



Corona Fire Department

Solar Photovoltaic Installation Guideline per 2022 California Fire Code

PURPOSE

The intent of this guideline is to provide the information necessary to ensure safety of the firefighters and the public when installing solar photovoltaic systems. These systems impinge on traditional firefighting techniques such as roof venting, water extinguishment and fire overhaul. This guideline addresses these issues while embracing the environmental advantages of this technology.

SCOPE

This guideline is applicable to all solar voltaic systems, regardless of size, for residential and commercial purposes. This guideline conforms to 2022 California Fire Code Section 1205.

DEFINITIONS

Array:

Any number of photovoltaic modules connected together to provide a single electrical output.

Inverter:

Devices that convert DC electricity (single or multiphase), either for stand alone systems (not connected to the grid) or for utility-interactive systems, from the solar system to the AC electricity for use in the buildings electric system or the grid, or both.

Photovoltaic (PV):

pertaining to direct conversion of light into electricity.

PERMITS

A permit is required for the installation of, or modification to, a photovoltaic system. Prior to commencement of any installation, plans for installation of photovoltaic systems shall be submitted to Building Department review and approval, and shall contain the following details:

REQUIREMENTS

A. MARKING:

1. Main Service Disconnect:

Residential:

Marking may be placed within the main service disconnect. If the main service disconnect is operable with the service panel closed, the marking shall be placed on the outside cover.

Commercial:

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

Marking Content and Format

- CAUTION: SOLAR ELECTRIC SYSTEM CONNECTED AND ENERGIZED
- Red background with white lettering
- Minimum 3/8" letter height; all upper case letters
- Arial or similar font; non-bold
- Reflective, weather resistant material suitable for the environment (durable, adhesive materials may meet this requirement)



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2. Direct Current Conduit, Raceways, Enclosures, Cable Assemblies and Junction Boxes:

Marking is required on all interior and exterior DC conduit, raceways, enclosures, cable assemblies, and junction boxes, to alert the Fire Service to avoid cutting them. Marking shall be placed on all interior and exterior DC conduit, raceways, enclosures, and cable assemblies, at intervals of not greater than 10'; at turns and changes of direction; at above and/or below penetrations, and at all DC combiner and junction boxes.

Marking Content and Format

- CAUTION: SOLAR CIRCUIT ENERGIZED DURING DAYLIGHT
- Red background with white lettering
- Minimum 3/8" letter height; all upper-case letters
- Arial or similar font; non-bold
- Reflective, weather resistant material suitable for the environment (durable, adhesive materials may meet this requirement)

3. Disconnect:

Circuits shall be equipped with a means for remote disconnect located downstream from the photovoltaic array at the point where the circuit enters the structure. Control of the remote disconnect shall be located within five feet (5') of the main electrical panel. Signage shall be located immediately adjacent to the remote disconnect control, as follows:

- CAUTION: SOLAR CIRCUIT DISCONNECT
- Red background with white lettering
- Minimum 3/8" letter height; all upper-case letters
- Arial or similar font; non-bold
- Reflective, weather resistant material suitable for the environment (durable, adhesive materials may meet this requirement)

B. ACCESS, PATHWAYS AND SMOKE VENTILATION:

1. Residential Systems – Single and Two-Unit Dwellings:

Plan review and approval is required for a system to be installed on a roof area of a residential structure. Residential fire sprinklers complying with NFPA 13D may be required when more than 75% of the roof is obstructed due to solar photovoltaic installation.

Access/Pathways

- For residential structures with hip roof layouts, modules shall be located in a manner that provides one (1) three-foot (3') wide clear access pathway from the eave to the ridge on each slope where modules are located. The access pathway shall be located at a structurally strong location (such as a bearing wall).
- Modules installed on residential structures with a single ridge shall be located in a manner that provides two (2) three-foot (3') wide access pathways from the eave to the ridge on each roof slope.
- Hips and Valleys: Modules shall be located no closer than one and one-half feet (1.5') to a hip or valley, if located on both sides of the hip or valley. If the modules are to be located on only one side of a hip or valley, the modules may be placed directly adjacent to the hip or valley.
- Flat roofs: There shall be a minimum of three feet (3') wide clear perimeter around the edges of the roof.



