



Photovoltaic Systems

Effective January 1, 2014

Please be advised that the city of San Jose's Municipal Fire Code section concerning Photovoltaic (PV) systems installations has been relinquished effective January 1, 2014. When PV systems are installed there are now requirements in the CFC that must be followed.

With the adoption of the 2013 California Fire Code (CFC) effective January 1, 2014 additional regulations regarding the installation of PV systems have been introduced through the state code as the minimum standard by which San Jose and the rest of the state may regulate. The new Section of the CFC, 605.11, supersedes and rendered our local code section redundant. Hence, the PV section of our Local Municipal Code has been retired.

Installers of PV systems are, as has been the procedure, required to acquire building permits and follow the appropriate Building, Electrical, Fire and Residential codes. Residential systems up to 15kw will be permitted and inspected in accord with the California State mandate of Senate Bill-1222 by the electrical inspection group. The Residential requirements in the CFC are the same as the California Residential Code (CRC) R331. Larger or commercial PV systems will be subject to City of San Jose standard permitting and inspection procedures. Complete detailed drawings depicting the installation, including openings such as windows or doors, and demonstrating the access point(s) do not conflict with overhead obstructions such as tree limbs, wires, or signs

The new requirement being questioned the most at the time of the posting is the regulation requiring set backs under CFC Section 605.11.3.2 and 605.11.3.3. This is now the minimum standard of must be adhered to. (See the drawings below for examples of configurations both residential and commercial) In answer to the discussions prevalent to date we offer the following:

605.11.3 Access and pathways. In general, roof access, pathways, and spacing requirements necessary to ensure access to the roof; provide pathways to specific areas of the roof; provide for smoke ventilation operations; and to provide emergency egress from the roof are in the Fire Code as they pertain to Firefighter safety.

There are two basic reasons for smoke ventilation operations. Dangerous gases and dark smoke accumulate in a burning building. Unlike the movie versions of fires, it is impossible for firefighters to see in such an environment. When a hole is made in the roof because the building is "vented", the smoke and gases escape because heat and smoke rise. It makes it much easier for the firefighters in the building to see. It also reduces the possibilities of backdraft and flashover by reducing heat and removing flammable and toxic gases. Victims trapped inside have a greater chance of survival because more oxygen is present and firefighters can perform a more efficient search. Another reason for venting the roof is to see how far the fire has progressed. One of the fastest avenues through which fires spread is the attic. Heat and smoke rise into the attic where the fire can move quickly. Firefighters may go ahead of the fire on a roof, cut holes to access the attic and stop the fire from spreading through the attic.

The following requests for interpretation have been solicited:

A. In reference to the Exceptions to section 605.11.3 Access and pathways, please clarify.

As Authority Having Jurisdiction of the Fire Code, the San Jose Fire Department deems these exceptions to signify that all criteria presented by Section 605.11.3 shall be applied and:

(1) Residential structures shall be designed so that each photovoltaic array is no greater than 150 feet (45 720 mm) by 150 feet (45 720 mm) in either axis. Hence, Arrays shall be no greater than 150 by 150 feet in distance in either axis

(2) Panels/modules shall be permitted to be located up to the roof ridge where an alternative ventilation method approved by the fire chief has been provided or where the fire chief has determined vertical ventilation techniques will not be employed.

B. With regard to Exception 2 of 605.11.3 the one question that comes up is if SJFD has allowed “Alternative Ventilation methods”? At present:

(1) With automatic vents (drop-out skylights), would 605.11.3.3 allow modules to the ridge?

- a. No, SJFD has not as yet allowed this as an “Alternative Ventilation method”. There has been discussion to allow variances for a shorter setback depending on the configuration of the roof and access points. We understand that additional variances have been provided in other jurisdictions allowing for minute dimensional variations of module-specific arrangements.

SJFD is in the process of developing the process to consider alternative ventilation methods for approval by the fire chief. At this time such requests are to be sent to ray.simpson@sanjoseca.gov along with all documentation necessary for use to understand the request. See the diagrams on pages 3 and 4 for visual aids concerning residential projects and pages 5 and 6 for some insight and reasoning.

