



Process Improvements

Step 1, PR-1B

Streamline Permitting: Create a permit checklist

Create a permit checklist summarizing the necessary regulatory steps

A permit checklist guides an installer or other interested party through the permitting process by clearly stating all the necessary types of plan review and required permits. At its most basic level, a permit checklist only outlines the sequential steps of the permitting process; a more comprehensive checklist will also include applicable standards for each step in the review process.

A basic checklist should include all of the information that an individual jurisdiction will require in order to permit a solar installation. For this reason, content tends to vary according to local context. For example, a denser, more urban city may require a site plan showing adequate setbacks, while a more rural area may not. Regions with extreme winter weather may require more detailed information regarding panel weights and roof loads than jurisdictions without such weather. Overall, a basic checklist may require information from the applicant such as:

- Age of structure.
- Roof type and material.
- Roof structural elements.
- Weight of solar panel arrays.
- Type of solar panel mounting hardware.

It may also require electrical information from the applicant, such as:

- Line diagram of electrical system (array configuration and wiring, grounding, points of interconnection, etc.)
- Array information (number of modules in series, voltage, current, etc.)

Plans may be required, such as:

- Site plan showing location of building in relation to street and property lines.
- Structural plans demonstrating sufficient support and uplift of photovoltaic panels.

Professional engineers' stamps may be required from:

- Electrical engineers.
- Structural engineers.

Other required information may include:

- Manufacturer's cut sheets for all components.
- Signage requirements.
- List of all equipment and components.

Jurisdictions interested in drafting their own checklists must start with a review of their own local regulations. Guidelines should distinguish procedural differences between residential and commercial installations. The examples below are helpful points of reference, but since the local context of each jurisdiction is different, there is no one-size-fits-all approach.

Examples

City of Portland, Oregon: Solar Photovoltaic Residential and Commercial Guides and State of Oregon Checklist

The city of Portland has developed detailed residential and commercial guides for solar installation. The guides contain checklists for both types of installations, detail permitting requirements and processes, and include necessary forms and documentation. The guides also include the State of Oregon's checklist for solar photovoltaic installations.

Residential: www.portlandoregon.gov/bds/article/195360

Commercial: www.portlandoregon.gov/bds/article/193776

Oregon Solar Checklist: www.cbs.state.or.us/bcd/programs/solar/state_solar_checklist_100710.pdf

Boulder County, Colorado: Solar Photovoltaic Systems Checklist

The Solar Photovoltaic Systems Checklist thematically groups permit submission requirements for solar photovoltaic systems into categories including: site plan, floor plan, wiring and equipment requirements. It also denotes differences in requirements for roof-, pole- and ground-mounted systems. The checklist is required to be completed and included with other documents for solar system approval in Boulder County.

www.bouldercounty.org/doc/landuse/b46solarphotovoltaicchecklist.pdf

Miami-Dade County, Florida: Solar Systems Permit Document Guideline

In Florida, Miami-Dade County offers a consolidated permitting checklist for solar electric and thermal systems. They also include requirements for solar hot-water heaters. The checklist goes over structural requirements for building permits as well as electrical requirements. The guidance includes special provisions for wind, since the county is located in a high-velocity hurricane zone.

www.miamidade.gov/building/library/guidelines/solar-systems-permit.pdf

City of Richland Hills, Texas: Solar Panel System Checklist

Richland Hills uses this checklist not only as a resource for installers, but also for plan reviewers, to reduce the likelihood of missing information. For each required item, the applicant must initial each line, sign and date.

This checklist is applicable to both residential and commercial installations. Compared with other jurisdictions, this checklist goes into slightly greater detail regarding the information needed to meet each requirement.

www.richlandhills.com/home/showdocument?id=202

Town of Babylon, New York: Solar Panel Permit Requirements for Residential Properties

The town of Babylon's Planning and Development Department developed a solar permitting checklist for one- and two-family homes. The document includes permitting forms and details requirements on other external documents necessary for solar system approval.

www.townofbabylon.com/DocumentCenter/View/160

Example 1 - Photovoltaic System Application and Checklist

Jurisdiction: _____

Project Name: _____

Contact Name: _____

Contractor Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Phone: _____ Fax: _____ Email: _____

Project Location: _____

I have read the information below and acknowledge that all required documents have been provided. I understand that omissions in the required information will result in delays in the review process.