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2. Commercial Installations:

Commercial installations include all commercial buildings and residential structures where the number of dwelling units equals three (3) or more units.

Exception: If the City of Corona, Fire Department determines that the roof configuration is similar to residential (i.e. townhomes, condominiums, or single-family attached buildings), the Fire Department may make a determination which permits the application of the residential access and ventilation requirements. Determinations shall be made on a case-by-case basis.

Plan review is required if a system is installed on commercial buildings and/or any multi-family residential structures. Commercial fire sprinklers in compliance with NFPA 13, may be required when more than 75% of the roof is obstructed due to solar photovoltaic installation.

Access/Pathways

a. There shall be a minimum six foot (6') wide clear perimeter around the roof edges.

Exception: If either axis of the building is 250' or less, there shall be a minimum four-foot (4') wide clear perimeter around the roof edges.

b. Ground ladder roof access points shall correspond with roof pathways and shall not be located over an opening (i.e., windows or doors). Ground ladder access points shall be located at strong points in the building construction and not in conflict with overhead obstructions (i.e., tree limbs, wires, or signs).

c. Pathways shall be established in the design of the solar installation. Pathways shall meet the following requirements:

- Shall be located over structural members
- Center line axis pathways shall be provided in both axis of the roof. Center line axis pathways shall run on structural members or over the next closest structural member nearest to the center lines of the roof
- Shall be straight line not less than four feet (4') clear to skylights and/or ventilation hatches
- Shall provide not less than four feet (4') clear path around roof access hatch with at least one clear pathway of not less than four feet (4') to the parapet or roof edge
- Shall not cover center hallways
- Shall be straight line not less than four feet (4') clear to roof standpipes

Ventilation:

a. Arrays shall be no greater than 150' by 150' in distance in either axis

b. Ventilation options between array sections shall be either:

- A pathway eight feet (8') or greater clear width
- A four foot (4') or greater clear width pathway to, **and** four foot (4') border around, existing roof skylights or ventilation hatches
- A four foot (4') or greater clear width pathway to, **and** four foot (4') border around "venting cutouts";
- "venting cutouts" shall measure 4' x 8' and shall be located every twenty feet (20') on alternating sides of the pathway



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C. Location of Direct Current (DC) Conductors:

Exposed 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 use design guidelines that minimize the total amount of conduit on the roof by taking the shortest path from the array to the DC combiner box. The SC combiner boxes are to be located such that the conduit runs are minimized in the pathways between arrays.

To limit the hazard of cutting live conduit in venting operations; DC wiring shall be run in metallic conduit or raceways when located within enclosed spaces in a building and shall be run, to the maximum extent possible, along the bottom of load bearing members. Combiner boxes shall have an approved disconnecting means at each combiner box, a main disconnect at the roof prior to the inverter or at the DC main drop point. A disconnect shall be located prior to the building service electrical connection. All disconnects shall be properly labeled indicating to what the disconnect controls and shall be as approved by the Fire Department.

D. Non-Habitable Structures:

These guidelines may apply to non-habitable structures. Examples of non-habitable structures include, but are not limited to, parking shade structures, solar trellises, etc. This guideline will apply to parking structures.

E. Ground Mounted Photovoltaic Arrays:

Set back requirements do not apply to ground-mounted, free standing photovoltaic arrays. A clear brush area of ten feet (10') is required for ground mounted photovoltaic arrays. All arrays and installations shall have approved security fencing and locking devices.