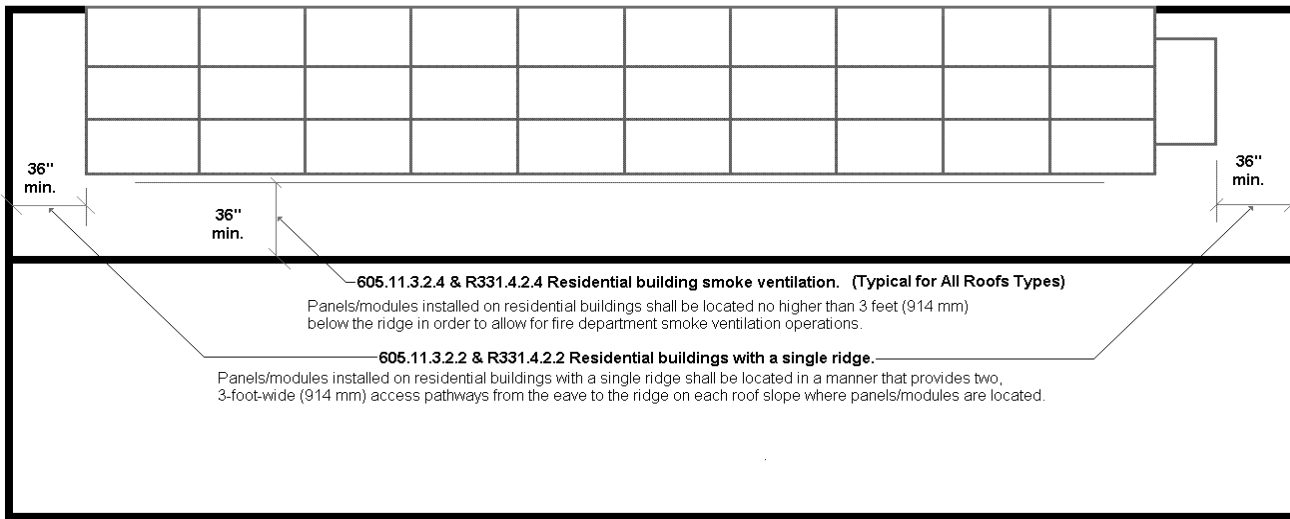
We appreciate the good work of our local industry and hope to continue to work closely with you to continue to keep San Jose one of the best large cities in America.

DOCUMENT REVISIONS

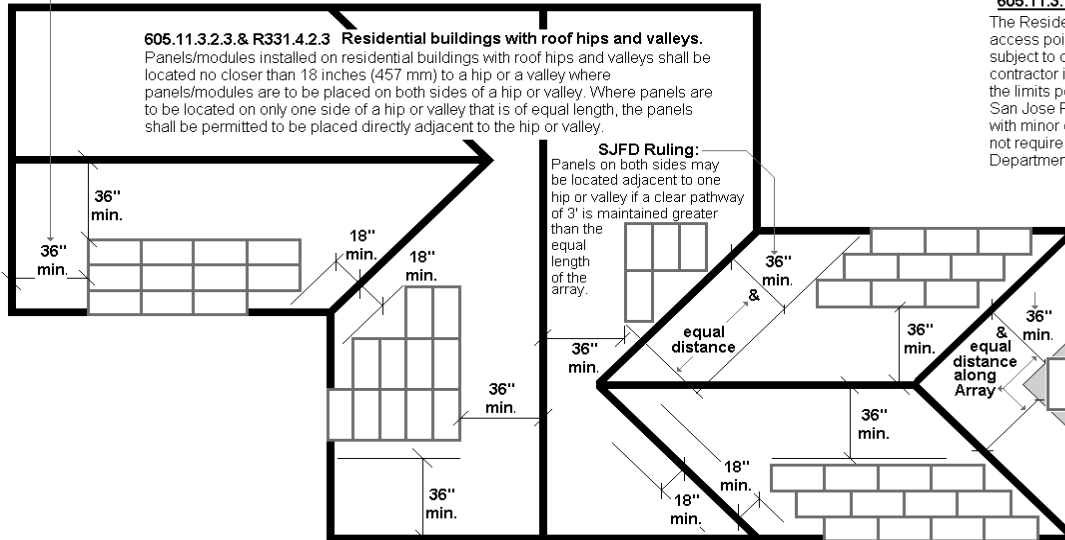
This document is subject to revisions. For general information and to verify that you have the most current document, please call (408) 535-7750, and request the current version.

Roof Access Point Diagrams - Plan Views

These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2: 12) or less.

