

# *SUMMARY OF CALIFORNIA FIRE MARSHAL SOLAR PHOTOVOLTAIC INSTALLATION GUIDELINE*

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# How the State Guideline Process Started

- Many installation permits began being held up due to concerns over compliance with LA guidelines.
- Solar industry began voicing concerns to CalSEIA and the state fire marshal about delays.
- State Fire Marshal convened first meeting on August 17, 2007—approximately 20 participants—roughly half fire officials and half solar representatives.



# Primary Concerns of Stakeholders in the Process

- Fire Fighters
  - Clear walkways on rooftops
  - Access and area on rooftops for purpose of venting.
  - Methods to protect firefighters from energized conductors
  - Warning signs to notify of dangers.
- Solar Industry
  - Clearly defined process for permitting
  - Building department review of basic compliance
  - Minimize impact of requirements on installation



# Education Process for Both Sides

- Fire Fighters
  - Residential, small commercial, and large commercial all have differing issues and differing needs for access.
  - Very difficult to prevent shock if fire fighters directly contact PV circuits during daylight hours.
  - Disconnects do not necessarily deenergize PV conductors—used primarily for maintenance.
- Solar Industry
  - Why fire departments ventilate buildings
  - Importance of roof access
  - Hazards of fire fighting



# Basic Content of Guidelines

- Mainly contains requirements for signs and conduit labeling, as well as access pathways and roof space for ventilation.
- DC disconnect requirements are conspicuously absent. Rooftop disconnects do not provide the safety that most firefighters think they provide. This misunderstanding is more dangerous than not having the disconnect.
- DC disconnects for fire fighters on large systems are simply dangerous.
- <http://osfm.fire.ca.gov/training/pdf/photovoltaics/solarphotovoltaicguideline.pdf>



# Summary of Fire Marshal Guidelines (3/10/08 DRAFT)

- MARKING
  - Main Service Disconnect

CAUTION: SOLAR ELECTRIC SYSTEM CONNECTED

- dc conduit, raceways, enclosures, cable assemblies, and junction boxes. Every 10', at every turn, above/below penetrations, and all dc combiner and junction boxes.