Project Location: _____

Signature: _____ Date: _____

- Step 1:** Submit net metering/interconnection application to electric utility and secure utility approval.
- Step 2:** Complete photovoltaic system application and checklist, including review of photovoltaic system.
- Step 3:** Attach approved net metering/interconnection application from electric utility to photovoltaic system application and checklist.
- Step 4:** Submit complete packet to jurisdiction (see jurisdiction details below).
- Step 5:** Obtain permit(s) from jurisdiction once approved.
- Step 6:** Notify jurisdiction when ready for inspection.
- Step 7:** Jurisdiction will notify electric utility when inspection is passed.
- Step 8:** Electric utility will schedule their inspection and meter exchange.
- Step 9:** Electric utility will provide permission to operate (PTO).

Example 2 - Photovoltaic System Application and Checklist

Photovoltaic System Application Checklist and Required Documents

By checking each requirement, you are stating that you have supplied correct and complete information. In the event that the required information is not contained in the submitted documents, you will be notified of the deficiency. Failure to supply the additional requested information within five (5) working days after notification may result in your application being delayed and eventually discarded. A new application, the original application, complete plans and a new checklist will be required for re-submittal for plan review. This re-submittal will be treated as a new application and will be processed in the order of receipt. Complete the information sheet attached.

General Requirements

- 1. Type of Application Residential Commercial
- 2. All construction documents and plans for the installation of the photovoltaic system have been reviewed or designed, and sealed by a licensed professional engineer to comply with [applicable code]. [Two/three] sets submitted.
- 3. Completed permit application(s) and supplemental information sheet(s), if required.
- 4. The applicant has verified that the proposed installation complies with any zoning, planned development districts, historic districts and conservation districts. Subject to plan review.
- 6. The applicant will comply with other restrictions the [Jurisdiction name] may not enforce, such as private deed restrictions.
- 7. Copy of the net metering/interconnection application approval acknowledgement.

Residential Application Requirements

- Photovoltaic application and fee.
- [Two (2) copies] of inverter manufacturer's specifications. *
- [Two (2) copies] of photovoltaic system module manufacturer's specifications.*
- [Two (2) copies] of manufacturer's installation instructions.
- Equipment must be listed and labelled. Signage details to be provided.*
- Number of solar panels to be installed: _____
- Location of solar panels. A site plan may be required (refer to commercial requirements): *
 - A roof plan that shows the existing condition and location of proposed equipment. *
 - Building elevations showing the total building height with the proposed equipment.

- Engineered construction documents or sealed assembly/installation plans of the photovoltaic system.
- Engineering construction documents of the photovoltaic system's connection to the structure of the building. Construction documents shall include, but are not limited to, framing plans, connection details to the building and any structural calculations or load diagrams.
- Line diagram showing the array configuration, array wiring, combiner/junction box, conduit/wiring from array to inverter, DC grounding system, disconnecting means, inverter, conduit/wiring from inverter to utility point of connection, AC grounding and system grounding, and point of connection attachment method.*

Commercial Application Requirements

- 1. Photovoltaic application and fee.
- 2. Building code information about the building the photovoltaic system will be attached to, if applicable.
 - Occupancy group Number of stories
 - Construction type Fire sprinkler system (select for fully-sprinklered buildings only)
- 3. Two copies of equipment manufacturer's specifications and installation instructions (panel and inverter). *
- 4. Equipment must be listed and labelled. Signage details to be provided. *
- 5. Number of photovoltaic panels to be installed: _____
- 6. Location of solar panels:
- 7. [Two (2)] sets of fully dimensioned construction plans of the following drawn to scale and legible:
 - A detailed site plan that shows all property lines indicating length, metes and bounds, building lines, easements and north arrow. Also, show the location of existing structures and proposed solar system equipment.*
 - A roof plan that shows the existing mechanical and plumbing venting and intakes, and location of proposed equipment.*
 - Building elevations showing the total building height with the proposed equipment.
 - Engineered construction documents or sealed assembly/installation plans of the photovoltaic system.
 - Engineering construction documents of the photovoltaic system's connection to the structure of the building, if applicable. Construction documents shall include, but are not limited to, framing plans, connection details to the building, and any structural calculations or load diagrams.
 - Line diagram showing the array configuration, array wiring, combiner/junction box, conduit/wiring from array to inverter, DC grounding system, disconnecting means, inverter, conduit/wiring from inverter to utility point of connection, AC grounding and system grounding, point of connection attachment method.*

Notes

- All documents submitted for review must have a minimum text size of 3/32" and a minimum drawing sheet size of 11"x17" and a maximum drawing sheet size of 36"x48", "E" size.
- Additional information required by the building official may be necessary for the issuance of the permit [reference ordinance].

