

B. Solar Electric

A solar electric system produces electricity that is distributed to the home via the residence's main electrical panel, offsetting electric energy that would otherwise be purchased from the utility. It consists of two, primary components:

1. Photovoltaic panels, which are commonly installed on the roof; and
2. An inverter, which converts direct current electricity produced by the panels into alternating current electricity that can be used by the home.

C. Residential Solar Pool Heating

A residential solar pool heating system consists of light-weight unglazed polymer (plastic) solar collectors, typically mounted on a roof, through which swimming pool water is circulated during the summer months to capture the sun's heat.

This type of system is not subject to the requirements of this program guide, and may be installed by obtaining a mechanical permit. In some cases an electrical permit may also be necessary to install the control system for the solar collectors.

III. SCOPE

This Program Guide is designed to provide guidelines and permitting requirements to those interested in solar hot water heaters or photovoltaic solar electric panels on residential construction. This may include adding a solar system on to an existing structure as an addition or an alteration, or incorporating a solar system into a new building. The intent of these guidelines is to streamline the permitting process for solar energy systems. The Bureau of Development Services (BDS) may require additional information be submitted to ensure proper compliance with code requirements.

IV. INSTALLATION REQUIREMENTS

For a typical residential installation the following rules apply. For installations not complying with this guide contact BDS for installation requirements.

A. Land Use

Solar installations must comply with the Zoning Code. Specific Zoning information regarding a site can be obtained from the BDS Planning and Zoning Section by calling 503-823-7526.

1. Height

In all instances, installations of solar equipment, including the rails and panels, are subject to the height limitations of the specific zone where they are being installed.

Roof-mounted solar panels are not included in height calculations, and may exceed the maximum height of the zone if the following are met:

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- a. For flat roofs or the horizontal portion of mansard roofs, the panels may extend up to 5 feet above the highest point of the roof.
- b. For pitched, hipped, or gambrel roofs, the panels must be mounted no more than 12 inches from the surface of the roof at any point, and may not extend above the ridgeline of the roof. The 12 inches is measured from the upper side of the solar panel.

2. Setbacks

Installations that are 6 feet or less in height are allowed to be placed in the setbacks of the individual lot. Installations taller than 6 feet are not allowed in this area unless they are placed on the roof of a building or approved through a land use review adjustment process.

3. Design and Historic Review

- a. **General** Design review analyzes the aesthetics of a project, in order to conserve or enhance special scenic, architectural or cultural areas of the City. Projects in design overlay zones, historic districts, conservation districts, or individual historic or conservation landmarks may require design review. In some design overlay zones or historic districts a design review may not be required if the project is eligible to use the Community Design Standards.

In the Central City and Gateway plan districts, roof-mounted solar panels on existing buildings are exempt from Design Review if specified standards are met (see Zoning Code Section 33.420.045.Y). Roof-mounted solar panels are also exempt from Historic Design Review in historic design districts if specified standards are met (see Zoning Code Section 33.445.320.B.8).

Please contact BDS Planning and Zoning Section at 503-823-7526 if you are unsure if the project is located in a design or historic zone or is eligible to use the Community Design Standards.

- b. **Notice requirements** Design review is a discretionary review that requires a public notice and generally takes about 8 weeks to complete.
- c. **Fees** The Design Review fee for a solar installation will be based on the current Land Use Services Fee Schedule for a 'Minor C' review.

B. Structural

The solar collectors and underlying substructure (mounts, rails, etc.) must be designed and installed in accordance with the requirements of the latest version

of the Oregon Solar Installation Specialty Code (OSISC). The prescriptive requirements as described in section 305.4 of OSISC are assumed to meet the residential code requirements and therefore will not require the system be designed by a registered Oregon engineer. Use the checklist attached to the back of this code guide to determine if your system would qualify for the prescriptive path. All other systems that do not meet the prescriptive requirements are required to be designed by an engineer registered in Oregon.

C. Plumbing and Electrical

All portions of the installation of solar systems governed by the plumbing or electrical portions of the residential code shall comply with the respective requirements of each code section at the time of completion of the project. In general, plumbing or electrical plan review is not required for the installation of residential solar systems, but electrical and plumbing permits must be obtained either as separate permits, or combined with the residential building permit. In all instances, field inspection is required to verify code compliance.

