRY FOUNDATION WALLS WITH REINFORCING WHERE $d > 8.75$ INCHES^{a,c}

WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL ^a	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES) ^{a,c}		
		Soil classes and lateral soil load ^d (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SG and ML soils 45	SC, ML-CL and inorganic CL soils 60
6 feet 8 inches	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet 8 inches	#4 at 72	#4 at 72	#5 at 72
7 feet 4 inches	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#4 at 72	#5 at 72
8 feet	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#4 at 72	#5 at 72
8 feet 8 inches	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#4 at 72	#5 at 72
9 feet 4 inches	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#4 at 72	#5 at 72
10 feet	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#4 at 72	#5 at 72
	7 feet	#4 at 72	#5 at 72	#5 at 72
	8 feet	#5 at 72	#5 at 72	#5 at 36
	9 feet	#5 at 72	#5 at 36	#5 at 36
	10 feet	#5 at 64	#5 at 40	#5 at 32

- For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/mm.
- Mortar shall be Type M or S and masonry shall be laid in running bond.
 - Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per linear foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches.
 - Vertical reinforcement shall be Grade 60 minimum. The distance, d , from the face of the soil side of the wall to the center of vertical reinforcement shall be at least 8.75 inches.
 - Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for moist conditions without hydrostatic pressure. Refer to Table R405.1.
 - Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab on-grade is provided and in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height is permitted to be measured from the exterior finish ground level to the top of the interior concrete slab is permitted.

TABLE R404.1.2(1)
MINIMUM HORIZONTAL REINFORCEMENT FOR CONCRETE BASEMENT WALLS^{a,b}

MAXIMUM UNSUPPORTED HEIGHT OF BASEMENT WALL (feet)	LOCATION OF HORIZONTAL REINFORCEMENT
≤ 8	One No. 4 bar within 12 inches of the top of the wall story and one No. 4 bar near mid-height of the wall story.
> 8	One No. 4 bar within 12 inches of the top of the wall story and one No. 4 bar near third points in the wall story.

- For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 kPa.
- Horizontal reinforcement requirements are for reinforcing bars with a minimum yield strength of 40,000 psi and concrete with a minimum concrete compressive strength 2,500 psi.
 - See Section R404.1.2.2 for minimum reinforcement required for foundation walls supporting above-grade concrete walls.

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TABLE R404.1.2(2)
MINIMUM VERTICAL REINFORCEMENT FOR 6-INCH NOMINAL FLAT CONCRETE BASEMENT WALLS^(a-c, e-h, i)

MAXIMUM UNSUPPORTED WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT ^f (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)		
		Soil classes ^a and design lateral soil (psf per foot of depth)		
		GW, GP, SW, SP 30	GM, GC, SM, SM-SC and ML 45	SC, ML-CL and Inorganic CL 60
8	4	NR	NR	NR
	5	NR	6 @ 30	6 @ 48
	6	5 @ 39	6 @ 48	6 @ 35
	7	6 @ 48	6 @ 34	6 @ 25
	8	6 @ 39	6 @ 25	6 @ 18
9	4	NR	NR	NR
	5	NR	5 @ 37	6 @ 48
	6	5 @ 36	6 @ 44	6 @ 32
	7	6 @ 47	6 @ 30	6 @ 22
	8	6 @ 34	6 @ 22	6 @ 16
10	9	6 @ 27	6 @ 17	DR
	4	NR	NR	NR
	5	NR	5 @ 35	6 @ 48
	6	6 @ 48	6 @ 41	6 @ 30
	7	6 @ 43	5 @ 28	6 @ 20
	8	6 @ 31	6 @ 20	DR
	9	6 @ 24	6 @ 15	DR
	10	6 @ 19	DR	DR

For SI: 1 foot = 304.8 mm; 1 inch = 25.4 mm; 1 pound per square foot per foot = 0.1571 kPa/m; 1 pound per square inch = 6.895 kPa.
 NR = Not required.

a. Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1.
 b. Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi concrete with a minimum specified compressive strength of 2,500 psi and vertical reinforcement being located at the centerline of the wall. See Section R404.1.2.3.7.2.
 c. Vertical reinforcement with a yield strength of less than 60,000 psi and/or bars of a different size than specified in the table are permitted in accordance with Section R404.1.2.2.7.6 and Table R404.1.2(9).
 d. Deflection criterion is $L/240$, where L is the height of the basement wall in inches.
 e. Interpolation is not permitted.
 f. Where walls will retain 4 feet or more of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.
 g. NR indicates no vertical wall reinforcement is required, except for 6-inch nominal walls formed with stay-in-place forming systems in which case vertical reinforcement shall be No. 4 @ 48 inches on-center.
 h. See Section R404.1.2.2 for minimum reinforcement required for basement walls supporting above-grade concrete walls.
 i. See Table R611.3 for tolerance from nominal thickness permitted for flat walls.
 j. DR means design is required in accordance with the applicable building code, or where there is no code, in accordance with ACI 318.

TABLE R404.1.2(3)
MINIMUM VERTICAL REINFORCEMENT FOR 8-INCH (203 mm) NOMINAL FLAT CONCRETE BASEMENT WALLS

MAXIMUM UNSUPPORTED WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHTS (feet)	MINIMUM VERTICAL REINFORCEMENT BAR SIZE AND SPACING (inches)		
		SOIL CLASSES* and design lateral soil (psf per foot of depth)		
		GW, GP, SW, SP 30	GM, GC, SM, SM-SC and ML 45	SC, ML, CL and inorganic CL 60
8	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	6 @ 37
	7	NR	6 @ 36	6 @ 35
	8	6 @ 41	6 @ 35	6 @ 26
9	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	6 @ 35
	7	NR	6 @ 35	6 @ 32
	8	6 @ 36	6 @ 32	6 @ 23
10	9	6 @ 35	6 @ 25	6 @ 18
	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	6 @ 35
	7	NR	6 @ 36	6 @ 29
	8	6 @ 35	6 @ 29	6 @ 21
	9	6 @ 34	6 @ 22	6 @ 16
10	6 @ 27	6 @ 17	6 @ 13	

For SI: 1 foot = 304.8 mm; 1 inch = 25.4 mm; 1 pound per square foot per foot = 0.1571 kPa/m; 1 pound per square inch = 6.895 kPa.
 NR = Not required.
 a. Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1.
 b. Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi, concrete with a minimum specified compressive strength of 2,500 psi and vertical reinforcement being located at the centerline of the wall. See Section R604.1.2.3.1.2.
 c. Vertical reinforcement with a yield strength of less than 60,000 psi and/or bars of a different size than specified in the table are permitted in accordance with Section R604.1.2.3.1.5 and Table R404.1.2(3).
 d. NR indicates no vertical reinforcement is required.
 e. Deflection criterion is $L/240$, where L is the height of the basement wall in inches.
 f. Impregnation is not permitted.
 g. Where walls will retain 4 feet or more of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.
 h. See Section R604.1.2.2 for minimum reinforcement required for basement walls supporting above grade concrete walls.
 i. See Table R611.3 for minimum base thickness permitted for flat walls.

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TABLE R404.1.2(4)
MINIMUM VERTICAL REINFORCEMENT FOR 10-INCH NOMINAL FLAT CONCRETE BASEMENT WALLS

MAXIMUM UNSUPPORTED WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHTS (feet)	MINIMUM VERTICAL REINFORCEMENT, BAR SIZE AND SPACING (inches)		
		Soil classes ^a and design lateral soil (psf per foot of depth)		
		GM, GP, SW, SP 30	GM, GC, SM, SM-SC and ML 45	SC, ML, CL and Inorganic CL 60
8	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	NR
	7	NR	NR	NR
	8	6 @ 48	6 @ 35	6 @ 28
9	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	NR
	7	NR	NR	6 @ 31
	8	NR	6 @ 31	6 @ 28
10	9	6 @ 37	6 @ 28	6 @ 24
	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	NR
	7	NR	NR	6 @ 28
	8	NR	6 @ 28	6 @ 28
	9	6 @ 33	6 @ 28	6 @ 23
	10	6 @ 28	6 @ 23	6 @ 17

For SF 1 foot = 304.8 mm; 1 inch = 25.4 mm; 1 pound per square foot per foot = 0.1571 kPa/m; 1 pound per square inch = 6.895 kPa.
 NR = Not required.
 a. Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R406.1.
 b. Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi concrete with a minimum specified compressive strength of 2,500 psi and vertical reinforcement being located at the centerline of the wall. See Section R404.1.2.3.1.2.
 c. Vertical reinforcement with a yield strength of less than 60,000 psi and/or bars of a different size than specified in the table are permitted in accordance with Section R404.1.2.3.3.6 and Table R404.1.2(3).
 d. NR indicates no vertical reinforcement is required.
 e. Deflection criterion is $L/240$, where L is the height of the basement wall in inches.
 f. Interpolation is not permitted.
 g. Where walls will retain 4 feet or more of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.
 h. See Section R404.1.2.2 for minimum reinforcement required for basement walls supporting above-grade concrete walls.
 i. See Table R501.3 for minimum thicknesses permitted for flat walls.

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TABLE R404.1.2(6)
MINIMUM VERTICAL WALL REINFORCEMENT FOR 6-INCH WAFFLE-GRID BASEMENT WALLS^{a, b, c, d, e, f, g, h, i}

MAXIMUM UNSUPPORTED WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT ⁱ (feet)	MINIMUM VERTICAL REINFORCEMENT - BAR SIZE AND SPACING (inches)		
		Soil classes ^d and design lateral soil (psf per foot of depth)		
		GW, GP, SW, SP 30	GM, GC, SM, SM-SC and ML 45	SC, ML, CL and inorganic CL 60
8	4	4 @ 48	4 @ 46	6 @ 39
	5	4 @ 45	5 @ 40	6 @ 47
	6	5 @ 45	6 @ 46	DR
	7	6 @ 44	DR	DR
	8	6 @ 32	DR	DR
9	4	4 @ 48	4 @ 46	4 @ 37
	5	4 @ 42	5 @ 43	6 @ 44
	6	5 @ 41	6 @ 37	DR
	7	6 @ 39	DR	DR
	> 8	DR ^e	DR	DR
10	4	4 @ 48	4 @ 46	4 @ 35
	5	4 @ 40	5 @ 40	6 @ 41
	6	5 @ 38	6 @ 34	DR
	7	6 @ 36	DR	DR
	> 8	DR	DR	DR

^a For SI: 1 foot = 304.8 mm; 1 inch = 25.4 mm; 1 pound per square foot per foot = 0.1571 kPa/m; 1 pound per square inch = 6.895 kPa.
^b Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1.
^c Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi concrete with a minimum specified compressive strength of 2,500 psi and vertical reinforcement being located at the centerline of the wall. See Section R404.1.2.3.7.2.
^d Maximum spacings shown are the values calculated for the specified bar size. Where the bar used is Grade 60 and the size specified in the table, the actual spacing in the wall shall not exceed a whole-number multiple of 12 inches (i.e., 12, 24, 36 and 48) that is less than or equal to the tabulated spacing. Vertical reinforcement with a yield strength of less than 60,000 psi and/or bars of a different size than specified in the table are permitted in accordance with Section R404.1.2.3.7.3 and Table R404.1.2(9).
^e Deflection criterion is $L/240$, where L is the height of the basement wall in inches.
^f Interpolation is not permitted.
^g Where walls will retain 4 feet or more of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.
^h See Section R404.1.2.2 for minimum reinforcement required for basement walls supporting above-grade concrete walls.
ⁱ See Table R611.3 for thickness and dimensions of waffle grid walls.
^j DR means design is required in accordance with the applicable building code, or where there is no code, in accordance with ACI 318.

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TABLE R404.1.2(6)
MINIMUM VERTICAL REINFORCEMENT FOR 8-INCH WAFFLE-GRID BASEMENT WALLS*

MAXIMUM UNSUPPORTED WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHTS (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)		
		Soil classes ^a and design lateral soil (psf per foot of depth)		
		GW, GP, SW, SP 30	GM, GC, SM, SM-SC and ML 45	SC, ML, CL and inorganic CL 60
5	4	NR	NR	NR
	5	NR	5 @ 48	5 @ 48
	6	5 @ 48	5 @ 43	6 @ 45
	7	5 @ 46	6 @ 43	6 @ 31
	8	6 @ 48	6 @ 32	6 @ 23
9	4	NR	NR	NR
	5	NR	5 @ 47	5 @ 45
	6	5 @ 46	5 @ 39	6 @ 41
	7	5 @ 42	6 @ 38	6 @ 28
	8	6 @ 44	6 @ 28	6 @ 20
10	9	6 @ 34	6 @ 21	DR
	4	NR	NR	NR
	5	NR	5 @ 46	5 @ 44
	6	5 @ 46	5 @ 37	6 @ 38
	7	5 @ 38	6 @ 35	6 @ 25
	8	6 @ 39	6 @ 25	DR
9	6 @ 30	DR	DR	
10	6 @ 24	DR	DR	

For SF: 1 foot = 304.8 mm; 1 inch = 25.4 mm; 1 pound per square foot per foot = 0.1571 kPa²/m; 1 pound per square inch = 6.895 kPa.

NR = Not required.

a. Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1.

b. Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi concrete with a minimum specified compressive strength of 2,500 psi and vertical reinforcement being located at the centerline of the wall. See Section R404.1.2.3.2.2.

c. Maximum spacings shown are the values calculated for the specified bar size. Where the bar used is Grade 60 (420 MPa) and the size specified in the table, the actual spacing in the wall shall not exceed a whole-number multiple of 32 inches (i.e., 12, 24, 36 and 48) that is less than or equal to the tabulated spacing. Vertical reinforcement with a yield strength of less than 60,000 psi and/or bars of a different size than specified in the table are permitted in accordance with Section R404.1.2.3.2.5 and Table R404.1.2(9).

d. NR indicates no vertical reinforcement is required.

e. Deflection criterion is $L/750$, where L is the height of the basement wall in inches.

f. Interpolation shall not be permitted.

g. Where walls will retain 4 feet or more of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.

h. See Section R404.1.2.2 for minimum reinforcement required for basement walls supporting above-grade concrete walls.

i. See Table R611.3 for thicknesses and dimensions of waffle-grid walls.

j. DR means design is required in accordance with the applicable building code, or where there is no code, in accordance with ACI 318.

TABLE R404.1.2(7)
MINIMUM VERTICAL REINFORCEMENT FOR 6-INCH (152 mm) SCREEN-GRID BASEMENT WALLS

MAXIMUM UNSUPPORTED WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT (feet)	MINIMUM VERTICAL REINFORCEMENT - BAR SIZE AND SPACING (inches)		
		Soil classes ^a and design lateral soil (psf per foot of depth)		
		GW, GP, SW, SP 30	GM, GC, SM, SM-SC and ML 45	SC, ML-CI and Inorganic CI 60
8	4	4 @ 48	4 @ 48	4 @ 43
	5	4 @ 48	5 @ 48	5 @ 37
	6	5 @ 48	6 @ 43	6 @ 32
	7	6 @ 48	DR	DR
9	4	4 @ 48	4 @ 48	4 @ 41
	5	4 @ 48	5 @ 48	6 @ 48
	6	5 @ 45	6 @ 41	DR
	7	6 @ 43	DR	DR
10	> 8	DR	DR	DR
	4	4 @ 48	4 @ 48	4 @ 39
	5	4 @ 44	5 @ 41	6 @ 46
	6	5 @ 42	6 @ 38	DR
10	7	6 @ 40	DR	DR
	> 8	DR	DR	DR

- Feet SI: 1 foot = 304.8 mm; 1 inch = 25.4 mm; 1 pound per square foot per foot = 0.1571 kPa²/m; 1 pound per square inch = 6.895 kPa.
- Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1.
 - Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi, concrete with a minimum specified compressive strength of 2,500 psi and vertical reinforcement being located at the centerline of the wall. See Section R404.1.2.1.7.2.
 - Maximum spacings shown are the values calculated for the specified bar size. Where the bar used is Grade 60 and the size specified in the table, the actual spacing in the wall shall not exceed a whole number multiple of 12 inches (i.e., 12, 24, 36 and 48) that is less than or equal to the calculated spacing. Vertical reinforcement with a yield strength of less than 60,000 psi and/or bars of a different size than specified in the table are permitted in accordance with Section R404.1.2.3.7.6 and Table R404.1.2(9).
 - Deflection criterion is $L/240$, where L is the height of the basement wall in inches.
 - Interpolation is not permitted.
 - Where walls will retain 4 feet or more of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.
 - See Sections R404.1.2.2 for minimum reinforcement required for basement walls supporting above-grade concrete walls.
 - See Table R611.3 for thicknesses and dimensions of screen-grid walls.
 - DR means design is required in accordance with the applicable building code, or where there is no code, in accordance with ACI 318.

