Building Division	PHOTOVOLTAIC SUBMITTAL CHECKLIST City of Palo Alto Building Inspection Division 285 Hamilton Ave. Inspection Request: 650 329-2496	Revision Date: 05/23/13 General Requirements/Checklist for: **COMMERCIAL** Codes Enforced: 2010 CEC/2008 NEC Palo Alto Municipal Code (PAMC)

APPLICATION

- **Submittal checklist requirements for commercial photovoltaic permits.**

PROJECT ADDRESS_____

COMPANY_____

- Photovoltaic applications are a separate submittal/permit.
- Photovoltaic permit applications shall be submitted to the building department.

- **Complete submittals will be reviewed within 10 working days.**
- **Incomplete submittals will be reviewed once all the documentation has been submitted.**
- **Additional review time may be required for battery backup systems and when new technology is part of the design.**

At resubmittal, all revisions shall be clouded on the plans and indicate date and revision number in the title block.

*Field installation shall be per code/plan. Changes shall be submitted to the city for approval prior to inspection.

***If a new roofing system is going to be installed, a separate roofing permit and inspections are required. See checklist for specific roof being installed.**

Follow the SFM guidelines for signage and clearances. PAFD must be contacted if the requirements of the guidelines can not be met. Contact Scott Woodfin at 650-329-2324 or at scott.woodfin@cityofpaloalto.org.

☐ Show the required clearances on the site plan.

The CA State Fire Marshall PV guidelines are located at:
www.osfm.fire.ca.gov/pdf/reports/solarphotovoltaicguideline.pdf

To view the CPA's amendments to these guidelines please go to the following link.
www.cityofpaloalto.org/civica/filebank/blobdload.asp?blobid=13907

Please verify by checking the box that each item has been verified and reference a sheet number to the items below.

☐ Provide a 8 x 11 legible photo of the electrical equipment showing the entire enclosure (include sub panel when used to backfeed) with the dead front removed._____

☐ A **completed** utility photovoltaic electric load sheet must accompany the submittal. The load sheet can be found at www.cityofpaloalto.org/civicax/filebank/documents/8070/

☐ Plan size shall be 18" x 24" minimum and a maximum of 30" x 42". Font size shall be a minimum of #10 for viewing and micro filming. Provide 3 sets. Note: all information must be suitable / legible for micro filming.

☐ Provide a cd/pdf copy of the plans, installation instructions and electrical calculations.

☐ Positively grounded systems must be clearly identified on the plans. Specify color coding requirements for positive conductors on the plans. _____

☐ Provide the available short circuit current on electrical equipment for all supply side taps. This information is available from CPA electrical utilities @ (650) 566-4551 for Mike Mintz or (650) 566-4516 for Gopal Jagannath. _____

☐ Provide complete manufacturer's installation instructions for all equipment (i.e. inverters, modules, combiner boxes, racking systems (including tilt up systems), flashing (e.g. Quick Mount) junction/transition boxes, disconnects, transformers, etc..,) provide 1 copy. (Provide cad drawings for disconnects) all **documents shall be distinct and separate to allow for ready review.** _____

☐ **Standing seam metal roofs:**

-Provide location and detail of metal panel grounding method. Provide this on the plans.
-When penetrating metal roofs, provide detail, on the plans, from the metal roof manufacturer.
-If using S-5 clamps, provide metal roof fastener spacing from metal roof manufacturer. Module/array attachments must be the same spacing as the standing seam panel attachment.

☐ **Tilt up systems:** Provide structural calculations based on wind speeds of 85 mph to justify additional loads. Provide attachment details, connection details (top, bottom and any cross bracing connections), specifications for all racking equipment and location of attachments. Include the thickness, size, diameter and material of all hardware.