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Diagram 1: Cross Gable Roof

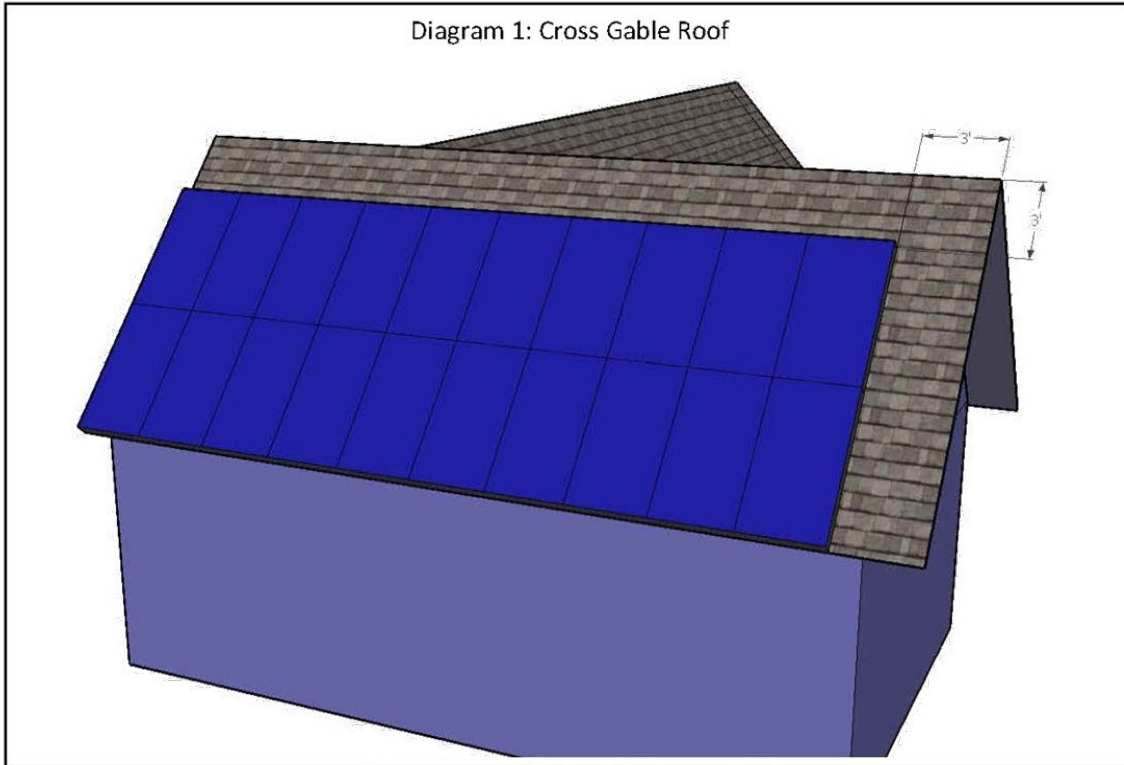