V. PERMITS

A. General Requirements

1. Alterations

When a solar system is added to an existing one or two family dwelling, the installation is considered an “alteration”. Under the provisions of the residential code, all alterations must meet the code requirements for new construction. Permits for solar installations qualifying as alterations may be processed in one of two ways:

- a. Through the traditional permitting system; or
- b. Through the Field Issuance Remodel (FIR) program.

The specific requirements of each of these two processes are described in detail under B. Application Process.

2. New Construction

Solar panels that are included in the construction of a new one or two family dwelling will be processed in conjunction with the new construction permit.

In all instances, the type of solar system to be installed shall be clearly indicated with the application documents and all necessary permits shall be obtained before installation of the system.

B. Application Process

All solar installations shall be submitted for permit review.

1. Traditional Permitting System: For New Construction and Alterations

All permits for new construction and alterations are required to be processed through the Development Services Center (DSC) located at 1900 SW 4th Avenue, Portland Oregon on the first floor. All solar panels that are installed as a part of a new construction project will be processed in conjunction with the other work being permitted.

A building permit and any necessary plumbing and electrical permits will be created at the Second Screen station at the time of visit. A permit technician will evaluate the plans for completeness, and if complete, a building permit folder will be created to document all necessary reviews and approvals. An applicant may choose to combine the building permit and the plumbing/electrical permit into a single permit application, called a combination residential permit, or may apply for each of the permits separately. However, if the plumbing or electrical permits are obtained separately they will not be issued to the applicant until the associated building permit has been approved.

After the initial permits have been created, the applicant will proceed through the various review stations (Planning & Zoning and Plan Review) to verify that the design meets all of the necessary requirements. If the project is shown to comply with all requirements, and all permit fees are paid, the permit will be issued to the applicant the same day.

In some cases, depending upon the complexity of the project, it may be necessary for a particular project to be reviewed more closely and the permit will be taken in for review. In these instances, the necessary reviews will be completed within 7 days. The applicant will be notified of any additional questions via a “checksheet”, or the reviews will be approved. After all necessary reviews have been completed the applicant will be notified when the permit is “Approved to Issue”. The permit will be issued after all permit fees have been paid.

2. Field Issuance Remodel (FIR) Program: (Available only for Alterations)

The FIR program application process differs from the traditional application process and requires contractor registration. After the registration process is completed, the designated FIR inspector works with the contractor in the field to issue all necessary permits and advise the contractor potential issues associated with the project, such as Planning and Zoning issues. The FIR inspector will also conduct all necessary inspections for the project. All solar system permits that are processed through the FIR program will be subject to FIR registration and inspection fees. For additional information on the FIR program, consult the BDS FIR Program Guide available online at

<http://www.portlandoregon.gov/bds> or contact the FIR program directly at 503-823-7784.

C. Permit Submittal Requirements

Regardless of the permit application process, the following information shall be submitted for each permit.

1. Site Plan

A site plan is required showing building footprints, property lines, location and dimensions of solar collectors, ridgeline of roof, fire fighter access and a description of the solar system. The system must be shown in sufficient detail to assess whether requirements of section 304.9 or one of the exceptions of OSISC have been met. See attached Figure #4.

2. Elevation Drawings

A simple building elevation will be required to measure the height of the installation above the roof. The elevation must show the height of the building, and the height of the solar installation, but does not need to show other building details, unless a Design Review is required. See attached Figure #3.

3. Structural Plans

a. Prescriptive system If the system meets all the prescriptive requirements of the OSISC, no structural calculations will be required. However, a simple structural plan showing the roof framing and system racking attachment details are required. See figures 1 through 4 for sample drawings. In addition, complete and attach the checklist for prescriptive installations found at the end of this document.

b. Designed system

- 1)** If the system does not qualify for the prescriptive path, then structural calculations prepared by an Oregon registered engineer are required. At a minimum, structural calculations verifying adequacy of the structure's roof framing, strut or frame supporting the rails (where used), attachment of the rail to the support /strut frame and the attachment to the building's roof framing are required. Calculations must be based on the latest version of the Oregon Structural Specialty Code. In some cases, manufacturer's information and installation details may be substituted for required calculations and details
- 2)** Drawings shall include a roof framing plan (member size, type, span and spacing) and any additional framing required to reinforce the existing framing. The plans should include the layout of the module system and its mounting points. Drawings should also provide

information on any support strut or frame that supports the rails including frame member sizes, lateral bracing where required and their attachments. Details and information on the attachment of the system to the building structure are also required.

