

Solar Water Heating and Photovoltaic Electrical Systems Installed on One or Two Family Dwellings

~~Category: Residential Construction~~

~~Responsible Bureau Section:
Authority Having Jurisdiction~~

I. BACKGROUND

As awareness of renewable energy and green building options increases, solar energy systems are becoming a more common energy choice for Oregon homeowners. Energy from the sun can be harnessed using a solar water heating or solar electric system.

This ~~Program-G~~ guide outlines the application and review procedures for obtaining the necessary permit(s) to install a solar energy system for a new or existing residential building. The guide also describes what system ~~siting or~~ design elements may trigger the need for additional plan review.

II. SOLAR ENERGY SYSTEM DESCRIPTION

A solar energy system is defined, for the purpose of this ~~Program-G~~ guide, as a solar water heating or solar electric (also known as a photovoltaic or PV) system.

A. Solar Water Heating

A solar water heating system reduces household energy consumption by preheating water so that the residence's water heater does less work. It consists of two, primary components:

1. Solar collectors, which are commonly installed on the roof; and
2. A storage tank, which is typically co-located with the residence's water heater and in which potable water is preheated by the solar collectors via a heat exchanger.

A residential solar pool heating system consists of 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.

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.

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III. SCOPE

This ~~Program G~~ 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. Authority Having Jurisdiction (AHJ) reserves the right to require additional information for any reason they deem necessary to ensure proper compliance with code requirements.

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IV. INSTALLATION REQUIREMENTS

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

A. Land Use

Solar installations must comply with the local Zoning Code. Specific Zoning information regarding a site can be obtained from the AHJ Planning and Zoning Section.

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.

For installations mounted flush with a pitched roof, the height of the panels will not be calculated, unless the panels will extend above the highest ridge of the roof.

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.~~ Check with the AHJ [Planning and Zoning](#).

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 historic districts, may require design review. Please contact the AHJ Planning and Zoning department if you are unsure if the project is located in a design or historic ~~zone, zone or is eligible to use the Community Design Standards.~~

~~b. **Notice requirements.** Historic d) Design review is a discretionary review that requires a public notice —and generally takes about 8 weeks to complete. Check with the AHJ.~~

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~~c. **Historic plan review Fees.** Contact the AHJ Planning Department.~~

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B. Structural

The solar collectors and underlying substructure (mounts, rails, etc.) must be designed to meet the loading requirements of the Oregon Residential Specialty Code. The prescriptive requirements as described in this section are assumed to meet the residential code requirements and therefore will not require the system be design by a registered Oregon engineer. *An engineer registered in Oregon must complete the design and details of all other systems not meeting the prescriptive requirements provided in this guide.*

A project will qualify as a prescriptive installation with an acceptable supporting roof structure if all of the following criteria are met:

1. **Roof structure:** The supporting roof framing shall be of typical residential construction with multiple parallel wood roof rafters or trusses. Minimum rafter or truss chord size is 2x4 and maximum spacing is 2 ft. on center. See attached diagram. #1A
2. **Roof materials:** Roofing material must be either standing seam metal, single layer wood shingle or shake, or not more than two layers of composition shingle. Concrete or tile roofs will require structural review.
 - a. **Loading:** Collectors are either directly attached to the roof framing or are mounted to continuous rails that are attached directly to the roof framing. These attachments must be anchored to roof framing at a spacing no greater than 4 ft. on center maximum or per manufacturer's instructions. Collector and mounting hardware (rails, frame, etc) weight shall not exceed 4.5 pounds per square foot (psf). Solar thermal collector weight shall include the weight of the working fluid inside the collector. See attached diagram #1A.
3. **Height:** Maximum panel height above roof shall be 18" from top of panel to roof surface. See attached diagram #1B.

For additional information regarding the structural requirements for solar panel installations, please contact the AHJ local building department at .

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. A PV ~~One-~~Line Drawing must accompany the permit application. See Example attached.

V. PERMITS

A. General Requirements

1. Alterations.

If solar systems are added to an existing one or two family dwelling, the installation of these components are considered an alteration. Under the provisions of the residential code, all

alterations must meet the code requirements for new construction. Permits for solar panel qualifying as alterations may be processed in one of two ways:

- a. **Online or** Faxed – If the AHJ has this program available; or
- b. Through the traditional permitting system (over the counter).

~~1) Permits processed through the traditional permitting system. Permits that are processed through the traditional permitting system will follow the same general application process that is used for new construction described in the next section and will be processed through the AHJ.~~

2. New Construction

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

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 permit applications for solar installations shall be submitted for review.~~

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1. New Construction and Alterations

All solar panels that are installed as a part of a new construction project or as part of an alteration will be processed in conjunction with the other work being permitted.

If the project is shown to comply with all necessary requirements, and all permit fees are paid, the permit will be issued to the applicant the same day.

In some cases, 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 and the permit will be issued after all necessary reviews are completed and all necessary fees have been paid.

C. Permit Submittal Requirements

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

1. Structural Plans

- a. **Prescriptive system.** If the system meets all of the prescriptive requirements of the structural section of this program guide, no structural plans and calculations will be required. Data showing that the solar installation meets the prescriptive requirements must be included with the site plan.