Diagram 2: Cross Gable with Valley

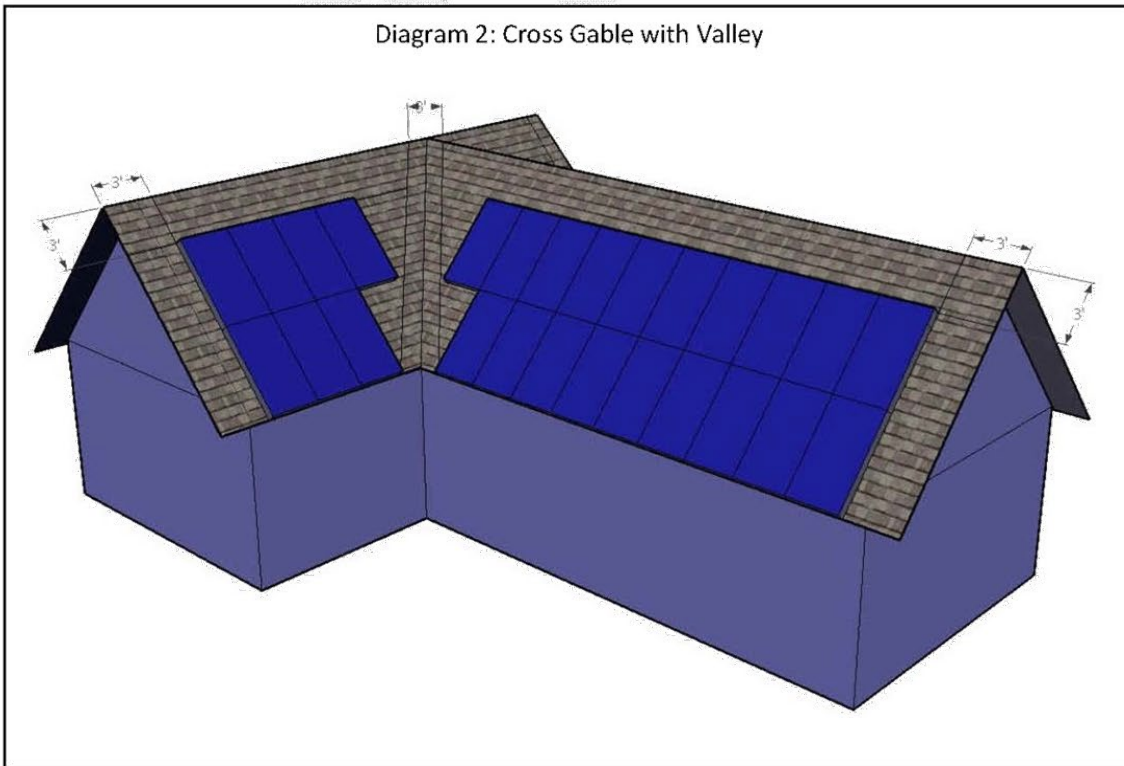


Figure 1 – Residential Applications



