Oregon Solar Installation Specialty Code

Effective October 1, 2010

DEPARTMENT OF CONSUMER and BUSINESS SERVICES

BUILDING CODES DIVISION

2010 OREGON SOLAR INSTALLATION SPECIALY CODE (OSISC)

Authorized by ORS 455.020
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CHAPTER 1
ADMINISTRATION

SECTION 101
GENERAL

Commentary: *Because this code was specifically developed for Oregon by the Building Codes Division, the wording of the administrative provisions differs from the administrative provisions drafted by the International Code Council for the ICC codes. Regardless of any differences in the wording the division's intent is that this code be administered consistently with Oregon's other building codes.*

101.1 Title. These regulations shall be known as the *Oregon Solar Installation Specialty Code*, hereinafter referred to as "this code."

101.2 Scope.

101.2.1 General. The provisions of this code shall apply to all aspects of the structural requirements for the installation, alteration, replacement and repair of solar Photovoltaic (PV) systems.

Exceptions:

1. This code shall not apply to the installation, alteration, re-placement, repair of PV systems in a public way.

2. This code shall not apply to the installation of structural components on exempt agricultural buildings as defined in Oregon Revised Statute (ORS) 455.315.

3. Electrical installation, alteration and repair as defined in ORS 479.510 through 479.895 are controlled by *Electrical Code* Chapter 690. Amendments to *Electrical Code* 690 are reprinted in Appendix A for the users convenience.

4. Existing PV installations that complied with minimum safety standards in effect at time of installation shall not be considered in violation of the current minimum PV installation standards unless the use or occupancy changed, requiring different methods, alterations or additions or the *Fire Code* or Building Official requires updates to protect the safety of the occupants and public.

455.020 Purpose; scope of application; exceptions; scope of rules; fees by rule. (1) This chapter is enacted to enable the Director of the Department of Consumer and Business Services to promulgate a state building code to govern the construction, reconstruction, alteration and repair of buildings and other structures and the installation of mechanical devices and equipment therein, and to require the correction of unsafe conditions caused by earthquakes in existing buildings. The state building code shall establish uniform performance standards providing reasonable safeguards for health, safety, welfare, comfort and security of the residents of this state who are occupants and users of buildings, and will provide for the use of modern methods, devices, materials, techniques and practicable maximum energy conservation.

(2) The rules adopted pursuant to this chapter shall include structural standards; standards for the installation and use of mechanical, heating and ventilating devices and equipment; and standards for prefabricated structures; and shall, subject to ORS 455.210, prescribe reasonable fees for the issuance of building permits and similar documents, inspections and plan review services by the Department of Consumer and Business Services. The department may also establish, by rule, the amount of any fee pertaining to the state building code or any specialty code that is authorized by statute, but for which an amount is not specified by statute.

(3) This chapter does not affect the statutory jurisdiction and authority of the Workers' Compensation Board, under ORS chapter 654, to promulgate occupational safety and health standards relating to places of employment, and to administer and enforce all state laws, regulations, rules, standards and lawful orders requiring places of employment to be safe and healthful.

(4) This chapter and any specialty code does not limit the authority of a municipality to enact regulations providing for local administration of the state building code; local appeal boards; fees and other charges; abatement of nuisances and dangerous buildings; enforcement through penalties, stop-work orders or other means; or minimum health, sanitation and safety standards for governing the use of structures for housing, except where the power of municipalities to enact any such

regulations is expressly withheld or otherwise provided for by statute. Pursuant to the regulation of dangerous buildings, a municipality may adopt seismic rehabilitation plans that provide for phased completion of repairs that are designed to provide improved life safety but that may be less than the standards for new buildings.

101.3 Intent. This code is meant to set minimum requirements for the installation of PV components and support systems in keeping with the purpose of Oregon's Specialty Codes. The code should be administered to ensure integrity of structures in order to safeguard public health, and safety and protect life and property from fire and other hazards associated with the installation of PV systems, and to provide for fire fighters safety in the case of an emergency.

It is not the purpose of this code to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefited by the terms of this code. It does not affect the requirements contained in ORS 479.620 through 479.630 or the rules thereunder.

101.4 Statutory References. This code is adopted pursuant to the ORS. Where in any specific case this code and the statutes specify different requirements, the statute shall govern. Statutes related to this code are ORS 455.010 through 455.895.

101.5 Severability. In the event that any part or provision of this code is held to be illegal or void, this shall not have the effect of making void or illegal any of the other parts or provisions.

SECTION 102
APPLICABILITY

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

102.2 Other laws. The provisions of this code shall not be deemed to nullify any provisions of state or federal law.

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

102.4 Referenced codes and standards. The codes and standards referenced in this code are part of the requirements of this code to the prescribed extent of each reference. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

102.4.1 Structural. Where not specifically addressed in this code, the provisions of the *Building Code*, shall apply to the design and installation of structural support systems for PV installations.

SECTION 103
DUTIES AND POWERS OF THE BUILDING OFFICIAL

103.1 General. The building official is hereby authorized and directed to enforce the provisions of this code under the structural program and ORS 455.148 or 455.150. The building official shall have the authority to render interpretations of this code and to adopt policies and procedures in order to clarify the application of its provisions. Such interpretations, policies and procedures shall be in compliance with the intent and purpose of this code and the *Building Code*. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in this code.

103.2 Applications and permits. The building official shall receive applications, review construction documents, issue permits for the installation, alteration, replacement, repair of PV systems including the electrical and structural requirements, inspect the premises for which such permits have been issued, and enforce compliance with the provisions of this code.

Separate electrical permits are required under the *Electrical Code* and Oregon Administrative Rule (OAR) 918-309.

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

103.4 Inspections. The building official shall make the required inspections or if they choose may accept inspection reports by approved individuals or agencies. All inspection reports must be in writing and be certified by the responsible individual or officer of an approved agency.

103.5 Reserved.

103.6 Right of entry. The building official has the right of entry to a structure at reasonable times to perform the required inspections and enforce the

provisions of this code. Where a building official has reasonable cause to believe that there is a condition contrary to or in violation of this code making the structure or premises unsafe, dangerous or hazardous, the building official has the right of entry to inspect the structure. If a structure or premises is occupied, entry should be requested and credentials must be shown upon request. Where a structure or premises is unoccupied, the building official shall make a reasonable effort to locate the owner or person having control of the structure and request entry prior to entering. The building official shall have recourse to the remedies provided by law to secure entry, if entry is refused.

103.7 Department records. The building official shall keep official records as dictated by OAR 166-150-0020 where a county has jurisdiction; OAR 166-200-0025 where a city has jurisdiction; and OAR Chapter 166 Division 300 et al for the cities and counties where the State of Oregon has jurisdiction. Such records shall be retained in the official records for the period indicated in the respective OARs noted above. The building official shall maintain a permanent record of all permits issued in flood hazard areas, including copies of inspection reports and certifications required in the *Building Code*, Section 1612.

103.8 Liability. See ORS 30.265 for regulations relating to liability.

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ORS 30.265 Scope of liability of public body, officers, employees and agents; liability in nuclear incident. **(1)** Subject to the limitations of ORS 30.260 to 30.300, every public body is subject to action or suit for its torts and those of its officers, employees and agents acting within the scope of their employment or duties, whether arising out of a governmental or proprietary function or while operating a motor vehicle in a ridesharing arrangement authorized under ORS 276.598. The sole cause of action for any tort of officers, employees or agents of a public body acting within the scope of their employment or duties and eligible for representation and indemnification under ORS 30.285 or 30.287 shall be an action against the public body only. The remedy provided by ORS 30.260 to 30.300 is exclusive of any other action or suit against any such officer, employee or agent of a public body whose act or omission within the scope of the officer's, employee's or agent's employment or duties gives rise to the action or suit. No other form of civil action or suit shall be permitted. If an action or suit is filed against an officer, employee or agent of a public body, on appropriate motion the public body shall be substituted as the only defendant. Substitution of the public body as the defendant does not exempt the public body from making any report required under ORS 742.400.

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

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

(a) Any claim for injury to or death of any person covered by any workers' compensation law.

(b) Any claim in connection with the assessment and collection of taxes.

(c) Any claim based upon the performance of or the failure to exercise or perform a discretionary function or duty, whether or not the discretion is abused.

(d) Any claim that is limited or barred by the provisions of any other statute, including but not limited to any statute of ultimate repose.

(e) Any claim arising out of riot, civil commotion or mob action or out of any act or omission in connection with the prevention of any of the foregoing.

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

(4) Subsection (1) of this section applies to any action of any officer, employee or agent of the state relating to a nuclear incident, whether or not the officer, employee or agent is acting within the scope of employment, and provided the nuclear incident is covered by an insurance or indemnity agreement under 42 U.S.C. 2210.

(5) Subsection (3)(c) of this section does not apply to any discretionary act that is found to be the cause or

partial cause of a nuclear incident covered by an insurance or indemnity agreement under the provisions of 42 U.S.C. 2210, including but not limited to road design and route selection.

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

103.9.1 Used materials and equipment. Used materials meeting the requirements of this code for new materials are permitted.

103.10 Modifications. The building official has the authority to grant modifications to this code where there are practical difficulties involved in strictly applying the letter of this code. Prior to granting a modification for individual cases the building official must find, based on representations from the owner or person responsible for the project, that based on special considerations strict application of the code is impracticable or impossible. The owner or person responsible for the project must show that the modification still complies with the purpose and intent of this code and does not reduce the life and fire safety, structural, or accessibility requirements. Any modification approved by the building must be recorded and entered in the files of the building department.

103.11 Alternative materials, design and methods of construction and equipment. This code is not intended to inhibit innovation, prohibit designs or methods of construction or prevent the installation of any material not specifically prescribed by this code, if that alternative is approved by the building official. Where the building official finds a proposed alternate complies with the intent this code, and for the purpose intended, that the material, method or work offers at least the equivalent in quality, strength, and fire resistance and safety of that prescribed in this code alternate materials, designs or methods of construction shall be approved.

103.11.1 Tests. The building official has the authority to require tests as evidence that a material or method meets the requirement of this code if there is a question of compliance, or as necessary to make a ruling on a request for alternate materials or methods. Tests shall be performed by an approved agency. Testing methods shall follow recognized test standards or specifications in this or Oregon's other specialty codes. Where no specification or recognized testing standard exists, the building official should approve the testing procedures. Tests are to be made at no expense to the jurisdiction. Reports of tests shall be retained as department records and comply with Section 103.7.