TABLE R404.1.2(8)
 MINIMUM VERTICAL REINFORCEMENT FOR 6-, 8-, 10-INCH AND 12-INCH NOMINAL FLAT BASEMENT WALLS^{a, b, c, d, e, f, g, h, i, j, k, l, m, n}

MAXIMUM WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT ² (feet)	MINIMUM VERTICAL REINFORCEMENT BAR SIZE AND SPACING (inches)											
		Soil classes ^a and design lateral soil (psf per foot of depth)											
		GM, GP, SW, SP 30				GM, GC, SM, SA, SC and MU 45				SE, ML, CL and inorganic CL 60			
		Minimum nominal wall thickness (inches)											
		4	8	10	12	6	8	10	12	6	8	10	12
5	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
6	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	4 @ 35	NR	NR	NR
7	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 36	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 37	NR	NR	NR
8	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 38	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 39	NR	NR	NR
9	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 40	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 41	NR	NR	NR
10	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 42	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 43	NR	NR	NR
11	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 44	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 45	NR	NR	NR
12	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 46	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 47	NR	NR	NR
13	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 48	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 49	NR	NR	NR
14	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 50	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 51	NR	NR	NR
15	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 52	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 53	NR	NR	NR
16	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 54	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 55	NR	NR	NR
17	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 56	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 57	NR	NR	NR
18	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 58	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 59	NR	NR	NR
19	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 60	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 61	NR	NR	NR
20	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 62	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 63	NR	NR	NR
21	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 64	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 65	NR	NR	NR
22	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 66	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 67	NR	NR	NR
23	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 68	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 69	NR	NR	NR
24	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 70	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 71	NR	NR	NR
25	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 72	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 73	NR	NR	NR
26	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 74	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 75	NR	NR	NR
27	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 76	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 77	NR	NR	NR
28	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 78	NR	NR	NR
	6	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 79	NR	NR	NR

For SI: 1 foot = 304.8 mm; 1 inch = 25.4 mm; 1 pound per square foot per foot = 0.1571 kPa²/m; 1 pound per square inch = 6.895 kPa.
 NR = Not required.
 a. Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1.
 b. Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi.
 c. Vertical reinforcement with a yield strength of less than 60,000 psi and/or bars of a different size than specified in the table are permitted in accordance with Section R404.1.2.3.7.5 and Table R404.1.2(9).
 d. NR indicates no vertical wall reinforcement is required, except for 6-inch nominal walls formed with stay-in-place forming systems in which case vertical reinforcement shall be #4 @ 48 inches on center.
 e. Allowable deflection criteria is $L/240$, where L is the unsupported height of the basement wall in inches.
 f. Interpolation is not permitted.
 g. When walls will retain 4 feet or more of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.
 h. Vertical reinforcement shall be located to provide a cover of 1.25 inches measured from the inside face of the wall. The center of the steel shall not vary from the specified location by more than the greater of 30 percent of the wall thickness or $\frac{1}{4}$ inch.
 i. Concrete cover for reinforcement measured from the inside face of the wall shall not be less than $\frac{1}{2}$ inch. Concrete cover for reinforcement measured from the outside face of the wall shall not be less than $\frac{1}{4}$ inch for No. 5 bars and smaller, and not less than 2 inches for larger bars.
 j. DR means design is required in accordance with the applicable building code, or where there is no code in accordance with ACI 318.
 k. Concrete shall have a specified compressive strength, f'_c , of not less than 2,500 psi at 28 days, unless a higher strength is required by footnote for m.
 l. The minimum thickness is permitted to be reduced 2 inches, provided the minimum specified compressive strength of concrete, f'_c , is 4,000 psi.
 m. A plain concrete wall with a minimum nominal thickness of 12 inches is permitted, provided minimum specified compressive strength of concrete, f'_c , is 3,500 psi.
 n. See Table R404.1 for tolerance from nominal thickness permitted for flat walls.

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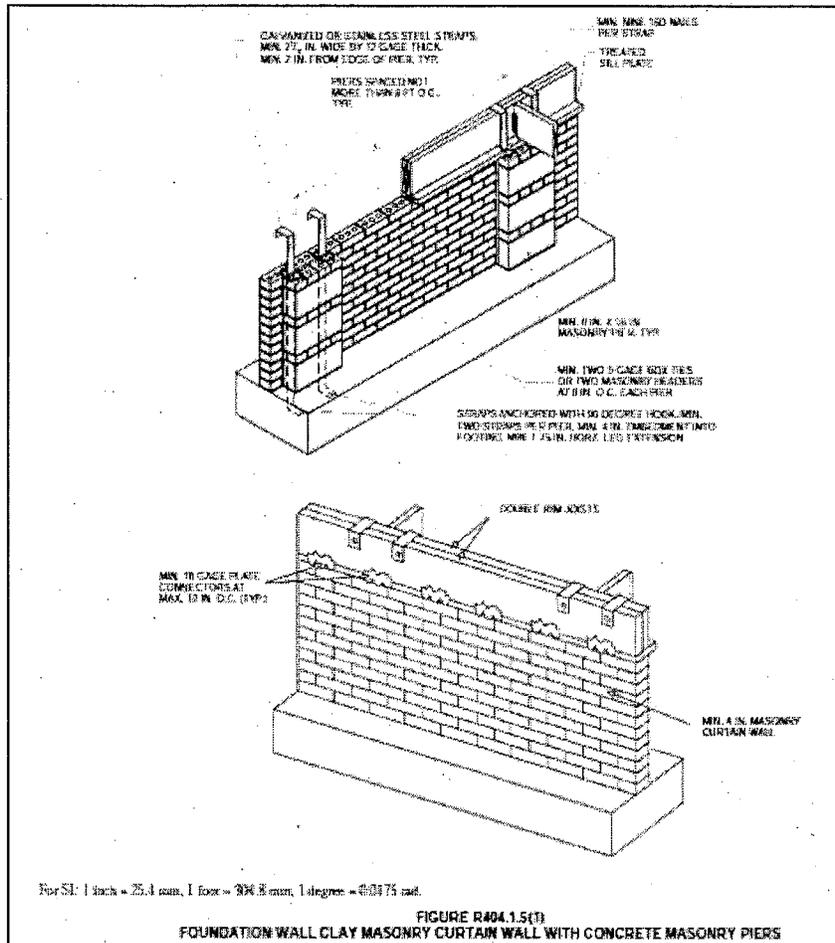
**TABLE R404.1.2(9)
 MINIMUM SPACING FOR ALTERNATE BAR SIZE AND/OR ALTERNATE GRADE OF STEEL^{a,b,c}**

BAR SIZE FROM APPLICABLE TABLE IN SECTION R404.1.2.2

BAR SPACING FROM APPLICABLE TABLE IN SECTION R404.1.2.2 (inches)	#4			#5			#6								
	Alternate bar size and/or alternate grade of steel desired														
	Grade 60			Grade 40			Grade 60								
	#5	#6	#4	#5	#6	#4	#5	#6	#4	#5	#6				
	Maximum spacing for alternate bar size and/or alternate grade of steel (inches)														
8	12	16	5	8	12	5	11	3	5	8	4	6	2	4	5
9	14	20	6	9	13	6	13	4	6	9	4	6	3	4	6
10	16	22	7	10	15	6	14	4	7	9	5	7	3	5	7
11	17	24	7	11	16	7	16	5	7	10	5	8	3	5	7
12	19	26	8	12	18	8	17	5	8	11	5	8	4	6	8
13	20	29	9	13	19	8	18	5	9	12	6	9	4	6	9
14	22	31	9	14	21	9	20	6	9	13	6	10	4	7	9
15	23	33	10	16	22	10	21	6	10	14	7	11	5	7	10
16	25	35	11	17	23	10	23	7	11	15	7	11	5	8	11
17	26	37	11	18	25	11	24	7	11	16	8	12	5	8	11
18	28	40	12	19	26	12	26	8	12	17	8	13	5	8	12
19	29	42	13	20	28	12	27	8	13	18	9	13	6	9	13
20	31	44	13	21	29	13	28	9	13	19	9	14	6	9	13
21	33	46	14	22	31	14	30	9	14	20	10	15	6	10	14
22	34	48	15	23	32	14	31	9	15	21	10	16	7	10	15
23	36	48	15	24	34	15	33	10	15	22	10	16	7	11	15
24	37	48	15	25	35	15	34	10	15	23	11	17	7	11	16
25	39	49	17	26	37	16	35	11	17	24	11	18	8	12	17
26	40	48	17	27	38	17	37	11	17	25	12	18	8	12	17
27	42	48	18	28	40	17	38	12	18	26	12	19	8	13	18
28	43	48	19	29	41	18	40	12	19	26	13	20	8	13	18
29	45	48	19	30	43	19	41	12	19	27	13	20	9	14	19
30	47	48	20	31	44	19	43	13	20	28	14	21	9	14	20
31	48	48	21	32	45	20	44	13	21	29	14	22	9	15	21
32	48	48	21	33	47	21	45	14	21	30	15	23	10	15	21
33	48	48	22	34	48	21	47	14	22	31	15	23	10	16	22
34	48	48	23	35	48	22	48	15	23	32	15	24	10	16	23
35	48	48	23	36	48	23	48	15	23	33	16	25	11	16	23
36	48	48	24	37	48	23	48	15	24	34	16	25	11	17	24
37	48	48	25	38	48	24	48	16	25	35	17	26	11	17	25
38	48	48	25	39	48	25	48	16	25	36	17	27	12	18	25
39	48	48	26	40	48	25	48	17	26	37	18	27	12	18	26
40	48	48	27	41	49	26	48	17	27	38	18	28	12	19	27
41	48	48	27	42	48	26	48	18	27	39	19	29	12	19	27
42	48	48	28	43	48	27	48	18	28	40	19	30	13	20	28
43	48	48	29	44	48	28	48	18	29	41	20	30	13	20	28
44	48	48	29	45	48	28	48	19	29	42	20	31	13	21	29
45	48	48	30	47	48	29	48	19	30	43	20	32	14	21	30
46	48	48	31	48	48	30	48	20	31	44	21	32	14	22	31
47	48	48	31	48	48	30	48	20	31	44	21	33	14	22	31
48	48	48	32	48	48	31	48	21	32	45	22	34	15	23	32

For SI: 1 inch = 25.4 mm; 1 pound per square inch = 6.895 kPa.
 a. This table is for use with tables in Section R404.1.2.2 that specify the minimum bar size and maximum spacing of vertical wall reinforcement for foundation walls used above-grade walls. Reinforcement specified in tables in Section R404.1.2.2 is based on Grade 60 steel reinforcement.
 b. Bar spacing shall not exceed 48 inches on center and shall not be less than one-half the nominal wall thickness.
 c. For Grade 80 steel bars (ASTM A 996, Type K), use spacing for Grade 40 bars or interpolate between Grades 40 and 60.

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[W] R404.4 Retaining walls. Retaining walls not supporting a structure that are not laterally supported at the top and that retain in excess of 24 inches (610 mm) of unbalanced fill shall be designed to ensure stability against overturning, sliding, excessive foundation pressure and water uplift. Retaining walls shall be designed for a safety factor of 1.5 against lateral sliding and overturning.

R404.5 Precast concrete foundation walls.

R404.5.1 Design. Precast concrete foundation walls shall be designed in accordance with accepted engineering practice. The design and manufacture of precast concrete foundation

1 wall panels shall comply with the materials requirements of Section R402.3 or ACI 318. The
2 panel design drawings shall be prepared by a registered design professional where required
3 by the statutes of the *jurisdiction* in which the project is to be constructed in accordance with
4 Section ~~((R106.4))~~ R105.5.1.1.

5 **R404.5.2 Precast concrete foundation design drawings.** Precast concrete foundation wall
6 design drawings shall be submitted to the *building official* and *approved* prior to installation.
7 Drawings shall include, at a minimum, the information specified below:

- 8 1. Design loading as applicable;
- 9 2. Footing design and material;
- 10 3. Concentrated loads and their points of application;
- 11 4. Soil bearing capacity;
- 12 5. Maximum allowable total uniform load;
- 13 6. Seismic design category; and
- 14 7. Basic wind speed.

15 **R404.5.3 Identification.** Precast concrete foundation wall panels shall be identified by a
16 certificate of inspection *label* issued by an *approved* third party inspection agency.

17 ***

18 SECTION R408 19 UNDER-FLOOR SPACE

20 **[W] R408.1 Ventilation.** The under-floor space between the bottom of the floor joists and the
21 earth under any building (except space occupied by a *basement*) shall have ventilation openings
22 through foundation walls or exterior walls. ~~((The minimum net area of ventilation openings shall
23 not be less than 1 square foot (0.0929 m²) for each 150 square feet (14 m²) of under floor space
24 area, unless the ground surface is covered by a Class 1 vapor retarder material. When a Class 1
25 vapor retarder material is used, the minimum net area of ventilation openings shall not be less~~

1 than 1 square foot (0.0929 m²) for each 1,500 square feet (140 m²) of under-floor space area.
2 ~~One such ventilating opening shall be within 3 feet (914 mm) of each corner of the building.)~~

3 **[W] R408.2 Openings for under-floor ventilation.** The minimum net area of ventilation
4 openings shall not be less than 1 square foot (0.0929 m²) for each ~~((150))~~ 300 square feet ~~((14))~~
5 28 m²) of under-floor area. ((One ventilation opening shall be within 3 feet (915 mm) of each
6 corner of the building.)) Required openings shall be evenly placed to provide cross ventilation of
7 the space except one side of the building shall be permitted to have no ventilation openings.

8 Ventilation openings shall be covered for their height and width with any of the following
9 materials provided that the least dimension of the covering shall not exceed 1/4 inch (6.4 mm):

- 10 1. Perforated sheet metal plates not less than 0.070 inch (1.8 mm) thick.
- 11 2. Expanded sheet metal plates not less than 0.047 inch (1.2 mm) thick.
- 12 3. Cast-iron grill or grating.
- 13 4. Extruded load-bearing brick vents.
- 14 5. Hardware cloth of 0.035 inch (0.89 mm) wire or heavier.
- 15 6. Corrosion-resistant wire mesh, with the least dimension being 1/8 inch (3.2 mm) thick.

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

23 **[W] R408.3 Unvented crawl space.** Ventilation openings in under-floor spaces specified in
24 Sections R408.1 and R408.2 shall not be required where:

1 1. Exposed earth is covered with a continuous Class I vapor retarder. Joints of the vapor
2 retarder shall overlap by 6 inches (152 mm) and shall be sealed or taped. The edges of the
3 vapor retarder shall extend at least 6 inches (152 mm) up the stem wall and shall be
4 attached and sealed to the stem wall ~~((or insulation))~~ and a radon system shall be installed
5 that meets the requirements of Appendix F;

6 2. Continuously operated mechanical exhaust ventilation is provided at a rate equal to 1 cubic
7 foot per minute (0.47 L/s) for each 50 square feet (4.7 m²) of crawlspace floor area.

8 Exhaust ventilation shall terminate to the exterior.

9 Exception: Plenums in existing structures complying with Section M1601.5, if under-floor
10 space is used as a plenum.

11 ~~((2. One of the following is provided for the under-floor space:~~

12 ~~2.1. Continuously operated mechanical exhaust ventilation at a rate equal to 1 cubic foot~~
13 ~~per minute (0.47 L/s) for each 50 square feet (4.7m²) of crawlspace floor area,~~
14 ~~including an air pathway to the common area (such as a duct or transfer grille), and~~
15 ~~perimeter walls insulated in accordance with Section N1103.2.1 of this code;~~

16 ~~2.2. Conditioned air supply sized to deliver at a rate equal to 1 cubic foot per minute (0.47~~
17 ~~L/s) for each 50 square feet (4.7 m²) of under-floor area, including a return air pathway~~
18 ~~to the common area (such as a duct or transfer grille), and perimeter walls insulated in~~
19 ~~accordance with Section N1102.2 of this code;~~

20 ~~2.3. Plenum in existing structures complying with Section M1601.5, if under-floor space is~~
21 ~~used as a plenum.))~~

22 ***

23
24 Section 6: The following sections of Chapter 5 of the International Residential Code,
25 2012 Edition, are amended as follows:

1
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3 **SECTION R507**

4 **DECKS**

5 ***

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

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

17 **[W] R507.2.2 Alternate deck ledger connections.** Deck ledger connections not conforming
18 to Table R507.2 shall be attached with approved fasteners having equivalent withdrawal
19 capacity or be designed in accordance with accepted engineering practice. Girders supporting
20 deck joists shall not be supported on deck ledgers or band joists. Deck ledgers shall not be
21 supported on stone or masonry veneer.

22 **[W] R507.2.3 Deck lateral load connection.** The lateral load connection required by Section
23 R507.1 shall be permitted to be in accordance with Figure R507.2.3. Where the lateral load
24 connection is provided in accordance with Figure 507.2.3, hold-down tension devices shall be
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installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N).

