



Solar Energy Systems Plan Submission and Inspection Guidelines

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Policy and Guidelines Overview

[Building Development Policy: Solar Energy Systems](#) establishes the overall policy requirements for installing Solar Energy Systems. The Policy includes requirements for plan review, licensing, permits, inspections, and the County Tax Exemption for installation of Solar Energy Systems.

The Solar Energy Systems Plan Submission and Inspection Guidelines is a companion document that provides the procedures for plan review and inspections of Solar Energy Systems. The Guideline provides County Typical Solar Energy Systems Plans that can be submitted for small residential Photovoltaic (PV) Solar Energy Systems (e.g., 20 Kilowatts (KW) of energy or less) and residential Solar Hot Water Systems.



Attachments/Hyperlinks

- **County Typical Solar Energy Systems Plans**
 - [County Typical Residential Solar Small, Micro Inverter/AC System Load Side Connection](#)
 - [County Typical Residential Solar Small, Single Inverter System Load Side Connection](#)
 - [County Typical Residential Solar Small, Micro Inverter/AC System Supply Side Tap](#)
 - [County Typical Residential Solar Small, Single Inverter System Supply Side Tap](#)
 - [County Typical Residential Solar Structural Details](#)
- [Building Development Policy: Solar Energy Systems](#)
- [Residential Solar Energy Systems ePLANS Checklist](#)
- [Solar Energy Systems Inspection Certification](#)
- [Building Development Policy: Inspections - Certifications Electronic Submissions](#)

Plan Submission Requirements

OVERVIEW

The Solar Energy Systems Plan Submission Guidelines provides the general application requirements for submission of a Building Permit Application with plans for Solar Energy Systems. The structural plan submission requirements provide the criteria to determine if the County Typical Solar Energy Systems Plans can be used in lieu of customized plans designed by a Registered Design Professional (RDP) or a properly licensed contractor. Additionally, the Electrical and Mechanical plan submission requirements are provided.

GENERAL APPLICATION GUIDELINES

1. Building Permit Application – Submit a completed [Building Permit Application](#).
2. Site Diagram – Provide the proposed site diagram showing the layout of the installation.
3. Plans – Prepare the plans in accordance with [Building Development Policy: Solar Energy Systems](#) and this Guideline.
4. Specifications – Provide the manufacturer's installation instructions and specifications.
5. Zoning Approval – Provide the [Zoning Approval](#) for ground mounted systems and commercial installations.

STRUCTURAL PLAN SUBMISSION GUIDELINES

1. Residential Roof Installation
 - A. Guidelines for Using County Typical Solar Energy Systems Plans

The County Typical Solar Energy Systems Plans including the manufacturer's installation instructions may be submitted as the structural plan submission, provided the following conditions are met.

 - (1) The mounting structure is an engineered product designed and listed to mount modules.
 - (2) The roof truss/rafter system is an engineered product.
 - (3) Roof trusses/rafters shall not be over-spanned. Use International Residential Code span tables to determine if your truss/rafter system is over-spanned.
 - (4) Building Structure is fully enclosed.



- (5) Roof slope is greater than or equal to 4/12 (18.43 degrees) and less than or equal to 8/12 (33.69 degrees).
- (6) The roof type is lightweight (dead load not greater than 20 psf).
- (7) The roof has one application (layer) of asphalt shingles.
- (8) The spacing between attachment points of the rails shall not exceed 4 feet.
- (9) Provide the roof plan showing the layout of the modules.
- (10) Provide manufacturer's installation recommendations and product specifications.
- (11) The longer dimension of module shall not be more than 90 inches by 48 inches; and the longer dimension shall be perpendicular to the supporting beam/rail.
- (12) Module shall be flush with roof/wall. (Modules are parallel to the roof/wall surface with no more than 3-inches difference between ends of assembly; and with no more than 10-inches space between roof surface, and the bottom of the modules.)
- (13) Dead weight per attachment point will not exceed 45 lbs.
- (14) The distributed weight of the modules will not exceed 5 psf.
- (15) Occupancy is Residential Group R-5 including detached single- and two-family dwellings or townhouses three stories or less above grade and not a manufactured home.

To determine compliance with items 13 and 14, please refer to the [Solar Energy Systems – Roof Mounted Solar Panels Structural Plan](#) and complete the Roof System Information Section and the Module Attachment Information Section.

