City of La Puente

Division of Building and Safety

SOLAR AND PHOTOVOLTAIC ARRAYS

INTRODUCTION

The following information is presented as guidelines for Solar and Photovoltaic installations. These guidelines apply to all solar and photovoltaic (PV) installations for Residential and Commercial installations. Areas of concern covered within this document include the electrical requirements of both the 2007 California Building Codes (CBC) and the servicing Utility, the ability of the existing roof structure to support the additional loads of the arrays and the Los Angeles County Fire Department concern for firefighter safety. This guideline applies to "ALL" Solar applications including but not limited to water heating systems, pool heating systems, solar charging systems and other types of arrays with associated equipment. (See water heating and storage tanks for additional information and requirements)

ADMINISTRATIVE

1. Provide 3 sets of plans, minimum size is 18" X 24" designed by an Electrical Engineer, Architect, or by the respective California Licensed Contractor installing the system.

2. Plans to include all manufacturers' specification sheets, installation instructions, and U.L. listings.

3. All sheets of the final plans, specifications, calculations and reports prepared by a civil, structural or architect shall bear the signature and stamp of the professional engineer or architect and the expiration date of the registration and plans prepared by a California Licensed Contractor shall bear the contractor's signature.

4. The following clearances or approvals are required before a building permit can be issued:
   a. City of La Puente Planning Department.
   b. A completed Southern California Electric (SCE) service planning work order
   c. Verification of a submittal of the interconnect application to Southern California Electric (SCE) This may be noted on the Service planning order.
   d. Los Angeles County Fire Department review and approval
5. Provide a statement on the title sheet of the plans that this project shall comply with the 2007 CBC, and 2007 CEC.

SITE PLAN

1. Provide fully dimensioned site plan drawn to scale. Show lot size, street, alley, easements, parking spaces, division walls, all projections, location, size and use of all structures on the lot and property line walls. Identify property lines, lot dimensions, distances from building to property lines and property line to street centerlines.

2. Show the size and location of the service meter.

3. Show the required working clearances around the Service meter main, AC Disconnect, Inverters, and DC disconnects.

4. Show the required access, pathways, and smoke ventilation clearances around the arrays.

ROOF INFORMATION (ROOFTOP SYSTEMS)

Show the following information on the plans:

a. If the conductors are run through the roof and into the building, show method of conductor protection and note that the conduit is to kept 18" below the roof surface
b. Weight of the arrays (pounds per square foot- including mounting hardware)
c. If the array weight is less than 6 pounds per sq. ft., including the mounting hardware then engineering calculations are un-necessary for roof loading
d. If array weight is 6 pounds per sq. ft. or greater, describe and show the roof structural elements, including:
    - Rafter size
    - Rafter span
    - Rafter spacing
    - Roof sheathing
e. Provide additional structural calculations and/or engineer's verification of load capacity of the roof structure.
f. Identify roofing type (e.g. comp shingle, shake, light weight tile, etc.)
g. Provide details of PV panel mounting hardware attachment to the roof framing members.
h. Identify and show method of sealing the roof penetrations. (e.g. flashing, urethane caulking, etc.)

RESIDENTIAL ACCESS

- *Single ridge roof system*. Provide two (2) three-foot wide accesses from the eave to the ridge where panels are located.
- *Hip roof system*. Provide one (1) three-foot wide access pathways from the eave to the ridge where panels are located.
- *Hip and Valley roof systems*. Modules shall not be located closer than 1-1/2 feet to a hip or valley if panels are located on both sides of the hip or valley.
- Modules shall be located no higher than three (3) feet below the ridge.

COMMERCIAL ACCESS

Provide a minimum six (6) foot wide clear perimeter around the edges of the roof.

**Exception: If either axis of the building is 250 feet or less, the perimeter may be reduced to four (4) feet.

1) Center line axis pathways shall be provided in both axes of the roof.
2) Provide a four (4) foot clear path to skylights and/or ventilation hatches.
3) Provide a four (4) foot straight line clear path to the roof fire protection standpipe outlets.
4) Provide four (4) foot clear width around roof hatch with at least one pathway not less than four (4) feet clear width to parapet or roof edge.

Note on the site plan:

" The discharge of pollutants to any storm drainage system is prohibited. No solid waste, petroleum byproducts, soil particulate, construction waste materials, or wastewater generated on construction sites or by construction activities shall be placed, conveyed or discharged into the street, gutter or storm drain system."