Exceptions:

1. Decks not more than 30 inches above grade at any point may be unattached.
2. Where a new deck is being added to an existing structure, the lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figure R507.2.4.

TABLE R507.2
 FASTENER SPACING FOR A SOUTHERN PINE OR HEM-FIR DECK LEDGER AND
 A 2-INCH-NOMINAL SOLID-SAWN SPRUCE-PINE-FIR BAND JOIST^{a, b, c}
 (Deck live load = 40 psf, deck dead load = 10 psf)

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

- For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.
- a. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
 - b. The maximum gap between the face of the ledger board and face of the wall sheathing shall be 1/2 inch.
 - c. Ledgers shall be flashed to prevent water from contacting the house band joist.
 - d. Lag screws and bolts shall be staggered in accordance with Section R507.2.1.
 - e. Deck ledger shall be minimum 2 x 8 pressure-preservative-treated No. 2 grade lumber, or other approved materials as established by standard engineering practice.
 - f. When solid-sawn pressure-preservative-treated deck ledgers are attached to a minimum 1-inch-thick engineered wood product (structural composite lumber, laminated veneer lumber or wood structural panel band joist), the ledger attachment shall be designed in accordance with accepted engineering practice.
 - g. A minimum 1 x 9 1/2 Douglas Fir laminated veneer lumber rimboard shall be permitted in lieu of the 2-inch nominal band joist.
 - h. Wood structural panel sheathing, gypsum board sheathing or foam sheathing not exceeding 1 inch in thickness shall be permitted. The maximum distance between the face of the ledger board and the face of the band joist shall be 1 inch.

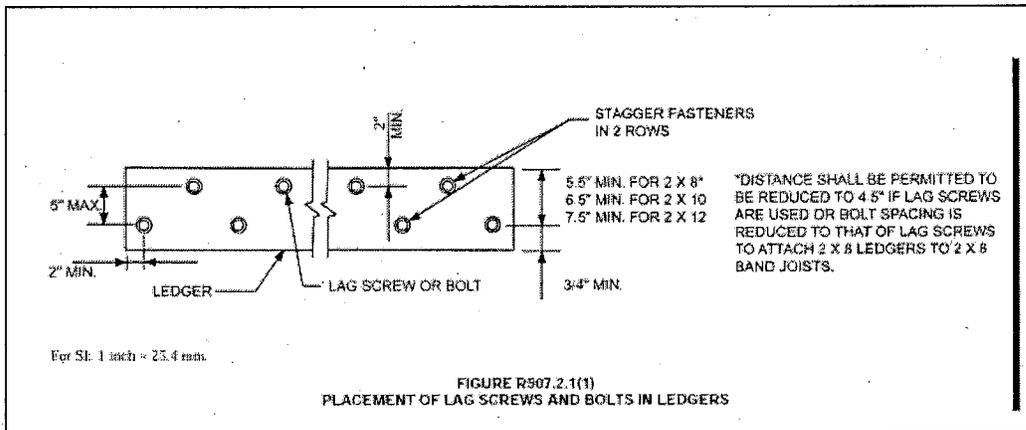
[W]TABLE 507.2.1
PLACEMENT OF LAG SCREWS AND BOLTS IN DECK LEDGERS AND BAND JOISTS

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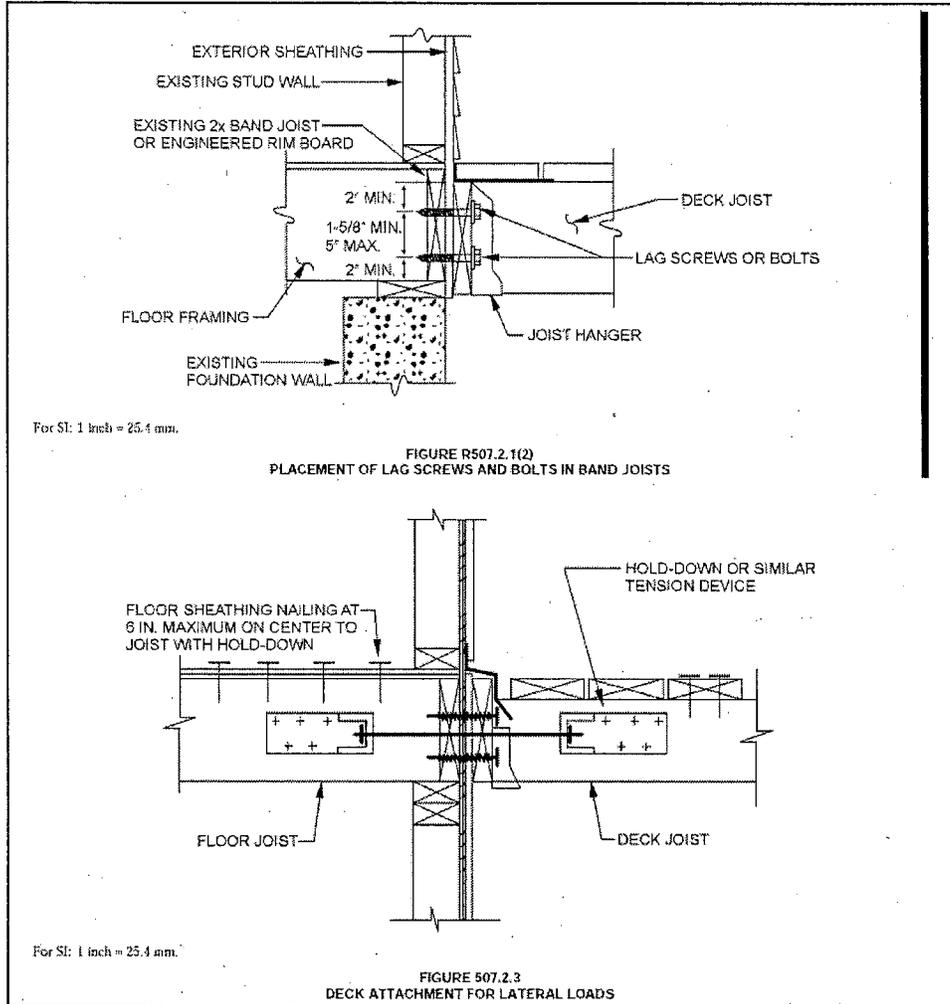
MINIMUM END AND EDGE DISTANCES AND SPACING BETWEEN ROWS				
	TOP EDGE	BOTTOM EDGE	ENDS	ROW SPACING
Ledger ^a	2 inches ^d	((1/4)) 3/4 inch	2 inches ^b	1-5/8 inches ^b
Band joist ^c	3/4 inch	2 inches ^e	2 inches ^b	1-5/8 inches

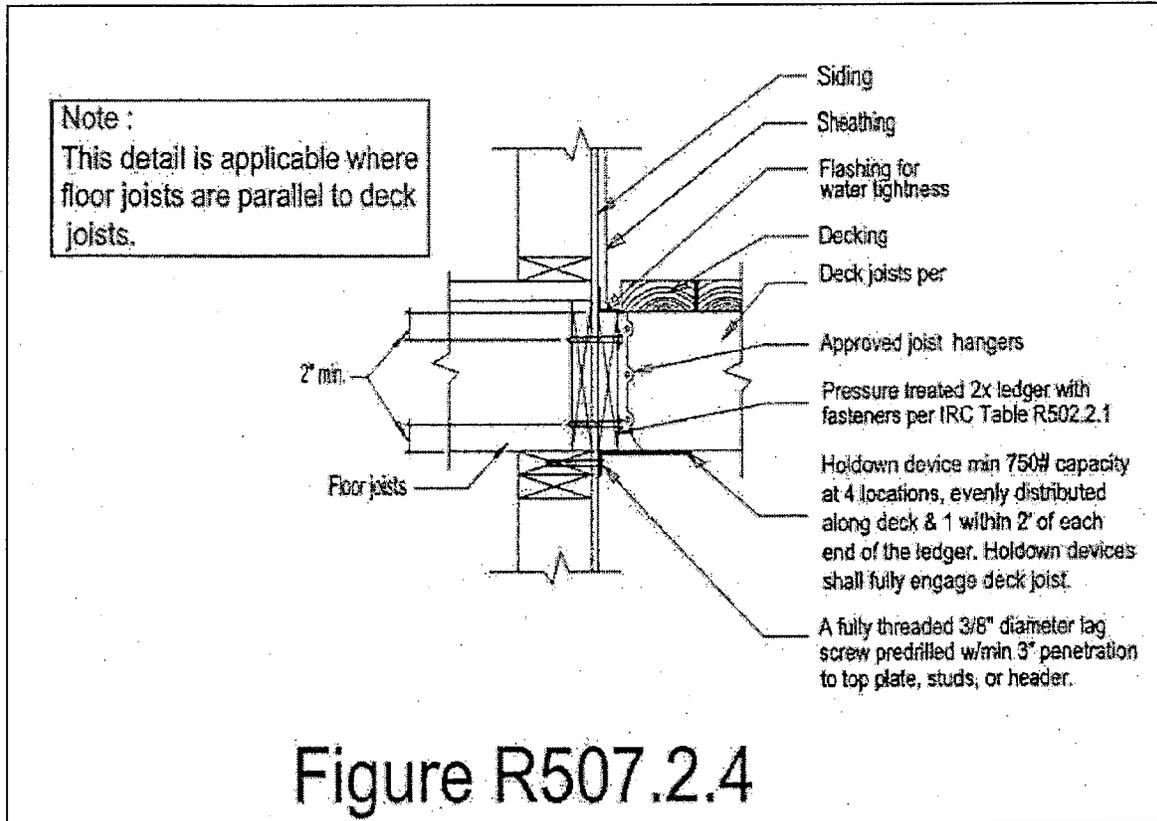
For SI: 1 inch = 25.4 mm.

- a. Lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger in accordance with Figure R507.2.1(1).
- b. Maximum 5 inches.
- c. For engineered rim joists, the manufacturer's recommendations shall govern.
- d. The minimum distance from bottom row of lag screws ((or bolts)) to the top edge of the ledger shall be in accordance with Figure R507.2.1(1).
- e. The 2 inches may be reduced to 3/4 inch when the band joist is directly supported by a mudsill, a header or by double top wall plates.



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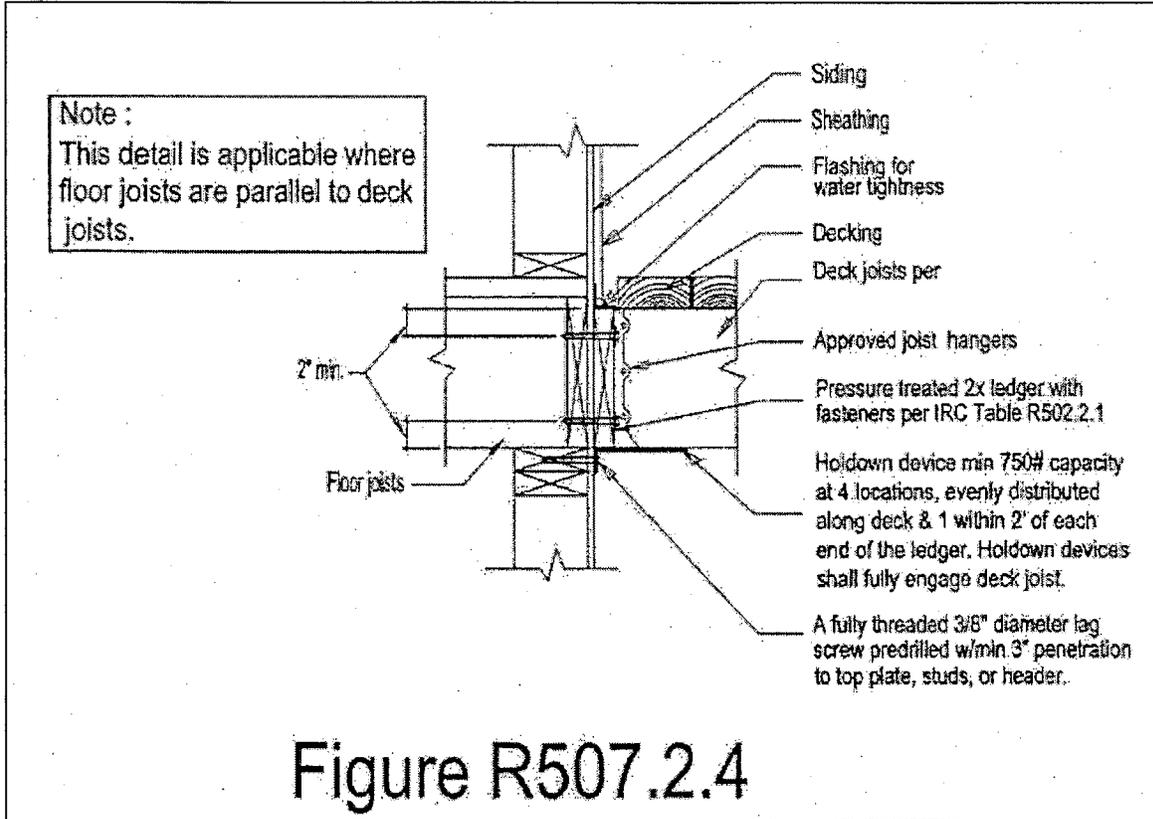


Figure R507.2.4

Section 7. The following sections of Chapter 6 of the International Residential Code, 2012 Edition, are amended as follows:

**CHAPTER 6
 WALL CONSTRUCTION**

**SECTION R602
 WOOD WALL FRAMING**

[W] R602.9 Foundation ((C))cripple walls. Foundation *cripple walls* shall be framed of studs not smaller than the studding above. When exceeding 4 feet (1219 mm) in height, such walls shall be framed of studs having the size required for an additional *story*.

1 characteristics and *approved* inspection agency to indicate compliance with
2 AAMA/WDMA/CSA 101/I.S.2/A440. Exterior side-hinged doors shall be tested and *labeled* as
3 conforming to AAMA/WDMA/CSA 101/I.S.2/A440 or comply with Section R612.5.

4 **Exceptions:**

- 5 1. Decorative glazed openings.
6 2. Custom exterior windows and doors manufactured by a *small business* are exempt from
7 all testing requirements in Section R612 provided they meet the applicable provisions of
8 Chapter 24 of the *International Building Code*.

9 **R612.3.1 Comparative analysis.** Structural wind load design pressures for window and door
10 units smaller than the size tested in accordance with Section R612.3 shall be permitted to be
11 higher than the design value of the tested unit provided such higher pressures are determined
12 by accepted engineering analysis. All components of the small unit shall be the same as those
13 of the tested unit. Where such calculated design pressures are used, they shall be validated by
14 an additional test of the window or door unit having the highest allowable design pressure.

15 ***

16 Section 8. The following sections of Chapter 7 of the International Residential Code,
17 2012 Edition, are amended as follows:

18 **CHAPTER 7**
19 **WALL COVERING**

20 ***

21 **SECTION R702**
22 **INTERIOR COVERING**

23 ***

24 **[W] R702.5 Other finishes.** Wood veneer paneling and hardboard paneling shall be placed on
25 wood or cold-formed steel framing spaced not more than 16 inches (406 mm) on center. Wood
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1 veneer and hard board paneling less than 1/4-inch (6 mm) nominal thickness shall not have less
2 than a 3/8-inch (10 mm) gypsum board backer. Wood veneer paneling not less than 1/4-inch (6
3 mm) nominal thickness shall conform to ANSI/HPVA HP-1. Hardboard paneling shall conform
4 to CPA/ANSI A135.5. All structural panel components within the conditioned space such as
5 plywood, particle board, wafer board and oriented strand board shall be identified as
6 “EXPOSURE 1,” “EXTERIOR” OR “HUD-APPROVED.”

7 ***

8 SECTION R703

9 EXTERIOR COVERING

10 **R703.1 General.** Exterior walls shall provide the building with a weather-resistant exterior wall
11 envelope. The exterior wall envelope shall include flashing as described in Section R703.8.

12 **[W] R703.1.1 Water resistance.** The exterior wall envelope shall be designed and
13 constructed in a manner that prevents the accumulation of water within the wall assembly by
14 providing a water-resistant barrier behind the exterior veneer as required by Section R703.2
15 and a means of draining ((to the exterior)) water that enters the assembly to the exterior.

16 Protection against condensation in the exterior wall assembly shall be provided in accordance
17 with Section R702.7 of this code.