SECTION 104
PERMITS

104.1 Required. Before any owner or authorized representative may construct, enlarge, alter, or change the installation of a PV system regulated by this code, or cause any such work to be done, they must first make application to the building official and obtain the required permit.

104.2 Work exempt from permit. Exemptions from permit requirements of this code do not grant authorization for any work to be done in any manner that violates the provisions of this code or any other laws or ordinances of the jurisdiction. Permits shall not be required for the following:

104.2.1 Temporary testing systems. A permit shall not be required for the installation of any temporary testing system.

104.2.2 Emergency repairs. Where equipment replacements and repairs must be performed in an emergency situation, the permit application must be submitted by the next working business day to the building official.

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

104.2.4 Electrical Permits. Additional exemptions from permitting requirements for electrical installations are found in Oregon Administrative Rule 918-309-0000.

104.3 Application for permit. An applicant for a permit must file an application, in writing on a form provided by the building department for that purpose. An applicant may submit an electronic application where available.

The application must:

1. Identify and describe the work to be covered by the permit for which application is made.
2. Describe the land on which the proposed work is to be done by legal description, street address or similar description that enables the building department to readily identify and definitively locate the proposed work.
3. Be accompanied by construction documents and other information as required in Section 105.

4. State the valuation of the proposed work.
5. Be signed by the applicant, or the applicant's authorized representative.
6. Give such other information as required by the building official.

104.3.1 Action on application. The building official is responsible for reviewing permit applications or having staff review them within a reasonable time. If the application or the construction documents do not conform to the requirements of this code, other referenced codes, or of pertinent laws, the application should be rejected in writing and state the reasons for rejecting the application. If the proposed work conforms to the requirements of this code and other applicable ordinances, a permit should be issued as soon as practicable.

104.3.2 Time limitation of application. Unless an application for a permit has been pursued in good faith or a permit has been issued for any proposed work, an application will be considered abandoned 180 days after the date of filing. A building official is authorized to provide extensions of time for additional periods not more than 90 days each. Extension must be requested in writing and demonstrate reasonable cause.

104.4 Validity of permit. Permits cannot grant authority to violate or cancel the provisions of this code or other ordinances of the jurisdiction. Granting a permit application and issuing a permit shall not be construed to be approval of any violation of any of the provisions of this code or of any other ordinance of the jurisdiction. Issuing a permit based on construction documents and other data does not prevent the building official from requiring the correction of errors in the construction documents or other data. The building official is authorized to prevent use of a PV system where it violates this code or of any other ordinances of the jurisdiction.

104.5 Expiration. Issued permits become invalid unless the work authorized by the permit is begun within 180 days of issuance, or if the work authorized is suspended or abandoned for 180 days after the date the work began. Extensions may be granted by the building official, if requested in writing and reasonable cause shown. The extension shall be requested in writing and justifiable cause demonstrated. Extensions must be granted in writing and cannot exceed 180 days each.

104.6 Suspension or revocation. Issued permits may be suspended or revoked by the building official wherever the permit is issued in error or on the basis of incorrect, inaccurate or incomplete information, or in violation of any ordinance or regulation or any of the provisions of this or referenced codes.

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

SECTION 105
SUBMITTAL DOCUMENTS

105.1 General. Two or more sets of required construction documents, including statement of special inspections, geotechnical report and other data must be submitted with each permit application. Where the building official determines that special conditions exist, they are authorized to require additional construction documents. Where required by the building codes or other statute, construction documents must be prepared by a registered design professional.

Exceptions:

1. Where the building official determines that the nature of the work that is the subject of a permit application is such that review of construction documents is unnecessary to obtain compliance with this code the building official may waive requirement to submit construction documents and other data not required to be prepared by a registered design professional.

2. Plans, calculations and specifications, diagrams and other data prepared and designed by an architect or an engineer licensed by the state to practice as such are not required for the following work, provided the building official determines that the work is not of a highly technical nature or there is unreasonable potential risk to life and/or the safety of the structure:

2.1 The erection, enlargement or alteration of any structure, or any appurtenance thereto, where the resulting structure has a ground area of 4,000 square feet (372 m^2) or less and is not more than 20 feet (6096 mm) in height from the top surface of the lowest floor to the highest interior finish (See ORS 671.030).

2.2 A single family dwelling, a farm agricultural building, non-farm agricultural building, or accessory building to a single-family dwelling.

2.3 Alterations or repairs that do not involve structural parts of the building.

105.2 Construction documents. Construction documents shall be in accordance with Sections 105.2.1 through 105.2.5.

Exception: Construction documents shall not be required when an applicant has demonstrated on a form approved by the division that a proposed installation complies with the requirements of Sections 304.9 and 305.4

105.2.1. Construction Documents. The construction documents required by Section 105.2 shall be provided to the Authority Having Jurisdiction at the time of permit application.

105.2.2 Support Structure. The construction documents shall describe, with sufficient clarity, the structure required to support the components and to resist the applicable snow, seismic, wind and uplift forces as defined in the *Building Code*. The construction documents, including calculations, shall be prepared by an Architect or Engineer licensed to practice in the state of Oregon and shall be designed in accordance with the requirements of the *Building Code*.

105.2.3 Component Attachment. The construction documents shall be in sufficient clarity to show attachments are designed to resist the applicable snow, seismic, wind and uplift forces on the PV components as defined in the *Building Code*. The construction documents, including calculations, shall be prepared by an Architect or Engineer licensed to practice in the state of Oregon and shall be designed in accordance with the requirements of the *Building Code*.

Exception: Construction documents showing component attachment shall not be required to be prepared by an Architect or Engineer licensed in the State of Oregon when the manufacturers installation instructions provide designs sufficient for the applicable snow, seismic, wind and uplift loads.

105.2.5 Building and Site Plan. The construction documents shall show and describe, with sufficient clarity, the location(s) of the PV components in relation to buildings, structures, property lines and, as applicable, flood hazard areas, and shall show compliance with local zoning, planning, solar access requirements, etc, if applicable, as required by the Building Official. The building official is authorized to waive or modify the requirement for a site plan when the application for permit is for alteration or repair or when otherwise warranted.

Exception: Subject to the approval of the Building Official, construction documents showing the building and site plan shall not be required when, due to the nature of the project, it can be demonstrated that there are no significant impacts to the items in listed above.

105.2.5.1 Design flood elevations. Where design flood elevations are not specified, they shall be established in accordance with *Building Code*, Section 1612.3.1.

105.2.6 Information on construction documents. Construction documents must be sufficiently clear to show the location, nature and extent of the proposed work. The documents must show in detail sufficient to indicate to the building official that the proposed work conforms to this code, relevant laws, ordinances, rules and regulations. The building official may approve the submission of electronic documents.

105.3 Examination of documents. The building official is responsible for reviewing the submittal documents, or having staff review them, within a reasonable time to determine whether the construction indicated and described is in accordance with the requirements of this code, referenced codes and applicable laws, ordinances, and regulations.

105.3.1 Approval of construction documents. When the building official issues a permit, the construction documents shall be approved, in writing or by stamp, as "Reviewed for Code Compliance." One set of construction documents so reviewed shall be retained by the building official. The other set shall be returned to the applicant, shall be kept at the site of work and shall be open to inspection by the building official or a duly authorized representative.

105.3.2 Previous approvals. New editions of this or the referenced codes are not retroactively applied once valid construction documents have been submitted and a permit issued or authorized, and the construction has been pursued in good faith. The construction for which the permit was issued must have been begun within 180 days after issuance of the valid permit and not been abandoned.

105.3.3 Phased approval. If an applicant files adequate information demonstrating compliance with the applicable requirements of this code, the building official may issue a permit for the construction of PV support systems before construction documents for the entire PV system are submitted. The issuance of a permit for part of a PV system does not act as an assurance of approval for the remainder of the system.

105.3.4 Design professional in responsible charge.

105.3.4.1 General. When Sections 105.1 and 105.2 require the submission of documentation

prepared by a registered design professional, the building official shall be authorized to require the owner, or installer to engage and designate on the permit application a registered design professional in responsible charge. The registered design professional in responsible charge is responsible for reviewing and coordinating submittal documents, including phased and deferred submittal items, for compatibility with the design of the PV system. The owner, or installer, must notify the building official, in writing, if the designated design professional in responsible charge is changed for any reason. The owner or installer must designation a new registered design professional to perform the duties of the original registered design professional in responsible charge.

105.3.4.2 Deferred submittals. A building official may approve a deferred submittal. The registered design professional in responsible charge must list any deferred submittals on the construction documents to be reviewed by the building official. Deferred submittals are those portions of the design submitted to the building official within a specified period, after the time of the initial application.

The design professional in responsible charge shall review and submit deferred submittals to the building official. Deferred submittal documents must be specifically noted by the responsible design professional that they have been reviewed and are in general conformance to the design of the PV system. Items covered under a deferred submittal may not be installed until the building official has approved the deferred submittal documents.

105.4 Amended construction documents. Changes made during installation that deviate from the approved construction documents, must be resubmitted for approval as an amended set of construction documents.

105.5 Retention of construction documents. The building official shall retain one set of approved construction documents for a period of not less than that dictated by OAR 166-150-0020 where a county has jurisdiction, OAR 166-200-0025 where a city has jurisdiction and OAR 166-300 et al for the jurisdictions where the State of Oregon has jurisdiction. One set of approved plans and specifications shall be returned to the applicant, and said set shall be kept on the site of the work at all times during which the work authorized thereby is in progress. The building official shall maintain a permanent record of all permits issued in flood hazard areas, including copies of inspection reports and certifications required in the *Building Code*, Section 1612.

SECTION 106
TEMPORARY STRUCTURES AND USES

106.1 General. The building official is authorized to issue permits for temporary uses or temporary structures. Temporary permits shall not be permitted for more than 180 days. Extensions may be granted upon request where the building official determines there is demonstrated cause.

106.2 Conformance. Temporary structures and uses must comply with the strength, and fire safety requirements of this code as required to ensure public health and safety.

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

SECTION 107
FEES

107.1 Payment of fees. A permit is not valid until the fees prescribed by law have been paid. Amendments to a permit will not be released until the additional fee, if any, has been paid.

107.2 Schedule of permit fees. A fee for each permit shall be paid as required, in accordance with the schedule as established by the applicable governing authority under ORS 455.020 and 455.210.

