

## **Somers Fire Dept. Suggested Photovoltaic Systems Installations Practices**

### **PURPOSE:**

The installation of photovoltaic (PV) solar systems presents additional areas of concern for firefighter safety and firefighting operations i.e. energized equipment, trip hazards, restricting venting locations, limiting walking surfaces on roof structures, etc. This guideline establishes a suggested minimum standard for the layout design, marking, and installation of solar photovoltaic systems and is intended to mitigate fire safety issues.

### **SCOPE:**

This guideline applies to all rooftop solar photovoltaic systems. This document is in addition to the 2011 NEC and any applicable building codes or requirements currently recognized in Connecticut.

## **1. GENERAL REQUIREMENTS**

### **1.1 Marking**

Marking is required on interior and exterior direct-current (DC) conduit, enclosures, raceways, cable assemblies, junction boxes, combiner boxes and disconnects.

Marking is needed to provide emergency responders with appropriate warning and guidance with respect to isolating the solar electric system. This can facilitate identifying energized electrical lines that connect the solar panels to the inverter, as these should not be cut when venting for smoke removal.

#### **1.1.1 Materials**

The materials used for marking shall be reflective and suitable for the environment.

#### **1.1.2 Marking content**

The marking shall contain the words "WARNING: PHOTOVOLTAIC POWER SOURCE."

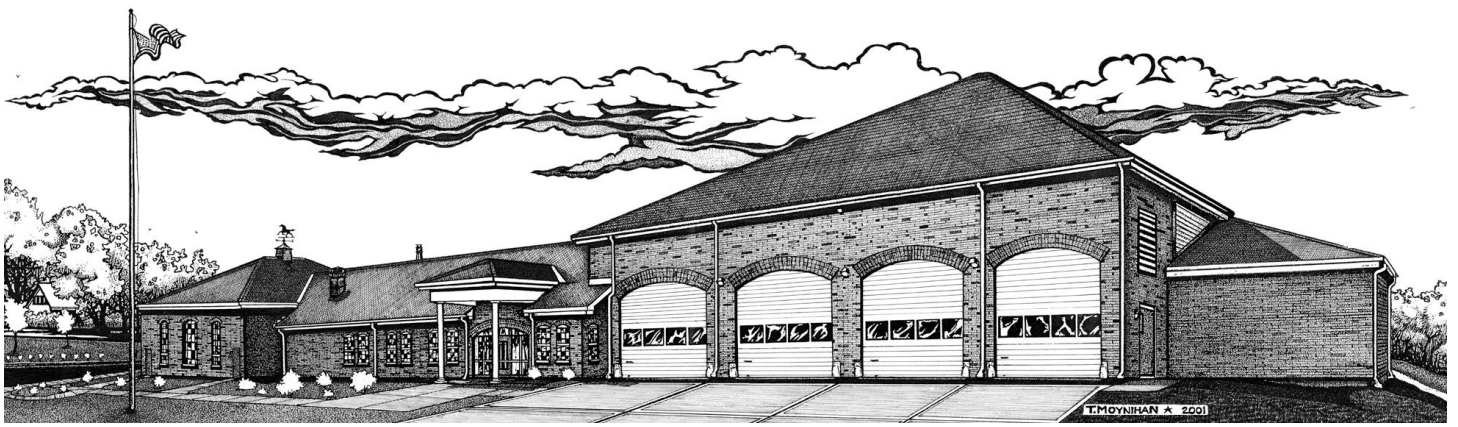
# ***SOMERS FIRE DEPARTMENT***

**Fire ★ Rescue ★ EMS**

400 Main St., Somers, CT 06071

Phone (860)749-7626 • Fax (860)763-8233

Web: [www.somersfire.org](http://www.somersfire.org)



### **1.1.3 Main Service Disconnect**

The marking shall be placed adjacent to the main service disconnect in a location clearly visible from the location where the disconnect is operated.

### **1.1.4 Location of marking**

Marking shall be placed on interior and exterior DC conduit, raceways, enclosures, and cable assemblies every 10 feet (3048 mm), within 1 foot (305 mm) of turns or bends, and within 1 foot (305 mm) above and below penetrations of roof/ceiling assemblies, walls or barriers.

### **1.1.5 Exterior AC disconnect**

A label identifying the installer and emergency contact information will be placed on the exterior AC disconnect if located at ground level. If not located at ground level the label will be located inside the main circuit breaker panel.