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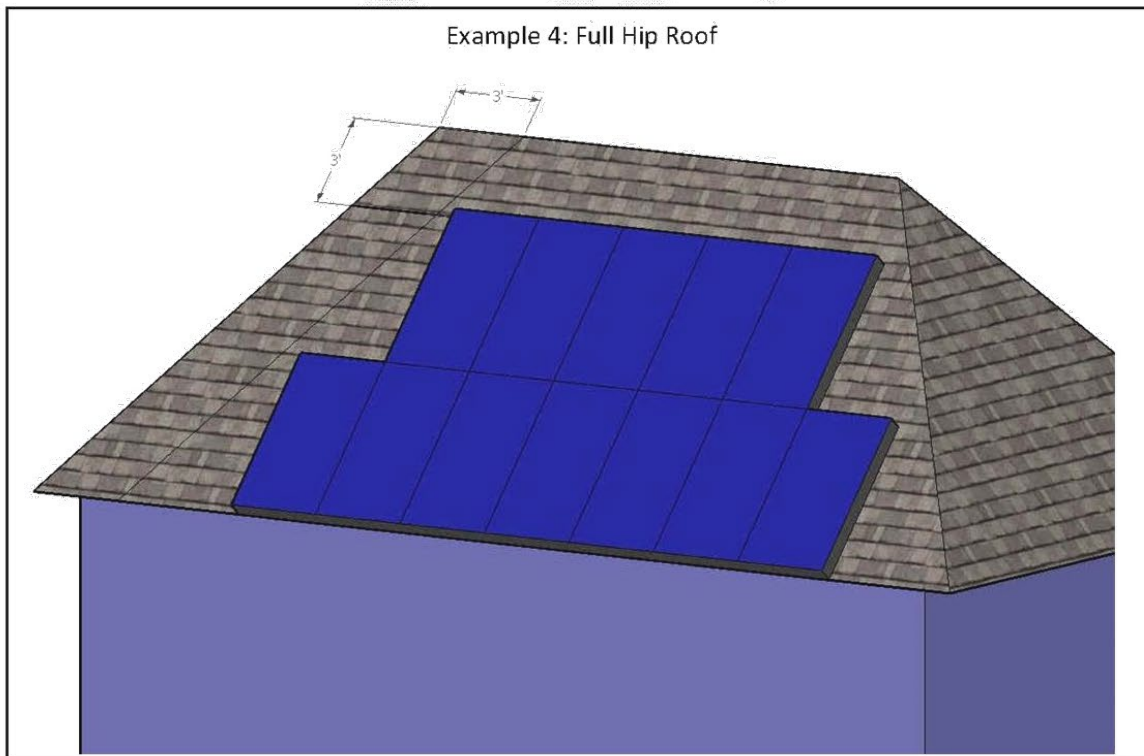
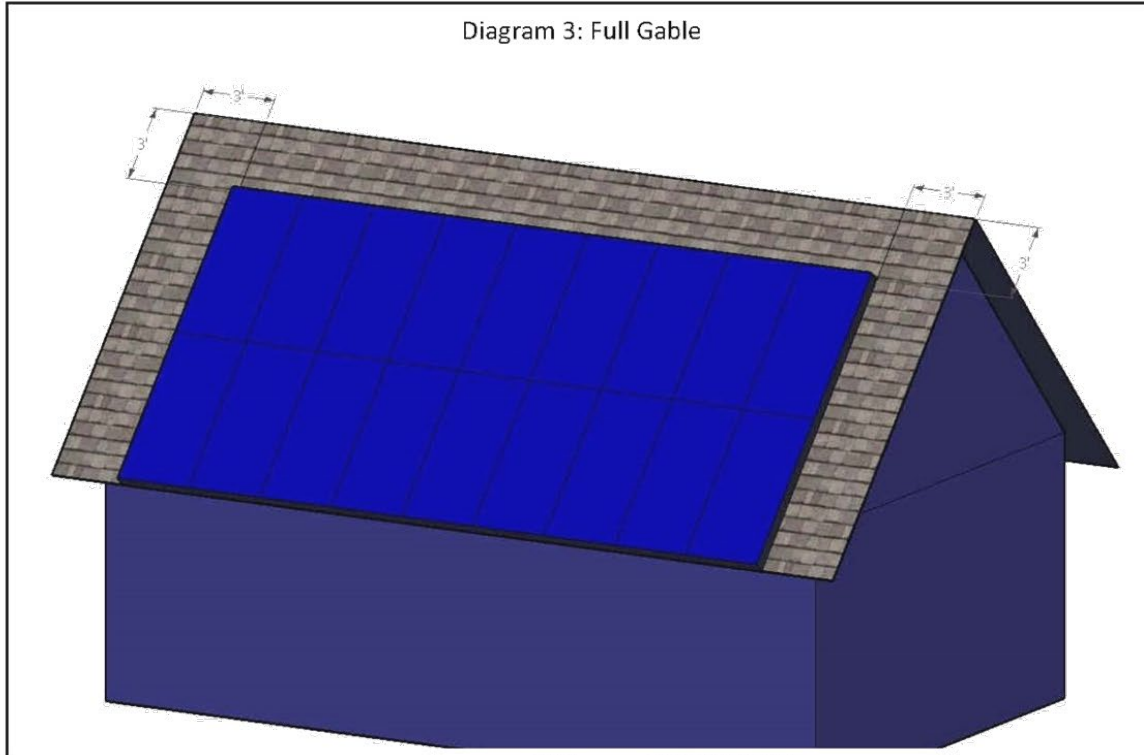