ORS 455.210. **(1)** Fees shall be prescribed as required by ORS 455.020 for plan review and permits issued by the Department of Consumer and Business Services for the construction, reconstruction, alteration and repair of prefabricated structures and of buildings and other structures and the installation of mechanical heating and ventilating devices and equipment. The fees may not exceed 130 percent of the fee schedule printed in the "Uniform Building Code," 1979 Edition, and in the "Uniform Mechanical Code," 1979 Edition, both published by the International Conference of Building Officials. Fees are not effective until approved by the Oregon Department of Administrative Services.

(2) Notwithstanding subsection (1) of this

section, the maximum fee the Director of the Department of Consumer and Business Services may prescribe for a limited plan review for fire and life safety as required under ORS 479.155 shall be 40 percent of the prescribed permit fee.

(3)(a) A municipality may adopt by ordinance or regulation such fees as may be necessary and reasonable to provide for the administration and enforcement of any specialty code or codes for which the municipality has assumed responsibility under ORS 455.148 or 455.150. A municipality shall give the director notice of the proposed adoption of a new or increased fee under this subsection. The municipality shall give the notice to the director at the time the municipality provides the opportunity for public comment under ORS 294.160 regarding the fee or, if the proposed fee is contained in an estimate of municipal budget resources, at the time notice of the last budget meeting is published in a newspaper under ORS 294.401.

(b) Ten or more persons or an association with 10 or more members may appeal the adoption of a fee described in this subsection to the Director of the Department of Consumer and Business Services. The persons or association must file the appeal no later than 60 days after the director receives notice of the proposed adoption of the fee from the municipality under paragraph (a) of this subsection. However, if the municipality failed to give notice to the director, an appeal may be filed with the director within one year after adoption of the new or increased fee. Upon receiving a timely appeal, the director shall, after notice to affected parties and hearing, review the municipality's fee adoption process and the costs of administering and enforcing the specialty code or codes referred to in paragraph (a) of this subsection. The director shall approve the fee if the director feels the fee is necessary and reasonable. If the director does not approve the fee upon appeal, the fee is not effective. The appeal process provided in this paragraph does not apply to fees that have been submitted for a vote and approved by a majority of the electors voting on the question.

(c) Fees collected by a municipality under this subsection shall be used for the administration and enforcement of a building inspection program for which the municipality has assumed responsibility under ORS 455.148 or 455.150.

(d) For purposes of paragraph (b) of this subsection, in determining whether a fee is reasonable the director shall consider whether:

(A) The fee is the same amount as or closely approximates the amount of the fee charged by other municipalities of a similar size and geographic location for the same level of service;

(B) The fee is calculated with the same or a similar calculation method as the fee charged by other municipalities for the same service;

(C) The fee is the same type as the fee charged by other municipalities for the same level of service; and

(D) The municipality, in adopting the fee, complied with ORS 294.160, 294.361 and 294.401 and this section and standards adopted by the director under ORS 455.148 (11) or 455.150 (11).

(4) Notwithstanding any other provision of this chapter:

(a) For the purpose of partially defraying state administrative costs, there is imposed a surcharge in the amount of four percent of the total permit fees or, if the applicant chooses to pay an hourly rate instead of purchasing a permit, four percent of the total hourly charges collected.

(b) For the purpose of partially defraying state inspection costs, there is imposed a surcharge in the amount of two percent of the total permit fees or, if the applicant chooses to pay an hourly rate instead of purchasing a permit, two percent of the total hourly charges collected.

(c) For the purpose of defraying the cost of administering and enforcing the state building code, there is imposed a surcharge on permit fees and on hourly charges collected instead of permit fees. The surcharge may not exceed one percent of the total permit fees or, if the applicant chooses to pay an hourly rate instead of purchasing a permit, one percent of the total hourly charges collected.

(5) Municipalities shall collect and remit surcharges imposed under subsection (4) of this section to the director as provided in ORS 455.220.

(6) The director shall adopt administrative rules to allow reduced fees for review of plans that have been previously reviewed.

107.3 Plan review fees

107.3.1 Building permit valuations.

1. Permits issued for installations that comply with Sections 304.9 and 305.4, will be charged a flat fee

that includes permit review in accordance with OAR 918-050-0180.

2. All other installations shall be based on the value of the system following the methodology set out in OAR 918-050-0180.

107.4 Work commencing before permit issuance. A person who begins any work on a PV system before obtaining the necessary permits is subject to an investigation fee equal to the permit fee. The investigation fee is in addition to the required permit fees.

Exception: Work as permitted in Section 104.2.1

107.5 Related fees. Payment of a permit fee for work done in connection with or concurrently with the work authorized by a permit does not relieve the applicant or responsible person under the permit from the obligation to pay other fees that are prescribed by law.

107.6 Refunds. The building official is authorized to establish a refund policy.

SECTION 108
INSPECTIONS

108.1 General. Work for which a permit is required is subject to inspection by the building official. Until approved, the work must remain exposed and accessible for inspection purposes. Work approved as the result of an inspection cannot be construed as approval of a violation of the provisions of this code or other relevant laws or ordinances of the jurisdiction. Inspections indicating authority to violate or cancel the provisions of this code or of other laws or ordinances of the jurisdiction shall not be valid. It is the permit applicant's responsibility to cause the work to remain accessible and exposed for an inspection. Any expense incurred by the removal or replacement of any material required to allow for an inspection, is the permit holder's responsibility.

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

108.3 Required Inspections. The building official, upon notification, shall make the inspections set forth in Sections 108.3.1 through 108.3.10.

108.3.1 Ground Mounted Footing and Foundation Inspection. Prior to the inspection for footing and foundation are made, the excavations for footings must be complete and any required reinforcing steel in place. It shall be noted in the inspection report if the structural metal and reinforcing steel comply with the *Electrical Code* requirements for a grounding electrode. For concrete foundations, any required forms shall be in place prior to inspection. Materials for the foundation shall be on the job.

Exception: Where concrete is ready mixed in accordance with ASTM C 94, the concrete need not be on the job.

108.3.2 Mounting Inspection. Inspection shall be made of the attachment of modules to racking or structural supports and the attachment of components to the structure.

108.3.3 Electrical Inspection. Inspection of electrical components of a PV system shall be conducted in accordance with the requirements of OAR 918-271.Where structural components, such as rebar, are used as grounding elements they shall be included as part of the electrical inspection.

108.3.4 Lowest Equipment Elevation. In flood hazard areas, the elevation certification required in *Building Code* Section 1612.5 shall be submitted to the building official.

108.3.5 Other Inspections. The building official is authorized to make or require other inspections of any construction work to ascertain compliance with the provisions of this code and other laws that are enforced by the building, in addition to the inspections specified above.

108.3.6 Special Inspections. For special inspections, see the *Building Code,* Section 1704.

108.3.7 Final Inspection. The final inspection shall be made after all work required by the building permit is completed.

108.4 Inspection Agencies. A building official may accept reports from approved inspection agencies, provided such agencies meet qualification and reliability requirements.

108.5 Inspection Requests. It is the responsibility of the permit holder or their duly authorized agent to notify the building official when work is ready for inspection. The permit holder has the responsibility to provide access to and means for inspections of work as required by this code.

108.6 Approval Required. The building official, once notified that work is ready for inspection, shall make the requested inspections and indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or their representative if and how the construction fails to comply with this code.

Any portions of work that do not comply must be corrected. No work shall be done past the point indicated in each successive inspection without first obtaining the approval of the building official. No portion of work shall be covered or concealed until authorized by the building official.

SECTION 109
BOARD OF APPEALS

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

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

109.4 Appeal of Decisions of Building Official. ORS 455.475 provides an alternative appeals process to that set forth by the local municipality.

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

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

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

(3) If an appeal is made under this section, an inspection authority shall extend the plan review deadline by the number of days it takes for a final decision to be issued for the appeal.

SECTION 110
VIOLATIONS

110.1 Prohibited Acts. Prohibited acts are as described in ORS 455.450.

455.450 Prohibited acts. A person may not:

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

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

(3) Violate, or procure or assist in the violation of, any standard, specification, requirement, prohibition or other technical provision set forth in the state building code or an applicable local building code or in any rule or order of the Department of Consumer and Business Services, an advisory board, a local governing body or local building official.

110.2 Notice of Violation. The building official is authorized to serve a notice of violation on a person responsible for the erection, construction, alteration,

extension, or repair of a PV system in violation of the provisions of this code, or of a permit issued under this code. The notice of violation shall direct the person to stop the illegal action or condition and abate the violation.

110.3 Prosecution of Violation. If the notice of violation is not complied with promptly, the building official is authorized to request the legal counsel of the jurisdiction to institute the appropriate proceeding at law or in equity to restrain, correct or abate such violation, or to require the removal of the PV system in violation of the provisions of this code or of the order or direction made pursuant thereto.

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

110.5 Penalties. Penalties for violations are prescribed in ORS 455.895 or as adopted by the municipality having authority. Local authority to levy penalties is limited to violations of code application only.

455.895 Civil penalties. (1)(a) The State Plumbing Board may impose a civil penalty against a person as provided under ORS 447.992 and 693.992. Amounts recovered under this paragraph are subject to ORS 693.165.
(b) The Electrical and Elevator Board may impose a civil penalty against a person as provided under ORS 479.995. Amounts recovered under this paragraph are subject to ORS 479.850.
(c) The Board of Boiler Rules may impose a civil penalty against a person as provided under ORS 480.670. Amounts recovered under this paragraph are subject to ORS 480.670.
(2) The Director of the Department of Consumer and Business Services, in consultation with the appropriate board, if any, may impose a civil penalty against any person who violates any provision of ORS 446.003 to 446.200, 446.225 to 446.285, 446.395 to 446.420, 446.566 to 446.646, 446.666 to 446.746, 479.510 to 479.945, 479.950 and 480.510 to 480.670 and this chapter and ORS chapters 447, 460 and 693, or any rule adopted or order issued for the administration and enforcement of those provisions. Except as provided in subsections (3), (4) and (9) of this section or ORS 446.995, a civil penalty imposed under this section must be in an amount determined by the appropriate board or the director of not more than $5,000 for each offense or, in the case of a continuing offense, not more than $1,000 for each day of the offense.
(3) Each violation of ORS 446.003 to 446.200 or 446.225 to 446.285, or any rule or order issued thereunder, constitutes a separate violation with respect to each manufactured structure or with respect to each failure or refusal to allow or perform an act required thereby, except that the maximum civil penalty may not exceed $1 million for any related series of violations occurring within one year from the date of the first violation.
(4) The director may impose a civil penalty of not more than $25,000 against a public body responsible for administering and enforcing a building inspection program. As used in this subsection, "public body" has the meaning given that term in ORS 174.109.
(5) The maximum penalty established by this section for a violation may be imposed only upon a finding that the person has engaged in a pattern of violations. The Department of Consumer and Business Services, by rule, shall define what constitutes a pattern of violations. Except as provided in subsections (1) and (10) of this section, moneys received from any civil penalty under this section are appropriated continuously for and shall be used by the director for enforcement and administration of provisions and rules described in subsection (2) of this section.
(6) Civil penalties under this section shall be imposed as provided in ORS 183.745.
(7) A civil penalty imposed under this section may be remitted or reduced upon such terms and conditions as the director or the appropriate board considers proper and consistent with the public health and safety. In any judicial review of a civil penalty imposed under this section, the court may, in its discretion, reduce the penalty.
(8) Any officer, director, shareholder or agent of a corporation, or member or agent of a partnership or association, who personally participates in or is an accessory to any violation by the partnership, association or corporation of a provision or rule

described in subsection (2) of this section is subject to the penalties prescribed in this section.