- 3) When S5 clips or similar clips are used at standing seam metal roof decks, the following guidelines shall be followed:

Allowable Loads

Subject to the limitations noted below, the allowable uplift design loads for S-5-U Mini Clips shall not be taken greater than:

- (i) 75 lbs per clip when the clips are spaced at 24" o.c. or more but less than 48" o.c. along the seam of the standing seam deck OR
- (ii) 115 lbs per clip when the spacing along the seam of the deck is 48" o.c. or more.

Limitations:

1. The S-5-U Mini Clips shall be spaced a minimum of 24" o.c.
2. The minimum roof framing size shall be 2x4 (nominal). Maximum framing spacing shall be 24 inches. Roof sheathing shall be a minimum of ½" nominal plywood with minimum prescriptive nailing (8d at 6" o.c. edge nailing, 12" o.c. field nailing).
3. The standing seam metal roofing shall be one of the following types (or similar):
 - Bruce & Dana – Snap-Lock (12-inch panel width, 24 gage)
 - Taylor Metal Products – Easy Lock (12-inch panel width, 24 gage)
 - ASC Metal Products – Skyline Roofing (16-inch panel width, 26 gage)
 - AEP Span – Design Span HP (18-inch panel width, 24 gage)
 - AEP Span – Span-Lok HP (16-inch panel width, 24 gage)
4. Metal roofing shall be fastened to the roof framing per the manufacturer's instructions and at 24" o.c. maximum with a minimum of #10 pancake head screws. For roofing systems installed with clips (AEP span systems) clip spacing shall be 24" o.c. maximum and clips shall be installed with a minimum of two #10 pan head screws.

Submittal Requirements

In addition to requirements for standard installations, solar installation permits utilizing S-5-U Mini Clips shall contain the following additional information:

1. Roof framing plan indicating framing member size and spacing, type of roofing, roofing attachment of metal roofing to framing, location and spacing of S-5-U Mini Clips.
2. Structural calculations demonstrating that uplift demand on the S-5-U Mini Clip is less than allowable uplift load.

VI. INSPECTIONS

The following inspections will be required for the installation of the solar system:

A. Building

Building inspections are required to verify that the solar support system is properly installed. For alterations, two building inspections, listed in order, are required to verify that the system has been installed properly:

1. IVR Code 299: Final Structural
2. IVR Code 999: Final Building.

For new construction or for permits that include additional work beyond the installation of the solar system additional inspections may be required.

B. Plumbing

A plumbing inspection is required where the solar apparatus attaches to the potable water system, usually a water heater. The inspection will verify that the collection system is properly attached so that no contamination of the potable system can occur. Two plumbing inspections, listed in order, are required to verify that the system has been installed properly:

1. IVR Code 340: Water Heater
2. IVR Code 399: Final Plumbing.

C. Electrical

An electrical inspection is required in all instances where the solar system provides power to the dwelling electrical system. The inspection will verify that the circuits and feeders have been installed properly and the system has been connected properly. Three electrical inspections, listed in order, are required to verify that the system has been installed properly:

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1. IVR Code 145: Circuits/Feeders
2. IVR Code 120: Permanent Electrical Service/Reconnect
3. IVR Code 199: Final Electrical.

VII. FEES

Fees for all required building, plumbing or electrical permits will be calculated using the current and applicable BDS fee schedule available online at <http://www.portlandoregon.gov/bds> or in the BDS Development Services Center at 1900 SW 4th Avenue, Portland Oregon.

In general, building permit fees will be based on the valuation of the structural elements for the solar panels, including the mounting brackets and rails and the cost of labor to install them. Excluded from the permit valuation is the cost of the solar equipment, including the solar collector panels, inverters and preheat tanks.

Valuation of Project = Total Project Price – Solar Equipment Value

If a Design Review is required, the fee will be for a 'Minor C' Design Review, based on the current Land Use Services Fee Schedule.

VIII. ENFORCEMENT

All code requirements shall be in accordance with the applicable permitting and inspection procedures.