## **1.2 Access, Pathways, and Smoke Ventilation**

Access and spacing requirements shall be observed in order to:

1. Ensure access to the roof
2. Provide pathways to specific areas of the roof
3. Provide for smoke ventilation opportunity areas
4. Provide emergency egress from the roof

Exceptions to this requirement may be requested where access, pathway or ventilation requirements are reduced due to:

- Unique site specific limitations
- Alternative access opportunities (as from adjoining roofs)
- Ground level access to the roof area in question
- Other adequate ventilation opportunities when approved by the fire department
- Adequate ventilation opportunities afforded by panel set back from other rooftop equipment (for example: shading or structural constraints may leave significant areas open for ventilation near HVAC equipment.)
- Automatic ventilation device
- New technology, methods, or other innovations that ensure adequate fire department access, pathways and ventilation opportunities

Designation of ridge, hip, and valley does not apply to roofs with 2-in-12 or less pitch. All roof dimensions are measured to centerlines.

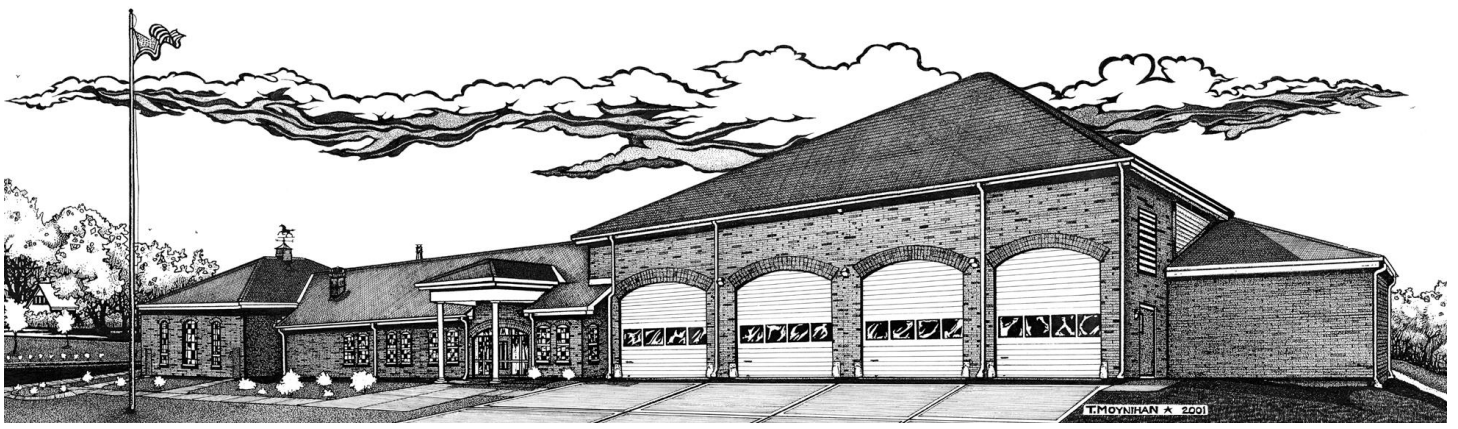
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Roof access points shall be defined as an area that does not require ladders to be placed over openings (i.e., windows, vents, or doors), that are located at strong points of building construction and in locations where ladders will not be obstructed by tree limbs, wires, signs, or other overhead obstructions.

### **1.2.1 Residential -- Single and Two-Unit Residential Dwellings**

The fire department will review all plans for roof mounted photovoltaic systems.

#### **1.2.1.1 Access**

Residential Buildings with hip roof layouts: Modules shall be located in a manner that provides one two foot wide clear access pathway from the eave to the ridge on each roof slope where panels are located. The access pathway shall be located at a structurally strong location on the building (such as a bearing wall).

Residential Buildings with a single ridge: Modules shall be located in a manner that provides two two foot wide access pathways from the eave to the ridge on each roof slope where panels are located.

Hips and Valleys: Modules shall be located no closer than one and one half feet to a hip or a valley if panels are to be placed on both sides of a hip or valley. If the panels are to be located on only one side of a hip or valley, that is of equal length, then the panels may be placed directly adjacent to the hip or valley.

#### **1.2.1.2 Ventilation**

Modules shall be located no higher than eighteen inches below the ridge.

Exception: If the fire department determines adequate space for ventilation and ladder placement is present this rule can be modified.