(9) In addition to the civil penalty set forth in subsection (1) or (2) of this section, any person who violates a provision or rule described in subsection (2) of this section may be required by the director or the appropriate board to forfeit and pay to the General Fund of the State Treasury a civil penalty in an amount determined by the director or board that shall not exceed five times the amount by which such person profited in any transaction that violates a provision or rule described in subsection (2) of this section.

(10) If a civil penalty is imposed for a violation of a provision of ORS 446.566 to 446.646 and the violation relates to a filing or failure to file with a county assessor functioning as agent of the department, the department, after deducting an amount equal to the department's procedural, collection and other related costs and expenses, shall forward one-half of the remaining civil penalty amount to the county in which the manufactured structure is located at the time of the violation.

SECTION 111
STOP WORK ORDER

111.1 Authority. The building official is authorized to issue a stop work order, whenever the building official finds any work regulated under this code being performed in a dangerous or unsafe manner or contrary to the provisions of this code.

111.2 Issuance. A written stop work order shall be provided to the person doing the work in violation or that is dangerous or unsafe, or to the owner of the property or the owners. Work must stop immediately once a stop work order is issued. The stop work order must clearly state the reason for the order, and where applicable cite to the section of code violated. The stop work order must also contain a description of the conditions that must be met before work will be permitted to begin again.

111.3 Unlawful Continuance. Any person who violates a stop work order by continuing any work after having been served with such order, except as directed to perform to remove a violation or unsafe condition, shall be subject to penalty.

CHAPTER 2

DEFINITIONS

201.1 Scope. Unless otherwise expressly stated, the following words and terms shall, for the purposes of this code, have the meanings indicated in this chapter.

201.2 Interchangeability. Words used in the present tense include the future; the singular number includes the plural and the plural, the singular

201.3 Terms Defined in Other Codes. Where terms are not defined in this code such terms shall have the meanings ascribed to them as in other code publications adopted by the State of Oregon.

201.4 Terms Not Defined. Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies.

SECTION 202
DEFINITIONS

– A –

Approved. Acceptable to the authority having jurisdiction.

Approved Field Evaluation Firm– An organization primarily established for purposes of testing to approved standards and approved by the Authority Having Jurisdiction.

Array. A mechanically integrated assembly of modules or panels with a support structure and foundation, tracker, and other components, as required, to form a power-producing unit.

Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

– B –

Building Code. For the purpose of this code, any reference to the *Building Code* shall mean the *Oregon Structural Specialty Code*.

Building Integrated Photovoltaics. Photovoltaic cells, devices, modules, or modular materials that are integrated into the outer surface or structure of a building and serve as the outer protective surface of that building.

– D –

Dead Load. The weight of materials of construction incorporated into the building, including but not limited to walls, floors, roofs, ceilings, stairways, built-in partitions, finishes, cladding and other similarly incorporated architectural and structural items, and the weight of fixed service equipment, such as cranes, plumbing stacks and risers, electrical feeders, HVAC systems and fire sprinkler systems.

– E –

Electrical Code. For the purpose of this code, any reference to the *Electrical Code* shall mean the *Oregon Electrical Specialty Code*.

Existing Work. Existing work is a PV system or any part thereof which has been installed prior to the effective date of this Code.

– F –

Fire Code. Shall mean the *Oregon Fire Code* as adopted by OAR 837-040-0010.

– L –

Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Live loads (roof). Those loads produced (1) during maintenance by workers, equipment and materials; and (2) during the life of the structure by movable objects such as planters and by people.

– M –

Mechanical Code. For the purpose of this code, any reference to the *Mechanical Code* shall mean the *Oregon Mechanical Specialty Code*.

Module. A complete, environmentally protected unit consisting of solar cells, optics, and other components, exclusive of tracker, designed to generate power when exposed to sunlight.

– N –

NRTL. A Nationally Registered Testing Laboratory.

– P –

Photovoltaic (PV). Relating to electricity produced by the action of solar radiation on a solar cell.

Photovoltaic (PV) System. The total components and subsystems that, in combination, convert solar energy into electric energy suitable for connection to a utilization load.

– R –

Racking. A system of components that directly supports the PV modules and transfers the applied loads to the building structure or ground-supported structure.

Residential Code. For the purpose of this code, any reference to the *Residential Code* shall mean the *Oregon Residential Specialty Code*.

– S –

Supports. Supports, hangers, and anchors are devices for properly supporting and securing pipe, appurtenances, fixtures, and equipment.

– T –

Townhouse. Means a single family dwelling unit constructed in a group of three of more attached units in which each unit extends from foundation to roof and with open space on at least two sides. For the purposes of this code, row house, and zero lot line dwellings shall be considered to be townhouses.

CHAPTER 3

INSTALLATION REQUIREMENTS

SECTION 301
GENERAL

301.1 Scope. The provisions of this chapter shall govern the installation of photovoltaic (PV) components including location, materials and structural support. Where the installation of PV systems is not covered by this chapter the installation shall be in compliance with the applicable provisions of the Oregon Building Code as defined in ORS 455.020.

Exception: Where applicable provisions are specified, compliance with the *Residential Code* shall satisfy the requirements of this section when the PV system is installed on;

1. Detached one and two family dwellings and townhouses classified as Group R-3, and Group U Occupancies; and
2. Residences used for family child care home or foster care in accordance with ORS Chapters 418, 443 and 657A; and
3. Detached Congregate living facilities (each accommodating 10 persons or less) and detached lodging houses containing not more than five guest rooms.

SECTION 302
DEFINITIONS

302.1 General. The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

Conventional Light-Frame Wood Construction. A type of construction whose primary structural elements are formed by a system of repetitive wood-framing members in accordance with *Building Code*, Section 2308 or the *Residential Code* as applicable.

Cutout. An area adjacent to a pathway for use by firefighters to cut a vent if needed. Cutouts shall not be less than 30 inches (762 mm) in any dimension.

Non-Occupied Accessory Structure. A structure normally not occupied such as a garage, carport, shed, or agricultural building.

Pathway. Unobstructed route provided within or around the PV array to provide unimpeded access and egress for firefighting purposes.

Racking. A system of components that directly supports the PV modules and transfers the applied loads to the building structure or ground-supported structure

Solar Roof. A roof on which a solar array is installed.

SECTION 303
MINIMUM STANDARDS AND QUALITY

303.1 General. Photovoltaic (PV) components, racking, support structures and attachments shall be in accordance with the provisions of this chapter. PV systems shall be designed and installed in accordance with this code and the manufacturer's installation instructions.

303.2 Type of Construction. PV systems, including supporting structure, shall comply with the requirements of *Building Code*, Chapter 6 for the structures required to be of non-combustible type of construction or the *Residential Code* as applicable.

303.3 Material Standards. PV modules shall be certified in accordance with UL 1703 and shall be installed in accordance with the manufacturer's installation instructions.

303.4 Certification Requirements. PV racking and attachments shall comply with one of the following:

1.Certified to UL 1703 by a nationally recognized testing laboratory and installed in accordance with the manufacturer's installation instructions.
2.For exempt structures in accordance with Section 105.1, documentation demonstrating to the satisfaction of the building official, that the racking system has been designed to resist the applicable loads, and installed in accordance with the manufacturer's installation instructions.
3.Designed by an Oregon Licensed Engineer or Architect.
4.Field evaluation by an Approved Field Evaluation Firm.
5.Approval by the Authority Having Jurisdiction.

303.5 Fire Classification. Rooftop mounted PV systems shall be non-combustible or have a fire classification that is equal to or greater than the roof assembly required by *Building Code,* Section 1505.1.

303.6 Weather Protection. All components of the PV system exposed to the weather shall be constructed of

materials approved for exterior locations and protected from corrosion or deterioration.

SECTION 304
LOCATION

304.1 General. The location of Photovoltaic (PV) components, racking, support structures and attachments shall be in accordance with the provisions of this chapter.

304.2 Zoning Requirements. The installation of PV systems shall comply with the requirements of the zoning requirements of the Authority Having Jurisdiction (AHJ).

304.3 Flood Hazard Areas. Installation of PV systems within flood hazard areas, as defined by the AHJ, shall comply with the *Building Code* or *Residential Code,* Section R322 as applicable.

304.4 Building Egress. PV systems shall not be installed in locations that would restrict, or otherwise prevent the use of, the required means of egress and emergency escape and rescue. The means of egress shall comply with Chapter 10 of the *Building Code* or *Residential Code,* Section R310 and R311 as applicable.

304.5 Light and Ventilation. PV systems shall not be installed in locations that would restrict the required light and ventilation. Light and ventilation shall comply with *Building Code,* Chapter 12 or *Residential Code,* Section R303 as applicable.

304.6 Rooftop Vent and Drain Clearances. PV systems shall not be installed in locations that would restrict the function of plumbing or mechanical vents, skylights, drains or other rooftop features.

Exception: Non-operable skylights in one- and two-family dwellings.

304.7 Mechanical Equipment Clearances. PV systems shall be installed with not less than a 30 inch (762 mm) clearance around mechanical equipment requiring service or maintenance. The specific provisions of the *Mechanical Code* and *Electrical Code* apply to installations of PV systems.

