



Rooftop Solar Ready Construction Guidelines

A Guide For Residential Developers, Architects, and Builders

These voluntary guidelines have been developed for the local governments of the OKI region to share with residential developers, home builders and architects for the design and construction of new residential buildings. The guidelines are intended to alert a developer, architect, or other interested party to the components of building design required to prepare a building for future photovoltaic (PV) solar installation. They include best practices for solar-ready building design to minimize the costs of future solar installation while maximizing potential system efficiency, and apply to site selection, building design, and building construction.

Site Considerations

Building and Roof Orientation Buildings should be oriented to afford a south-facing roof and designed in a way that maximizes future solar panel access to sunlight.

Avoid Shading Buildings should be designed in such a way that solar panels will not be shaded by nearby structures or trees to the south. Although the proximity of the building site to any existing shade trees from other directions should be considered, such consideration should not necessarily preclude Solar Ready construction because the service life of the structure will potentially surpass the lifespan of the tree(s).

Roof Design Considerations

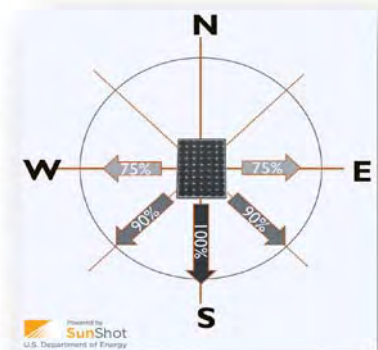
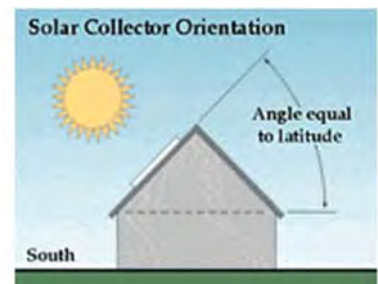
Preserve Rooftop Space for Solar Collectors The south-facing portion of the roof should include a contiguous area, free of rooftop obstruction, of sufficient size to allow for a solar system. At minimum, an area of several square feet (100 sq. ft. per kW) should be identified. Typical residential rooftop PV systems are 5-10kW in capacity; accordingly, roof space of 500-1000 sq. ft. is ideal.

Flat Roof Configuration For flat roofs, designers should ensure that the building has adequate roof access, and should consider integrating rooftop safety equipment such as guardrails and/or tie offs as appropriate. The area identified for solar collection should be near the middle of the roof, away from any parapets to avoid shading.

Pitched Roof Configuration For pitched roofs, designers should take into account the degree of pitch that would maximize the generation capacity of solar panels located flush against the roof. In the OKI region, an optimal roof pitch for solar is approximately 39°, or a 9:12 pitch.

Allow for additional weight The roof should be adequately reinforced to allow for the additional weight, including both the weight of the solar system itself and the impact of wind and snow loads. Solar PV systems add up to 4 pounds per square foot to the dead load of a roof, and up to 45 lbs. at specific attachment points. If a ballasted system is installed on a flat roof, it may add up to 10 pounds per square foot to the roof's dead load. A structural engineer should be consulted when additional weight is being added.

Wind Load Considerations The wind loads on rooftop solar equipment must be analyzed in order to ensure that the roof structure is sufficient. Rack mounted solar collectors can increase wind load significantly, particularly on a flat roof. Solar Ready Construction should consider wind load of future solar equipment and design the roof structure to comfortably handle the eventual loading conditions.





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Record Roof Reinforcements Any reinforcements to the roof should be recorded on official drawings, such as the code sheet, for the benefit of solar developers.

Record Potential Layouts Provide detailed drawings and potential layouts to code officials for filing. Future homeowners and/or contractors will benefit from understanding design intentions.

Roof Warranty Determine if any material or installation warranties would be jeopardized with a future PV installation and document findings for homeowner records.

Standing Seam Roof A rooftop PV system can be installed on a standing seam roofing material (SSRM) just as it is on asphalt shingle. Depending upon the SSRM, in some cases the PV system framing and clamps can be designed to attach to the seam of the metal roof. Another option to consider on SSRM is Thin film PV. Thin film PV laminates can be easily applied to even curved metal roof surfaces. Note that Thin film is 20-30% less efficient than crystalline panels, thus will require more roof area to generate equivalent power when compared to crystalline panels.

Technology	Roof Area Needed in Square Feet	
	PV Module Efficiency (%)	Square Feet Needed per 1 kW
Thin-Film	4	300
Thin-Film	8	150
Multi-crystalline	12	100
Mono-crystalline	16	80

Source: U.S. Department of Energy, Energy Efficiency and Renewable Energy

Electrical and Mechanical Considerations

Reserve Wall Space for Inverter A 3'x3' (some jurisdictions require 4'x4') area of wall space next to the building's main electrical panel, with an additional 3' of clearance space in front of the most protruding part of any electrical panel equipment, should be reserved for the installation of an inverter. To minimize voltage loss, the meter box and reserved inverter space should be located just below the rooftop space reserved for the solar collector.

Install Conduit Conduit at least 1" in diameter should be installed that will run through the building from the area identified for the inverter to the area identified for the solar collector.

Leave Room for PV Breaker The electric panel should include the necessary space for a power input breaker at the opposite end of the electric service panel from the main breaker.

Provide Adequate Home Electrical Service Electrical service of at least 200 amperes in residential buildings is preferable to ensure that PV power generation can be accommodated.

Label Equipment and Reserved Spaces Clearly label any conduit, wall space reserved, and reserved breaker space for future solar PV installation.