SUPPLIED DIAGRAMS

Provide a minimum of a single-line diagram with the permit application package showing:

1) Array configuration and Array wiring identified
2) Combiner/junction box identified
3) Conduit and size from junction box to PV power source disconnect identified
4) Equipment and System grounding specified
5) Disconnect specified
6) Conduit and size from disconnect to inverter identified
7) Inverter specified
8) Conduit and size from inverter to AC disconnect to panel identified
9) Point of connection attachment method identified

PV MODULE INFORMATION

Show the following on the plans:

1) Provide a cut sheet for PV Modules
2) Provide the approval listing for utility interactivity
3) Show the open-circuit voltage (Voc) from the listing
4) Show the maximum permissible system voltage from the listing.
5) Show the Short-circuit current(Isc) from the listing
6) Show the maximum series fuse rating from the listing
7) Show the Maximum Power @ standard test conditions (Pmax)
8) Show voltage at Pmax
9) Show current at Pmax

ARRAY INFORMATION

Show the following on the plans:

1) Number of modules in series.
2) Number of parallel source circuits
3) Total number of modules
4) Operating voltage (number of modules in series X module voltage @ Pmax.)
5) Operating current. (number of parallel source circuits X module current @ Pmax)
6) Maximum system voltage (CEC690.7)
7) Short-circuit current (CEC690.8)
8) Roof mounted arrays for residential dwellings must have Ground Fault Protection (GFPD) (CEC690.5)

INVERTER INFORMATION

Show the following information on the plans:

1) Provide a cut sheets for inverter(s)
2) Show on plans, the inverter model number
3) Provide the approval listing for utility interactivity
4) Show maximum continuous output power @ 25°C
5) Show input voltage range of inverter
6) Provide and show the grounding electrode conductor and associated ground rod or ufer (NOTE*ufer for new construction only by approval)attachment
7) Provide and show a minimum of a #6 grounding conductor
8) Provide and show grounding conductor protection
9) Provide and show ground fault protection of inverter

WIRING AND OVERCURRENT PROTECTION

Show the following on the plans:

a. Wire type is 90°C wet rated
b. Conductor ampacity is sufficient:

(Ampacity, maximum amount of current a cable can carry before sustaining immediate or pregressive deterioration-Also described as current rating or current-carrying capacity.)

- *PV source circuit current*
- *PV source circuit ampacity*
- *PV output circuit ampacity*
- *Inverter output circuit ampacity*

c. Over-current protection on inverter output circuit is sufficient

d. Point of connection meets provisions of CEC690.64

- *Point of connection panel busbar rating*

e. Source circuit over-current protection is sufficient

- *If inverter is not listed for NO backup current, does each source have over-current protection in compliance with the listed maximum series fuse?*
- *If inverter is listed for no backup current, over-current protection is not necessary if only two parallel strings are connected to the inverter.*

DISCONNECT

Note on the plans, SCE requires the installation of a visible open, lockable disconnect

GROUND MOUNTED STRUCTURE

1. Weight of array (pounds per square foot- including mounting hardware)

2. Provide details of the array supports, framing members, and foundation posts and footings.

3. Provide details of the structural mounting. Structures above 6 feet high may require engineering calculations.

4. Provide details on the module attachment method to mounting structure.

SYSTEM LABLES AND WARNINGS

Show on the plans the required plaques to be installed on the Main Service Meter Panel and the AC disconnect

Plaques shall be metal or plastic, with engraved or machine printed letters, or electro-photo plating, in a RED background with WHITE lettering, a minimum of 3/8" letter height, and all capital letters.

Plaque shall be attached to the service equipment with pop-rivets, screws, or approved adhesive.

To be installed on the face of the service meter panel

CAUTION
POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECT LOCATED AS SHOWN

CAUTION
SOLAR ELECTRIC SYSTEM CONNECTED

Show on the plans the required plaques to be installed on the AC Disconnect:

To be installed on the face of the AC disconnect

CAUTION
SOLAR CIRCUIT DISCONNECT FOR UTILITY OPERATION

If a switch or circuit breaker has all the terminals energized when in the open position, a label should be placed near it indicating

WARNING
ELECTRIC SHOCK HAZARD – DO NOT TOUCH TERMINALS
TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

Show on the plans the required markings to be installed on the DC Circuits:

a) Material used for marking shall be weather resistant. UL 969 shall be used as a standard for weather rating.
b) Marking is required on all interior and exterior DC conduit, raceways, enclosures, cable assemblies, and junction boxes. Markings shall be placed every 10 feet, at turns, and above and/or below penetrations, and at all DC combiner and junction boxes.

CAUTION
SOLAR CIRCUIT