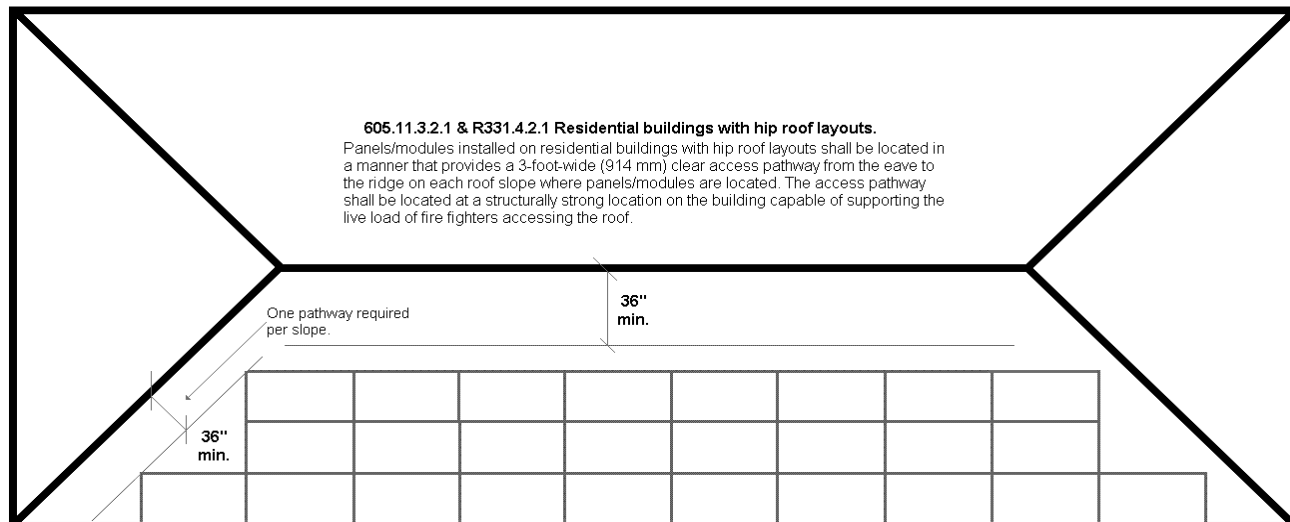


For a Cross Gable Roofs (See Diagram 1 of the Residential Isometric Diagram)
A single 3' gutter to ridge setback along one side of the array is allowed if the rear gable is clear of panels, accessible and otherwise unobstructed.



SJFD Ruling:
605.11.3.1 & R331.4.1 Roof access points.
The Residential and Fire Codes require that roof access points be located in areas that are not subject to obvious obstructions. The installation contractor is responsible for compliance. Due to the limits posed by Senate Bill 1222 and since the San Jose Fire Department is equipped to deal with minor obstructions, the installation permit will not require additional inspection by the Fire Department for compliance.

SJFD Ruling:
Panels may be adjacent to the hip ridge (0") if a 3' path along side the Array is maintained on the adjacent roof slope. In this case the adjacent hip is shown without an Array as the area outside the required 3' clear path is insufficient to support additional panels.



Residential Isometric Diagrams:

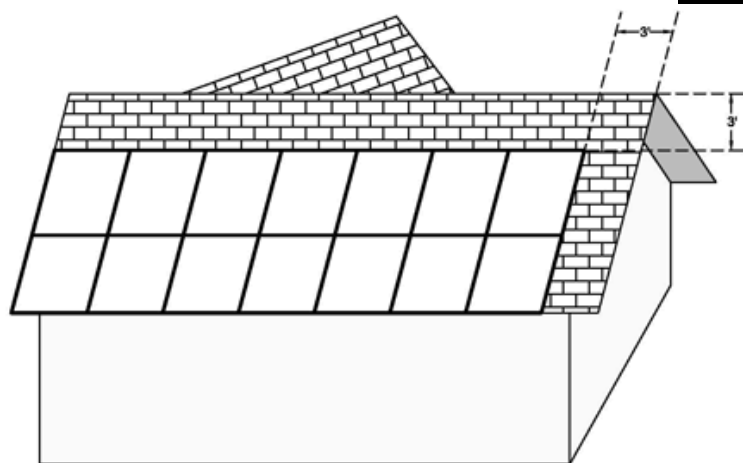


DIAGRAM 1: CROSS GABLE ROOF

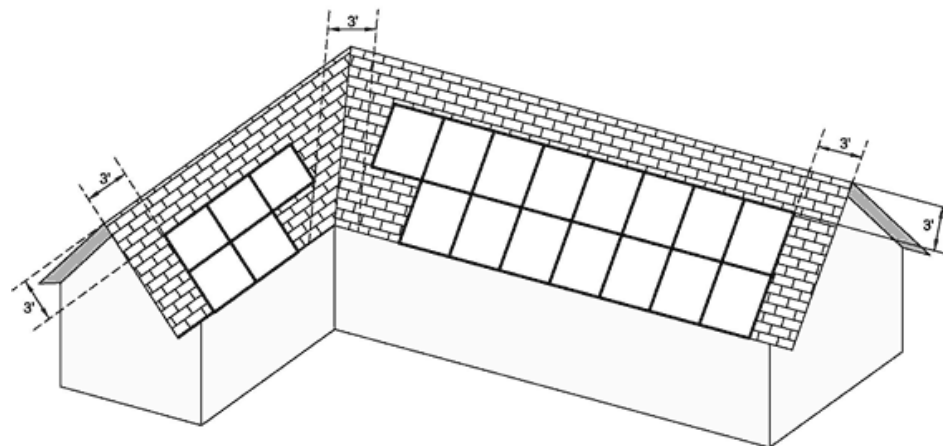


DIAGRAM 2: CROSS GABLE WITH VALLEY

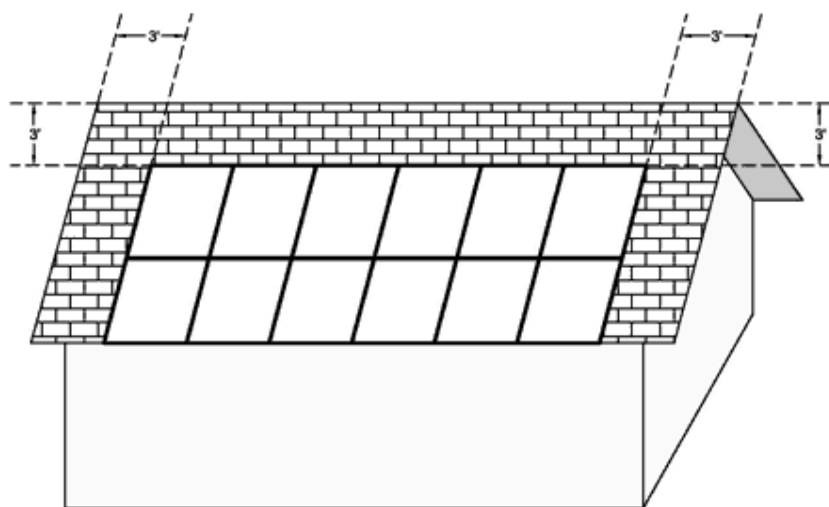


DIAGRAM 3: FULL GABLE ROOF

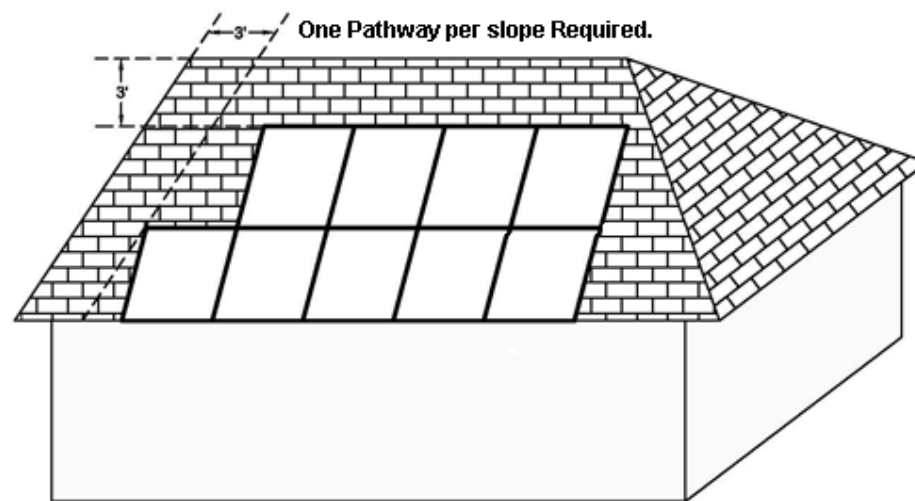


DIAGRAM 4: FULL HIP ROOF

SJFD Revised Diagrams Originally published in the Solar Photovoltaic Installation Guideline
The California Department of Forestry and Fire Protection (CalFire), Office of the State Fire Marshal