18 **Exceptions:**

- 19 1. A weather-resistant exterior wall envelope shall not be required over concrete or
20 masonry walls designed in accordance with Chapter 6 and flashed according to
21 Section R703.7 or R703.8.
- 22 2. Compliance with the requirements for a means of drainage, and the requirements of
23 Sections R703.2 and R703.8, shall not be required for an exterior wall envelope that
24 has been demonstrated to resist wind-driven rain through testing of the exterior wall
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1 envelope, including joints, penetrations and intersections with dissimilar materials, in
2 accordance with ASTM E 331 under the following conditions:

3 2.1. Exterior wall envelope test assemblies shall include at least one opening, one
4 control joint, one wall/eave interface and one wall sill. All tested openings and
5 penetrations shall be representative of the intended end-use configuration.

6 2.2. Exterior wall envelope test assemblies shall be at least 4 feet by 8 feet (1219 mm
7 by 2438 mm) in size.

8 2.3. Exterior wall assemblies shall be tested at a minimum differential pressure of 6.24
9 pounds per square foot (299 Pa).

10 2.4. Exterior wall envelope assemblies shall be subjected to the minimum test
11 exposure duration (~~for a minimum~~) of 2 hours.

12 The exterior wall envelope design shall be considered to resist wind-driven rain
13 where the results of testing indicate that water did not penetrate control joints in the
14 exterior wall envelope, joints at the perimeter of openings penetration or intersections
15 of terminations with dissimilar materials.

16 3. The requirement for a means of drainage shall not be construed to mean an air space
17 cavity under the exterior cladding for an exterior wall clad with panel or lapped siding
18 made of plywood, engineered wood, hardboard, or fiber cement. A water-resistive
19 barrier as required by Section R703.2 and Table R703.4 is required on exterior walls.

20 **Interpretation R703.1.1:** According to Section R703.1 exception 3, a rain-screen or similar
21 construction method is not required for most exterior siding and cladding, and single-wall
22 construction is allowed. Drainage methods are required to conform to the manufacturer's
23 installation instructions and other sections of the *International Residential Code*.

1 Note: The “water-resistive barrier” behind the exterior wall covering provides drainage of
2 the water that may enter an exterior wall envelope. If water penetrates the exterior wall
3 covering, the felt paper or other approved material will direct the water to the bottom of the
4 wall where it will escape to the exterior.

5 **R703.1.2 Wind resistance.** Wall coverings, backing materials and their attachments shall be
6 capable of resisting wind loads in accordance with Tables R301.2(2) and R301.2(3). Wind-
7 pressure resistance of the siding and backing materials shall be determined by ASTM E 330
8 or other applicable standard test methods. Where wind-pressure resistance is determined by
9 design analysis, data from approved design standards and analysis conforming to generally
10 accepted engineering practice shall be used to evaluate the siding and backing material and
11 its fastening. All applicable failure modes including bending rupture of siding, fastener
12 withdrawal and fastener head pull-through shall be considered in the testing or design
13 analysis. Where the wall covering and the backing material resist wind load as an assembly,
14 use of the design capacity of the assembly shall be permitted.

15 ***

16 **[W] R703.8 Flashing.** *Approved* corrosion-resistant flashing shall be applied shingle-fashion in
17 a manner to prevent entry of water into the wall cavity or penetration of water to the building
18 structural framing components. Self-adhered membranes used as flashing shall comply with
19 AAMA 711. The flashing shall extend to the surface of the exterior wall finish. *Approved*
20 corrosion-resistant flashings shall be installed at all of the following locations:

- 21 1. Exterior window and door openings. Flashing at exterior window and door openings shall
22 extend to the surface of the exterior wall finish or to the water-resistive barrier for
23 subsequent drainage. ~~((Flashing at exterior window and door openings shall be installed in~~
24 ~~accordance with one or more of the following:~~

1 5.2. Air-permeable insulation only. In addition to the air-permeable insulation installed
2 directly below the structural sheathing, minimum R-10 rigid board or sheet insulation
3 shall be installed directly above the structural roof sheathing (~~as specified in Table~~
4 ~~R806.5~~) for condensation control.

5 5.3. Air-impermeable and air-permeable insulation. (~~The~~) Minimum R-10 *air-*
6 *impermeable insulation* shall be applied in direct contact with the underside of the
7 structural roof sheathing (~~as specified in Table R806.5~~) for condensation control. The
8 air-permeable insulation shall be installed directly under the *air-impermeable*
9 *insulation*.

10 5.4. Where preformed insulation board is used as the air-impermeable insulation layer, it
11 shall be sealed at the perimeter of each individual sheet interior surface to form a
12 continuous layer.

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CLIMATE ZONE	MINIMUM RIGID BOARD ON AIR- IMPERMEABLE INSULATION R-VALUE ^a
2B and 3B tile roof only	0 (none required)
1, 2A, 2B, 3A, 3B, 3C	R-5
4C	R-10
4A, 4B	R-15
5	R-20
6	R-25
7	R-30
8	R-35

20 a. Contributes to but does not supersede the requirements in Section
21 N1103.2.1.

22

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26 ***

1 Section 10. The following sections of Chapter 9 of the International Residential Code,
2 2012 Edition, are amended as follows:

3 CHAPTER 9
4 ROOF ASSEMBLIES

5 ***

6 SECTION R903
7 WEATHER PROTECTION

8 ***

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

11 **[W] R903.4.1 Secondary (emergency overflow) drains or scuppers.** Where roof drains are
12 required, secondary emergency overflow ((roof)) drains or scuppers shall be provided where
13 the roof perimeter construction extends above the roof in such a manner that water will be
14 entrapped if the primary drains allow buildup for any reason. Overflow drains having the
15 same size as the roof drains shall be installed with the inlet flow line located 2 inches (51 mm)
16 above the low point of the roof, or overflow scuppers having three times the size of the roof
17 drains and having a minimum opening height of 4 inches (102 mm) shall be installed in the
18 adjacent parapet walls with the inlet flow located 2 inches (51 mm) above the low point of the
19 roof served. The installation and sizing of overflow drains, leaders and conductors shall
20 comply with ((Sections 1106 and 1108 as applicable of)) the ((*International*)) Uniform
21 Plumbing Code.

22 Overflow drains shall discharge to an *approved* location ((and shall not be connected to roof
23 drain lines)).

24 ***

1 Section 11. The following sections of Chapter 10 of the International Residential Code,
2 2012 Edition, are amended as follows:

3 CHAPTER 10
4 CHIMNEYS AND FIREPLACES
5 SECTION R1001
6 MASONRY FIREPLACES

7 ***

8 **R1001.7 Lintel and throat.** Masonry over a fireplace opening shall be supported by a lintel of
9 noncombustible material. The minimum required bearing length on each end of the fireplace
10 opening shall be 4 inches (102 mm). The fireplace throat or damper shall be located a minimum
11 of 8 inches (203 mm) above the lintel.

12 **[W] R1001.7.1 Damper.** Masonry fireplaces shall be equipped with a ferrous metal damper
13 located at least 8 inches (203 mm) above the top of the fireplace opening. Dampers shall be
14 installed in the fireplace or the chimney venting the fireplace, and shall be operable from the
15 room containing the fireplace. Fireplaces shall be provided with each of the following:

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

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

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

1 **[W]** (~~**R1006.1.1 Factory-built fireplaces.**~~ Exterior *combustion air* ducts for factory-built
2 fireplaces shall be a *listed* component of the fireplace and shall be installed according to the
3 fireplace manufacturer's instructions.

4 ~~**R1006.1.2 Masonry fireplaces.**~~ *Listed combustion air* ducts for masonry fireplaces shall be
5 installed according to the terms of their *listing* and the manufacturer's instructions.

6 ~~**R1006.2 Exterior air intake.**~~ The exterior air intake shall be capable of supplying all
7 *combustion air* from the exterior of the *dwelling* or from spaces within the *dwelling* ventilated
8 with outside air such as nonmechanically ventilated crawl or *attic* spaces. The exterior air intake
9 shall not be located within the garage or *basement* of the *dwelling* nor shall the air intake be
10 located at an elevation higher than the firebox. The exterior air intake shall be covered with a
11 corrosion-resistant screen of 1/4-inch (6 mm) mesh.))

12 **[W] R1006.2 Solid fuel burning appliances and fireplaces.** Solid-fuel-burning appliances and
13 fireplaces shall be provided with tight-fitting metal or ceramic glass doors, and:

14 1. A source from outside the structure of primary combustion air, connected to the appliance
15 as per manufacturer's specification. The air inlet shall originate at a point below the fire box.
16 The duct shall be 4 inches or greater in diameter, not exceed 20 feet in length, and be
17 installed as per manufacturer's instructions; or

18 2. The appliance and manufacturer's recommended combustion air supply, as an installed unit,
19 shall be certified by an independent testing laboratory to have passed Test No. 11-Negative
20 Pressure Test, Section 12.3, of ULC S627-M1984 "Space Heaters for Use with Solid Fuels,"
21 modified as follows:

22 2.1 Negative pressure of 8 Pascal shall be initially established with the chamber sealed and
23 the air supply, if not directly connected to the appliance, closed off.

24 2.2 The air supply if not directly connected to the appliance, shall then be opened.

1 2.3 The maximum allowable air exchange rate from chamber leakage and intentional air
2 supply for the unit (appliance with combustion air supply) in the test chamber is 3.5 air
3 changes per hour, or 28 cfm (cubic feet of air per minute), whichever is less.

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

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

15 **R1006.3 Clearance.** Unlisted *combustion air* ducts shall be installed with a minimum 1-inch (25
16 mm) clearance to combustibles for all parts of the duct within 5 feet (1524 mm) of the duct
17 outlet.

18 ~~**[W]** ((R1006.4 Passageway. The *combustion air* passageway shall be a minimum of 6 square~~
19 ~~inches (3870 mm²) and not more than 55 square inches (0.035 m²), except that *combustion air*~~
20 ~~systems for listed fireplaces shall be constructed according to the fireplace manufacturer's~~
21 ~~instructions.))~~

22 **R1006.5 Outlet.** Locating the exterior air outlet in the back or sides of the firebox chamber or
23 within 24 inches (610 mm) of the firebox opening on or near the floor is permitted. The outlet
24 shall be closable and designed to prevent burning material from dropping into concealed
25 combustible spaces.

1 Section 12. The following sections of Chapter 12 of the International Residential Code,
2 2012 Edition, are amended as follows:

3 **CHAPTER 12**
4 **MECHANICAL ADMINISTRATION**

5 **SECTION M1201**

6 **GENERAL**

7 **[W] M1201.1 Scope.** The provisions of Chapters 12 through 24 shall regulate the design,
8 installation, maintenance, *alteration* and inspection of mechanical systems that are permanently
9 installed and used to provide control of environmental conditions within buildings. These
10 chapters shall also regulate those mechanical systems, system components, *equipment* and
11 *appliances* specifically addressed in this code.

12 **Exception:** The standards for liquefied petroleum gas installations shall be NFPA 58
13 (Liquefied Petroleum Gas Code) and ANSI Z223.1/NFPA 54 (National Fuel Gas Code).

14 **M1201.2 Application.** In addition to the general administration requirements of Chapter 1, the
15 administrative provisions of this chapter shall also apply to the mechanical requirements of
16 Chapters 13 through 24.

17 **[W] M1201.3 Construction documents.** The plans and specifications shall show in sufficient
18 detail pertinent data and features of the materials, equipment and systems as herein governed
19 including, but not limited to: design criteria, size and type of apparatus and equipment, systems
20 and equipment controls, provisions for combustion air to fuel-burning appliances, and other
21 pertinent data to indicate conformance with the requirements of this code.

22 **[W] M1201.4 Testing.** At the discretion of the building official, flow testing may be required to
23 verify that the mechanical system satisfies the requirements of this code. Specific testing
24 required by other sections of this code shall be performed. Flow testing may be performed using
25 flow hoods measuring at the intake or exhaust points of the system, in-line pitot tube, or pitot-

1 traverse type measurement systems in the duct, short-term tracer gas measurements, or other
2 means approved by the building official.

3 ***

4 Section 13. The following sections of Chapter 13 of the International Residential Code,
5 2012 Edition, are amended as follows:

6 **CHAPTER 13**
7 **GENERAL MECHANICAL SYSTEM REQUIREMENTS**

8 **SECTION M1301**

9 **GENERAL**

10 ***

11 **M1301.2 Identification.** Each length of pipe and tubing and each pipe fitting utilized in a
12 mechanical system shall bear the identification of the manufacturer.

13 **Exception:** The manufacturer identification for fittings and pipe nipples shall be on each
14 piece or shall be printed on the fitting or nipple packaging or provided documentation.

15 ***

16 Section 14. The following sections of Chapter 15 of the International Residential Code,
17 2012 Edition, are amended as follows:

18 **CHAPTER 15**
19 **EXHAUST SYSTEMS**

20 ***

21 **SECTION M1507**
22 **MECHANICAL VENTILATION**

23 **M1507.1 General.** Local exhaust and whole-house mechanical ventilation systems and
24 equipment shall be designed in accordance with this section. ((Where local exhaust or whole-
25 house mechanical ventilation is provided, the equipment shall be designed in accordance with
26 this section.))

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

5 **M1507.3 Whole-house mechanical ventilation system.** Whole-house mechanical ventilation
6 systems shall be designed in accordance with Sections M1507.3.1 through ((M1507.3.3))
7 M1507.3.7.3.

8 **M1507.3.1 System design.** Each *dwelling unit* or *guestroom* shall be equipped with a
9 ventilation system complying with Section M1507.3.4, M1507.3.5, M1507.3.6 or M1507.3.7.
10 Compliance is also permitted to be demonstrated through compliance with the *International*
11 *Mechanical Code*.

12 **M1507.3.2 Control and operation.**

- 13 1. Location of controls. Controls for all ventilation systems shall be *readily accessible* by
14 the occupant.
- 15 2. Instructions. Operating instructions for whole-house ventilation systems shall be
16 provided to the occupant by the installer of the system.
- 17 3. Local exhaust systems. Local exhaust systems shall be controlled by manual switches,
18 dehumidistats, timers, or other approved means.
- 19 4. Continuous whole-house ventilation systems. Continuous whole-house ventilation
20 systems shall operate continuously. Exhaust fans, forced-air system fans, or supply fans
21 shall be equipped with "fan on" as override controls. Controls shall be capable of
22 operating the ventilation system without energizing other energy-consuming appliances.
23 A label shall be affixed to the controls that reads "Whole House Ventilation (see
24 operating instructions)."

1 5. Intermittent whole-house ventilation systems. Intermittent whole-house ventilation
2 systems shall comply with the following:

3 5.1. They shall be capable of operating intermittently and continuously.

4 5.2. They shall have controls capable of operating the exhaust fans, forced-air system
5 fans, or supply fans without energizing other energy-consuming appliances.

6 5.3. The ventilation rate shall be adjusted according to the exception in Section
7 M1507.3.3.

8 5.4. The system shall be designed so that it can operate automatically based on the type of
9 control timer installed.

10 5.5. The intermittent mechanical ventilation system shall operate at least one hour out of
11 every four.

12 5.6. The system shall have a manual control and automatic control, such as a 24-hour
13 clock timer.

14 5.7. At the time of final inspection, the automatic control shall be set to operate the
15 whole-house fan according to the schedule used to calculate the whole-house fan
16 sizing.

17 5.8. A label shall be affixed to the control that reads "Whole House Ventilation (see
18 operating instructions)."

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

22 ~~((M1507.3.1 System design. The whole-house ventilation system shall consist of one or more~~
23 ~~supply or exhaust fans, or a combination of such, and associated ducts and controls. Local~~
24 ~~exhaust or supply fans are permitted to serve as such a system. Outdoor air ducts connected to~~
25 ~~the return side of an air handler shall be considered to provide supply ventilation.~~

~~**M1507.3.2 System controls.** The whole-house mechanical ventilation system shall be provided with controls that enable manual override.)~~

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

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

Table M1507.3.3(1)
Continuous Whole-House Mechanical Ventilation System Airflow Rate Requirements

Dwelling Unit Floor Area (square feet)	NUMBER OF BEDROOMS				
	0 - 1	2 - 3	4 - 5	6 - 7	> 7
	Airflow in CFM				
< 1,500	30	45	60	75	90
1,501 - 3,000	45	60	75	90	105
3,001 - 4,500	60	75	90	105	120
4,501 - 6,000	75	90	105	120	135
6,001 - 7,500	90	105	120	135	150
> 7,501	105	120	135	150	165

For SI: 1 square foot = 0.0929 m², 1 cubic foot per minute = 0.0004719 m³/s.

Table M1507.3.3(2)
Intermittent Whole-House Mechanical Ventilation Rate Factors^{a, b}

Run-Time Percentage in Each 4-Hour Segment	25%	33%	50%	66%	75%	100%
Factor ^a	4	3	2	1.5	1.3	1.0

^a For ventilation system run time values between those given, the factors are permitted to be determined by interpolation.
^b Extrapolation beyond the table is prohibited.