Updates April 26, 2010 edition
Updates April 24, 2009 edition
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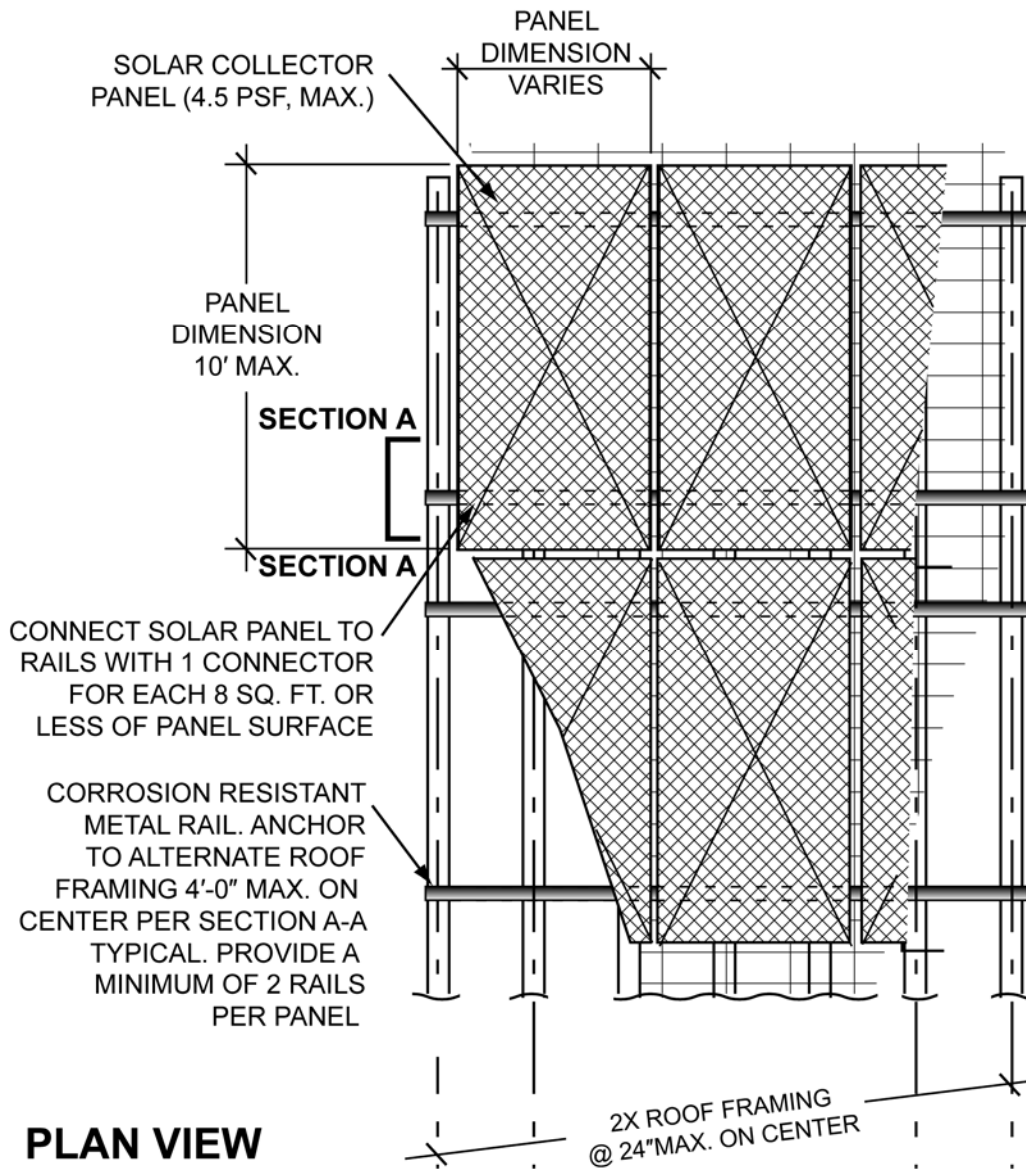
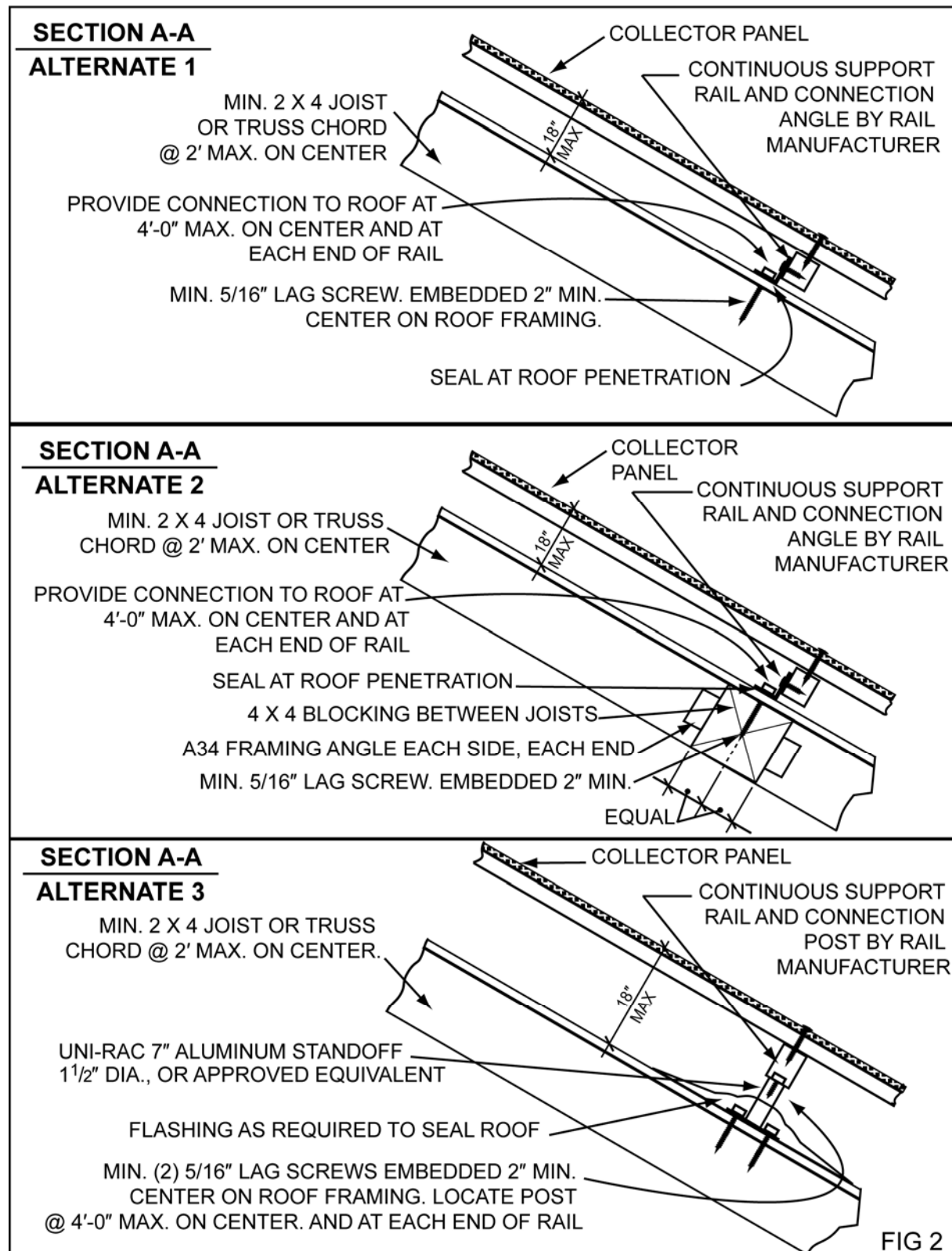