Basic reasoning behind the requirements of CFC 605.11.3 - Access and Pathways

The 3' access and ventilation requirements in 605.11.3.2.1 and 605.11.3.2.2 are among the most controversial items in the guideline for both the solar industry and firefighters. The origin of the "3' rule" was a result of lengthy deliberation and debate. Initially, the fire service requested 4' setbacks while the solar industry preferred a 2' setback. A 3' setback was suggested that could reasonably address the access needs of the fire service while allowing more room for larger solar arrays to be installed. While the 3' setback may appear to be a simple compromise between 2' and 4', the origin is technically based. An issue not commonly understood in the solar industry is that wind loading on rooftops limits the available roof area on many homes in high wind regions. The American Society of Civil Engineers (ASCE) publishes a standard ASCE 7, entitled "Building Loads on Structures", that is referenced by building codes in the U.S. This standard includes tables for wind pressures based upon location, wind exposure, and location on the roof. The outer 3' corners of a residential sloped roof structure have wind pressures that are double that of 3' in from the edge of the roof. Since PV modules are generally tested to withstand 30 PSF (pounds per square foot), areas of the country that have design wind speeds above 110 mph could experience wind pressures in excess of 30 PSF at roof corners. By staying away from the upper 3' corners of a sloped roof, PV modules can be mounted safely within their structural design capabilities while providing firefighters the access they need to get to the ridge of the roof for ventilation operations.

The assumption in this section is that each roof face must stand on its own without relying on access from other roof faces. The reason for this distinction is that, during roof operations, adjacent roof faces may not be available for access or ventilation holes. One reason for a roof face to be unavailable for ventilation operations is that a strong wind could be impinging on that roof face making ventilation holes counter productive. Single ridge roofs, such as full gable construction, have structurally strong framed end walls that provide good access and egress for the fire fighter to either end of the structure. Hip roofs often have a relatively small center ridge section while providing side ridges (hips) to get to the corners of the building. Since these hips are not as structurally strong as the single ridge gable ends, only a single 3' pathway is required. This pathway is intended to be the primary access and egress for the roof. However, should this pathway be blocked or compromised during a fire since it is not as structurally strong as a gable end, firefighters would generally choose to make an emergency escape from the closest unaffected hip or slope to get to safety.

(CFC 605.11.3.2.1) Residential Buildings with hip roof layouts.

Hip roofs only require one 3' pathway because it is necessary for at least one 3' pathway be available on any roof slope with a PV array. Although it is possible that a firefighter could walk on the opposing slope, there is a 3' pathway on the PV slope in the event a firefighter is having to rapidly cross the hip slope to access the ladder that may be against the PV slope at the corner. This would limit the total distance and time the firefighter would need to traverse the roof to get to a ladder.

(CFC 605.11.3.2.2) Residential Buildings with a single ridge.

Single ridge residences require two, 3' wide pathways to provide alternate means of access and egress for firefighters during operations. As a related issue, these ridges can be long relative to the size of the structure so that there is a high likelihood that one pathway is inaccessible in a fire.

(CFC 605.11.3.2.3) Hips and Valleys.

Roof types covered in (605.11.3.2.1) and (605.11.3.2.2) are common simple roof constructions. However, many roofs cannot be described as simple hip or gable roofs but include a combination of ridges, valleys, and hips. Hips and valleys are treated differently from gable construction since the hip and valleys often do not have structural walls under them. This makes hips and valleys less substantial than other access and egress options and therefore a lower priority during firefighting operations. However, hips and valleys may become a path for emergency egress should a fire prevent the firefighter from accessing the preferred structural access and egress location.

Basic rules to consider when requesting a Variance to address Access issues.

Access and spacing requirements are observed in order to:

- Ensure access to the roof
- Provide pathways to specific areas of the roof
- Provide for smoke ventilation opportunities area
- Provide emergency egress from the roof

The fire chief may consider a Variance to this requirement where access, pathway or ventilation requirements are reduced due to:

- a. Proximity and type of adjacent exposures
- b. Alternative access opportunities (as from adjoining roofs)
- c. Ground level access to the roof area in question
- d. Adequate ventilation opportunities beneath solar array (as with significantly elevated or widely-spaced arrays)
- e. Adequate ventilation opportunities afforded by module set back from other rooftop equipment (shading or structural constraints may leave significant areas open for ventilation near HVAC equipment, for example.)
- f. Automatic ventilation device.
- g. New technology, methods, or other innovations that ensure adequate fire department access, pathways and ventilation opportunities.