1
2 **M1507.3.4 Whole-house ventilation using exhaust fans.** This section establishes minimum
3 prescriptive requirements for whole-house ventilation systems using exhaust fans. A system
4 which meets all the requirements of this section shall be deemed to satisfy the requirements
5 for a whole-house ventilation system.

6 **M1507.3.4.1 Whole-house ventilation fans.** Exhaust fans providing whole-house
7 ventilation shall have a flow rating at 0.25 inches water gauge as specified in Table
8 M1507.3.3(1). Manufacturers' fan flow ratings shall be determined according to HVI 916
9 Home Ventilating Institute Airflow Test Procedure or AMCA 210, Laboratory Methods
10 of Testing Fans for Certified Aerodynamic Performance Rating.

11 **M1507.3.4.2 Fan noise.** Whole-house fans located 4 feet or less from the interior grille
12 shall have a sone rating of 1.0 or less measured at 0.1 inches water gauge. Manufacturer's
13 noise ratings shall be determined as per HVI 915 Home Ventilating Institute Loudness
14 Testing and Rating Procedure. Remotely-mounted fans shall be acoustically isolated from
15 the structural elements of the building and from attached ductwork using insulated
16 flexible duct or other approved material.

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

19 **M1507.3.4.4 Outdoor air inlets.** Outdoor air shall be distributed to each habitable space
20 by individual outdoor air inlets. Where outdoor air supplies are separated from exhaust
21 points by doors, provisions shall be made to ensure air flow by installation of distribution
22 ducts, undercutting doors, installation of grilles, transoms, or similar means. Doors shall
23 be undercut to a minimum of 1/2 inch above the surface of the finish floor covering.

24 Individual room outdoor air inlets shall:

25 1. Have controllable and secure openings;

1 2. Be sleeved or otherwise designed so as not to compromise the thermal properties of
2 the wall or window in which they are placed;

3 3. Provide not less than 4 square inches of net free area of opening for each habitable
4 space. Any inlet or combination of inlets which provide 10 cfm at 10 Pascals are
5 deemed equivalent to 4 square inches net free area.

6 Inlets shall be screened or otherwise protected from entry by leaves or other
7 material.

8 Outdoor air inlets shall be located so as not to take air from the following areas:

9 3.1. Closer than 10 feet from an appliance vent outlet, unless such vent outlet is
10 3 feet above the outdoor air inlet.

11 3.2. Where it will pick up objectionable odors, fumes or flammable vapors.

12 3.3. A hazardous or unsanitary location.

13 3.4. A room or space having any fuel-burning appliances therein.

14 3.5. Closer than 10 feet from a vent opening of a plumbing drainage system
15 unless the vent opening is at least 3 feet above the air inlet.

16 3.6. Attic, crawl spaces, or garages.

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

21 **M1507.3.5.1 Integrated whole-house ventilation systems.** Integrated whole-house
22 ventilation systems shall provide outdoor air at the rate calculated using Section
23 M1507.3.3. Integrated forced-air ventilation systems shall distribute outdoor air to each
24 habitable space through the forced-air system ducts. Integrated forced-air ventilation
25 systems shall have an outdoor air inlet duct connecting a terminal element on the outside

1 of the building to the return air plenum of the forced-air system, at a point within 4 feet
2 upstream of the air handler. The outdoor air inlet duct connection to the return air stream
3 shall be located upstream of the forced-air system blower and shall not be connected
4 directly into a furnace cabinet to prevent thermal shock to the heat exchanger. The system
5 shall be equipped with a motorized damper connected to the automatic ventilation control
6 as specified in Section M1507.3.2, item 5. The required flow rate shall be verified by
7 field testing with a flow hood or a flow measuring station.

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

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

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

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

1 **M1507.3.6.1 Outdoor air.** Supply fan ventilation systems shall distribute outdoor air to
2 each habitable space through the forced-air system ducts or through dedicated ducts to
3 each habitable space. Supply fans shall have the capacity to provide the amount of
4 outdoor air specified in Table M1507.3.3(1) at 0.40 inches water gauge as per HVI 916
5 Home Ventilating Institute Airflow Test Procedure. The outdoor air shall be filtered
6 before it is delivered to habitable spaces. The filter may be located at the intake device, in
7 line with the fan, or, in the case of a connection to the return plenum of the air handler,
8 using the furnace filter. An outdoor air inlet shall be connected to either the supply or
9 return air stream.

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

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24 **Table M1507.3.6.2**
25 **Prescriptive Supply Fan Duct Sizing**
26 **Supply Fan Tested cfm at 0.40" wg**

<u>Specified Volume from Table M1508.2</u>	<u>Minimum Smooth Duct Diameter</u>	<u>Minimum Flexible Duct Diameter</u>
<u>50 - 90 cfm</u>	<u>4 inch</u>	<u>5 inch</u>
<u>90 - 150 cfm</u>	<u>5 inch</u>	<u>6 inch</u>
<u>150 - 250 cfm</u>	<u>6 inch</u>	<u>7 inch</u>
<u>250 - 400 cfm</u>	<u>7 inch</u>	<u>8 inch</u>

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

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

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

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

1. Closer than 10 feet from an appliance vent outlet, unless such vent outlet is 3 feet above the outdoor air inlet.
2. Where it will pick up objectionable odors, fumes or flammable vapors.

1 3. A hazardous or unsanitary location.

2 4. A room or space having any fuel-burning appliances therein.

3 5. Closer than 10 feet from a vent opening of a plumbing drainage system unless the
4 vent opening is at least 3 feet above the air inlet.

5 6. Attic, crawl spaces, or garages.

6 **M1507.3.7 Whole-house ventilation using a heat recovery ventilation system.** This
7 section establishes minimum prescriptive requirements for whole-house ventilation using a
8 heat recovery ventilation system.

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

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

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

19 1. Closer than 10 feet from an appliance vent outlet, unless such vent outlet is 3 feet
20 above the outdoor air inlet.

21 2. Where it will pick up objectionable odors, fumes or flammable vapors.

22 3. A hazardous or unsanitary location.

23 4. A room or space having any fuel-burning appliances therein.

24 5. Closer than 10 feet from a vent opening of a plumbing drainage system unless the
25 vent opening is at least 3 feet above the air inlet.

1 Section 15. The following sections of Chapter 16 of the International Residential Code,
2 2012 Edition, are amended as follows:

3 **CHAPTER 16**
4 **DUCT SYSTEMS**
5 **SECTION M1601**
6 **DUCT CONSTRUCTION**

7 **M1601.1 Duct design.** *Duct systems* serving heating, cooling and *ventilation equipment* shall be
8 installed in accordance with the provisions of this section and ACCA Manual D or other
9 *approved* methods.

10 **[W] M1601.1.1 Above-ground duct systems.** Above-ground *duct systems* shall conform to
11 the following:

- 12 1. *Equipment* connected to *duct systems* shall be designed to limit discharge air temperature
13 to a maximum of 250°F (121°C).
- 14 2. Factory-made air ducts shall be constructed of Class 0 or Class 1 materials as designated
15 in Table M1601.1.1(1).
- 16 3. Fibrous duct construction shall conform to the SMACNA *Fibrous Glass Duct*
17 *Construction Standards* or NAIMA *Fibrous Glass Duct Construction Standards*.
- 18 4. Minimum thickness of metal duct material shall be as listed in Table M1601.1.1(2).
19 Galvanized steel shall conform to ASTM A 653. Metallic ducts shall be fabricated in
20 accordance with SMACNA Duct Construction Standards Metal and Flexible.
- 21 5. Use of gypsum products to construct return air ducts or plenums is permitted, provided
22 that the air temperature does not exceed 125°F (52°C) and exposed surfaces are not
23 subject to condensation.
- 24 6. *Duct systems* shall be constructed of materials having a flame spread index not greater
25 than 200.

1 7. Stud wall cavities and the spaces between solid floor joists shall not be used as a duct or
2 an air plenum in new construction. For existing systems, stud wall cavities and the spaces
3 between solid floor joists to be used as air plenums shall comply with the following
4 conditions:

5 7.1. These cavities or spaces shall not be used as a plenum for supply air.

6 7.2. These cavities or spaces shall not be part of a required fire-resistance-rated assembly.

7 7.3. Stud wall cavities shall not convey air from more than one floor level.

8 7.4. Stud wall cavities and joist-space plenums shall be isolated from adjacent concealed
9 spaces by tight-fitting fireblocking in accordance with Section R602.8.

10 7.5. Stud wall cavities in the outside walls of building envelope assemblies shall not be
11 utilized as air plenums.

12 **M1601.1.2 Underground duct systems.** Underground *duct systems* shall be constructed
13 of *approved* concrete, clay, metal or plastic. The maximum duct temperature for plastic ducts
14 shall not be greater than 150°F (66°C). Metal ducts shall be protected from corrosion in an
15 *approved* manner or shall be completely encased in concrete not less than 2 inches (51 mm)
16 thick. Nonmetallic ducts shall be installed in accordance with the manufacturer's installation
17 instructions. Plastic pipe and fitting materials shall conform to cell classification 12454-B of
18 ASTM D 1248 or ASTM D 1784 and external loading properties of ASTM D 2412. All ducts
19 shall slope to an accessible point for drainage. Where encased in concrete, ducts shall be sealed
20 and secured prior to any concrete being poured. Metallic ducts having an *approved* protective
21 coating and nonmetallic ducts shall be installed in accordance with the manufacturer's
22 installation instructions.

TABLE M1601.1.1(2)
 GAGES OF METAL DUCTS AND PLENUMS USED FOR HEATING OR COOLING

DUCT SIZE	GALVANIZED		ALUMINUM
	Minimum Thickness (inches)	Equivalent Galvanized Gage No.	Minimum Thickness (inches)
Round ducts and enclosed rectangular ducts			
14 inches or less	0.0157	28	0.0145
16 and 18 inches	0.0187	26	0.018
20 inches and over	0.0236	24	0.023
Exposed rectangular ducts			
14 inches or less	0.0157	28	0.0145
Over 14 inches	0.0187	26	0.018

For SI: 1 inch = 25.4 mm.

a. For duct gages and reinforcement requirements at static pressures of 1/2 inch, 1 inch and 2 inches w.g., SMACNA *Duct Construction Standard*, Tables 2-1, 2-2 and 2-3 shall apply.

TABLE M1601.1.1(1)
 CLASSIFICATION OF FACTORY-MADE AIR DUCTS

DUCT CLASS	MAXIMUM FLAME SPREAD INDEX
0	0
1	25

Section 16. The following sections of Chapter 17 of the International Residential Code, 2012 Edition, are amended as follows:

CHAPTER 17
COMBUSTION AIR
SECTION M1701
GENERAL

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

Fireplaces shall comply with Chapter 10.

1 **M1701.2 Opening location.** In flood hazard areas as established in Table R301.2(1), *combustion*
2 *air* openings shall be located at or above the elevation required in Section R322.2.1 or R322.3.2.

3
4 Section 17. The following sections of Chapter 20 of the International Residential Code,
5 2012 Edition, are amended as follows:

6 **CHAPTER 20**
7 **BOILERS AND WATER HEATERS**
8 **SECTION M2001**
9 **BOILERS**

10 **M2001.1 Boilers.** Boilers shall comply with the Seattle Boiler and Pressure Vessel Code.

11 ~~((M2001.1 Installation.~~ In addition to the requirements of this code, the installation of boilers
12 shall conform to the manufacturer's instructions. The manufacturer's rating data, the nameplate
13 and operating instructions of a permanent type shall be attached to the boiler. Boilers shall have
14 all controls set, adjusted and tested by the installer. A complete control diagram together with
15 complete boiler operating instructions shall be furnished by the installer. ~~Solid and liquid-~~
16 ~~fuelburning boilers shall be provided with *combustion air* as required by Chapter 17.~~

17 ~~M2001.1.1 Standards.~~ Oil-fired boilers and their control systems shall be listed and *labeled* in
18 accordance with UL 726. Electric boilers and their control systems shall be *listed* in accordance
19 with UL 834. Solid fuel-fired boilers shall be listed and labeled in accordance with UL 2523.
20 Boilers shall be designed and constructed in accordance with the requirements of ASME CSD-1
21 and as applicable, the *ASME Boiler and Pressure Vessel Code*, Sections I and IV. Gas-fired
22 boilers shall conform to the requirements *listed* in Chapter 24.

23 **M2001.2 Clearance.** ~~Boilers shall be installed in accordance with their *listing* and *label*.~~

1 ~~**M2001.3 Valves.** Every boiler or modular boiler shall have a shutoff valve in the supply and~~
2 ~~return piping. For multiple boiler or multiple modular boiler installations, each boiler or modular~~
3 ~~boiler shall have individual shutoff valves in the supply and return piping.~~

4 ~~**Exception:** Shutoff valves are not required in a system having a single low-pressure steam~~
5 ~~boiler.~~

6 ~~**M2001.4 Flood-resistant installation.** In flood hazard areas established in Table R301.2(1),~~
7 ~~boilers, water heaters and their control systems shall be located or installed in accordance with~~
8 ~~Section R322.1.6.~~

9 SECTION M2002

10 OPERATING AND SAFETY CONTROLS

11 ~~**M2002.1 Safety controls.** Electrical and mechanical operating and safety controls for boilers~~
12 ~~shall be *listed* and *labeled*.~~

13 ~~**M2002.2 Hot water boiler gauges.** Every hot water boiler shall have a pressure gauge and a~~
14 ~~temperature gauge, or combination pressure and temperature gauge. The gauges shall indicate~~
15 ~~the temperature and pressure within the normal range of the system's operation.~~

16 ~~**M2002.3 Steam boiler gauges.** Every steam boiler shall have a water gauge glass and a pressure~~
17 ~~gauge. The pressure gauge shall indicate the pressure within the normal range of the system's~~
18 ~~operation. The gauge glass shall be installed so that the midpoint is at the normal water level.~~

19 ~~**M2002.4 Pressure relief valve.** Boilers shall be equipped with pressure relief valves with~~
20 ~~minimum rated capacities for the *equipment* served. Pressure relief valves shall be set at the~~
21 ~~maximum rating of the boiler. Discharge shall be piped to drains by gravity to within 18 inches~~
22 ~~(457 mm) of the floor or to an open receptor.~~

23 ~~**M2002.5 Boiler low-water cutoff.** All steam and hot water boilers shall be protected with a low-~~
24 ~~water cutoff control. The low-water cutoff shall automatically stop the combustion operation of~~

1 ~~the appliance when the water level drops below the lowest safe water level as established by the~~
2 ~~manufacturer.~~

3 **SECTION M2003**
4 **EXPANSION TANKS**

5 ~~**M2003.1 General.** Hot water boilers shall be provided with expansion tanks. Nonpressurized~~
6 ~~expansion tanks shall be securely fastened to the structure or boiler and supported to carry twice~~
7 ~~the weight of the tank filled with water. Provisions shall be made for draining nonpressurized~~
8 ~~tanks without emptying the system.~~

9 ~~**M2003.1.1 Pressurized expansion tanks.** Pressurized expansion tanks shall be consistent with~~
10 ~~the volume and capacity of the system. Tanks shall be capable of withstanding a hydrostatic test~~
11 ~~pressure of two and one-half times the allowable working pressure of the system.~~

12 ~~**M2003.2 Minimum capacity.** The minimum capacity of expansion tanks shall be determined~~
13 ~~from Table M2003.2.))~~

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26 ~~((TABLE M2003.2~~

EXPANSION TANK MINIMUM CAPACITY^a FOR FORCED HOT-WATER SYSTEMS

SYSTEM VOLUME^b (gallons)	PRESSURIZED DIAPHRAGM TYPE	NONPRESSURIZED TYPE
10	1.0	1.5
20	1.5	3.0
30	2.5	4.5
40	3.0	6.0
50	4.0	7.5
60	5.0	9.0
70	6.0	10.5
80	6.5	12.0
90	7.5	13.5
100	8.0	15.0

For SI: 1 gallon = 3.785 L, 1 pound per square inch gauge = 6.895 kPa, °C = [(°F) - 32]/1.8.

a. Based on average water temperature of 195°F (91°C), fill pressure of 12 psig and a maximum operating pressure of 30 psig.

b. System volume includes volume of water in boiler, convectors and piping, not including the expansion tank.)

Section 18. Section P2904 of the International Residential Code, 2012 Edition, is adopted as follows:

SECTION P2904

DWELLING UNIT FIRE SPRINKLER SYSTEMS

P2904.1 General. The design and installation of residential fire sprinkler systems shall be in accordance with NFPA 13D or Section P2904, which shall be considered equivalent to NFPA 13D. Partial residential sprinkler systems shall be permitted to be installed only in buildings not required to be equipped with a residential sprinkler system. Section P2904 shall apply to stand-alone and multipurpose wet-pipe sprinkler systems that do not include the use of antifreeze. A

1 multipurpose fire sprinkler system shall provide domestic water to both fire sprinklers and
2 plumbing fixtures. A stand-alone sprinkler system shall be separate and independent from the
3 water distribution system. A backflow preventer shall not be required to separate a stand-alone
4 sprinkler system from the water distribution system.