Figure 2 – Residential Applications



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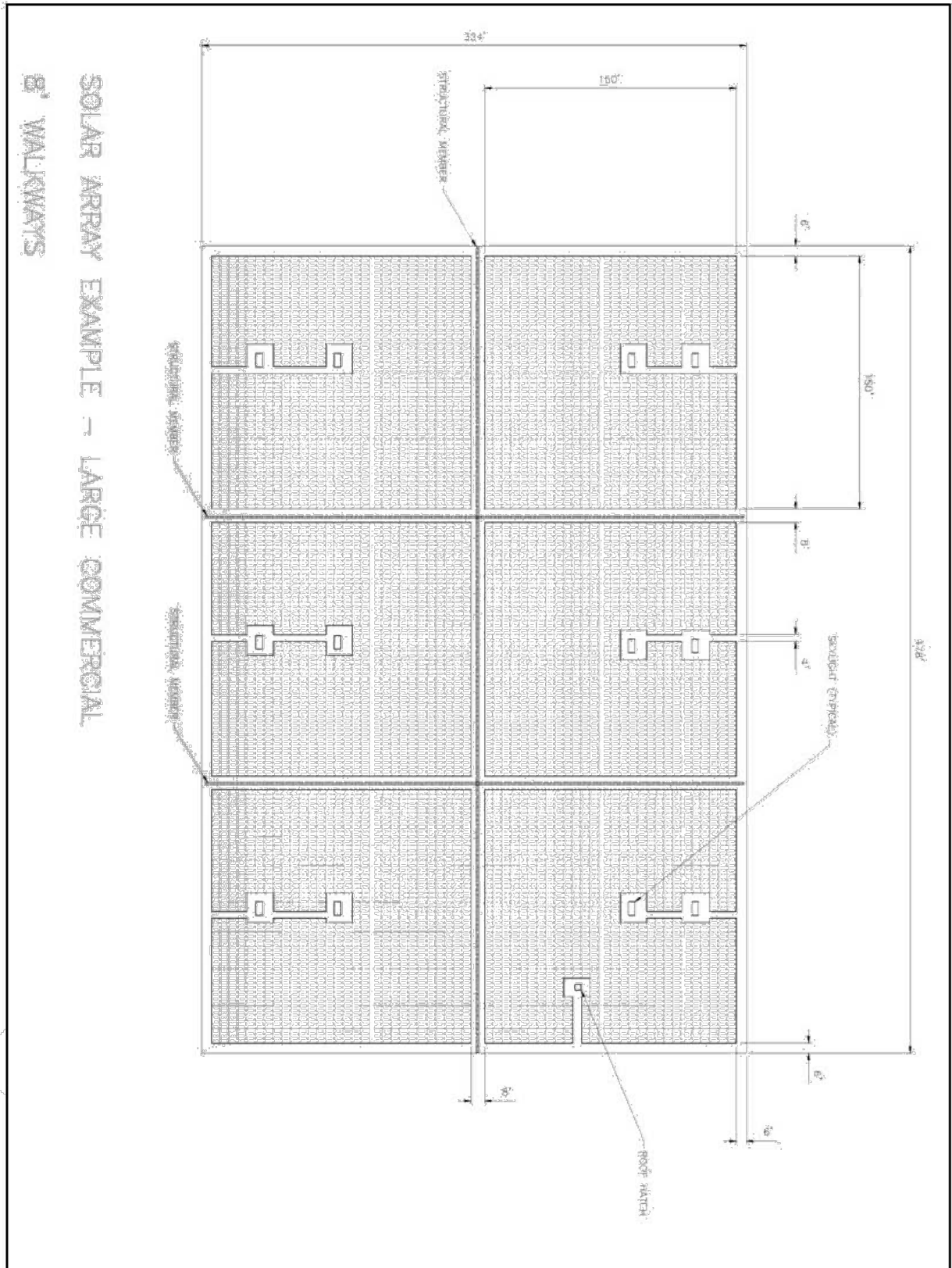