CAUTION SOLAR CIRCUIT

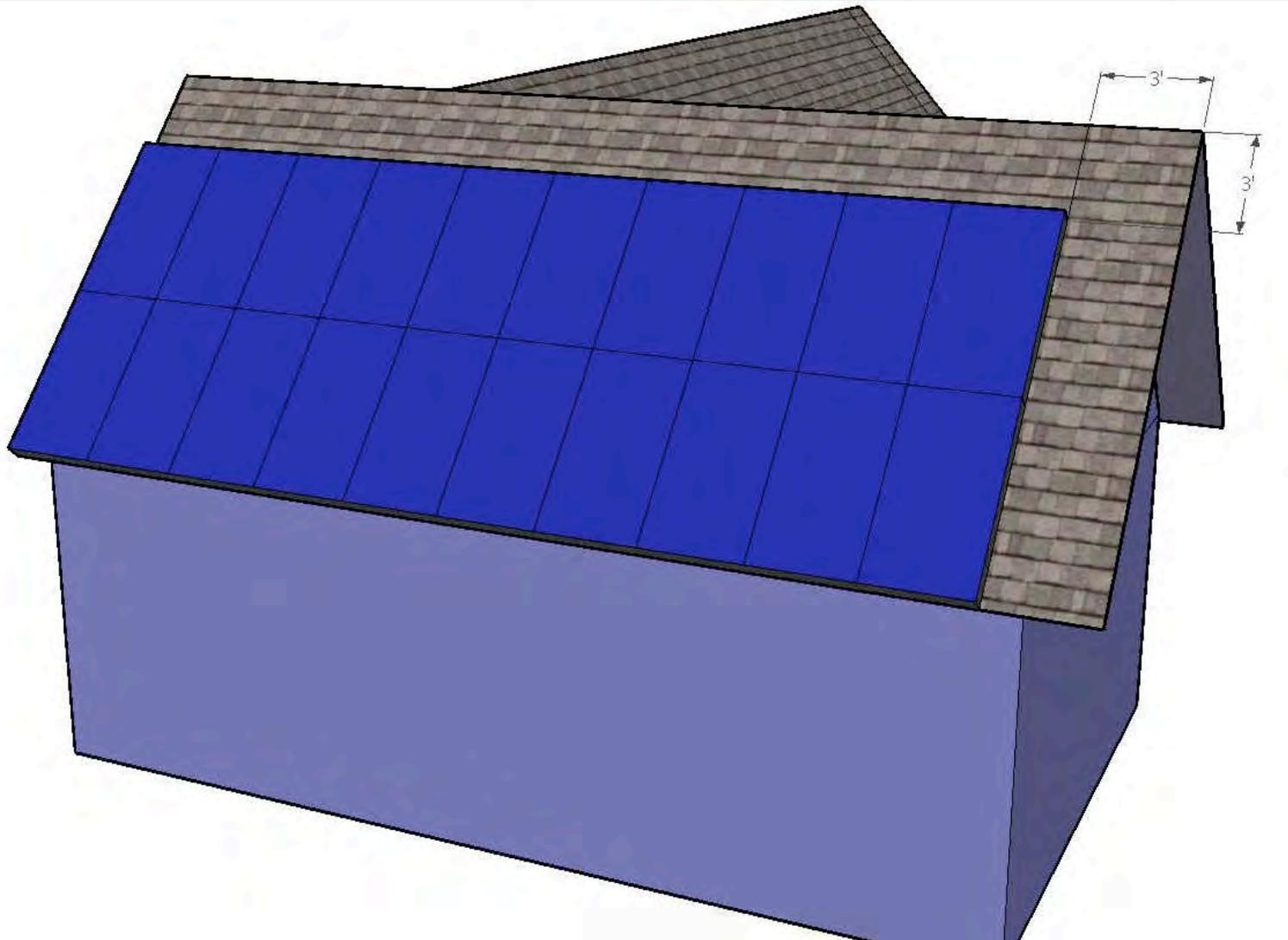


# Summary of Fire Marshal Guidelines—Residential

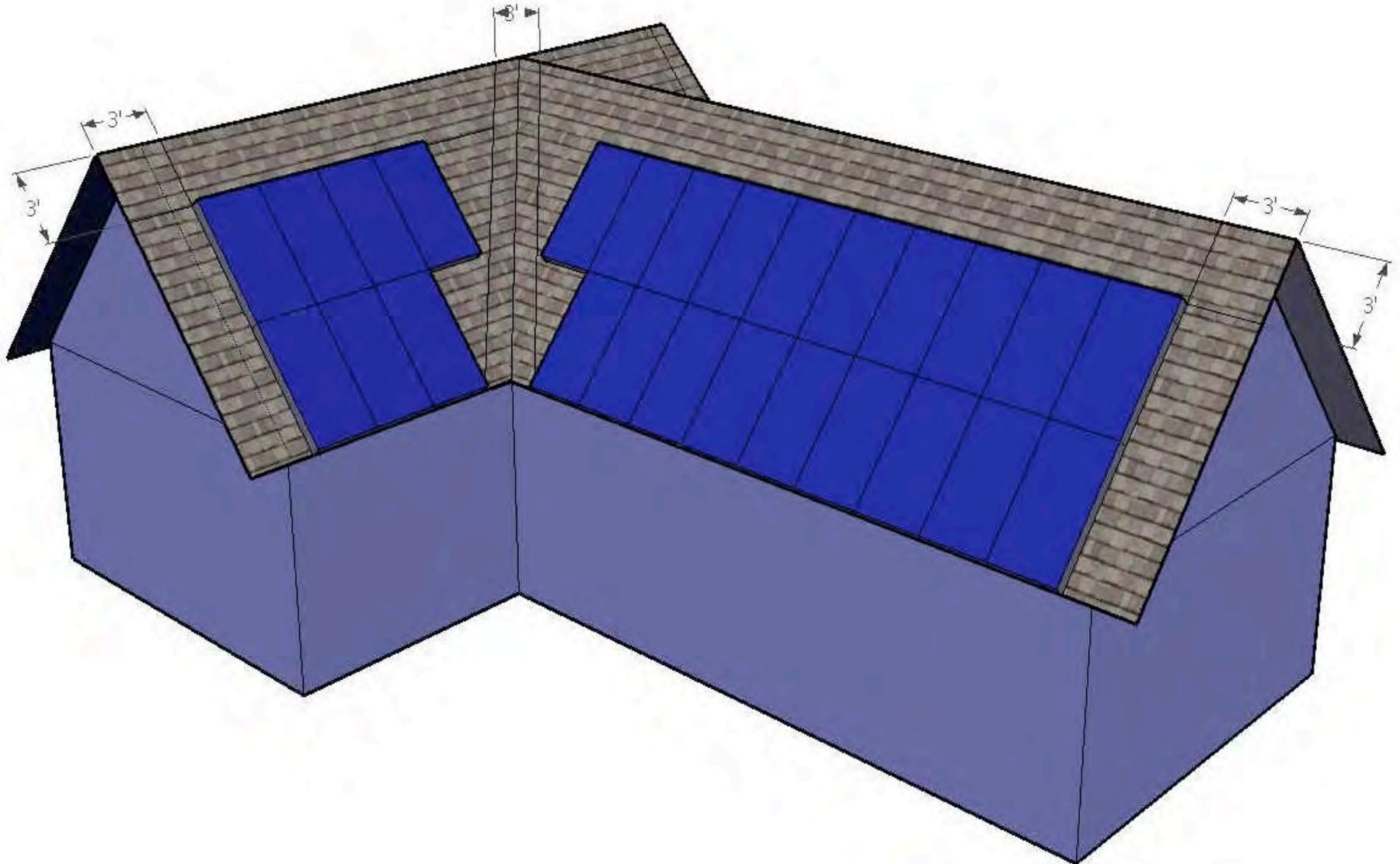
- 3' space along edge of load bearing exterior wall, 3' from ridge and 1.5' on either side of a hip or valley.
- Single ridge need two 3' pathways on array faces.
- No rooftop disconnect requirement.
- Each roof face treated independently.
- PV array and wiring is off limits to fire fighters.