5 **P2904.1.1 Required sprinkler locations.** Sprinklers shall be installed to protect all areas of
6 a *dwelling unit*.

7 **Exceptions:**

- 8 1. Attics, crawl spaces and normally unoccupied concealed spaces that do not
9 contain fuel-fired appliances do not require sprinklers. In *attics*, crawl spaces and
10 normally unoccupied concealed spaces that contain fuel-fired equipment, a
11 sprinkler shall be installed above the equipment; however, sprinklers shall not be
12 required in the remainder of the space.
- 13 2. Clothes closets, linen closets and pantries not exceeding 24 square feet (2.2 m²) in
14 area, with the smallest dimension not greater than 3 feet (915 mm) and having
15 wall and ceiling surfaces of gypsum board.
- 16 3. Bathrooms not more than 55 square feet (5.1 m²) in area.
- 17 4. Garages; carports; exterior porches; unheated entry areas, such as mud rooms, that
18 are adjacent to an exterior door; and similar areas.

19 **P2904.2 Sprinklers.** Sprinklers shall be new listed residential sprinklers and shall be installed in
20 accordance with the sprinkler manufacturer's installation instructions.

21 **P2904.2.1 Temperature rating and separation from heat sources.** Except as provided for
22 in Section P2904.2.2, sprinklers shall have a temperature rating of not less than 135°F (57°C)
23 and not more than 170°F (77°C). Sprinklers shall be separated from heat sources as required
24 by the sprinkler manufacturer's installation instructions.

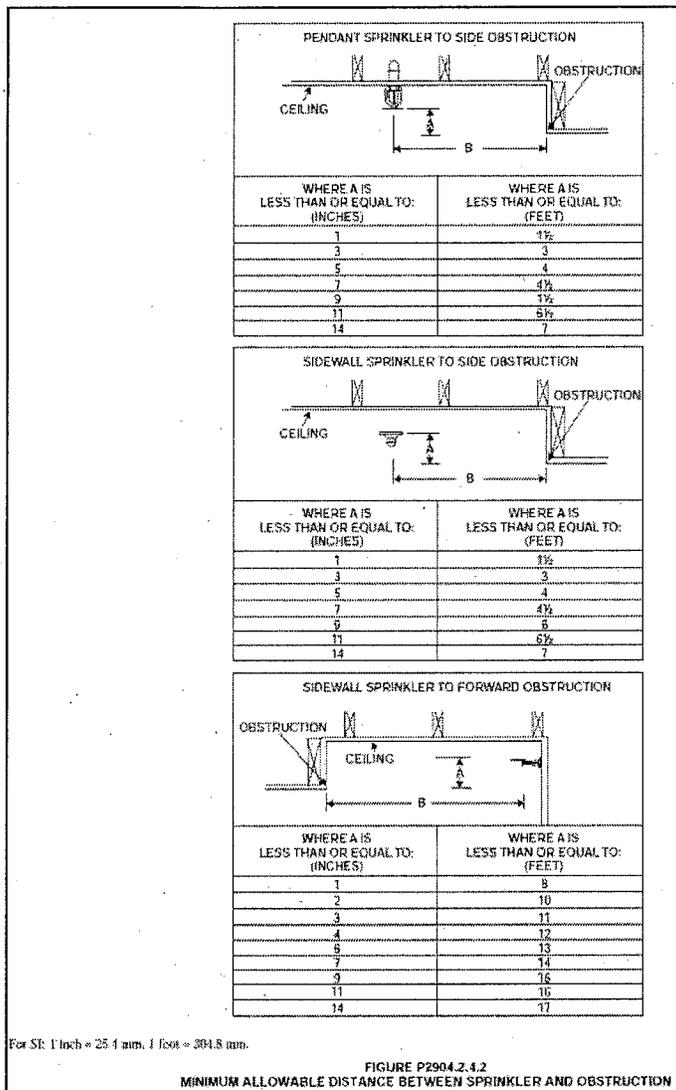
1 **P2904.2.2 Intermediate temperature sprinklers.** Sprinklers shall have an intermediate
2 temperature rating not less than 175°F (79°C) and not more than 225°F (107°C) where
3 installed in the following locations:

- 4 1. Directly under skylights, where the sprinkler is exposed to direct sunlight.
- 5 2. In *attics*.
- 6 3. In concealed spaces located directly beneath a roof.
- 7 4. Within the distance to a heat source as specified in Table P2904.2.2

8 **P2904.2.3 Freezing areas.** Piping shall be protected from freezing as required by Section
9 P2603.6. Where sprinklers are required in areas that are subject to freezing, dry-sidewall or
10 dry-pendent sprinklers extending from a nonfreezing area into a freezing area shall be
11 installed.

12 **P2904.2.4 Sprinkler coverage.** Sprinkler coverage requirements and sprinkler obstruction
13 requirements shall be in accordance with Sections P2904.2.4.1 and P2904.2.4.2.

14 **P2904.2.4.1 Coverage area limit.** The area of coverage of a single sprinkler shall not
15 exceed 400 square feet (37 m²) and shall be based on the sprinkler listing and the
16 sprinkler manufacturer's installation instructions.



P2904.2.4.2 Obstructions to coverage. Sprinkler discharge shall not be blocked by obstructions unless additional sprinklers are installed to protect the obstructed area. Additional sprinklers shall not be required where the sprinkler separation from obstructions complies with either the minimum distance indicated in Figure P2904.2.4.2 or the minimum distances specified in the sprinkler manufacturer's instructions where the manufacturer's instructions permit a lesser distance.

TABLE P2904.2.2

LOCATIONS WHERE INTERMEDIATE TEMPERATURE SPRINKLERS ARE REQUIRED

HEAT SOURCE	RANGE OF DISTANCE FROM HEAT SOURCE WITHIN WHICH INTERMEDIATE TEMPERATURE SPRINKLERS ARE REQUIRED ^{a,b} (inches)
Fireplace, side of open or recessed fireplace	12 to 36
Fireplace, front of recessed fireplace	36 to 60
Coal and wood burning stove	12 to 42
Kitchen range top	9 to 18
Oven	9 to 18
Vent connector or chimney connector	9 to 18
Heating duct, not insulated	9 to 18
Hot water pipe, not insulated	6 to 12
Side of ceiling or wall warm air register	12 to 24
Front of wall mounted warm air register	18 to 36
Water heater, furnace or boiler	3 to 6
Luminaire up to 250 watts	3 to 6
Luminaire 250 watts up to 499 watts	6 to 12

For IS: 1 inch = 25.4 mm.

a. Sprinklers shall not be located at distances less than the minimum table distance unless the sprinkler listing allows a lesser distance.

b. Distances shall be measured in a straight line from the nearest edge of the heat source to the nearest edge of the sprinkler.

P2904.2.4.2.1 Additional requirements for pendent sprinklers. Pendent sprinklers within 3 feet (915 mm) of the center of a ceiling fan, surfacemounted ceiling luminaire or similar object shall be considered to be obstructed, and additional sprinklers shall be installed.

1 **P2904.2.4.2.2 Additional requirements for sidewall sprinklers.** Sidewall sprinklers
2 within 5 feet (1524 mm) of the center of a ceiling fan, surfacemounted ceiling
3 luminaire or similar object shall be considered to be obstructed, and additional
4 sprinklers shall be installed.

5 **P2904.2.5 Sprinkler installation on systems assembled with solvent cement.** The solvent
6 cementing of threaded adapter fittings shall be completed and threaded adapters for
7 sprinklers shall be verified as being clear of excess cement prior to the installation of
8 sprinklers on systems assembled with solvent cement.

9 **P2904.2.6 Sprinkler modifications prohibited.** Painting, caulking or modifying of
10 sprinklers shall be prohibited. Sprinklers that have been painted, caulked, modified or
11 damaged shall be replaced with new sprinklers.

12 **P2904.3 Sprinkler piping system.** Sprinkler piping shall be supported in accordance with the
13 requirements for cold water distribution piping. Sprinkler piping shall comply with all
14 requirements for cold water distribution piping. For multipurpose piping systems, the sprinkler
15 piping shall connect to and be a part of the cold water distribution piping system.

16 **P2904.3.1 Nonmetallic pipe and tubing.** Nonmetallic pipe and tubing, such as CPVC, PEX,
17 and PE-RT shall be listed for use in residential fire sprinkler systems.

18 **P2904.3.1.1 Nonmetallic pipe protection.** Nonmetallic pipe and tubing systems shall be
19 protected from exposure to the living space by a layer of not less than 3/8-inch-thick (9.5
20 mm) gypsum wallboard, 1/2-inch-thick (13 mm) plywood, or other material having a 15-
21 minute fire rating.

22 **Exceptions:**

- 23 1. Pipe protection shall not be required in areas that do not require protection
24 with sprinklers as specified in Section P2904.1.1.

- 1 2. Pipe protection shall not be required where exposed piping is permitted by the
2 pipe listing.

3 **P2904.3.2 Shutoff valves prohibited.** With the exception of shutoff valves for the entire
4 water distribution system, valves shall not be installed in any location where the valve would
5 isolate piping serving one or more sprinklers.

6 **P2904.3.3 Single dwelling limit.** Piping beyond the service valve located at the beginning of
7 the water distribution system shall not serve more than one *dwelling*.

8 **P2904.3.4 Drain.** A means to drain the sprinkler system shall be provided on the system side
9 of the water distribution shutoff valve.

10 **P2904.4 Determining system design flow.** The flow for sizing the sprinkler piping system shall
11 be based on the flow rating of each sprinkler in accordance with Section P2904.4.1 and the
12 calculation in accordance with Section P2904.4.2.

13 **P2904.4.1 Determining required flow rate for each sprinkler.** The minimum required
14 flow for each sprinkler shall be determined using the sprinkler manufacturer's published data
15 for the specific sprinkler model based on all of the following:

- 16 1. The area of coverage.
17 2. The ceiling configuration.
18 3. The temperature rating.
19 4. Any additional conditions specified by the sprinkler manufacturer.

20 **P2904.4.2 System design flow rate.** The design flow rate for the system shall be based on
21 the following:

- 22 1. The design flow rate for a room having only one sprinkler shall be the flow rate
23 required for that sprinkler, as determined by Section P2904.4.1.

2. The design flow rate for a room having two or more sprinklers shall be determined by identifying the sprinkler in that room with the highest required flow rate, based on Section P2904.4.1, and multiplying that flow rate by 2.
3. Where the sprinkler manufacturer specifies different criteria for ceiling configurations that are not smooth, flat and horizontal, the required flow rate for that room shall comply with the sprinkler manufacturer's instructions.
4. The design flow rate for the sprinkler system shall be the flow required by the room with the largest flow rate, based on Items 1, 2 and 3.
5. For the purpose of this section, it shall be permissible to reduce the design flow rate for a room by subdividing the space into two or more rooms, where each room is evaluated separately with respect to the required design flow rate. Each room shall be bounded by walls and a ceiling. Openings in walls shall have a lintel not less than 8 inches (203 mm) in depth and each lintel shall form a solid barrier between the ceiling and the top of the opening.

P2904.5 Water supply. The water supply shall provide not less than the required design flow rate for sprinklers in accordance with Section P2904.4.2 at a pressure not less than that used to comply with Section P2904.6.

P2904.5.1 Water supply from individual sources. Where a *dwelling unit* water supply is from a tank system, a private well system or a combination of these, the available water supply shall be based on the minimum pressure control setting for the pump.

P2904.5.2 Required capacity. The water supply shall have the capacity to provide the required design flow rate for sprinklers for a period of time as follows:

1. Seven minutes for *dwelling units* one story in height and less than 2,000 square feet (186 m²) in area.

- 1 2. Ten minutes for *dwelling units* two or more stories in height or equal to or greater
2 than 2,000 square feet (186 m²) in area. Where a well system, a water supply tank
3 system or a combination thereof is used, any combination of well capacity and tank
4 storage shall be permitted to meet the capacity requirement.

5 **P2904.6 Pipe sizing.** The piping to sprinklers shall be sized for the flow required by Section
6 P2904.4.2. The flow required to supply the plumbing fixtures shall not be required to be added to
7 the sprinkler design flow.

8 **P2904.6.1 Method of sizing pipe.** Piping supplying sprinklers shall be sized using the
9 prescriptive method in Section P2904.6.2 or by hydraulic calculation in accordance with
10 NFPA 13D. The minimum pipe size from the water supply source to any sprinkler shall be
11 3/4 inch (19 mm) nominal. Threaded adapter fittings at the point where sprinklers are
12 attached to the piping shall be a minimum of 1/2 inch (13 mm) nominal.

13 **P2904.6.2 Prescriptive pipe sizing method.** Pipe shall be sized by determining the available
14 pressure to offset friction loss in piping and identifying a piping material, diameter and
15 length using the equation in Section P2904.6.2.1 and the procedure in Section P2904.6.2.2.

16 **P2904.6.2.1 Available pressure equation.** The pressure available to offset friction loss
17 in the interior piping system (P_t) shall be determined in accordance with the Equation 29-
18 1.

$$P_t = P_{sp} - PL_{wc} - PL_m - PL_d - PL_e - P_{sp} \text{ (Equation 29-1)}$$

where:

P_t = Pressure used in applying Tables P2904.6.2(4) through P2904.6.2(9).

P_{sp} = Pressure available from the water supply source.

PL_{wc} = Pressure loss in the water-service pipe.

PL_m = Pressure loss in the water meter.

PL_d = Pressure loss from devices other than the water meter.

PL_e = Pressure loss associated with changes in elevation.

P_{sp} = Maximum pressure required by a sprinkler.

1 **P2904.6.2.2 Calculation procedure.** Determination of the required size for water
2 distribution piping shall be in accordance with the following procedure:

3 **Step 1—Determine P_{sup}**

4 Obtain the static supply pressure that will be available from the water main from the
5 water purveyor, or for an individual source, the available supply pressure shall be in
6 accordance with Section P2904.5.1.

7 **Step 2—Determine PL_{svc}**

8 Use Table P2904.6.2(1) to determine the pressure loss in the water service pipe based on
9 the selected size of the water service.

10 **Step 3—Determine PL_m**

11 Use Table P2904.6.2(2) to determine the pressure loss from the water meter, based on the
12 selected water meter size.

13 **Step 4—Determine PL_d**

14 Determine the pressure loss from devices other than the water meter installed in the
15 piping system supplying sprinklers, such as pressure-reducing valves, backflow
16 preventers, water softeners or water filters. Device pressure losses shall be based on the
17 device manufacturer's specifications. The flow rate used to determine pressure loss shall
18 be the rate from Section P2904.4.2, except that 5 gpm (0.3 L/s) shall be added where the
19 device is installed in a water-service pipe that supplies more than one *dwelling*. As
20 alternative to deducting pressure loss for a device, an automatic bypass valve shall be
21 installed to divert flow around the device when a sprinkler activates.

22 **Step 5—Determine PL_e**

23 Use Table P2904.6.2(3) to determine the pressure loss associated with changes in
24 elevation. The elevation used in applying the table shall be the difference between the
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1 elevation where the water source pressure was measured and the elevation of the highest
2 sprinkler.

3 **Step 6—Determine P_{sp}**

4 Determine the maximum pressure required by any individual sprinkler based on the flow
5 rate from Section P2904.4.1. The required pressure is provided in the sprinkler
6 manufacturer's published data for the specific sprinkler model based on the selected flow
7 rate.

8 **Step 7—Calculate P_t**

9 Using Equation 29-1, calculate the pressure available to offset friction loss in water-
10 distribution piping between the service valve and the sprinklers.