Figure 4 – Commercial Applications



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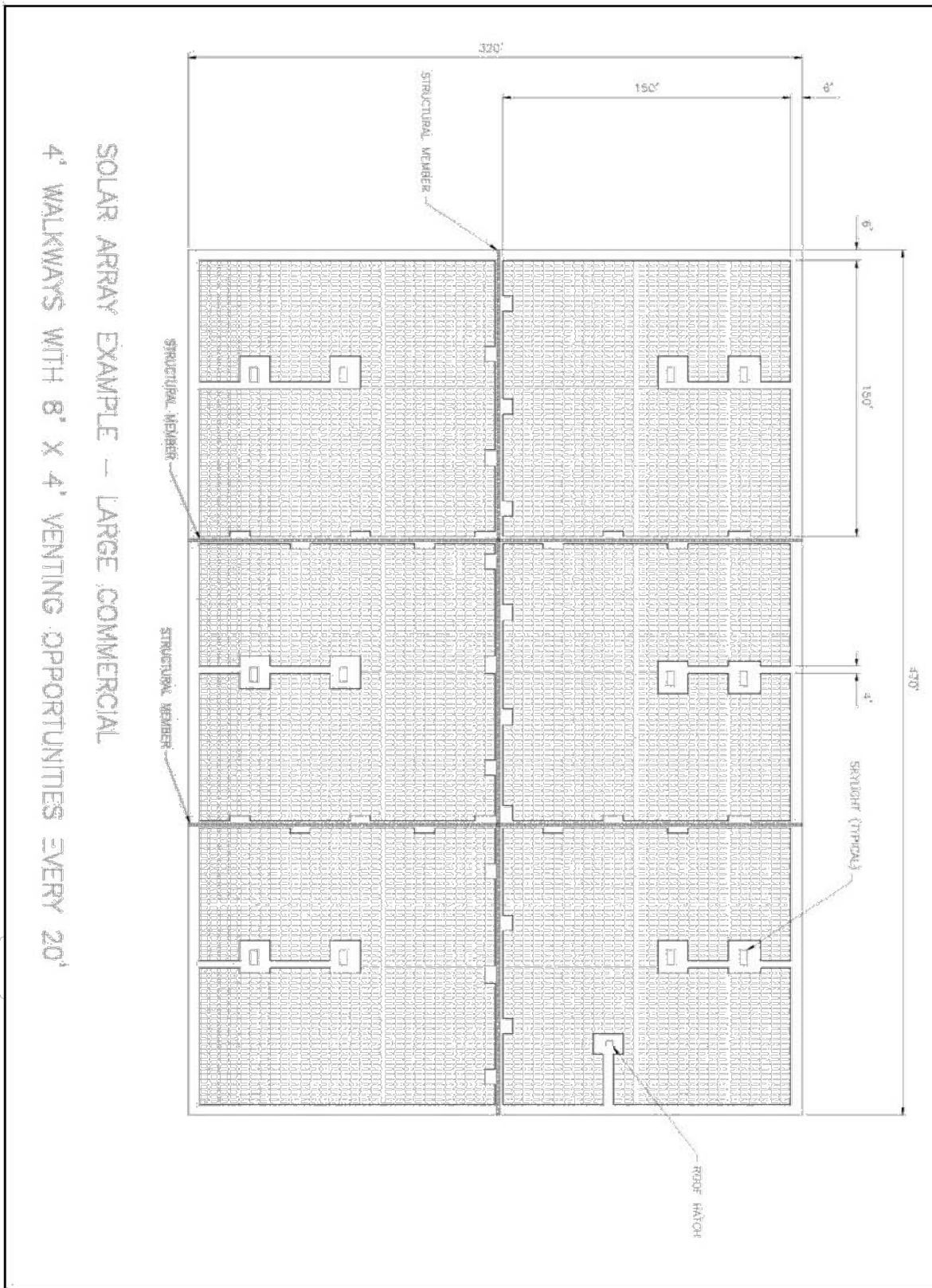