☐ **Micro Inverters:**

-Include the following documents provided by manufacturer; module and racking compatibility lists, circuit calculations.
-Install a separate ac disconnect on the roof adjacent to the array. (Option: a 60 amp unfused, pull-out air conditioning disconnect) _____

☐ Equipment shall be identified and listed for the application. **CEC *690.4(D)***

☐ Site and roof plans shall clearly show the location of the electrical service, pv array, modules, (each string shall be identified), combiner box, inverter, a/c & d/c disconnects, conduit, junction boxes and battery banks. On the site plan, clearly identify attachment points and spacing between the attachment points._____

☐ Roof plan shall include the location of existing equipment. _____

- ☐ Submit roof calculations for array mounting posts. Calculations shall be prepared by a licensed structural engineer. _____
- ☐ Provide a detail for the attachment of the pv array supports to the roof framing. Include method of weather proofing and water proofing. Detail shall include flashing and counter flashing. _____
- ☐ Plans shall include electrical room layout and location. Include all existing equipment and show required clearances per CEC 110.26 and per the equipment manufacturer. _____
- ☐ All equipment on the roof requiring servicing shall meet the required clearances of **CEC 110.26**. Plans shall show the required clearances. _____
- ☐ Provide three copies of a three line diagram showing all system components, wire sizes, conductor insulation type, method of protection (e.g. EMT) wire distances between each piece of equipment, grounding electrode system, equipment ground (and size) and disconnects. Clearly indicate (in writing along with the diagram) the number of modules per string, strings per array and number of modules total. _____
- ☐ Identify AC and DC PV wiring locations on site plan. _____
- ☐ Submit complete calculations for maximum system voltage (module coefficients must used when provided by module manufacturer), system string current, wire sizing, fuse/circuit breaker sizing, conduit fill, voltage drop, ambient temperature and terminal temperature. Calculations shall show all integers not just the end result.
- ☐ Where dc conductors are installed underground, conductors shall be buried 18" or more below grade and a warning tape installed 12" above the conduit. **CEC 300.5 (d) (1)** _____
- ☐ Plans shall identify listed means of bonding for photovoltaic modules. (The method of grounding shall reflect the method of grounding specified by the module manufacturer.)_____
- ☐ Palo Alto utilities requires an ac disconnect (only one) to be located within sight and within 10 feet from the main electrical service. The ac disconnect shall be readily accessible, visible-blade, and lockable. _____
- ☐ The City of Palo Alto requires separate ac and dc disconnects located adjacent to the inverter.
- ☐ Equipment shall be identified and listed for the application. *CEC 690.4(D)*
- ☐ Show location, type and number of batteries to be used. Show all ventilation requirements. Show how batteries are secured to prevent movement. _____
- ☐ Show setback distances to the proposed equipment.
- ☐ Provide battery enclosure attachment details on the plans and structural calculations for unit weighing over #400. (Including battery weight.)
- ☐ Do not install batteries in living areas or at electrical equipment/enclosures ***(CEC 110.26)***
- ☐ Provide a disconnect at the batteries where located in a separate room or more than 5' away from the inverter. _____

☐ Live parts of the batteries shall be guarded. Specify method of protection. ***(CEC 690.71 (B)(2)*** _____

☐ Conductors between the inverter and battery enclosure are required to be installed in conduit.

☐ Generators: 1) Provide disconnect at the generator and another disconnect at the inverter. 2) Provide disconnect with in sight/within 10' of generator ***(CEC 240.21).*** These conductors shall be rated 115% of the generator nameplate current rating (CEC 445.12). 3) Install automatic transfer switch. Switch shall be rated and listed for the use. ***(CEC 702.6)***

☐ Show size and location of all overcurrent protection devices. _____

☐ Provide an ac/dc grounding electrode system per ***CEC 690.47 (C)***. Where an existing grounding electrode system is a driven ground rod, an additional ground rod shall be driven to comply with ***CEC 250.56***. Grounding electrode system must be illustrated on the plans. _____

☐ Plans shall specify type, size and location of existing ac grounding electrode. _____

☐ Where the grounding electrode system is a ufer, each electrical service must attach separately to the ufer with a continuous grounding electrode conductor. Attachments to a ufer require a listed rebar clamp is required. _____

☐ Wire diagram shall show bonding from the pv grounding electrode system to the existing ac grounding electrode. Specify grounding electrode conductor size to comply with CEC 690.47. _____

☐ Plans shall include a torque schedule for all the equipment connections. The schedule shall include the following: inverter mounting hardware, inverter connections, disconnects, combiner boxes, breakers, and module clips, racking system, lug and panel hardware. The torque specifications shall be in inch/lbs or ft./lbs per the manufacturer's listing. Include connector torque specifications for devices such as Burndy, Polaris and all crimping devices. _____

I am the project pv designer/engineer and have read and verified that all information has been provided for review as specified above.

Name_____Date_____
Address_____
Designer cell phone #_____
Designer e-mail_____
Designer signature_____