304.8 Roof Drainage. PV systems shall not be installed in a manner that would obstruct roof drainage. No vertical supports or roof penetrations shall be allowed within 12 inches (305 mm) of each side of the low point of the valley. The PV modules or racking may extend into the valley no more than 6 inches (152 mm) from the valley low point provided that a minimum 3 inch (76 mm) clearance above the surface of the roof is maintained.

304.9 Fire Fighter Access and Escape. To provide access and escape for Fire Fighters the location of roof-mounted PV modules shall comply with the requirements of this section.

304.9.1 General Pathway Requirements. All PV installations shall include a 36 inch wide (914mm) pathway maintained along three sides of the solar roof. The bottom edge of a roof with a slope that exceeds 2:12 shall not be used as a pathway. All pathways shall be located over a structurally supported area and measured from edge of the roof and horizontal ridge to the solar array or any portion thereof.

Exception:

1. On structures with a PV array area of 1,000 square feet (92.90 m^2) or less installed on a roof with a slope that exceeds 2:12 and with an intersecting adjacent roof and where no section is larger than 150 feet (45720 mm) measured in length or width:

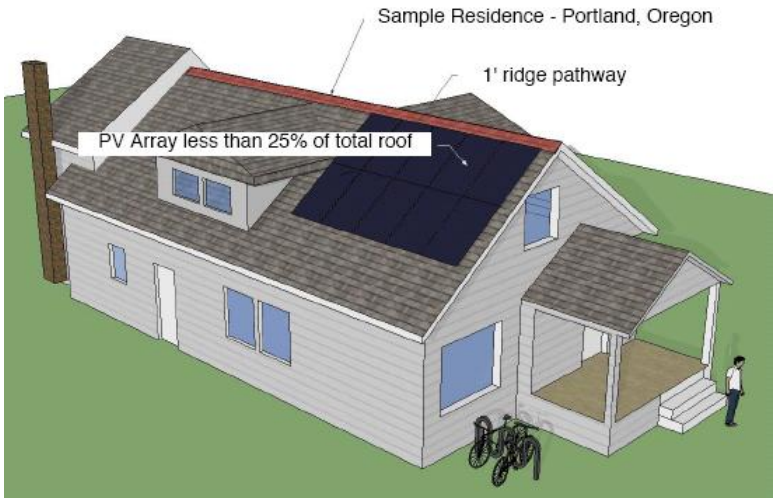
1.1. Where the PV array does not exceed 25% as measured in plan view of total roof area of the structure, a minimum 12 inch (305mm) unobstructed pathway, shall be maintained along each side of any horizontal ridge.

1.2. Where the solar array area exceeds 25% as measured in plan view of total roof area of the structure, a minimum of one 36 inch (914 mm) unobstructed pathway from ridge to eave, over a structurally supported area, must be provided in addition to a minimum 12 inch (305 mm) unobstructed pathway along each side of any horizontal ridge.

2. Pathways are not required on *non-occupied accessory structures* provided they are separated from occupied structures by a 6 feet (3048 mm) minimum separation distance or by a minimum two-hour fire rated assembly.

3. Townhouses providing fire separation as required by the applicable code at the time of construction may be considered one structure and comply with the provisions of Section 304.9.1(1.1).

Where *townhouses* are separated by real property lines and pathways cross real property lines, the building official shall review, approve and maintain a record of all easements for access related to the PV system installation. Easements may be general in nature or they may describe specific locations. The applicant shall provide a copy of the recorded easement to the building official prior to issuance of the building permit. Easements shall be recorded for each affected dwelling unit and the book and page number provided to the jurisdiction having authority.



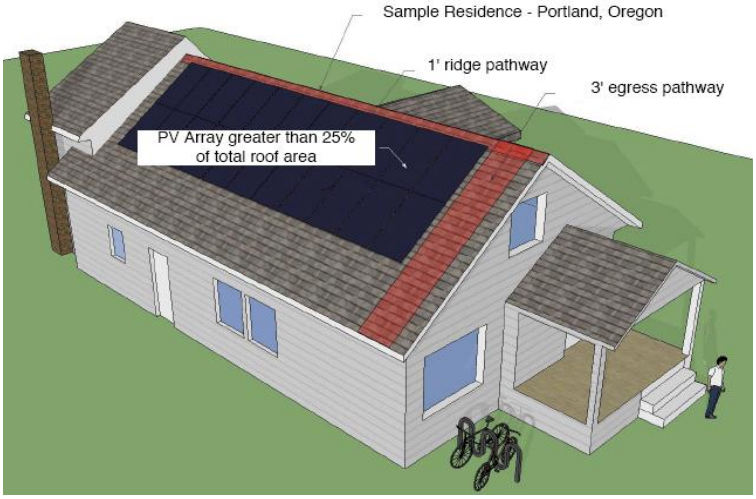


FIGURE 309.1
PANEL PATHWAY LOCATIONS

NOTE: *See Section 304.10 for alternate installations.*

304.9.2 Intermediate Pathway Locations. Systems that include a solar array section that is larger than 150 feet (45 720 mm) measured in length or width shall have additional intermediate pathways. An intermediate pathway not less than 36 inches (914 mm) wide separating the array shall be provided for every 150 feet (45 720 mm) of array including offset modules or angled installations. The maximum square footage of an array shall not exceed 22,500 ft^2. (2090 m^2) without the installation of an intermediate pathway.

304.9.2.1. Where a system is required to have intermediate pathways, all pathways shall have one or more cutouts located adjacent to the pathway. No point on the pathway shall be more than 25 feet (7620) from a cutout.

304.9.3 Prohibited Locations. Pathways shall not be located within 12 inches of the low point of a valley.

304.9.4 Smoke and Heat Vents. In structures where smoke and heat vents have been installed to comply with the requirements of the *Fire Code*, Chapter 9 Smoke and Heat Vents and Chapter 23 High Piled Storage, a 36 inch (914 mm) wide pathway to and around each vent shall be provided

for fire department access, maintenance and testing of these vents.

304.9.5 Electrical Component Location.

304.9.5.1 Disconnects, j-boxes, combiner boxes or gutters shall not be located in any required pathway or cutout.

304.9.5.2 Raceways on flat roofs that cross a required pathway shall be bridged to avoid tripping hazards. Raceways shall not be permitted in required pathways on roofs with a slope that exceeds 2:12 (17-percent slope).

304.10 Alternate Installations. In accordance with Section 103.11, an alternative material, design, location, method of construction, or means of safe fire fighter access and egress may be approved by the building official.

SECTION 305
STRUCTURAL

305.1 General. Photovoltaic (PV) components, racking, support structures and attachments shall be in accordance with the provisions of this section.

305.2 Module Attachment. PV modules shall be attached in accordance with the manufacturer's installation instructions and to account for all loads, including dead loads, snow loads, wind loads and seismic loads, as prescribed by the *Building Code*.

305.3 Racking. Racking shall comply with this section.

305.3.1 Building Penetrations. All penetrations shall be flashed or sealed in a manner that prevents moisture from entering the wall and roof.

305.3.2 Structural Support and Attachment. Racking and racking supports shall be positively attached to the structural components or blocking in accordance with this section. Racking and racking supports installed in accordance with manufacturer's specifications or be designed in accordance with the *Building Code* and shall be mounted in accordance with one of the following:

1. Installed in accordance with manufacturer's specifications and be designed in accordance with the *Building Code*.

2. Installed in accordance with Section 305.4.

3. Positively attached to the structural components or blocking in accordance through the use of screws, bolts, j-bolts, or other approved means. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Racking and racking supports shall be mounted to structural components and shall not be attached to wall or roof coverings, trim or structural sheathing as a means of structural support.

4. Attached to standing seam metal roofs with connectors in accordance with manufacturer's installation instructions.

5. Certified non-penetrating or minimally penetrating systems installed in accordance with the manufacturer's installation instructions.

305.3.3 Roof Mounted Racking. Roof-mounted supporting structures shall be certified in accordance with Section 303.4, and shall be designed in accordance with accepted engineering practice, constructed and installed to safely support all loads, including dead loads, snow loads, wind loads and seismic loads as prescribed by the *Building Code* or in accordance with Section 305.4.

305.3.4 Ground Mounted Racking. Ground-mounted supporting structures, and all parts thereof, shall be designed, constructed and installed to safely support all loads, including dead loads, flood loads, snow loads, wind loads and seismic loads as prescribed by the *Building Code*.

The bottom of modules shall be at least 18 inches (457 mm) clear from ground level.

305.4 Prescriptive Installations. Roof installations on conventional light-frame construction which complies with this section shall qualify as prescriptive and shall not require an engineered design if all of the following criteria are met:

1. Roof Structure: The supporting roof framing shall be conventional light framed wood construction with pre-engineered trusses or roof framing members at a spacing of 24 inch (610 mm) on center maximum that comply with the applicable allowable span in Table 305.4.1 (See Appendix B) for the specific loads including ground snow loads not exceeding 50 psf and wind loads that do not exceed 95 MPH in exposure C or 105 MPH in exposures A or B as defined in 1609 of the *Building Code*. Where the grade cannot be verified it is assumed to be #2 Douglas-Fir Larch.

Exception: Roof framing in compliance with the applicable allowable span in Table 305.4.2 (See Appendix B) for the specific loads including ground snow loads not exceeding 70 psf and wind exposure is limited to exposure A, B or C shall satisfy the requirements of this section when the PV system is installed on;

1. Detached one and two family dwellings and townhouses classified as Group R-3, and Group U Occupancies; and

2. Residences used for family child care home or foster care in accordance with ORS Chapters 418, 443 and 657A; and

3. Detached Congregate living facilities (each accommodating 10 persons or less) and detached lodging houses containing not more than five guest rooms.

2. Roof materials. Roofing material shall be metal, single layer wood shingle or shake, or not more than two layers of composition shingle.

3. Loading: Installation shall comply with Figure 305.4(1). The combined weight of the PV modules and racking shall not exceed 4.5 pounds per square foot (2.0412 kPa). PV modules or racking shall be directly attached to the roof framing or blocking. See Figures 305.4(1). These attachments must be spaced no greater than 48 inches (1219 mm) on center in any direction. Attachments shall be spaced no greater than 24 inches (609.6 mm) on center in any direction where:

3.1. Ground snow loads exceed 25 psf;

3.2. Located within 3 feet (91.44 cm) of a roof edge, hip, eave or ridge; or

3.3. Wind exposure is B or more and wind speed 95 MPH or more or wind exposure is exposure C and wind speed is 85 MPH or more.