* Indicates items required for both the net metering/interconnection application and the permit application.

Example 3 - Photovoltaic System Review

Review of Photovoltaic System

Structural Review of PV Array Mounting System

Is the array to be mounted on a defined, permitted roof structure? Yes No

If No due to non-compliant roof or a ground mount, submit completed Structural Worksheet – WKS1.

Roof Information:

1. Roof age: Structure: < 5 years 5–10 years 20–30 years 30+ years
Covering: < 5 years 5–10 years 20–30 years 30+ years

2. Is the roofing type lightweight? Yes No
(Yes = composition, lightweight masonry, metal, etc. No = heavy masonry, slate, etc.)
If No, submit completed Structural Worksheet – WKS1.

3. Does the roof have a single covering? Yes No
If No, submit completed Structural Worksheet — WKS1.

4. Provide method and type of weather-proofing roof penetrations (e.g. flashing, caulk).

Mounting System Information:

1. Is the mounting structure an engineered product designed to mount PV modules with no more than 18-inch gap beneath the module frames? Yes No

If No, provide details of structural attachment certified by a design professional. Must include design for uplift including system to rafter detail.

2. For manufactured mounting systems, fill out information on the mounting system below:

a. Mounting system manufacturer: _____ Product Name and Model #: _____

b. Total weight of PV modules and rails: _____ lbs.

c. Total number of attachment points: _____

Weight per attachment points ($b \div c$): _____ lbs. (*if greater than 45 lbs. see Structural Worksheet — WKS1.*)

d. Maximum spacing between attachment points on a rail: _____ inches

See product manual for maximum spacing allowed based on maximum design wind speed.

e. Total surface area of PV modules (square feet): _____ ft²

f. Distributed weight of PV module on roof ($b \div f$): _____ lbs./ ft²

If distributed weight of the PV system is greater than 5 lbs/ft² see Structural Worksheet — WKS1.

g. Mounting frame to rafter framing: Self-ballasted Penetrating

If penetrating, please provide for fasteners:

Type: _____ Size: _____ Number: _____ Spacing: _____ inches

Electrical Review of PV System (Calculations for Electrical Diagram)

In order for a PV system to be considered for an expedited permit process, the following must apply:

1. PV modules, utility-interactive inverters and combiner boxes are identified for use in PV systems.
2. The PV array is composed of four series strings or less per inverter.
3. The AC interconnection point is on the load side of service disconnecting means (690.64(B)).
4. A standard electrical diagram can be used to accurately represent the PV system.

Structural Worksheet — WKS1

Complete only if previous Structural Review questions ask for Structural Worksheet — WKS1 information.

If array is roof mounted:

This section is for evaluating roof structural members that are site built. This includes rafter systems and site built trusses. Manufactured trusses and roof joist systems, when installed with proper spacing, meet the roof structure requirements covered in item 2 below.

1. Roof construction: Rafters Trusses Other: _____
2. Describe site-built rafter or other site-built truss system:
 - a. Rafter size: _____ x _____ inches
 - b. Rafter spacing: _____ inches
 - c. Maximum unsupported span: _____ feet, _____ inches
 - d. Are the rafters over-spanned? (See the IRC span tables on the next page.) Yes No
 - e. If **Yes**, complete the rest of this section.
3. If the roof system has:
 - a. over-spanned rafters or trusses
 - b. the array over 5 lbs/ft² on any roof construction, or
 - c. the attachments with a dead load exceeding 45 lbs. per attachment;

it is recommended that you provide one of the following:

- i. A framing plan that shows details for how you will strengthen the rafters using the supplied span tables on the next page. This will include all supporting load paths.
- ii. Confirmation certified by a design professional that the roof structure will support the array.