11 **Step 8—Determine the maximum allowable pipe length**

12 Use Tables P2904.6.2(4) through P2904.6.2(9) to select a material and size for water
13 distribution piping. The piping material and size shall be acceptable if the *developed*
14 *length* of pipe between the service valve and the most remote sprinkler does not exceed
15 the maximum allowable length specified by the applicable table. Interpolation of P_t
16 between the tabular values shall be permitted. The maximum allowable length of piping
17 in Tables P2904.6.2(4) through P2904.6.2(9) incorporates an adjustment for pipe fittings,
18 and no additional consideration of friction losses associated with pipe fittings shall be
19 required.
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TABLE P2904.6.2(1)
WATER SERVICE PRESSURE LOSS ($P_{L_{ws}}$)^{a,b}

FLOW RATE ^c (gpm)	$\frac{1}{2}$ -INCH WATER SERVICE PRESSURE LOSS (psi)				1-INCH WATER SERVICE PRESSURE LOSS (psi)				$\frac{1\frac{1}{2}}$ -INCH WATER SERVICE PRESSURE LOSS (psi)			
	Length of water service pipe (feet)				Length of water service pipe (feet)				Length of water service pipe (feet)			
	40 or less	41 to 75	76 to 100	101 to 150	40 or less	41 to 75	76 to 100	101 to 150	40 or less	41 to 75	76 to 100	101 to 150
8	5.1	8.7	11.8	17.4	1.5	2.5	3.4	5.1	0.6	1.0	1.3	1.9
10	7.7	13.1	17.8	26.3	2.3	3.8	5.2	7.7	0.8	1.4	2.0	2.9
12	10.8	18.4	24.9	NP	3.2	5.4	7.3	10.7	1.2	2.0	2.7	4.0
14	14.4	24.5	NP	NP	4.2	7.1	9.6	14.3	1.6	2.7	3.6	5.4
16	18.4	NP	NP	NP	5.4	9.1	12.4	18.3	2.0	3.4	4.7	6.9
18	22.9	NP	NP	NP	6.7	11.4	15.4	22.7	2.5	4.3	5.8	8.6
20	27.8	NP	NP	NP	8.1	13.8	18.7	27.6	3.1	5.2	7.0	10.4
22	NP	NP	NP	NP	9.7	16.5	22.3	NP	3.7	6.2	8.4	12.4
24	NP	NP	NP	NP	11.4	19.3	26.2	NP	4.3	7.3	9.9	14.6
26	NP	NP	NP	NP	13.2	22.4	NP	NP	5.0	8.5	11.4	16.9
28	NP	NP	NP	NP	15.1	25.7	NP	NP	5.7	9.7	13.1	19.4
30	NP	NP	NP	NP	17.2	NP	NP	NP	6.5	11.0	14.9	22.0
32	NP	NP	NP	NP	19.4	NP	NP	NP	7.3	12.4	16.8	24.8
34	NP	NP	NP	NP	21.7	NP	NP	NP	8.2	13.9	18.8	NP
36	NP	NP	NP	NP	24.1	NP	NP	NP	9.1	15.4	20.9	NP

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 0.063 L/s, 1 pound per square inch = 6.895 kPa.
 NP = Not permitted. Pressure loss exceeds reasonable limits.
 a. Values are applicable for underground piping materials listed in Table P2905.4 and are based on an SDR of 11 and a Hazen Williams C Factor of 150.
 b. Values include the following length allowances for fittings: 25% length increase for actual lengths up to 100 feet and 15% length increase for actual lengths over 100 feet.
 c. Flow rate from Section P2904.4.2. Add 5 gpm to the flow rate required by Section P2904.4.2 where the water-service pipe supplies more than one dwelling.

TABLE P2904.6.2(2)
MINIMUM WATER METER PRESSURE LOSS (P_{L_m})^a

FLOW RATE (gallons per minute, gpm) ^b	$\frac{1}{2}$ -INCH METER PRESSURE LOSS (pounds per square inch, psi)	$\frac{3}{4}$ -INCH METER PRESSURE LOSS (pounds per square inch, psi)	1-INCH METER PRESSURE LOSS (pounds per square inch, psi)
8	2	1	1
10	3	1	1
12	4	1	1
14	5	2	1
16	7	3	1
18	9	4	1
20	11	4	2
22	NP	5	2
24	NP	5	2
26	NP	6	2
28	NP	6	2
30	NP	7	2
32	NP	7	3
34	NP	8	3
36	NP	8	3

For SI: 1 inch = 25.4 mm, 1 pound per square inch = 6.895 kPa, 1 gallon per minute = 0.063 L/s.
 NP = Not permitted unless the actual water meter pressure loss is known.
 a. Table P2904.6.2(2) establishes conservative values for water meter pressure loss at installations where the water meter loss is unknown. Where the actual water meter pressure loss is known, P_{L_m} shall be the actual loss.
 b. Flow rate from Section P2904.4.2. Add 5 gpm to the flow rate required by Section P2904.4.2 where the water-service pipe supplies more than one dwelling.

**TABLE P2904.6.2(3)
ELEVATION LOSS (PL_e)**

ELEVATION (feet)	PRESSURE LOSS (psi)
5	2.2
10	4.4
15	6.5
20	8.7
25	10.9
30	13
35	15.2
40	17.4

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

**TABLE P2904.6.2(4)
ALLOWABLE PIPE LENGTH FOR 1/2-INCH TYPE M COPPER WATER TUBING**

SPRINKLER FLOW RATE* (gpm)	WATER DISTRIBUTION SIZE (inch)	AVAILABLE PRESSURE—P _a (psi)									
		15	20	25	30	35	40	45	50	55	60
Allowable length of pipe from service valve to farthest sprinkler (feet)											
8	3/8	217	289	361	434	506	578	650	723	795	867
9	3/8	174	232	291	349	407	465	523	581	639	697
10	3/8	143	191	239	287	335	383	430	478	526	574
11	3/8	120	160	200	241	281	321	361	401	441	481
12	3/8	102	137	171	205	239	273	307	341	375	410
13	3/8	88	118	147	177	206	235	265	294	324	353
14	3/8	77	103	128	154	180	205	231	257	282	308
15	3/8	68	90	113	136	158	181	203	225	248	271
16	3/8	60	80	100	120	140	160	180	200	220	241
17	3/8	54	72	90	108	125	143	161	179	197	215
18	3/8	48	64	81	97	113	129	145	161	177	193
19	3/8	44	58	73	88	102	117	131	145	160	175
20	3/8	40	53	66	80	93	106	119	133	146	159
21	3/8	36	48	61	73	85	97	109	121	133	145
22	3/8	33	44	56	67	78	89	100	111	122	133
23	3/8	31	41	51	61	72	82	92	102	113	123
24	3/8	28	38	47	57	66	76	85	95	104	114
25	3/8	26	35	44	53	61	70	79	88	97	105
26	3/8	24	33	41	49	57	65	73	82	90	98
27	3/8	23	30	38	46	53	61	69	76	84	91
28	3/8	21	28	35	43	50	57	64	71	78	85
29	3/8	20	27	33	40	47	53	60	67	73	80
30	3/8	19	25	31	38	44	50	56	63	69	75
31	3/8	18	24	29	35	41	47	53	59	65	71
32	3/8	17	22	28	33	39	44	50	56	61	67
33	3/8	16	21	26	32	37	43	47	53	58	63
34	3/8	NP	20	25	30	35	40	45	50	55	60
35	3/8	NP	19	24	28	33	38	42	47	52	57
36	3/8	NP	18	22	27	31	36	40	45	49	54
37	3/8	NP	17	21	26	30	34	38	43	47	51
38	3/8	NP	16	20	24	28	32	36	40	45	49
39	3/8	NP	15	19	23	27	31	35	39	42	46
40	3/8	NP	NP	18	22	26	29	33	37	40	44

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 kPa, 1 gallon per minute = 3.785 L/s.
 NP—Not permitted.
 * Flow rate from Section P2904.4.2.

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TABLE P2904.6.2(5)
ALLOWABLE PIPE LENGTH FOR 1-INCH TYPE M COPPER WATER TUBING

SPRINKLER FLOW RATE* (gpm)	WATER DISTRIBUTION SIZE (INCH)	AVAILABLE PRESSURE—P ₁ (psi)									
		15	20	25	30	35	40	45	50	55	60
Allowable length of pipe from service valve to farthest sprinkler (feet)											
8	1	806	1075	1343	1612	1881	2149	2418	2687	2955	3224
9	1	648	864	1080	1296	1512	1728	1945	2161	2377	2593
10	1	533	711	889	1067	1245	1422	1609	1778	1956	2134
11	1	447	586	745	894	1043	1192	1341	1491	1640	1789
12	1	381	508	634	761	888	1015	1142	1269	1396	1523
13	1	328	438	547	657	766	875	985	1094	1204	1313
14	1	286	382	477	572	668	763	859	954	1049	1145
15	1	252	336	420	504	588	672	756	840	924	1008
16	1	224	298	373	447	522	596	671	745	820	894
17	1	200	266	333	400	466	533	600	666	733	799
18	1	180	240	300	360	420	479	539	599	659	719
19	1	163	217	271	325	380	434	488	542	597	651
20	1	148	197	247	296	345	395	444	493	543	592
21	1	135	180	225	270	315	360	406	451	496	541
22	1	124	165	207	248	289	331	372	413	455	496
23	1	114	152	190	228	267	305	343	381	419	457
24	1	106	141	176	211	246	282	317	352	387	422
25	1	98	131	163	196	228	261	294	326	359	392
26	1	91	121	152	182	212	243	273	304	334	364
27	1	85	113	142	170	198	226	255	283	311	340
28	1	79	106	133	159	185	212	238	265	291	318
29	1	74	99	124	149	174	198	223	248	273	298
30	1	70	93	116	140	163	186	210	233	256	280
31	1	66	88	110	132	153	175	197	219	241	263
32	1	62	83	103	124	145	165	186	207	227	248
33	1	59	78	98	117	137	156	176	195	215	234
34	1	55	74	92	111	129	148	166	185	203	222
35	1	53	70	86	103	120	137	154	171	189	206
36	1	50	66	83	100	116	133	150	166	183	199
37	1	47	63	79	95	111	126	142	158	174	190
38	1	45	60	75	90	105	120	135	150	165	181
39	1	43	57	72	86	100	115	129	143	158	172
40	1	41	55	68	82	96	109	123	137	150	164

For SF: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 kPa, 1 gallon per minute = 0.863 L/s
 a. Flow rate from Section P2904.4.2.

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TABLE P2904.6.2(6)
ALLOWABLE PIPE LENGTH FOR 1/2-INCH CPVC PIPE

SPRINKLER FLOW RATE* (gpm)	WATER DISTRIBUTION SIZE (inch)	AVAILABLE PRESSURE—P ₁ (psi)									
		15	20	25	30	35	40	45	50	55	60
Allowable length of pipe from service valve to furthest sprinkler (feet)											
8	1/2	348	465	581	697	813	929	1045	1161	1276	1394
9	1/2	290	374	467	560	654	747	841	934	1027	1121
10	1/2	231	307	384	461	538	615	692	769	845	922
11	1/2	193	258	322	387	451	515	580	644	708	773
12	1/2	165	219	274	329	384	439	494	549	603	658
13	1/2	142	189	237	284	331	378	426	473	520	568
14	1/2	124	165	206	247	289	330	371	412	454	495
15	1/2	109	145	182	218	254	290	327	363	399	436
16	1/2	97	129	161	193	226	258	290	322	354	387
17	1/2	86	115	144	173	202	230	259	288	317	346
18	1/2	78	104	130	156	181	207	233	259	285	311
19	1/2	70	94	117	141	164	188	211	234	258	281
20	1/2	64	85	107	128	149	171	192	213	235	256
21	1/2	58	78	97	117	136	156	175	195	214	234
22	1/2	54	71	89	107	125	143	161	179	197	214
23	1/2	49	66	82	99	115	132	148	165	181	198
24	1/2	46	61	76	91	107	122	137	152	167	183
25	1/2	42	56	71	85	99	113	127	141	155	169
26	1/2	39	52	66	79	92	105	118	131	144	157
27	1/2	37	49	61	73	85	98	110	122	135	147
28	1/2	34	46	57	69	80	92	103	114	126	137
29	1/2	32	43	54	64	75	86	96	107	118	129
30	1/2	30	40	50	60	70	81	91	101	111	121
31	1/2	28	38	47	57	66	76	85	95	104	114
32	1/2	27	36	45	54	63	71	80	89	98	107
33	1/2	25	34	42	51	59	68	76	84	93	101
34	1/2	24	32	40	48	56	64	72	80	88	96
35	1/2	23	30	38	45	53	61	68	76	83	91
36	1/2	22	29	36	43	50	57	65	72	79	86
37	1/2	20	27	34	41	48	55	61	68	75	82
38	1/2	20	26	33	39	46	52	59	65	72	78
39	1/2	19	25	31	37	43	50	56	62	68	74
40	1/2	18	24	30	35	41	47	53	59	65	71

Size 5/8" 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 kPa, 1 gallon per minute = 0.946 L/s.
 a. Flow rate from Section P2904.4.2.

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TABLE P2904.6.2(7)
 ALLOWABLE PIPE LENGTH FOR 1-INCH CPVC PIPE

SPRINKLER FLOW RATE ^a (gpm)	WATER DISTRIBUTION SIZE (inches)	AVAILABLE PRESSURE — (Pipst)									
		15	20	25	30	35	40	45	50	55	60
Allowable length of pipe from service valve to farthest sprinkler (feet)											
8	1	1049	1398	1748	2098	2447	2797	3146	3496	3845	4195
9	1	843	1125	1406	1687	1968	2249	2530	2811	3093	3374
10	1	694	925	1157	1388	1619	1851	2082	2314	2545	2776
11	1	582	775	970	1164	1358	1552	1746	1940	2133	2327
12	1	495	660	826	991	1156	1321	1486	1651	1816	1981
13	1	427	570	712	854	997	1139	1281	1424	1566	1708
14	1	372	487	621	745	869	993	1117	1241	1366	1490
15	1	328	437	546	656	765	874	983	1093	1202	1311
16	1	291	388	485	582	679	776	873	970	1067	1164
17	1	260	347	433	520	607	693	780	867	954	1040
18	1	234	312	390	468	546	624	702	780	858	936
19	1	212	282	353	423	494	565	635	706	776	847
20	1	193	257	321	385	449	513	578	642	706	770
21	1	176	235	293	352	410	469	528	586	645	704
22	1	161	215	269	323	377	430	484	538	592	646
23	1	149	198	248	297	347	396	446	496	545	595
24	1	137	183	229	275	321	366	412	458	504	550
25	1	127	170	212	255	297	340	382	425	467	510
26	1	118	158	197	237	276	316	355	395	434	474
27	1	111	147	184	221	258	295	332	368	405	442
28	1	103	138	172	207	241	275	310	344	379	413
29	1	97	129	161	194	226	258	290	323	355	387
30	1	91	121	152	182	212	242	273	303	333	364
31	1	86	114	143	171	200	228	257	285	314	342
32	1	81	108	134	161	188	215	242	269	296	323
33	1	76	102	127	152	178	203	229	254	280	305
34	1	72	96	120	144	168	192	216	240	265	289
35	1	68	91	114	137	160	182	205	228	251	273
36	1	65	87	108	130	151	173	195	216	238	260
37	1	62	82	103	123	144	165	185	206	226	247
38	1	59	78	98	117	137	157	176	196	215	235
39	1	56	75	93	112	131	149	168	187	205	224
40	1	53	71	89	107	125	142	160	178	196	214

For S_t 1 inch - 25.4 mm, 1 foot - 304.8 mm, 1 pound per square inch - 6.896 kPa, 1 gallon per minute - 0.563 L/s.
 a. Flow rate from Section P2904.4.2.

TABLE P2904.6.2(B)
ALLOWABLE PIPE LENGTH FOR 1/2-INCH PEX AND PE-RT TUBING

SPRINKLER FLOW RATE ^a (gpm)	WATER DISTRIBUTION SIZE (inch)	AVAILABLE PRESSURE—P ₁ (psi)									
		15	20	25	30	35	40	45	50	55	60
Allowable length of pipe from service valve to farthest sprinkler, (feet)											
8	1/2	63	123	154	185	216	247	278	309	339	370
9	1/2	74	99	124	149	174	199	223	248	273	298
10	1/2	61	82	102	123	143	163	184	204	225	246
11	1/2	51	68	86	103	120	137	154	171	188	205
12	1/2	44	58	73	87	102	117	131	146	160	175
13	1/2	38	50	63	75	88	101	113	126	138	151
14	1/2	33	44	55	66	77	88	99	110	121	132
15	1/2	29	39	48	58	68	77	87	96	105	116
16	1/2	26	34	43	51	60	68	77	86	94	103
17	1/2	23	31	38	46	54	61	69	77	84	92
18	1/2	21	28	34	41	48	55	62	69	76	83
19	1/2	19	25	31	37	44	50	56	62	69	75
20	1/2	17	23	28	34	40	45	51	57	62	68
21	1/2	16	21	26	31	36	41	47	52	57	62
22	1/2	NP	19	24	28	33	38	43	47	52	57
23	1/2	NP	17	22	26	31	35	39	44	48	52
24	1/2	NP	16	20	24	28	32	36	40	44	49
25	1/2	NP	NP	19	22	26	30	34	37	41	45
26	1/2	NP	NP	17	21	24	28	31	35	38	42
27	1/2	NP	NP	16	20	23	26	29	33	36	39
28	1/2	NP	NP	15	18	21	24	27	30	33	36
29	1/2	NP	NP	NP	17	20	23	26	29	31	34
30	1/2	NP	NP	NP	16	19	21	24	27	29	32
31	1/2	NP	NP	NP	15	18	20	23	25	28	30
32	1/2	NP	NP	NP	NP	17	19	21	24	26	28
33	1/2	NP	NP	NP	NP	16	18	20	22	25	27
34	1/2	NP	NP	NP	NP	NP	17	19	21	23	25
35	1/2	NP	NP	NP	NP	NP	16	18	20	22	24
36	1/2	NP	NP	NP	NP	NP	15	17	19	21	23
37	1/2	NP	NP	NP	NP	NP	NP	16	18	20	22
38	1/2	NP	NP	NP	NP	NP	NP	16	17	19	21
39	1/2	NP	NP	NP	NP	NP	NP	NP	16	18	20
40	1/2	NP	NP	NP	NP	NP	NP	NP	16	17	19

Note: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 kPa, 1 gallon per minute = 3.785 L/min.
 NP—Not permitted.
 a. Flow rate from Section P2904.4.2.