Exception: PV modules or racking may be attached directly to standing seam metal panels using clamps and roofing materials which meet the following:

1. The allowable uplift capacity of clamps shall not be less than 115 pounds for clamps spaced at 60 inches (1525 mm) on center or less as measured along the seam or not be less than 75 pounds for clamps spaced at less than 48 inches (1219 mm) on center.

2. Clamp spacing between or along seams shall not be less than 24-inches (610 mm). Spacing of clamps along a seam shall not exceed 60-inches.

3. Roofing panels shall comply with all of the following:

3.1. Shall be a minimum of 26 gage steel,

3.2. Shall be a maximum of 18-inches (457 mm) in width,

3.3. Shall be attached with a minimum of #10 screws at 24-inches (610 mm) on center,

3.4. Shall be installed over minimum ½-inch (12.7 mm) nominal wood structural panels attached to framing with 8d nails at 6-inches (153 mm) on center at panel edges and 12-inches (305 mm) on center field nailing.

4. Height: Maximum module height above roof shall be 18 inches (457 mm) from top of module to roof surface and in accordance with Figure 305.4(1).

5. Submittal Requirement. See Section 105.2 for requirements.

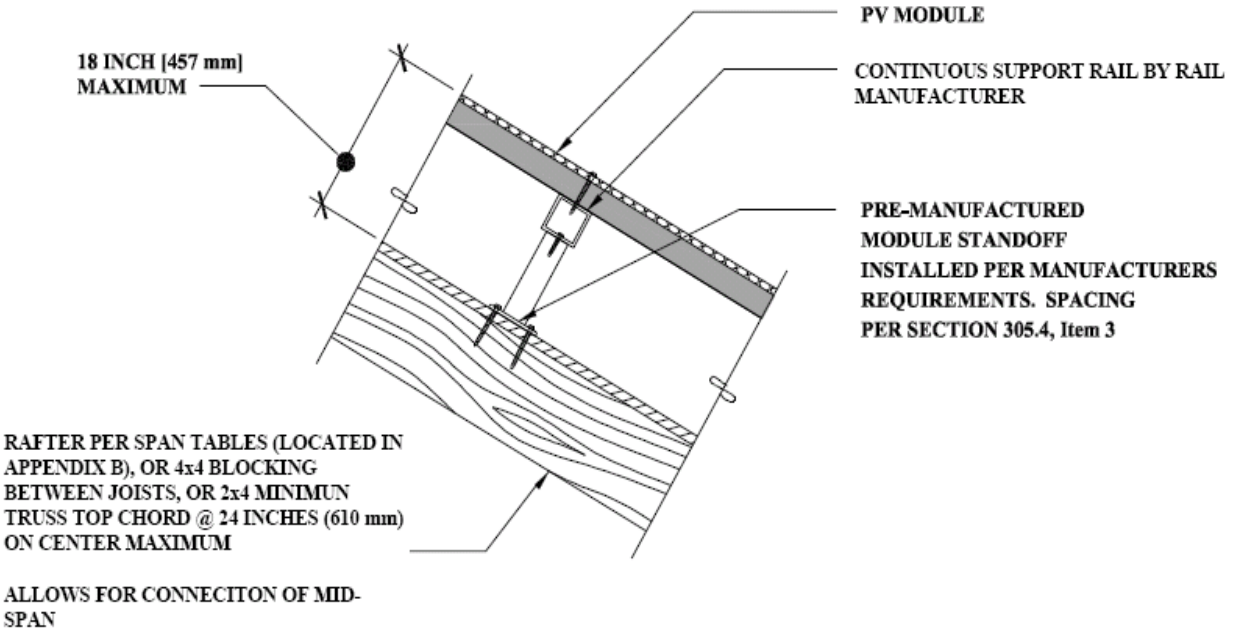


Figure 305.4(1)
LOADING

APPENDIX A
Amendments to the Oregon Electrical Specialty Code

Note: *The following amendments to the 2008 NEC Chapter 690 are reproduced here from OAR 918-305-0265 Table 1-E for convenience.*

Oregon Amendments to 2008 NEC Article 690 reprinted in their entirety from OAR 918-305-0265

Amended Language, 2008 NEC

918-305-0265

690.3 Other Articles. Wherever the requirements of other articles of this *Code* and Article 690 differ, the requirements of Article 690 shall apply and, if the system is operated in parallel with a primary source(s) of electricity, the requirements in 705.14, 705.16, 705.32, and 705.143 shall apply.

FPN: Raceways and conduit systems installed for use with solar photovoltaic systems may be subject to elevated temperatures and may require the use of expansion fittings and ambient temperature adjustment. See Table 310.15(B)(2)(c) for adjustment factors.

Exception: *Solar photovoltaic systems, equipment, or wiring installed in a hazardous (classified) location shall also comply with the applicable portions of Articles 500 through 516.*

690.4 Installation.

(A) Solar photovoltaic System. A solar photovoltaic system shall be permitted to supply a building or other structure in addition to any service(s) of another electricity supply system(s).

(**B) Conductors of Different Systems.** Photovoltaic source circuits and photovoltaic output circuits shall not be contained in the same raceway, cable tray, cable, outlet box, junction box, or similar fitting as feeders or branch circuits of other systems, unless the conductors of the different systems are separated by a partition or are connected together.

(C) Module Connection Arrangement. The connections to a module or panel shall be arranged so that removal of a module or panel from a photovoltaic source circuit does not interrupt a grounded conductor to another photovoltaic source circuit. Sets of modules interconnected as systems rated at 50 volts or less, with or without blocking diodes, and having a single over-current device shall be considered as a single-source circuit. Supplementary over-current devices used for the exclusive protection of the PV modules are not considered as over-current devices for the purpose of this section.

(D) Equipment. Inverters, motor generators, photovoltaic modules, photovoltaic panels, ac photovoltaic modules, source-circuit combiners, and charge controllers intended for use in photovoltaic power systems shall be identified and certified for the application.

(E) Circuit routing. Photovoltaic source and output circuits shall not be embedded in the roof covering.

Exception: *Circuits located in areas directly below photovoltaic modules and associated equipment or where passing through the roof assembly shall be permitted to be embedded in the roof covering.*

690.7 Maximum Voltage.

(A) Maximum Photovoltaic System Voltage. In a dc photovoltaic source circuit or output circuit, the maximum photovoltaic system voltage for that circuit shall be calculated as the sum of the rated open-circuit voltage of the series-connected photovoltaic modules corrected for the lowest expected ambient temperature. For crystalline and multicrystalline silicon modules, the rated open-circuit voltage shall be multiplied by the correction factor provided in Table 690.7. This voltage shall be used to determine the voltage rating of cables, disconnects, overcurrent devices, and other equipment. Where the lowest expected ambient temperature is below -40°C (-40°F), or where other than crystalline or

multicrystalline silicon photovoltaic modules are used, the system voltage adjustment shall be made in accordance with the manufacturer's instructions.
When open-circuit voltage temperature coefficients are supplied in the instructions for listed PV modules, they shall be used to calculate the maximum photovoltaic system voltage as required by 110.3(B) instead of using Table 690.7.

Table 690.7 Voltage Correction Factors for Crystalline and Multicrystalline Silicon Modules

Correction Factors for Ambient Temperatures below 25°C (77°F).
(Multiply the rated open circuit voltage by the appropriate correction factor shown below.)

Ambient Temperature (°C)	Factor	Ambient Temperature (°F)
24 to 20	1.02	76 to 68
19 to 15	1.04	67 to 59
14 to 10	1.06	58 to 50
9 to 5	1.08	49 to 41
4 to 0	1.10	40 to 32
-1 to -5	1.12	31 to 23
-6 to -10	1.14	22 to 14
-11 to -15	1.16	13 to 5
-16 to -20	1.18	4 to -4
-21 to -25	1.20	-5 to -13
-26 to -30	1.21	-14 to -22
-31 to -35	1.23	-23 to -31
-36 to -40	1.25	-32 to -40

(B) Direct-Current Utilization Circuits. The voltage of dc utilization circuits shall conform to 210.6.

(C) Photovoltaic Source and Output Circuits. In one- and two-family dwellings, photovoltaic source circuits and photovoltaic output circuits that do not include lampholders, fixtures, or receptacles shall be permitted to have a maximum photovoltaic system voltage up to 600 volts. Other installations with a maximum photovoltaic system voltage over 600 volts shall comply with Article 690, Part I**X**.

(D) Circuits over 150 Volts to Ground. In one- and two-family dwellings, live parts in photovoltaic source circuits and photovoltaic output circuits over 150 volts to ground shall not be accessible to other than qualified persons while energized.

FPN: See 110.27 for guarding of live parts, and 210.6 for voltage to ground and between conductors.

(E) Bipolar Source and Output Circuits. For 2-wire circuits connected to bipolar systems, the maximum system voltage shall be the highest voltage between the conductors of the 2-wire circuit if all of the following conditions apply:

(1) One conductor of each circuit is solidly grounded.
(2) Each circuit is connected to a separate subarray.
(3) The equipment is clearly marked with a label as follows:

WARNING
BIPOLAR PHOTOVOLTAIC ARRAY. DISCONNECTION OF NEUTRAL OR GROUNDED CONDUCTORS MAY RESULT IN OVERVOLTAGE ON ARRAY OR INVERTER.

690.8 Circuit Sizing and Current.

(A) Calculation of Maximum Circuit Current. The maximum current for the specific circuit shall be calculated in accordance with 690.8(A)(1) through (A)(4).

FPN: Where the requirements of 690.8(A)(1) and (B)(1) are both applied, the resulting multiplication factor is 156 percent.

(1) Photovoltaic Source Circuit Currents. The maximum current shall be the sum of parallel module rated short-circuit currents multiplied by 125 percent.

(2) Photovoltaic Output Circuit Currents. The maximum current shall be the sum of parallel source circuit maximum currents as calculated in 690.8(A)(1).

(3) Inverter Output Circuit Current. The maximum current shall be the inverter continuous output current rating.

(4) Stand-Alone Inverter Input Circuit Current. The maximum current shall be the stand-alone continuous inverter input current rating when the inverter is producing rated power at the lowest input voltage.

(B) Ampacity and Overcurrent Device Ratings. Photovoltaic system currents shall be considered to be continuous.