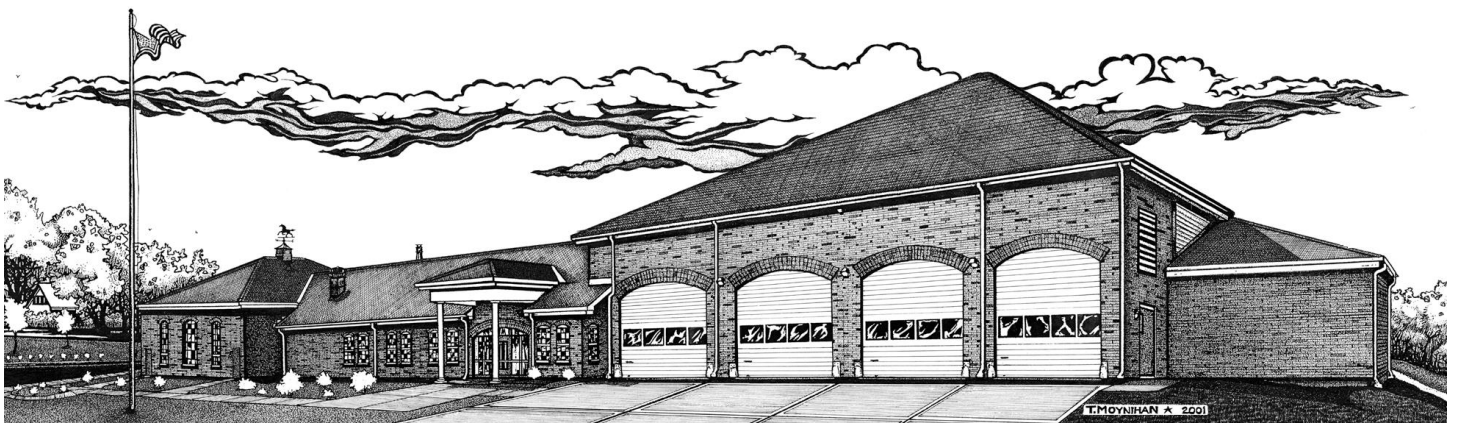
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## 2. Locations of DC conductors

Conduit, wiring systems, and raceways for photovoltaic circuits shall be located as close as possible to the ridge or hip or valley and from the hip or valley as directly as possible to an outside wall to reduce trip hazards and maximize ventilation opportunities. Conduit runs between sub arrays and to DC combiner boxes shall be installed in a manner that minimizes the total amount of conduit on the roof by taking the shortest path from the array to the DC combiner box. The DC combiner boxes shall be located such that conduit runs are minimized in the pathways between arrays. DC wiring shall be installed in metallic conduit or raceways when located within enclosed spaces in a building. Conduit shall run along the bottom of load bearing members.

## 3. NON-HABITABLE BUILDINGS

These guidelines do not apply to non-habitable structures. Examples of non-habitable structures include, but are not limited to, parking shade structures, carports, solar trellises, etc.

## 4. GROUND MOUNTED PHOTOVOLTAIC ARRAYS

Setback requirements do not apply to ground-mounted, free standing photovoltaic arrays. A clear brush area of 10' is required for ground mounted photovoltaic arrays.