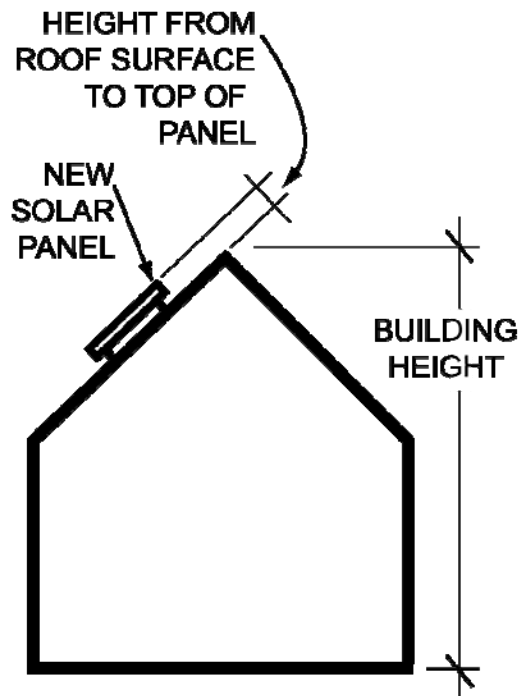
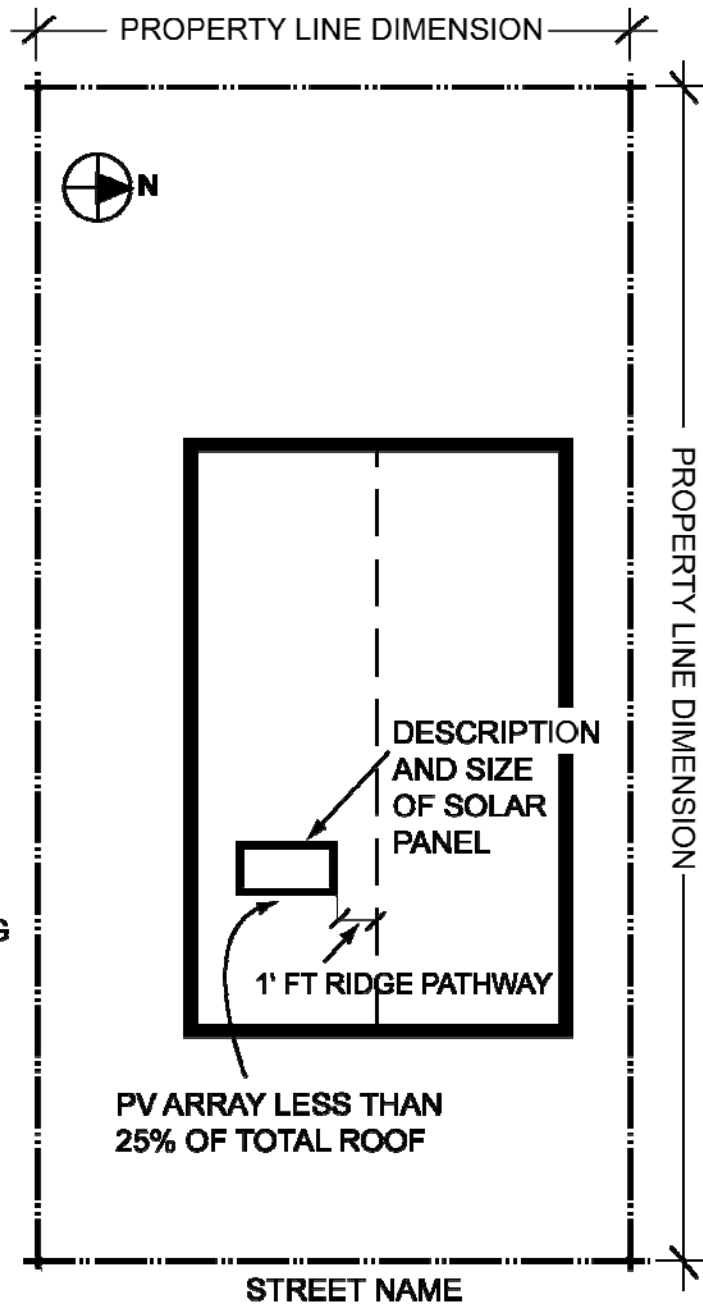