(1) Sizing of Conductors and Overcurrent Devices. The circuit conductors and overcurrent devices shall be sized to carry not less than 125 percent of the maximum currents as calculated in 690.8(A). The rating or setting of overcurrent devices shall be permitted in accordance with 240.4(B) and (C).

Exception: Circuits containing an assembly, together with its overcurrent device(s), that is listed for continuous operation at 100 percent of its rating shall be permitted to be utilized at 100 percent of its rating.

(2) Internal Current Limitation. Overcurrent protection for photovoltaic output circuits with devices that internally limit the current from the photovoltaic output circuit shall be permitted to be rated at less than the value calculated in 690.8(B)(1). This reduced rating shall be at least 125 percent of the limited current value. Photovoltaic output circuit conductors shall be sized in accordance with 690.8(B)(1).

Exception: An overcurrent device in an assembly listed for continuous operation at 100 percent of its rating shall be permitted to be utilized at 100 percent of its rating.

(C) Systems with Multiple Direct-Current Voltages. For a photovoltaic power source that has multiple output circuit voltages and employs a common-return conductor, the ampacity of the common-return conductor shall not be less than the sum of the ampere ratings of the overcurrent devices of the individual output circuits.

(D) Sizing of Module Interconnection Conductors. Where a single overcurrent device is used to protect a set of two or more parallel-connected module circuits, the ampacity of each of the module interconnection conductors shall not be less than the sum of the rating of the single fuse plus 125 percent of the short-circuit current from the other parallel-

connected modules.

(E) DC Current-Carrying Conductors. Conductors used for PV source and output circuits shall be considered current-carrying conductors. The provisions of Table 310.15(B)(2)(a) shall apply to all PV circuits contained in raceways.

690.47 Grounding Electrode System.

(A) Alternating-Current Systems. A grounding electrode system shall be provided in accordance with 250.50 through 250.60. The grounding electrode conductor shall be installed in accordance with 250.64, but shall not be smaller than 6 AWG copper or 4 AWG aluminum.

(B) Direct-Current Systems. a grounding electrode system shall be provided in accordance with 250.166 for grounded systems or 250.169 for ungrounded systems. The grounding electrode conductor shall be installed in accordance with 250.64**, but shall not be smaller than 6 AWG copper or 4 AWG aluminum**.

(C) Systems with Alternating-Current and Direct-Current Grounding Requirements. Systems with alternating-current and direct-current grounding requirements shall comply with items (C)(1) through (C)(8):

(1) Where photovoltaic power systems have both alternating-current (ac) and direct-current (dc) grounding requirements, the dc grounding system shall be bonded to the ac grounding system.

(2) A bonding conductor between these systems shall be sized as the larger of the dc requirement in accordance with 690.45, the ac requirements based on the inverter alternating current overcurrent device rating and 250.122, **but shall not be smaller than # 6 AWG copper or 4 AWG aluminum.**

(3) A conductor that serves as both an equipment grounding conductor and as part of the bond between ac and dc systems for an inverter incorporating dc ground-fault protection shall meet the requirements for equipment bonding jumpers in accordance with 250.102 but shall not be subject to the requirements for bonding jumpers in accordance with 250.28. A single conductor shall be permitted to be used to perform the multiple functions of dc grounding, ac grounding, and bonding between ac and dc systems.

(4) A bonding conductor or equipment grounding conductor that serves multiple inverters shall be sized based on the sum of applicable maximum currents used in item (2).

(5) A common ground bus shall be permitted to be used for both systems.

(6) A common grounding electrode shall be permitted to be used for both systems, in which case the grounding electrode conductor shall be connected to the ac ground system bonding point.

(7) Grounding electrode conductor(s) shall be sized to meet the requirements of 250.66 (ac system) and 690.47(B) (dc system).

(8) For systems with utility-interactive inverters, the premises grounding system serves as the ac grounding system.

(D) Additional Electrodes for Array Grounding. Grounding electrodes shall be installed at the location of all ground- and pole-mounted photovoltaic arrays and as close as practicable to the location of roof-mounted photovoltaic arrays. The electrodes shall be connected directly to the array frame(s) or structure. The dc grounding electrode conductor shall be sized according to 690.47(B). Additional electrodes are not permitted to be used as a substitute for equipment bonding or equipment grounding conductor requirements.

The structure of a ground- or pole-mounted photovoltaic array shall be permitted to be considered a grounding electrode if it meets the requirements of 250.52. Roof-mounted photovoltaic arrays shall be permitted to use the metal frame of a building or structure if the requirements of 250.52(A)(2) are met.

Exception No. 1: Array grounding electrode(s) shall not be required where the load served by the array is integral with the array.

Exception No. 2: Additional array grounding electrode(s) shall not be required if located within 6 ft of the premises wiring electrode.

690.53 Direct-Current PV Power Source. A permanent label for the direct-current

photovoltaic power source indicating items (1) through (5) shall be provided by the installer at the photovoltaic disconnecting means:

(1) Rated maximum power-point current

(2) Rated maximum power-point voltage

(3) Maximum system voltage

FPN to (3): See 690.7(A) for maximum photovoltaic system voltage.

(4) Short-circuit current

FPN to (4): See 690.8(A) for calculation of maximum circuit current.

(5) Maximum rated output current of the charge controller (if installed)

FPN: Reflecting systems used for irradiance enhancement may result in increased levels of output current and power.

690.64 Point of Connection. The output of a utility-interactive inverter shall be connected as specified in 690.64(A) or (B).

(A) Supply Side. The output of a utility-interactive inverter shall be permitted to be connected to the supply side of the service disconnecting means.

(B) Load Side. The output of a utility-interactive inverter shall be permitted to be connected to the load side of the service disconnecting means of the other source(s) at any distribution equipment on the premises. Where distribution equipment, including switchboards and panelboards, is fed simultaneously by a primary source(s) of electricity and one or more utility-interactive inverters, and where this distribution equipment is capable of supplying multiple branch circuits or feeders, or both, the interconnecting provisions for the utility-interactive inverter(s) shall comply with (B)(1) through (B)(7).

(1) Dedicated Overcurrent and Disconnect. Each source interconnection shall be made at a dedicated circuit breaker or fusible disconnecting means.

(2) Bus or Conductor Rating. The sum of the ampere ratings of overcurrent devices in circuits supplying power to a busbar or conductor shall not exceed 120 percent of the rating of the busbar or conductor. In systems with panelboards connected in series, the rating of the first overcurrent device directly connected to the output of a utility-interactive inverter(s) shall be used in the calculations for all busbars and conductors.

(3) Ground-Fault Protection. The interconnection point shall be on the line side of all ground-fault protection equipment.

Exception: Connection shall be permitted to be made to the load side of ground-fault protection, provided that there is ground-fault protection for equipment from all ground-fault current sources. Ground-fault protection devices used with supplies connected to the load-side terminals shall be identified and listed as suitable for back-feeding.

(4) Marking. Equipment containing overcurrent devices in circuits supplying power to a busbar or conductor supplied from multiple sources shall be marked to indicate the presence of all sources.

(5) Suitable for Back-feed. Circuit breakers, if back-fed, shall be suitable for such operation.

FPN: Circuit breakers that are marked "Line" and "Load" have been evaluated only in the direction marked. Circuit breakers without "Line" and "Load" have been evaluated in both directions. **Circuit breakers not marked "Line" and "Load" are considered to be identified as suitable for back-feeding.**

(6) Fastening. Listed plug-in-type circuit breakers back-fed from utility-interactive inverters complying with 690.60 shall be permitted to omit the additional fastener normally required for service equipment.

(7) Inverter Output Connection. Unless the panelboard is rated not less than the sum of the ampere ratings of all overcurrent devices supplying it, a connection in a panelboard shall be positioned at the opposite (load) end from the input feeder location or main circuit location. The bus or conductor rating shall be sized for the loads connected in accordance with Article 220. A permanent warning label shall be applied to the distribution equipment with the following or equivalent marking:

WARNING
INVERTER OUTPUT CONNECTION
DO NOT RELOCATE THIS OVERCURRENT DEVICE

APPENDIX B

Span Tables

Note: *Appendix B references the Span Tables contained in the*

Oregon Residential Specialty Code.

The Tables have been renumbered for inclusion in this Solar Code.

Please refer to the following information when using the tables:

Allowable rafter spans. Spans for rafters shall be in accordance with Tables 802.5.1(1) through 802.5.1(8). For other grades and species and for other loading conditions, refer to the AF&PA Span Tables for Joists and Rafters. The span of each rafter shall be measured along the horizontal projection of the rafter.

Purlins. Installation of purlins to reduce the span of rafters is permitted. as shown in Figure R802.5.1. Purlins shall be sized no less than the required size of the rafters that they support. Purlins shall be continuous and shall be supported by 2-inch by 4-inch (51 mm by 102 mm) braces installed to bearing walls at a slope not less than 45 degrees from the horizontal. The braces shall be spaced not more than 4 feet (1219 mm) on center and the un braced length of braces shall not exceed 8 feet (2438 mm).

Bearing. The ends of each rafter or ceiling joist shall have not less than $1^1/2$ inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on masonry or concrete.

