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 provide guidance for residential developers, home builders and architects in the design and construction of new residential buildings. These guidelines are intended to guide a developer, architect, or other interested party through the components of building design required to prepare a building for future solar installation. These guidelines 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

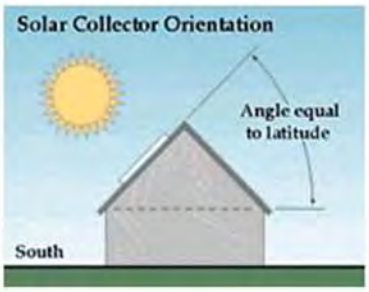
Building and Roof Orientation Buildings should be oriented to afford a south-facing roof and designed in a way that maximizes future solar panel access to sunlight.

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. Proximity of the building site to any existing shade trees should be considered, however, in situations where shade exists at time of construction should not necessarily deter from Solar Ready construction understanding that the service of the structure will potentially surpass the lifespan of the tree(s).

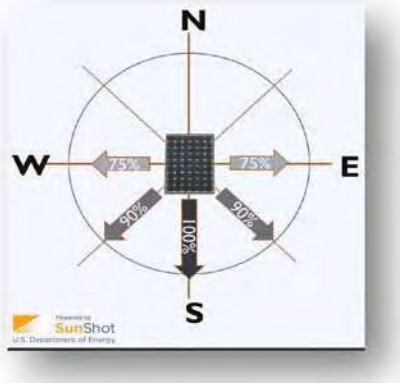
Roof Design Considerations

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, therefore, roof space of 500-100 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 when appropriate. The area identified for solar collection should be near the middle of the roof, away from any parapets to avoid shading. Any rooftop HVAC equipment should be positioned to avoid conflicting with the location of, or shading the solar collectors.



Pitched Roof Configuration For pitched roofs, designers should take into account the degree of pitch that would maximize the generation of solar panels located flush against the roof. In the OKI region, an optimal roof pitch for solar is slightly less than 38°, 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 systems itself and the impact of wind and snow loads. Solar PV systems add 3-6 lbs. 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 20-30 lbs. per square foot to the roof's dead load.

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 the 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.

Roof Area Needed in Square Feet		
Technology	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 guides say 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 wall, 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 Metallic conduit at least 2" (some guides say 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.

Solar Ready Field Inspection Checklist

A Guide For Residential Developers, Architects, and Builders

This checklist was developed to assist in-house and hired municipal inspectors with field inspections of residential rooftop photovoltaic (PV) systems in the Ohio-Kentucky-Indiana Region. The checklist may also be a helpful resource for solar PV installers, as an additional reminder of the inspection requirements that must be met for their systems. The checklist was developed in 2020 and should be conducted according to the requirements of applicable state and local codes. It is to be used for general reference and should not be assumed to be comprehensive, due to changes in technology and equipment.

The checklist is intended for an inspection that is being carried out, by a single person, in a single inspection. The checklist items follow the typical inspection pathway from the roof, down to the service entrance. The inspection pathway may also be done in reverse.

Residential Solar PV Field Inspection Checklist:

Make sure all PV disconnects and circuit breakers are in the open position, and verify the following:

1. ☐ Complete work in a neat and work person-like manner.
2. ☐ Confirm PV module model number, quantity, and location, according to the approved plan.
3. ☐ Array mounting system and structural connections, according to the approved plan.
4. ☐ Flashed and sealed roof penetrations, according to the approved plan.
5. ☐ Properly secure, support, and route array-exposed cables to prevent physical damage.
6. ☐ Complete conduit installation, according to the applicable requirements.
7. ☐ According to applicable requirements, complete the requirements for firefighter access according to approved plan.
8. ☐ Confirm the roof-mounted PV systems have the required fire classification.
9. ☐ Assess grounding and bonding of rack and modules, according to the manufacturer's installation instructions.
10. ☐ Confirm equipment is installed, listed, and labeled according to the approved plan (e.g., PV modules, dc/dc converters, combiners, inverters, rapid shutdown equipment).
11. ☐ For grid-connected systems, confirm the inverter is marked "utility interactive" or documentation is provided to show that inverter meets utility interconnection requirements.
12. ☐ Confirm correct conductors, cables, and conduit types, including sizes and markings, according to the approved plan.
13. ☐ Confirm the overcurrent devices are the type and size, according to the approved plan.
14. ☐ Confirm disconnects are properly located, as required by applicable requirements, according to the approved plan.

15. ☐ Confirm inverter output-circuit breaker is properly located, in its connection to utility supply, according to applicable requirements.
16. ☐ Confirm PV system markings, labels, and signs, according to the approved plan.
17. ☐ Confirm connection of the PV system to the grounding electrode system, according to the approved plan.
18. ☐ Confirm sufficient access and working space for operation and maintenance of PV equipment, such as inverters, disconnecting means, and panelboards (not required for PV modules).
19. ☐ Confirm the rapid shutdown system is installed and operational, according to the approved plan.