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b. Designed elements.

- 1) If any of the prescriptive requirements for roof structure, roof materials, loading or height are not met, then structural calculations by an Oregon engineer showing complete details for the rails, support struts and roof attachments must be provided. In addition, stamped calculations verifying adequacy of the roof construction are required
- 2) In the case where the support struts raise the panel height greater than 18" above the roof but all other prescriptive requirements of this program guide are met, then structural calculations by an Oregon engineer and details only for the support struts and its connections are required. In some cases, manufacturer's information and installation details may be substituted for the required engineering.

2. Elevation Drawings

For installations where the panels will not be mounted flush with the roof, a simple building elevation will be required to measure the height of the installation. 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 will be required.

3. Electrical 1-Line Drawing (attached)

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VI. INSPECTIONS

The following inspections may be required for the installation of the solar system. Approved permits must be posted at job location.

A. Building: Building inspections are required to verify that the solar support system is properly installed.

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.

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.

VII. FEES

Fees for all required building, plumbing or electrical permits will be calculated using the current and applicable AHJ fee schedule available with the Authority Having Jurisdiction.

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

Building Permit: Based on valuation. Electrical Fees: 5kva or less = \$79.00; 5.01 to 15kva = \$94.00; 15.01 to 25kva = \$156.00; 25.01kva and above \$156.00 + \$2 per kva. Plumbing Fees: Water Heater permit \$40.00

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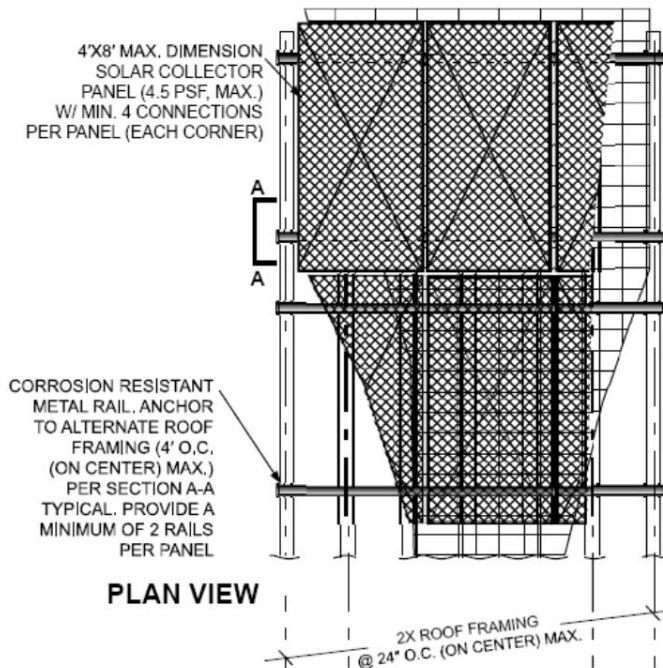
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VIII. ENFORCEMENT

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



Southern Oregon Chapter

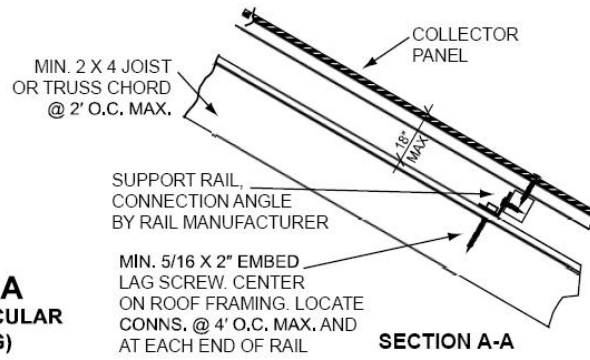
Submitted by Robert Rice 10-06-09

International Code Council
www.soc-icc.org

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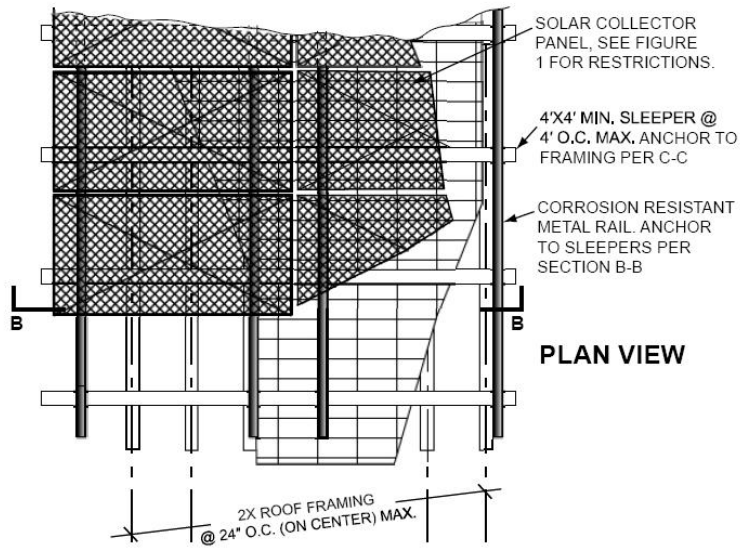
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DIAGRAM #1A
(RAILS PERPENDICULAR
TO ROOF FRAMING)



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