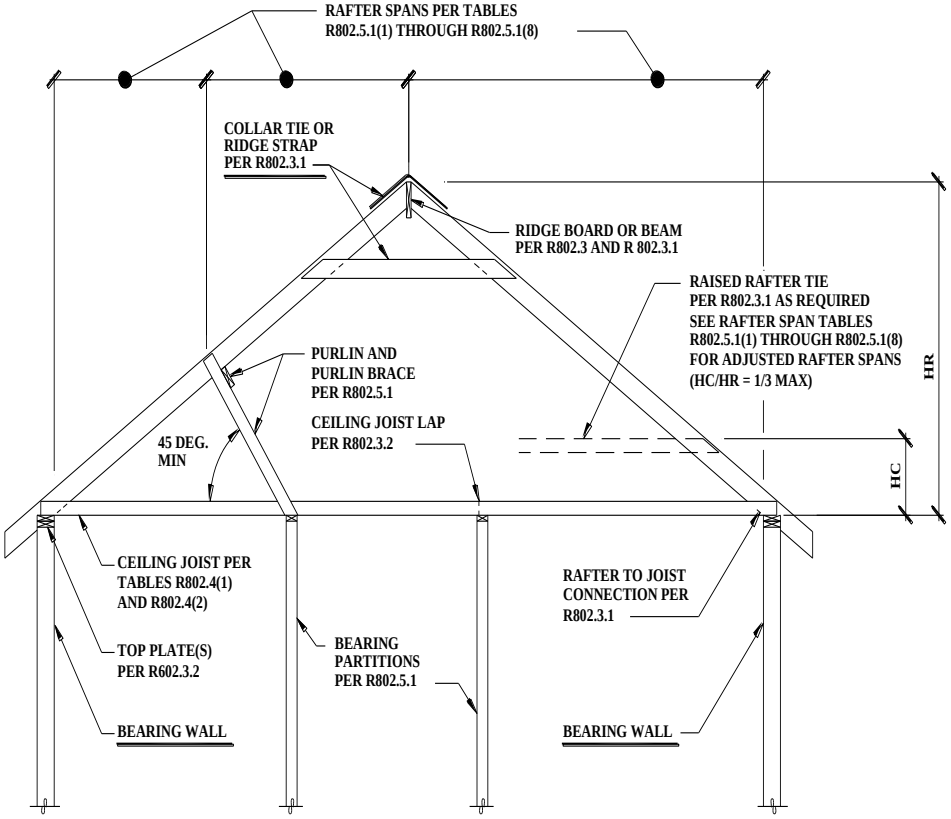


FIGURE R802.5.1
BRACED RAFTER CONNECTION

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

Note: Where ceiling joints run perpendicular to the rafter, rafter ties shall be installed per R802.3.1

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

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

Table 305.4.1
(ORSC TABLE 802.5.1(3)
RAFTER SPANS FOR COMMON LUMBER SPECIES)
(Ground snow load=30 psf, ceiling not attached to rafters, L/Δ = 180)

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

TABLE 802.5.1(3)—continued
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load=30 psf, ceiling not attached to rafters, $^{L}/\Delta$ = 180)

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

Check sources for availability of lumber in lengths greater than 20 feet.
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479kPa.

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

b.

HC/HR	Rafter Span Adjustment
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

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

b. Span exceeds 26 feet in length.

Table 305.4.1
(ORSC TABLE R802.5.1 (7)
RAFTER SPANS FOR 70 PSF GROUND SNOW LOAD)(Ceiling not attached to rafters, L/Δ = 180)

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

TABLE R802.5.1(7)—continued
RAFTER SPANS FOR 70 PSF GROUND SNOW LOAD
(Ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans [a]									
			(feet-inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
24	Douglas fir-larch	SS	6-0	8-10	11-3	13-9	15-11	5-9	8-4	10-7	12-	15-0
	Douglas fir-larch	#1	5-0	7-4	9-4	11-5	13-2	4-9	6-11	8-9	10-9	12-5
	Douglas fir-larch	#2	4-8	6-11	8-9	10-8	12-4	4-5	6-6	8-3	10-0	11-8
	Douglas fir-larch	#3	3-7	5-2	6-7	8-1	9-4	3-4	4-11	6-3	7-7	8-10
	Hem-fir	SS	5-8	8-8	11-0	13-6	13-11	5-7	8-3	10-5	12-4	12-4
	Hem-fir	#1	4-11	7-2	9-1	11-1	12-10	4-7	6-9	8-7	10-6	12-2
	Hem-fir	#2	4-8	6-9	8-7	10-6	12-2	4-4	6-5	8-1	9-11	11-6
	Hem-fir	#3	3-7	5-2	6-7	8-1	9-4	3-4	4-11	6-3	7-7	8-10
	Southern pine	SS	5-11	9-3	12-2	15-7	18-2	5-11	9-3	12-2	14-8	17-2
	Southern pine	#1	5-7	8-3	10-5	12-5	14-9	5-3	7-10	9-10	11-8	13-11
	Southern pine	#2	5-0	7-3	9-4	11-1	13-0	4-9	6-10	8-9	10-6	12-4
	Southern pine	#3	3-9	5-7	7-1	8-5	10-0	3-7	5-3	6-9	7-11	9-5
	Spruce-pine-fir	SS	5-6	8-3	10-5	12-9	14-9	5-4	7-9	9-10	12-0	12-11
	Spruce-pine-fir	#1	4-8	6-11	8-9	10-8	12-4	4-5	6-6	8-3	10-0	11-8
	Spruce-pine-fir	#2	4-8	6-11	8-9	10-8	12-4	4-5	6-6	8-3	10-0	11-8
	Spruce-pine-fir	#3	3-7	5-2	6-7	8-1	9-4	3-4	4-11	6-3	7-7	8-10

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

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

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

HC/HR	Rafter Span Adjustment
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

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

Table 305.4.1
(ORSC TABLE R802.5.1(8)
RAFTER SPANS FOR 70 PSF GROUND SNOW LOAD)
(Ceiling attached to rafters, L/Δ = 240)

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

TABLE R802.5.1(8)—continued
RAFTER SPANS FOR 70 PSF GROUND SNOW LOAD [a]
(Ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum rafter spans [a]									
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
24	Douglas fir-larch	SS	5-5	8-7	11-3	13-9	15-11	5-5	8-4	10-7	12-11	15-0
	Douglas fir-larch	#1	5-0	7-4	9-4	11-5	13-2	4-9	6-11	8-9	10-9	12-5
	Douglas fir-larch	#2	4-8	6-11	8-9	10-8	12-4	4-5	6-6	8-3	10-0	11-8
	Douglas fir-larch	#3	3-7	5-2	6-7	8-1	9-4	3-4	4-11	6-3	7-7	8-10
	Hem-fir	SS	5-2	8-1	10-8	13-6	13-11	5-2	8-1	10-5	12-4	12-4
	Hem-fir	#1	4-11	7-2	9-1	11-1	12-10	4-7	6-9	8-7	10-6	12-2
	Hem-fir	#2	4-8	6-9	8-7	10-6	12-2	4-4	6-5	8-1	9-11	11-6
	Hem-fir	#3	3-7	5-2	6-7	8-1	9-4	3-4	4-11	6-3	7-7	8-10
	Southern pine	SS	5-4	8-5	11-1	14-2	17-2	5-4	8-5	11-1	14-2	17-2
	Southern pine	#1	5-3	8-3	10-5	12-5	14-9	5-3	7-10	9-10	11-8	13-11
	Southern pine	#2	5-0	7-3	9-4	11-1	13-0	4-9	6-10	8-9	10-6	12-4
	Southern pine	#3	3-9	5-7	7-1	8-5	10-0	3-7	5-3	6-9	7-11	9-5
	Spruce-pine-fir	SS	5-0	7-11	10-5	12-9	14-9	5-0	7-9	9-10	12-0	12-11
	Spruce-pine-fir	#1	4-8	6-11	8-9	10-8	12-4	4-5	6-6	8-3	10-0	11-8
	Spruce-pine-fir	#2	4-8	6-11	8-9	10-8	12-4	4-5	6-6	8-3	10-0	11-8
	Spruce-pine-fir	#3	3-7	5-2	6-7	8-1	9-4	3-4	4-11	6-3	7-7	8-10

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

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

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

HC/HR	Rafter Span Adjustment
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

where:
HC = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.
HR = Height of roof ridge measured vertically above the top of the rafter support walls.

Table 305.4.1
(ORSC TABLE R802.5.1(9)
RAFTER/CEILING JOIST HEEL JOINT CONNECTIONS) [a,b,c,d,e,f,h]

RAFTER SLOPE	RAFTER SPACING (inches)	GROUND SNOW LOAD (psf)															
		20[g]				30				50				70			
		Roof span (feet)															
		12	20	28	36	12	20	28	36	12	20	28	36	12	20	28	36
		Required number of 16d common nails a, [b] per heel joint splices [c, d, e, f]															
3:12	12	4	6	8	10	4	6	8	11	5	8	12	15	6	11	15	20
	16	5	8	10	13	5	8	11	14	6	11	15	20	8	14	20	26
	24	7	11	15	19	7	11	16	21	9	16	23	30	12	21	30	39
4:12	12	3	5	6	8	3	5	6	8	4	6	9	11	5	8	12	15
	16	4	6	8	10	4	6	8	11	5	8	12	15	6	11	15	20
	24	5	8	12	15	5	9	12	16	7	12	17	22	9	16	23	29
5:12	12	3	4	5	6	3	4	5	7	3	5	7	9	4	7	9	12
	16	3	5	6	8	3	5	7	9	4	7	9	12	5	9	12	16
	24	4	7	9	12	4	7	10	13	6	10	14	18	7	13	18	23
7:12	12	3	4	4	5	3	3	4	5	3	4	5	7	3	5	7	9
	16	3	4	5	6	3	4	5	6	3	5	7	9	4	6	9	11
	24	3	5	7	9	3	5	7	9	4	7	10	13	5	9	13	17
9:12	12	3	3	4	4	3	3	3	4	3	3	4	5	3	4	5	7
	16	3	4	4	5	3	3	4	5	3	4	5	7	3	5	7	9
	24	3	4	6	7	3	4	6	7	3	6	8	10	4	7	10	13
12:12	12	3	3	3	3	3	3	3	3	3	3	3	4	3	3	4	5
	16	3	3	4	4	3	3	3	4	3	3	4	5	3	4	5	7
	24	3	4	4	5	3	3	4	6	3	4	6	8	3	6	8	10

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

a. 40d box nails shall be permitted to be substituted for 16d common nails.
b. Nailing requirements shall be permitted to be reduced 25 percent if nails are clinched.
c. Heel joint connections are not required when the ridge is supported by a load-bearing wall, header or ridge beam.
d. When intermediate support of the rafter is provided by vertical struts or purlins to a load bearing wall, the tabulated heel joint connection requirements shall be permitted to be reduced proportionally to the reduction in span.
e. Equivalent nailing patterns are required for ceiling joist to ceiling joist lap splices.
f. When rafter ties are substituted for ceiling joists, the heel joint connection requirement shall be taken as the tabulated heel joint connection requirement for two-thirds of the actual rafter-slope.
g. Applies to roof live load of 20 psf or less.
h. Tabulated heel joint connection requirements assume that ceiling joists or rafter ties are located at the bottom of the attic space. When ceiling joists or rafter ties are located higher in the attic, heel joint connection requirements shall be increased by the following factors:

HC/HR	Heel Joint Connection Adjustment Factor
1/3	1.5
1/4	1.33
1/5	1.25
1/6	1.2
1/10 or less	1.11

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