Items a – c describe examples of options that may allow fire departments to relax the setback options on a roof. PV arrays are often only mounted on one roof face. So, other roof faces may be fully open to roof access and venting options. This may result in acceptance of a reduction being allowed to the mandated 3' ridge setback by up to 18".

Items d & e describe examples of PV array placement that allows for sufficient venting options due to the array being tilted above the roof pitch sufficiently to access the roof below the array or gaps in the array to reduce the shading affects of rooftop equipment such as HVAC units or shrouds hiding this equipment.

Items f & g describe currently available ventilation options (automatic roof vents) and potential new innovations that may allow easy removal of PV modules for roof ventilation access.

All these measures can be presented for consideration when evaluating optional means and methods to meet the intent of adequate roof access and ventilation opportunities.

Commercial Diagrams – CFC 605.11.3.3

Diagrams Not to Scale

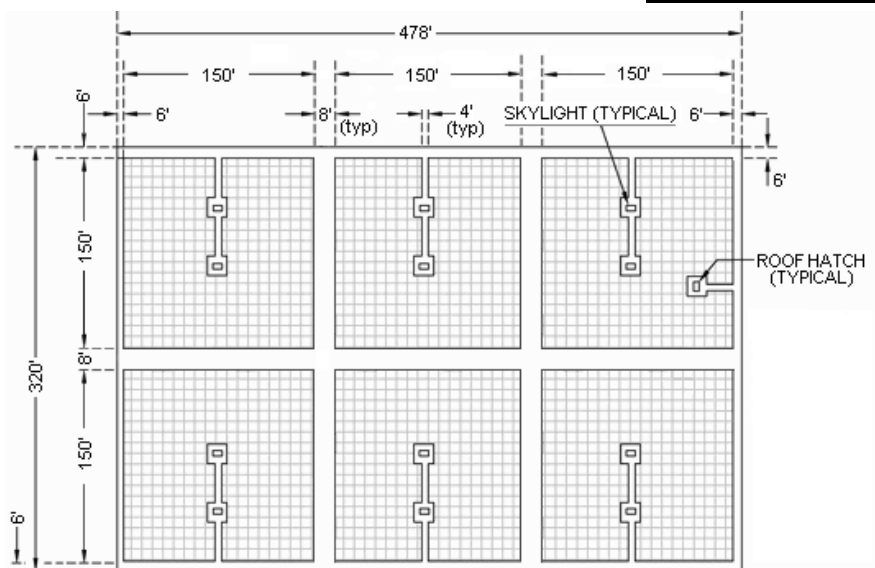


DIAGRAM 5
SOLAR ARRAY EXAMPLE - LARGE COMMERCIAL
8' WALKWAYS WITH SKYLIGHT & HATCH ACCESS SHOWN
 (The walkway shall be over areas capable of supporting the live load of firefighters accessing the roof.)