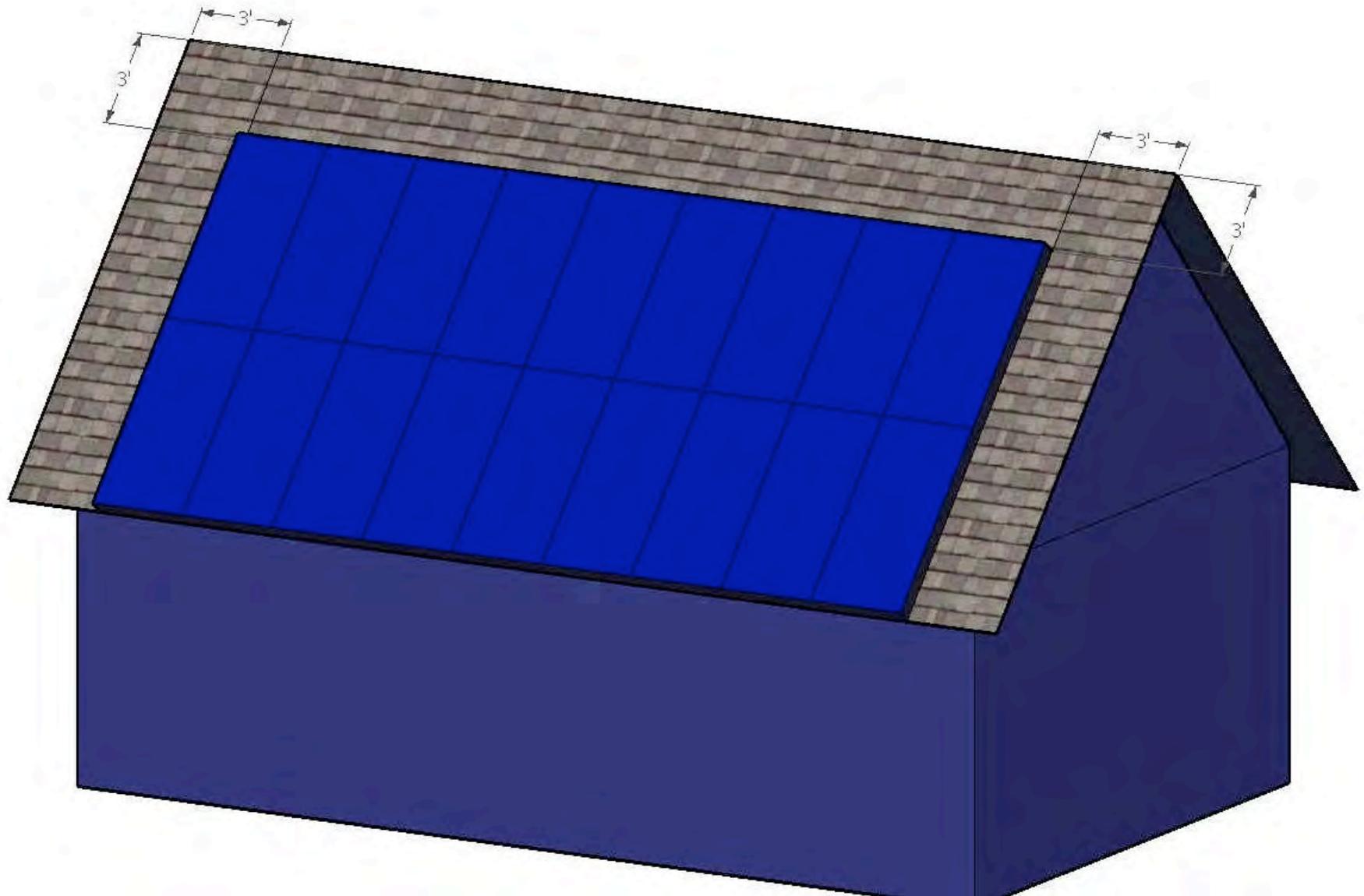
# Cross Gable Roof



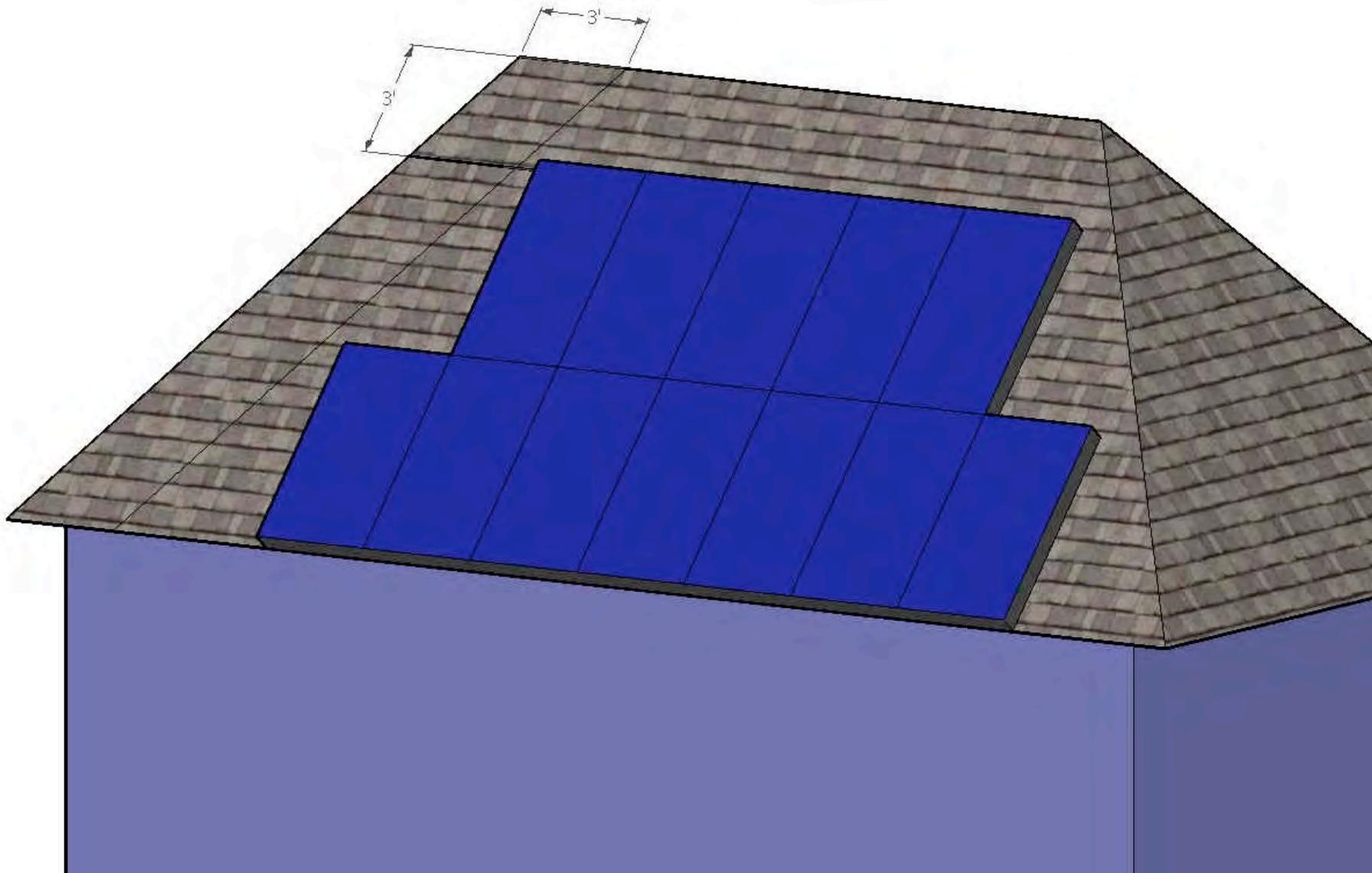
# Cross Gable with Valley



# Full Gable



# Full Hip



# Summary of Fire Marshal Guidelines—Commercial

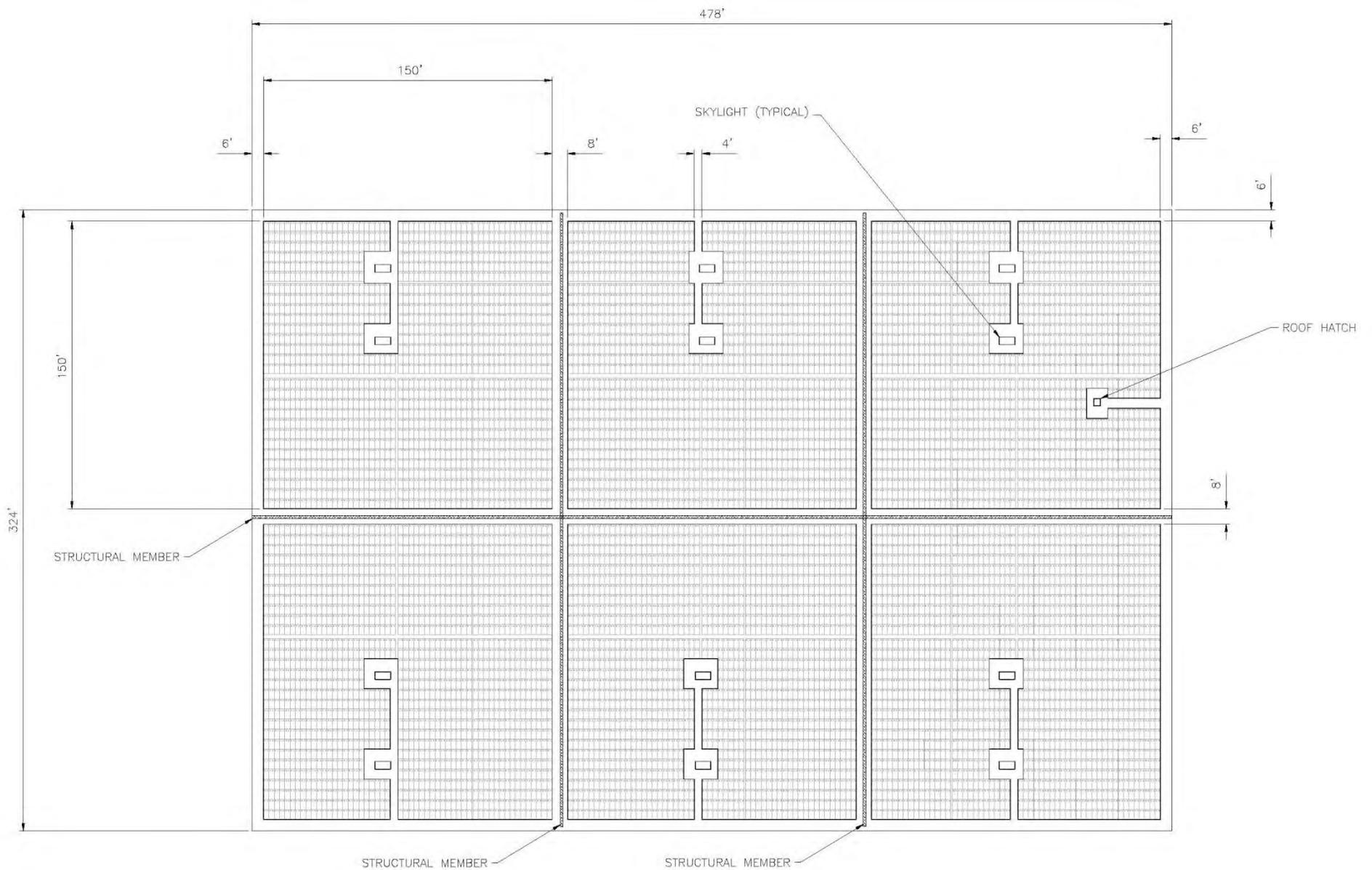
- Commercial flat roof with no roof dimension more than 250 feet—4' space around perimeter wall.
- Commercial flat roof with a roof dimension more than 250 feet—6' space around perimeter wall.
- No rooftop disconnect requirement for fire fighters.



# Summary of Fire Marshal Guidelines—Commercial (cont.)

- Minimum 4' pathway on center access of building in both directions. A 4' access to skylights, roof hatches, and fire standpipes shall be provided to the perimeter wall.
- Commercial rooftop arrays shall be no greater than 150 by 150 feet in distance in either axis.
- Array off limits to fire fighters.