FIG. 1





SAMPLE ELEVATION
 FIG. 3



SAMPLE SITE PLAN
 FIG. 4



Checklist and Submittal Requirements for Prescriptive Installations of Solar Photovoltaic and Solar Water Heating Systems in accordance with Oregon Solar Installation Specialty Code (OSISC)

Instructions

Complete the following with all the information requested. This form must be submitted along with the application for installation.

Property Owner Information

Property Owner Name: _____ Installation Address: _____

Day Phone: _____ Evening Phone: _____ Email: _____

Contractor: _____ CCB#: _____

Day Phone: _____ Evening Phone: _____ Email: _____

PV Modules or Solar Water Heating Collectors

Manufacturer: _____ Model Number: _____ Listing Agency: _____

Site Plan and Structural Plan

- Attach a simple site plan showing the location of the PV or solar water heating system in relation to buildings, structures, property lines, and, as applicable, flood hazard areas.
- Attach a simple structural plan showing the roof framing (rafter size, type and spacing) and PV module system racking attachment. Plans must be shown in sufficient detail to assess whether the requirements of section 304.9 of OSISC or one of the exceptions have been met.
- Attach simple building elevation.
- The plans must be on 8.5 x 11 or larger paper.

Structural Information

Roof Design and Attachment

- Roof rafter size: ____ x ____ inches OR Manufactured Trusses
- Rafter or manufactured roof truss spacing _____ inches o.c.
- For roof rafters, maximum rafter span allowed per table 305.4.1 (Appendix "B") of the Oregon Solar Installation Specialty Code (OSISC) (www.oregonbcd.org/programs/solar/solar_code/100110_OSISC.pdf) for the size and spacing of roof rafters is ____ ft ____ inches.

Checklist to determine if your installation qualifies for prescriptive path

Yes No Is this conventional light framed wood construction?

Yes No Does the structure have pre-engineered trusses?

OR

Does structure have roof framing members spaced at 24" o.c. maximum AND comply with the applicable allowable span in table 305.4.1 (Appendix "B") of the Oregon Solar Installation Specialty Code (OSISC)?

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-
- Yes No Is the roofing material metal, single layer wood shingle, or not more than two layers of composition shingle?
- Yes No Is the weight of the modules and racking less than 4.5 pounds per square foot?
- Yes No Is the module height less than 18 inches above the roof in accordance with section 305.4?
- For Standing Seam Metal Roofs Only (If not applicable please skip this section)**
- Yes No Is the metal gauge 26 or heavier?
- Yes No Clamp design: Are clamps designed to withstand uplift of at least 115 pounds for clamps spaced at 60 inches on center or less or at least 75 pounds for clamps spaced at 48 inches on center or less?
- Yes No Is the spacing of the clamps as measured along the seam greater than or equal to 24" o.c. and less than 60" o.c. AND the spacing perpendicular to the seam not greater than 24" o.c.?
- Yes No Is the roofing panel width 18-inches or greater?
- Yes No Is the roofing panel attached with at least #10 screws at 24" o.c.?
- Yes No Is the roofing panels installed over minimum 1/2-inch nominal wood structural panels attached to framing with 8d nails at 6" o.c. at panel edges and 12" o.c. field nailing?

If you have indicated "No" on any of these requirements above, the project may not be submitted using the prescriptive path.

Fire Fighter Access and Escape

Access and escape pathways are not required when the array is located on a non-occupied accessory structures that is separated from occupied structures by a 6 foot minimum separation distance or by a minimum two-hour fire rated assembly.

General Requirements: For all other roof mounted systems, a minimum 36" wide pathway is required along three sides of the solar roof, located over a structurally supported area. Any roof with a slope greater than 2:12 can not use the bottom roof edge as a pathway. Pathways and solar panels shall be located outside 12" of the low point of a valley.

If the array is greater than 150 feet in length or width, additional 36" wide intermediate pathways and cutouts are required. See code for details.

If the roof has smoke and/or heat vents, a 36" pathway shall be provided to and around each vent.

Exceptions to General Requirements:

- Yes No Is the roof slope greater than 2:12?
- Yes No Is the array area 1,000 sq ft or less?
- Yes No Is the array 150 feet or less in length or width?

If you have indicated "No" to any of the items above, exceptions do not apply, provide a simple plan conforming with the general requirements.

If you have indicated "Yes" to all of the items above, see below for reduced access and escape pathway requirements.

Is the array 25% or less of the roof area? Yes No

- If Yes, a 12" pathway along each side of any horizontal ridge is required.
- If No, a 12" pathway along each side of any horizontal ridge is required and a minimum of one 36" pathway is required from ridge to eave over a structurally supported area.

Provide a simple plan showing conformance to the reduced access pathway requirements.

As the property owner or authorized representative of the above listed property, I certify that I have verified the information provided above and that the roof rafters (if applicable to the project), meet the span requirements of Table 305.4.1 (Appendix B) of the Oregon Solar Installation Specialty Code.

Applicant name (please print) _____ **Signature** _____ **Date** _____