If array is ground mounted:

1. Show array supports, framing members, and foundation posts and footings.
2. Provide information on mounting structure(s) construction. If the mounting structure is unfamiliar to the local jurisdiction and is more than six (6) feet above grade, it may require engineering calculations by a design professional.
3. Show detail on module attachment method to mounting structure. Gravity loads and wind uplift must be addressed by design.

Structural Worksheet: Span Tables

A framing plan is required only if the combined weight of the PV array exceeds five lbs. per square foot (PSF or lbs/ft²) or the existing rafters are over-spanned. The following span tables from the 2009 International Residential Code (IRC) can be used to determine if the rafters are over-spanned. For installations in jurisdictions using different span tables, follow the local tables.

Span Table R802.5.1(1),

Use this table for rafter spans that have conventional light-weight dead loads and do not have a ceiling attached.

10 PSF Load							
Roof live load = 20 psf, ceiling not attached to rafters, L/Δ = 180							
Spacing (inches)	Rafter Size Species	Grade	The measurements below are in feet-inches				
			2 x 4	2 x 6	2 x 8	2 x 10	2 x 12
16	Douglas Fir-larch	#2 or better	9-10	14-4	18-2	22-3	25-9
16	Hem-fir	#2 or better	9-2	14-2	17-11	21-11	25-5
24	Douglas Fir-larch	#2 or better	7-10	11-9	14-10	18-2	21-0
24	Hem-fir	#2 or better	7-3	11-7	14-8	17-10	20-9

Use this table for rafter spans that have heavy dead loads and do not have a ceiling attached.

20 PSF Load

Roof live load = 20 psf, ceiling not attached to rafters, L/Δ = 180

Spacing (inches)	Rafter Size		The measurements below are in feet-inches (e.g. 9-10 = 9 feet, 10 inches)				
	Species	Grade	2 x 4	2 x 6	2 x 8	2 x 10	2 x 12
16	Douglas Fir-larch	#2 or better	8-6	12-5	15-9	19-3	22-4
16	Hem-fir	#2 or better	8-5	12-3	15-6	18-11	22-0
24	Douglas Fir-larch	#2 or better	6-11	10-2	12-10	15-8	18-3
24	Hem-fir	#2 or better	6-10	10-0	12-8	15-6	17-11

Structural Worksheet: Span Tables

Span Table R802.5.1(2),

Use this table for rafter spans with a ceiling attached and conventional light-weight dead loads.

10 PSF Load

Roof live load = 20 psf, ceiling not attached to rafters, L/Δ = 240

Spacing (inches)	Rafter Size		The measurements below are in feet-inches (e.g. 9-10 = 9 feet, 10 inches)				
	Species	Grade	2 x 4	2 x 6	2 x 8	2 x 10	2 x 12
16	Douglas Fir-larch	#2 or better	8-11	14-1	18-2	22-3	25-9
16	Hem-fir	#2 or better	8-4	13-1	17-3	21-11	25-5
24	Douglas Fir-larch	#2 or better	7-10	11-9	14-10	18-2	21-0
24	Hem-fir	#2 or better	7-3	11-5	14-8	17-10	20-9

Use this table for rafter spans with a ceiling attached and where heavy dead loads exist.

20 PSF Load

Roof live load = 20 psf, ceiling not attached to rafters, L/Δ = 240

Spacing (inches)	Rafter Size		The measurements below are in feet-inches (e.g. 9-10 = 9 feet, 10 inches)				
	Species	Grade	2 x 4	2 x 6	2 x 8	2 x 10	2 x 12
16	Douglas Fir-larch	#2 or better	8-6	12-5	15-9	19-3	22-4
16	Hem-fir	#2 or better	8-4	12-3	15-6	18-11	22-0
24	Douglas Fir-larch	#2 or better	6-11	10-2	12-10	15-8	18-3
24	Hem-fir	#2 or better	6-10	10-0	12-8	15-6	17-11

Use the conventional light-weight dead load table when the existing roofing materials are wood shake, wood shingle, composition roofing, or light-weight tile roofs. (The rationale for allowing these tables to be used is that the installation of a PV system should be considered part of the live load, since additional loading will not be added to the section of the roof where a PV array is installed.)

Where heavy roofing systems exist (e.g. clay tile or heavy concrete tile roofs), use the 20 lbs/ft² dead load tables.

Source for all examples: [Solar ABCs Expedited Permit Process for PV Systems](#)