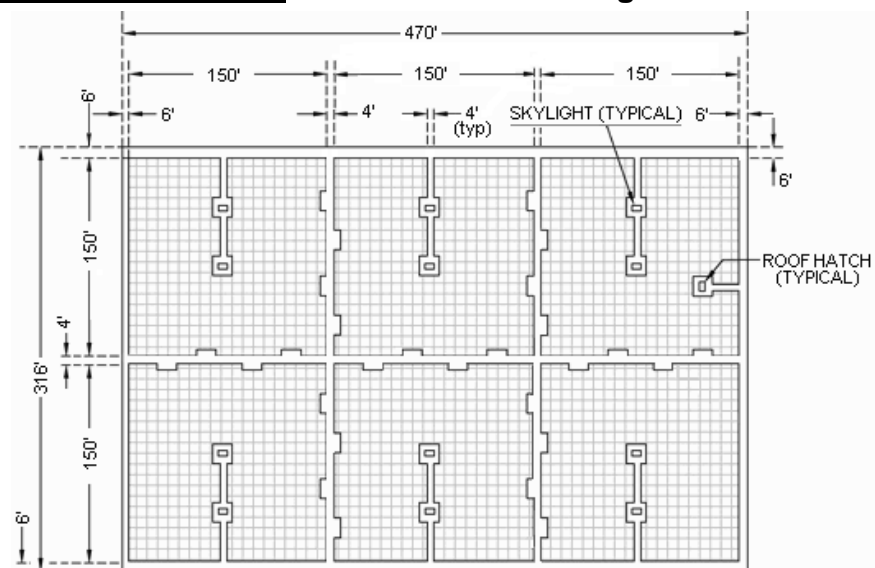


DIAGRAM 6
SOLAR ARRAY EXAMPLE - LARGE COMMERCIAL
4' WALKWAYS WITH 8' X 4' VENTING OPPORTUNITIES EVERY 20'
 (The walkway shall be over areas capable of supporting the live load of firefighters accessing the roof.)

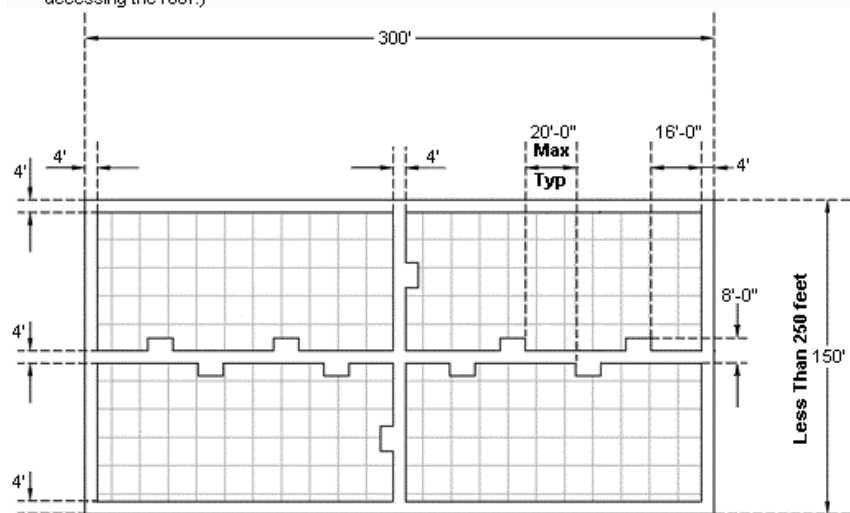


DIAGRAM 7
SOLAR ARRAY EXAMPLE - SMALL COMMERCIAL (605.11.3.3.1 Ex)
4' WALKWAYS WITH 8' X 4' VENTING OPPORTUNITIES EVERY 20'
 (The walkways shall be over areas capable of supporting the live load of fire fighters accessing the roof.)

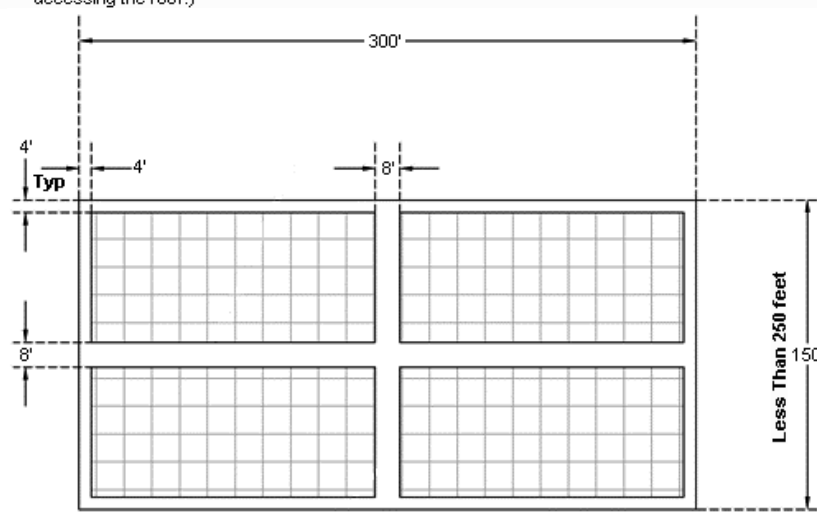


DIAGRAM 8
SOLAR ARRAY EXAMPLE - SMALL COMMERCIAL (605.11.3.3.1 Ex)
8' WALKWAYS
 (The walkways shall be over areas capable of supporting the live load of fire fighters accessing the roof.)