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TABLE P2904.8.2(1)
ALLOWABLE PIPE LENGTH FOR 1-INCH PEX AND PE-RT TUBING

SPRINKLER FLOW RATE* (gpm)	WATER DISTRIBUTION SIZE (inch)	AVAILABLE PRESSURE — P ₁ (psi)									
		15	20	25	30	35	40	45	50	55	60
Allowable length of pipe from service valve to farthest sprinkler (feet)											
8	1	314	418	523	628	732	837	941	1046	1151	1255
9	1	252	336	421	505	589	673	757	841	925	1009
10	1	208	277	346	415	485	554	623	692	761	831
11	1	174	232	290	348	406	464	522	580	638	696
12	1	148	198	247	296	346	395	445	494	543	593
13	1	128	170	213	256	298	341	383	426	469	511
14	1	111	149	186	223	260	297	334	371	409	446
15	1	98	131	163	196	229	262	294	327	360	392
16	1	87	116	145	174	203	232	261	290	319	348
17	1	78	104	130	156	182	208	233	259	285	311
18	1	70	93	117	140	163	187	210	233	257	280
19	1	63	84	106	127	148	169	190	211	232	253
20	1	58	77	96	115	134	154	173	192	211	230
21	1	53	70	88	105	123	140	158	175	193	211
22	1	48	64	80	97	113	129	145	161	177	193
23	1	44	59	74	89	104	119	133	148	163	178
24	1	41	55	69	82	96	110	123	137	151	164
25	1	38	51	64	76	89	102	114	127	140	152
26	1	36	47	59	71	83	95	106	118	130	142
27	1	33	44	55	66	77	88	99	110	121	132
28	1	31	41	52	62	72	82	93	103	113	124
29	1	29	39	48	58	68	77	87	97	106	116
30	1	27	36	45	54	63	73	82	91	100	109
31	1	26	34	43	51	60	68	77	85	94	102
32	1	24	32	40	48	56	64	72	80	89	97
33	1	23	30	38	46	53	61	68	76	84	91
34	1	22	29	36	43	50	58	65	72	79	86
35	1	20	27	34	41	48	55	61	68	75	82
36	1	19	26	32	39	45	52	58	65	71	78
37	1	18	25	31	37	43	49	55	62	68	74
38	1	18	23	29	35	41	47	53	59	64	70
39	1	17	22	28	33	39	45	50	56	61	67
40	1	16	21	27	32	37	43	48	53	59	64

For NE: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 pound per square inch = 6.895 kPa; 1 gallon per minute = 0.063 l/s.
 a. Flow rate from Section P2904.4.2

TABLE P2904.8.2(1)
ALLOWABLE PIPE LENGTH FOR 1-INCH PEX AND PE-RT TUBING

SPRINKLER FLOW RATE (gpm)	WATER DISTRIBUTION SIZE (inch)	AVAILABLE PRESSURE - P (psi)									
		15	20	25	30	35	40	45	50	55	60
Allowable length of pipe from service valve to farthest sprinkler (feet)											
8	1	314	418	523	628	732	837	941	1045	1151	1256
9	1	292	396	421	505	580	673	757	841	925	1009
10	1	268	277	346	415	485	554	623	692	761	831
11	1	174	232	290	348	406	464	522	580	638	696
12	1	148	198	247	296	346	395	445	494	543	593
13	1	128	170	213	256	298	341	383	426	469	511
14	1	111	149	186	223	260	297	334	371	409	446
15	1	98	131	163	196	229	262	294	327	360	392
16	1	87	116	145	174	203	232	261	290	319	348
17	1	78	104	130	156	182	208	233	259	285	311
18	1	70	93	117	140	163	187	210	233	257	280
19	1	65	84	106	127	148	169	190	211	232	253
20	1	58	77	96	115	134	154	173	192	211	230
21	1	53	70	88	105	123	140	158	175	193	211
22	1	48	64	80	97	113	129	145	161	177	193
23	1	44	59	74	89	104	119	133	148	163	178
24	1	41	55	69	82	96	110	123	137	151	164
25	1	38	51	64	76	89	102	114	127	140	152
26	1	35	47	59	71	83	95	106	118	130	142
27	1	33	44	55	66	77	88	99	110	121	132
28	1	31	41	52	62	72	82	93	103	113	124
29	1	29	39	49	59	68	77	87	97	106	116
30	1	27	36	45	54	63	73	82	91	100	109
31	1	26	34	43	51	60	68	77	85	94	102
32	1	24	32	40	48	56	64	72	80	89	97
33	1	23	30	38	46	53	61	68	76	84	91
34	1	22	29	36	43	50	58	65	72	79	86
35	1	20	27	34	41	48	55	61	68	75	82
36	1	19	25	32	39	45	52	58	65	71	78
37	1	18	24	31	37	43	49	55	62	68	74
38	1	18	23	29	35	41	47	53	59	64	70
39	1	17	22	28	33	39	45	50	56	61	67
40	1	16	21	27	32	37	43	48	53	59	64

For SF: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 percent per square inch = 6.895 kPa, 1 gallon per minute = 0.063 l/s.
 a. Flow rate from Section P2904.8.2.

P2904.7 Instructions and signs. An owner’s manual for the fire sprinkler system shall be provided to the owner. A sign or valve tag shall be installed at the main shutoff valve to the water distribution system stating the following: “Warning, the water system for this home supplies fire sprinklers that require certain flows and pressures to fight a fire. Devices that restrict the flow or decrease the pressure or automatically shut off the water to the fire sprinkler system, such as water softeners, filtration systems and automatic shutoff valves, shall not be added to this system without a review of the fire sprinkler system by a fire protection specialist. Do not remove this sign.”

P2904.8 Inspections. The water distribution system shall be inspected in accordance with Sections P2904.8.1 and P2904.8.2.

1 **P2904.8.1 Preconcealment inspection.** The following items shall be verified prior to the
2 concealment of any sprinkler system piping:

- 3 1. Sprinklers are installed in all areas as required by Section P2904.1.1.
- 4 2. Where sprinkler water spray patterns are obstructed by construction features,
5 luminaires or ceiling fans, additional sprinklers are installed as required by Section
6 P2904.2.4.2.
- 7 3. Sprinklers are the correct temperature rating and are installed at or beyond the
8 required separation distances from heat sources as required by Sections P2904.2.1
9 and P2904.2.2.
- 10 4. The pipe size equals or exceeds the size used in applying Tables P2904.6.2(4)
11 through P2904.6.2(9) or, if the piping system was hydraulically calculated in
12 accordance with Section P2904.6.1, the size used in the hydraulic calculation.
- 13 5. The pipe length does not exceed the length permitted by Tables P2904.6.2(4) through
14 P2904.6.2(9) or, if the piping system was hydraulically calculated in accordance with
15 Section P2904.6.1, pipe lengths and fittings do not exceed those used in the hydraulic
16 calculation.
- 17 6. Nonmetallic piping that conveys water to sprinklers is listed for use with fire
18 sprinklers.
- 19 7. Piping is supported in accordance with the pipe manufacturer's and sprinkler
20 manufacturer's installation instructions.
- 21 8. The piping system is tested in accordance with Section P2503.7.

22 **P2904.8.2 Final inspection.** The following items shall be verified upon completion of the
23 system:

- 24 1. Sprinkler are not painted, damaged or otherwise hindered from operation.

2. Where a pump is required to provide water to the system, the pump starts automatically upon system water demand.
3. Pressure-reducing valves, water softeners, water filters or other impairments to water flow that were not part of the original design have not been installed.
4. The sign or valve tag required by Section P2904.7 is installed and the owner's manual for the system is present.

Section 19. The following sections of Chapter 44 of the International Residential Code, 2012 Edition, are amended as follows:

**CHAPTER 44
 REFERENCED STANDARDS**

ANSI American National Standards Institute
 25 West 43rd Street, Fourth Floor
 New York, NY 10036

Standard reference number	Title	Referenced in code section number
<u>210</u>	<u>Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating</u>	<u>M1507.3</u>
ASTM	ASTM International 100 Barr Harbor Drive West Conshohocken, PA 19428	
Standard reference number	Title	Referenced in code section number
<u>E336-11</u>	<u>Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings</u>	<u>R330</u>

GA Gypsum Association
 810 First Street, Northeast, Suite 510
 Washington, DC 20002-4268

Standard reference number	Title	Referenced in code section number
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<u>GA-600-12</u>	<u>Fire Resistance Design Manual</u>	<u>R330</u>
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NFPA National Fire Protection Association
 1 Batterymarch Park
 Quincy, MA 02269

Standard reference number	Title	Referenced in code section number
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<u>54-12</u>	<u>National Fuel Gas Code</u>	<u>M1201</u>
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Section 21. Sections 2-18 of Ordinance 123383 are repealed.

Section 22. During the transition period, an applicant who submits a valid and fully complete building permit application may elect to have the application considered under the provisions of Ordinance 123383 rather than this Ordinance. The transition period begins on the effective date of this Ordinance and extends through the later of: (a) October 11, 2013; or (b) the 60th day following the effective date of this Ordinance (unless the 60th day is a Saturday, Sunday, or federal or City holiday, in which case the 60th day shall be deemed to be the next day that is not a Saturday, Sunday, or federal or City holiday)..

Section 23. The provisions of this ordinance are declared to be separate and severable. The invalidity of any clause, sentence, paragraph, subdivision, section or portion of this ordinance, or the invalidity of the application thereof to any person, owner, or circumstance shall

1 not affect the validity of the remainder of this ordinance, or the validity of its application to other
2 persons, owners, or circumstances.

3 Section 24. This ordinance shall take effect and be in force 30 days after its approval by
4 the Mayor, but if not approved and returned by the Mayor within ten days after presentation, it
5 shall take effect as provided by Seattle Municipal Code Section 1.04.020.

6 Passed by the City Council the ____ day of _____, 2013, and
7 signed by me in open session in authentication of its passage this
8 ____ day of _____, 2013.

9
10 _____
11 President _____ of the City Council

12
13 Approved by me this ____ day of _____, 2013.

14
15 _____
16 Michael McGinn, Mayor

17
18 Filed by me this ____ day of _____, 2013.

19
20 _____
21 Monica Martinez Simmons, City Clerk

22 (Seal)

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FISCAL NOTE FOR NON-CAPITAL PROJECTS

Department:	Contact Person/Phone:	CBO Analyst/Phone:
DPD	Maureen Traxler/233-3892	Melissa Lawrie/684-5805

Legislation Title:

AN ORDINANCE relating to the Seattle Residential Code, amending Section 22.150.010, and adopting by reference Chapters 2 through 10, 12 through 24, Section P2904, 44, and Appendices F and G of the 2012 International Residential Code, and amending certain of those chapters; adopting a new Chapter 1 related to administration, permitting and enforcement; and repealing Sections 2-18 of Ordinance 123383.

Summary of the Legislation:

This legislation adopts the 2012 Seattle Residential Code, consisting of the 2012 International Residential Code and Seattle amendments.

Background:

This legislation is one of seven coordinated bills that regulate construction and use of buildings in Seattle. Six are prepared by the Department of Planning and Development (DPD): the Seattle Building, Residential, Mechanical, Fuel Gas, Energy and Existing Building codes. The seventh bill adopts the 2012 Plumbing Code, which is administered by Public Health – Seattle & King County. These codes are the current state and national standards for building construction. A related bill adopting the 2012 Seattle Fire Code is being heard by the City Council Public Safety, Civil Rights and Technology Committee.

New editions of these codes are adopted by the State every 3 years, and State law requires local jurisdictions to enforce them. Seattle adds local amendments to the State codes. A list of the most significant Seattle amendments is attached.

X **This legislation does not have any financial implications.**

Other Implications:

- a) **Does the legislation have indirect financial implications, or long-term implications?**
No
- b) **What is the financial cost of not implementing the legislation?**
There is no cost if the legislation is not implemented.
- c) **Does this legislation affect any departments besides the originating department?**
Departments that will build or alter buildings or mechanical systems will be required to

meet updated construction standards. However, state law requires all cities and counties to adopt the state codes. The Seattle amendments are enhancements of the state codes.

d) What are the possible alternatives to the legislation that could achieve the same or similar objectives?

The alternative is to adopt the state codes only, without Seattle amendments.

e) Is a public hearing required for this legislation?

No.

f) Is publication of notice with *The Daily Journal of Commerce* and/or *The Seattle Times* required for this legislation?

No.

g) Does this legislation affect a piece of property?

No.

h) Other Issues:

List attachments to the fiscal note below:

Attachment 1: Changes in 2012 Seattle Residential Code

Attachment 1

Changes in 2012 Seattle Residential Code

Highlights of changes

Most of the changes in the International Residential Code, and in the Washington State and Seattle amendments are technical changes that will not have a major impact on construction. The most significant of the changes are listed here.

- 101.3 More complete provisions for vesting of permit applications are added to chapter 1.
- 105.2 A provision is added establishing a threshold size at which permits are required for small cisterns and other water tanks.
- 105 Rules about expiration, renewal and reestablishment of permits are clarified.
- 105.5. & 105.6 Additional provisions for review of projects in flood hazard areas are added to comply with requirements of the federal flood insurance program.
- 202 Provisions are added to clarify that accessory dwelling units are within the scope of the IRC.
- R301.2.2.3.1 A new state amendment is added containing criteria for determining whether a mezzanine is counted in the number of stories in a building.
- R303, R1001, R1002, R1004 Emission standards for solid fuel burning devices are revised to be consistent with Department of Ecology rules. An existing state standard is replaced with reference to DOE rules.
- R315 Carbon Monoxide Alarms is modified to be consistent with changes in state law.
- R325 Provisions for adult family homes are modified to customize grab bar requirements and other requirements consistent with the licensing rules.
- R328 Specific provisions for mezzanines are added.
- R401.5 Provisions for protection of adjoining property during excavations are added, consistent with the Building and Grading codes.
- R403, R404 Several state amendments for footings, foundations and retaining walls are deleted or modified to be consistent with the 2012 IRC.
- R501 The IRC contains a new requirement for fire protection of floors that is intended to reduce the risk that a floor would collapse during a fire.
- R507 An alternate method for deck connection is added.
- M1507 Revised state amendments require ventilation systems for residences to be set to operate at least one hour in every 4 hour period. Previous codes have required one hour in every 12 hours.



City of Seattle
Office of the Mayor

July 16, 2013

Honorable Sally J. Clark
President
Seattle City Council
City Hall, 2nd Floor

Dear Council President Clark:

I am pleased to transmit the attached proposed Council Bill that adopts the 2012 Seattle Residential Code. It is one of seven coordinated bills that regulate construction and use of buildings in Seattle. Six are prepared by the Department of Planning and Development (DPD): the Seattle Building, Residential, Mechanical, Fuel Gas, Energy and Existing Building codes. The seventh bill adopts the 2012 Plumbing Code, which is administered by Public Health – Seattle & King County. These codes are the current state and national standards for building construction. A related bill adopting the 2012 Seattle Fire Code is being heard by the City Council Public Safety, Civil Rights and Technology Committee.

These codes are adopted by the State, and State law requires local jurisdictions to enforce them. Seattle adds local amendments to the State codes. (A list of the most significant Seattle amendments is attached to the fiscal note for this legislation.) The Construction Codes Advisory Board (CCAB) has reviewed these proposed ordinances. CCAB, which consists of representatives of the general public, and design, development and construction industries, has devoted countless hours to reviewing and discussing these proposals. Drafts of the Seattle Residential Code were made available for public comment in November 2012 and February 2013. There is substantial consensus about this ordinance.

Thank you for your consideration of this legislation. Adoption of the new codes will provide additional flexibility of building design and will enhance safety for the citizens of Seattle. Should you have questions, please contact Maureen Traxler at 233-3892.

Sincerely,

Michael McGinn
Mayor of Seattle

cc: Honorable Members of the Seattle City Council