Figure 5 – Commercial Applications



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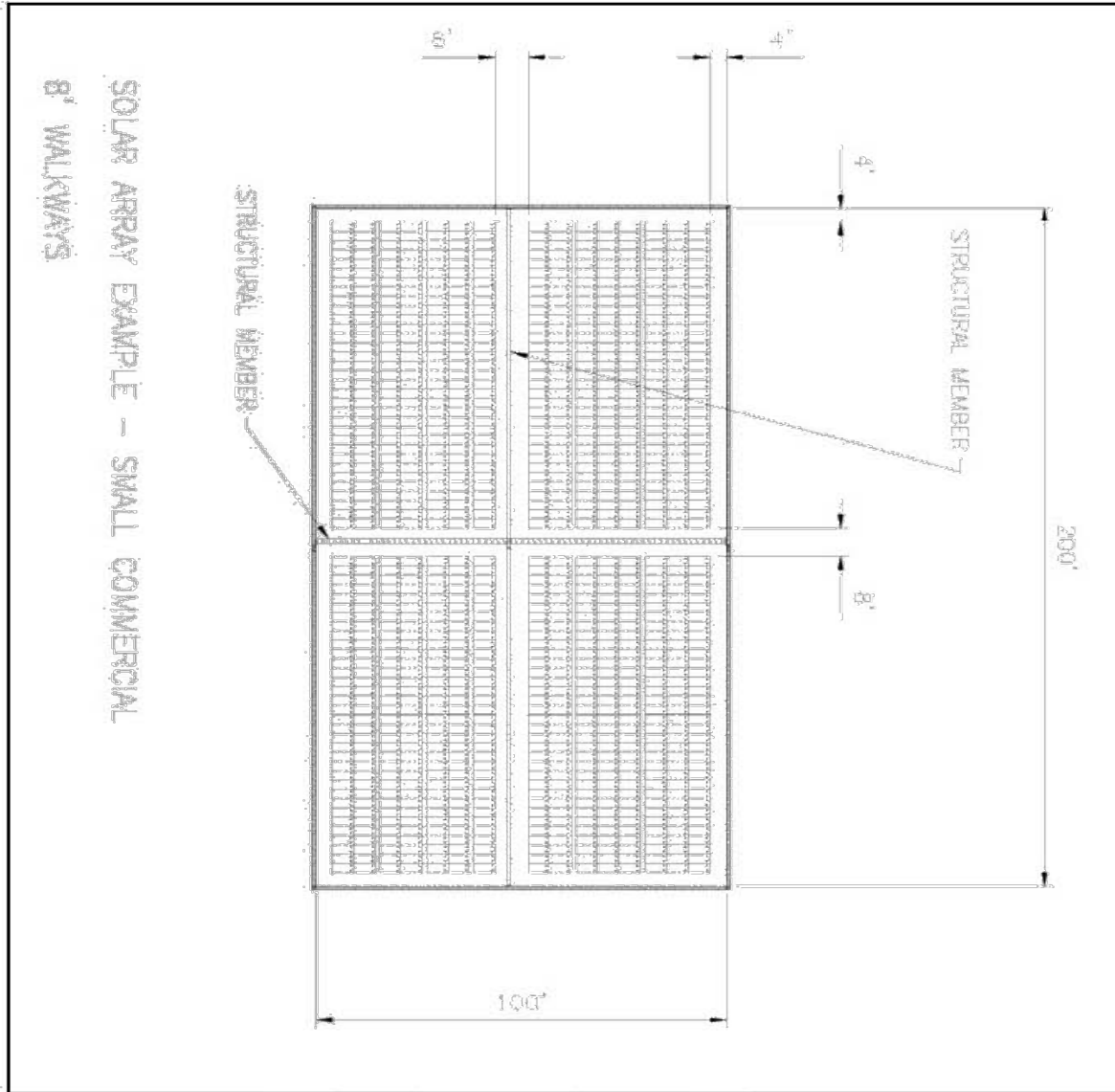


Figure 6 – Commercial Applications