B. Solar Energy Systems Requiring Designs by an RDP or Contractor

If the design of the Solar Energy System and the roof system does not comply with any of the fifteen criteria provided in paragraph 1A Guidelines for Using County Typical Solar Energy Systems Plans, an RDP or a properly licensed contractor must design the Solar Energy System.

2. Commercial Installation

All commercial module installations shall require design calculations and details of the structural supporting members by an RDP. Details shall include layout and attachment details.

3. Ground Mounted Module

- A. Mounting structure shall require engineering calculations and details by an RDP or a properly licensed contractor.
- B. Details shall include module supports, framing members, foundation posts, footings, and module attachment method to mounting structure.
- C. Provide manufacturer's installation manual, including product specification.
- D. Zoning Plat shall be submitted.

4. Penetration Through Fire Rated Assemblies

Penetrations through fire rated assemblies as a result of module installation shall be inspected. Refer to the section on inspections for other inspection requirements.

ELECTRICAL PLAN SUBMISSION GUIDELINES

1. Residential Installation

A. Guidelines for Using County Typical Solar Energy Systems Plans

- (1) Modules, utility interactive inverters and combiner boxes are identified and listed for use in PV Solar Energy Systems.
- (2) The PV array is composed of 4 strings or less.
- (3) Maximum output is 20 KW.



- (4) There are no battery storage provisions.
- (5) The County Typical Solar Energy Systems Plans can be used to accurately represent the PV Solar Energy System.
- (6) Submit the manufacturer's specifications sheets and installation instruction manuals for the major components.
- (7) An Electrical Permit will be required for Solar Hot Water Systems if a circuit is added or extended.

B. PV Solar Energy Systems that require design by an RDP or a properly licensed contractor

- (1) Systems over 20 KW.
- (2) Over four strings of modules.
- (3) Systems having battery storage capability.
- (4) Ground mounted PV Solar Energy Systems.

2. Commercial Installation

All commercial PV Solar Energy Systems require plans designed by an RDP or a properly licensed contractor.

MECHANICAL PLAN SUBMISSION GUIDELINES

For residential Solar Hot Water Systems submit the manufacturer's instructions. Plans are not required.

For commercial Solar Hot Water Systems plans are required to be submitted.

Solar Energy Systems Inspection Guidelines

BUILDING, ELECTRICAL AND MECHANICAL

1. Residential PV Solar Energy Systems and Solar Hot Water Systems

- A. The Approved County Plans and (if applicable) Approved County Structural Letter are required to be on site.
- B. All major component manufacturer specifications and installation instructions are required to be on site.
- C. Systems installed on sloped roofs and non-accessible pedestals will require the contractor to complete the [Solar Energy Systems Inspection Certification Form](#) and provide photographs of the installation.
- D. Certification and photographs are required to be uploaded through the customer's online Development Services ePortal account prior to the date of inspection.
- E. Egress from a window designated as an emergency escape and rescue opening shall be maintained. A minimum 3-foot path shall be provided from the opening to the eave of the roof to include a designated 3-foot by 3-foot landing on the ground.
- F. A minimum 3-foot perimeter shall be provided between the module and the eaves of the roof for access
- G. The contractor is responsible for providing adequate safe access to all components of the solar installation, including attic spaces, for county staff to perform the inspection. All equipment, fittings, piping, and components located inside the structure must be accessible for inspection by County inspection staff.
- H. For pedestal mounted systems, underground mechanical piping installations will be inspected by County inspection staff.