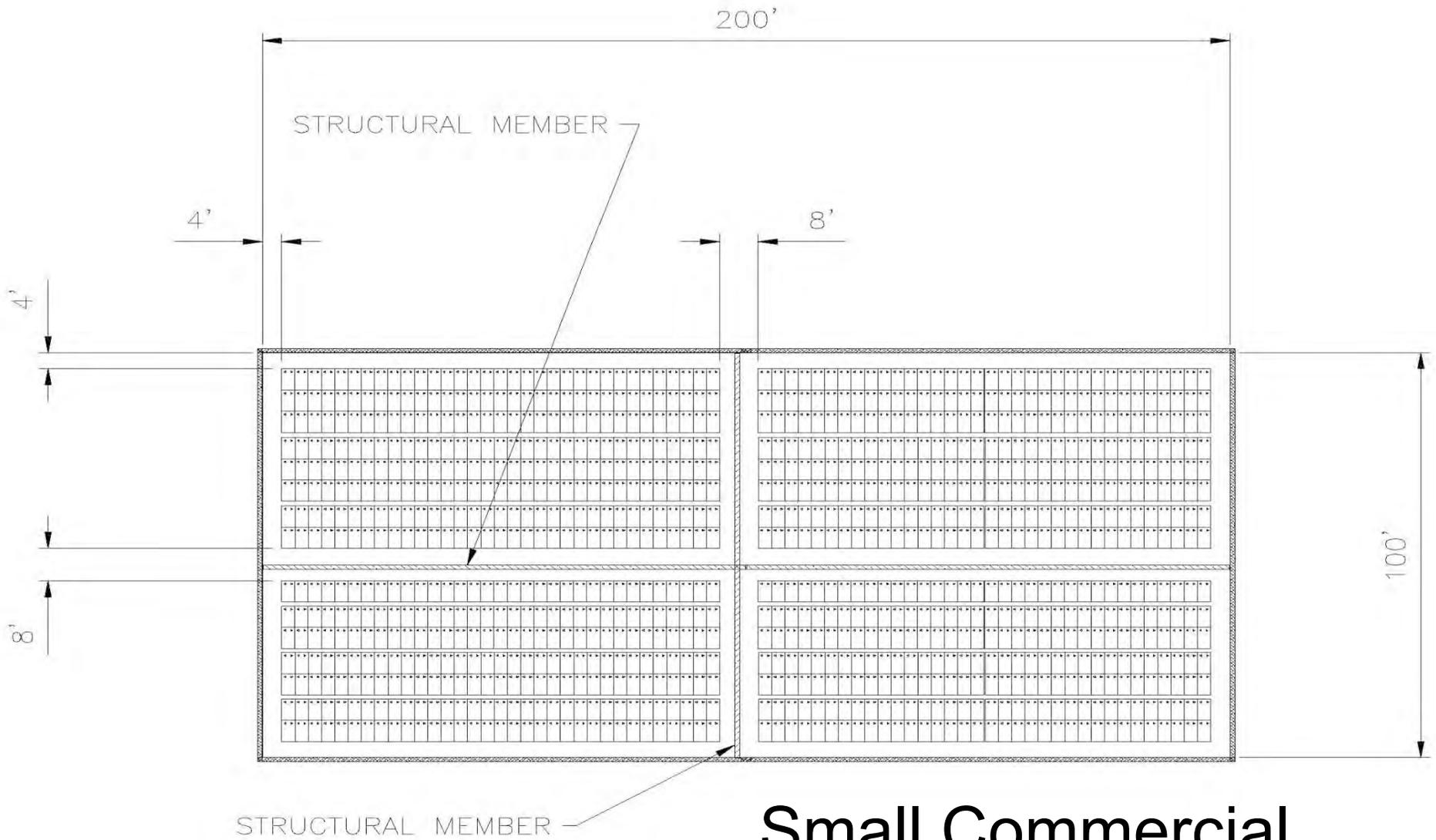




# Large Commercial

SOLAR ARRAY EXAMPLE – LARGE COMMERCIAL

8' WALKWAYS



SOLAR ARRAY EXAMPLE — SMALL COMMERCIAL

8' WALKWAYS

# LOCATION OF DC CONDUCTORS

- To limit the hazard of cutting live conduit in venting operations, DC wiring should be run in metallic conduit or raceways when located within enclosed spaces in a building and should be run, to the maximum extent possible, along the bottom of load-bearing members.
  - Intent is to stay away from common ventilation locations near ridge. Staying under load-bearing members minimizes likelihood of saws cutting wiring system.



# Next Steps with Fire Officials

- Provide basic PV training so they better understand the technology and hazards.
- Assemble group to address illustrative testing to better show level of hazard.
- Develop “white paper” outlining issues, hazards, and test results from illustrative testing, as well as recommendations for implementation of guidelines.



# Should National Guidelines Use California as a Model?

- Fire fighting technique do differ from region to region and department to department.
- LA Fire Department is nationally recognized as a leader in fire fighting practices, so what they agree to is of value to other departments (CA is a case in point).
- The discussions and education that took place over the course of over 5 months of meetings should not be ignored.
- California's guidelines are reasonable for suburban departments that routinely fight fires from rooftops regardless of regional location.