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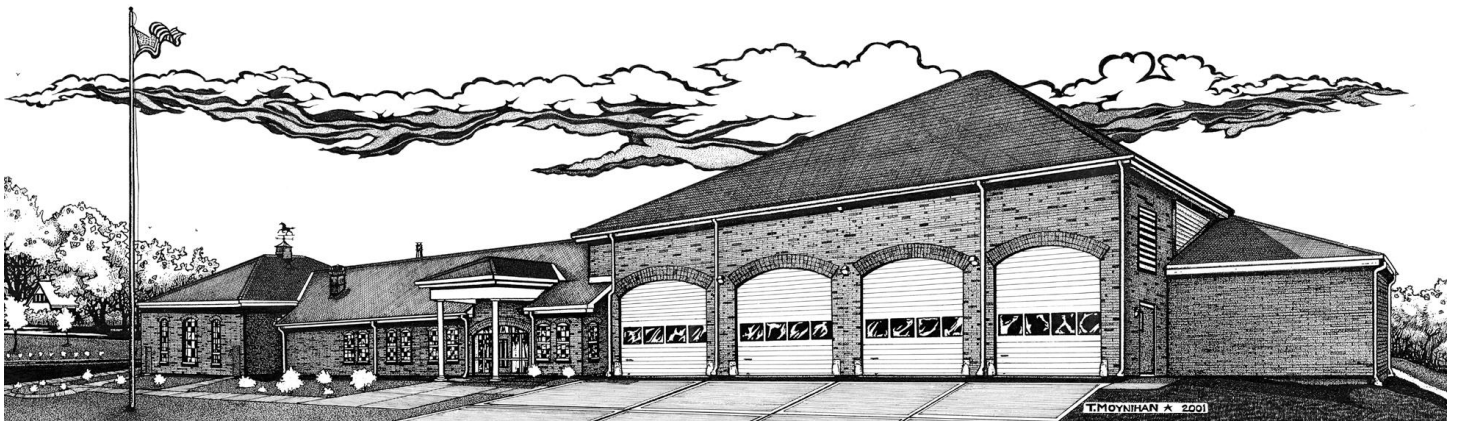
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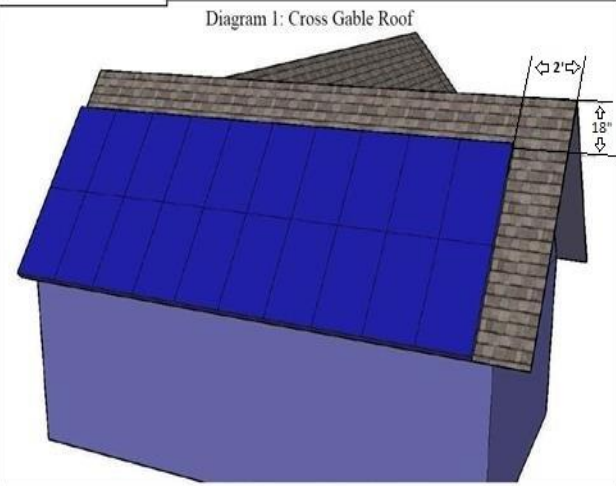
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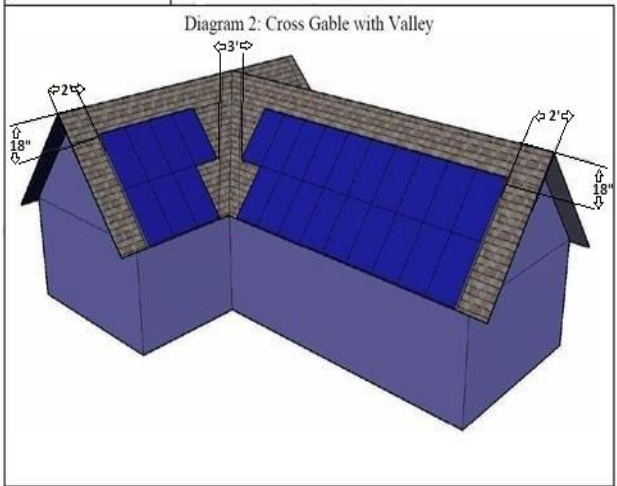
EXAMPLE 1

Diagram 1: Cross Gable Roof



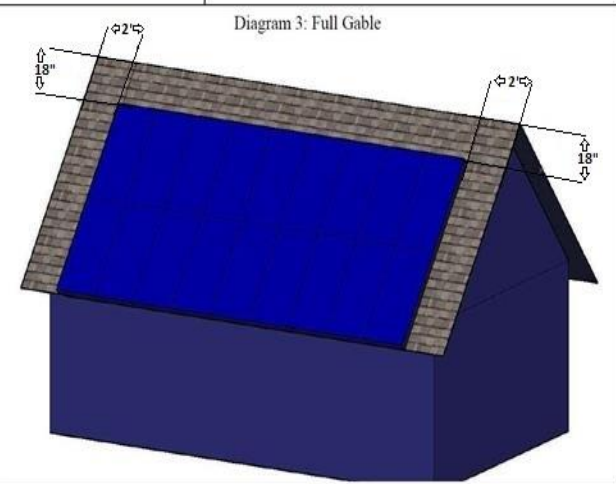
EXAMPLE 2

Diagram 2: Cross Gable with Valley



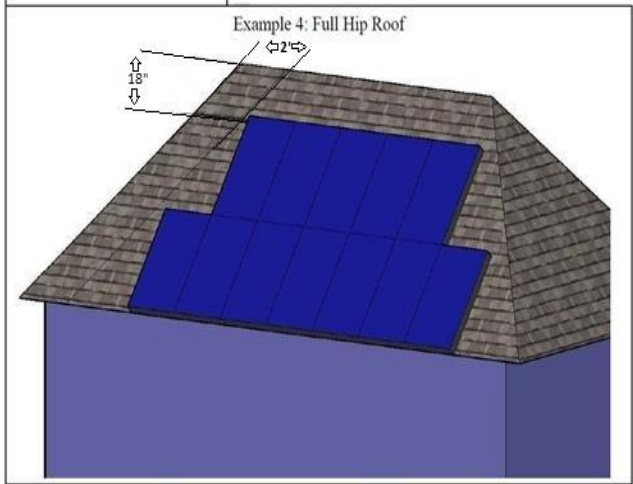
EXAMPLE 3

Diagram 3: Full Gable



EXAMPLE 4

Example 4: Full Hip Roof



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