2. Roof and Pedestal Mount Installation for Residential Town House Installation



- A. System cannot overhang adjacent property line or be installed on or attached to adjacent property.
 - B. Pathways cannot be on the adjacent property.
 - C. Penetrations are not permitted within 4-feet of the adjacent property line.
 - D. Egress from a window designated as an emergency escape and rescue opening shall be maintained. A minimum 3-foot path shall be provided from the opening to the eave of the roof to include a designated 3-foot by 3-foot landing on the ground.
 - E. A minimum 3-foot perimeter shall be provided between the module and the eaves of the roof for access.
- 3. Commercial PV Solar Energy Systems and Solar Hot Water Systems
 - A. The Approved County Plans are required to be on site.
 - B. The components are to be identified for use in PV Solar Energy Systems and/or Solar Hot Water Systems.
 - C. All installation instructions are required to be on site for the inspection.
 - D. Access to all components of the installation for inspection.
 - E. Commercial installation of testable backflow prevention devices must have an approved County listed testing agency. Provide the original test report at time of final inspection.
 - F. Systems installed on sloped roofs and non-accessible pedestals will require the contractor to complete the [Solar Energy Systems Inspection Certification Form](#) and provide photographs of the installation. Certification and photographs are required to be uploaded through the customer's online Development Services ePortal account prior to the date of inspection.
 - G. A minimum 3-foot perimeter shall be provided between the module and the eaves of the roof for access.
- 4. Photographic evidence is required for Roof and Pedestal Mount for all Residential and Non-Accessible Commercial Installation. Electronic photos are required to be uploaded through the customer's online Development Services ePortal account prior to the date of inspection. The photographs shall be limited to no more than 60 and shall be uploaded in a single file PDF. The inspector withholds the right to request additional photographic evidence if it is deemed necessary for the project.
 - A. Attach the following photographs to the Building Permit as one attachment.
 - 1) Close up Photo of NRTL label Solar Module
 - 2) Close up Photo of Attachment of Rack System Standoff(s) to structure.
 - 3) Close up Photo of Assembly of Rack System
 - 4) Overview of rack systems showing spacing of standoffs
 - 5) Close up Photo of Attachment of Module to Rack System
 - 6) Pitch degree of all roof plains containing a solar array
 - 7) Measurements of all fire pathways as shown on the county approved plans or as required by the Virginia Residential Code.
 - B. Attach the following photographs to the Electrical Permit as one attachment.
 - 1) Close up of micro inverters/optimizers product labels.
 - 2) Module manufacturer's nameplate and testing laboratory approved label.
 - 3) Close up of DC and AC wiring to show the type and size of conductors.
 - 4) Close up of all inaccessible junction boxes and compartments.
 - 5) Routing of wiring, conduits, and conduit strapping.
 - 6) Close up of wiring connections at micro inverters/optimizers.



- 7) Overview of grounding connections at mounting racks for each array from junction box to bonding point prior to module installation and module connections to racks.
5. Labeling Requirements for Residential and Commercial Applications
In addition to the required National Electrical Code (NEC) labeling, the Fire & Rescue Department recommends a warning label to be applied to the metering cabinet. The label shall have the words "Caution Solar Electric System Connected" with red background and white letter a minimum 3/8 inches high. The label shall be made of reflective, weather resistant material.
6. [Solar Energy Systems Inspection Certification Form](#) for Residential and Non-Accessible Commercial PV Solar Energy Systems and Solar Hot Water Collectors mounted on Roofs or Pedestals.
 - A. The contractor that obtained the Building Permit shall certify that:
 - (1) The installation and assembly of the rack system, attachment of rack system to the roof, the attachment of the solar collector to the rack system and all components are installed per the manufacturer's installation instructions and the County approved plans.
 - (2) All penetrations through the roof assembly are water and weather tight.
 - (3) A minimum 3-foot perimeter shall be provided between the module and the eaves of the roof for access.
 - B. If a homeowner obtains the Building Permit, a County approved Third Party Engineer shall conduct the inspection and certify the roof installation. If a homeowner pulls the Electrical Permit or Mechanical Permit, inspections must be conducted by the County.

REQUIRED INSPECTIONS

1. Required Scheduled Inspection Types for PV Solar Energy Systems
 - A. Building Permit Inspections
 - (1) (If applicable) Residential Code # 158 (SolarAPP+™ final)
 - (2) Residential Code # 151 (final inspection)
 - (3) Commercial Code # 1500 (final inspection)
 - B. Electrical Permit Inspections
 - (1) (If applicable) Residential code # 202 (electrical service)
 - (2) (If applicable) Residential Code # 208 (other electrical trench)
 - (3) (If applicable) Residential Code # 258 (SolarAPP+™ final)
 - (4) Residential Code # 250 (final inspection)
 - (5) Commercial Code # 2500 (final inspection)
2. Required Scheduled Inspection Types for Solar Hot Water Systems
 - A. Building Permit Inspections
 - (1) Residential Code # 151 (final inspection)
 - (2) Commercial Code # 1500 (final inspection)
 - B. Mechanical Permit Inspections
 - (1) Residential Code # 350 (final inspection)
 - (2) Commercial Code # 3500 (final inspection)
 - C. Electrical Permit Inspections
 - (1) (If applicable) Residential Code # 250 (final inspection)
 - (2) (If applicable) Commercial Code # 2500 (final inspection)